229_Management of Storm Water using Bioretention Filter Technique

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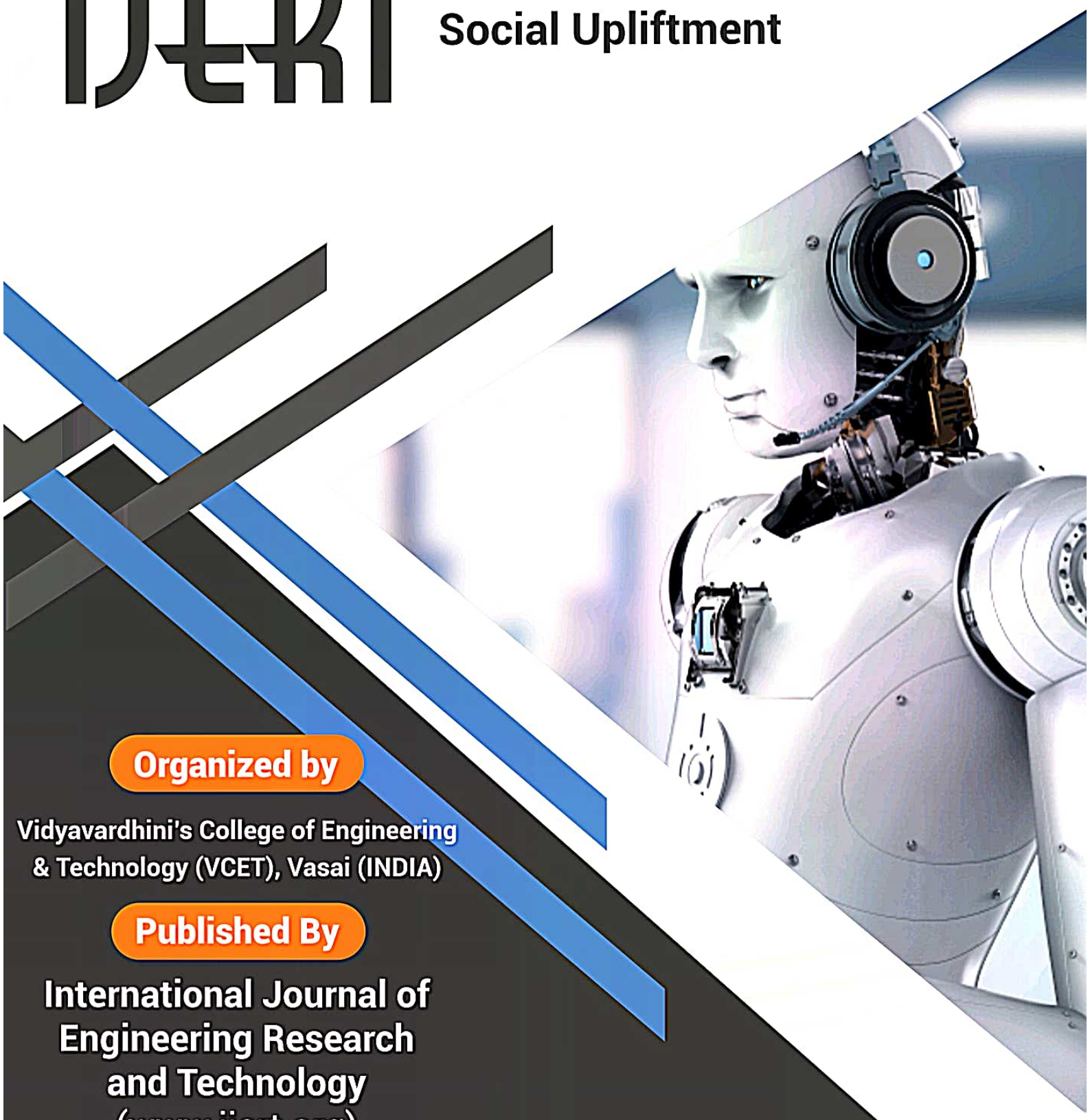

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Management of Storm Water using Bioretention Filter Technique

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Abstract- **The ongoing development in various sectors of urban areas in recent times has let to several issues which has affected the sustainability of urban drainage systems. The decrease of pervious surface areas in urban regions hampers hydrology and water quality. Typical impacts to downstream hydrologic cycle include increased peak flows and runoff volumes, shorter lag times and reduced infiltration and base flow. Urban runoff leads to increase in the conveyance of pollutants and nutrients and thus degrading water bodies downstream from urban regions. Bioretention is one of the most used methods to lessen these impacts despite its large spread use, research on bioretention systems remains active, particularly in terms of mix design and nitrogen treatment. Recent research focusing on bioretention is reviewed herein. The use of mesocosms provides the ability to isolate particular treatment processes and replaced variability. Computational models have been adapted and applied to simulate bioretention, providing potential improvements to their maintenance, operations and design. Maintenance practices are important for sustained operation and have also been tested.**

Predicting maintenance is necessary for assessing lifecycle value. Due to these research recommendation are made for the future work and various gaps are explored.

NTRODUCTION:-

A bioretention cell is a type of under drained soil filter that collects, filters, and treats moderate amounts of stormwater runoff using conditioned planting soil beds, gravel under drained beds, and vegetation. The filter basin captures and retains runoff and passes it through a soil filter media that contains a mixture of silty sand and organic matter to remove a wide range of pollutants, including suspended solids, phosphorus, nitrogen, metals, hydrocarbons, and some dissolved pollutants. Once through the soil media, the runoff is collected in a perforated underdrain pipe system and discharged downstream. Bioretention basins are usually located in close proximity to the origin of the stormwater runoff and should be scattered throughout a residential area or along the downhill edge of smaller parking areas with a maximum drainage area to each individual filter.

LITERATURE REVIEW

General

Design guidance from the CSUS Office of Water Programs was selected for this project. The CSUS Office of Water Programs design guidance was selected because it provides details on the individual design components of the bioretention BMP for storm water treatment. The CSUS Office of Water Programs design guidance was partially adapted from Center for Watershed Protection (CWP).

Robert Kluge. Storm Drain Filtration System. March 2007.[1]

Bioretention is best applied when contributing slopes are between 1.5 to 4.5%. The proposed treatment area will be located in a natural depression to minimize the excavation. The surface of the filter bed should be flat so that allow flow to spread out and not concentrate in one area of the practice. However, for linear bioretention practices, such as those along roadways, the longitudinal slope has to be considered. A stepped multi-cell design can be used when a flat surface cannot be maintained along the length of a linear bioretention. Available Space: Designers should reserve open areas of about 15 to 25% of the size of the contributing drainage area. These are areas that would be typically set aside for landscaping. More space is required for designs with soft and shallow side slopes than those with hard, vertical edges.

David Alderete and Misty Scharff. The Design of a Bioretention Area to treat Highway Runoff and Control Sediment. February 2005.[2]

Pretreatment prevents premature clogging of bioretention facilities by capturing coarse sediment particles before they reach filter bed. In some cases, where drainage areas produce little sediment, such as rooftops, bioretention can function effectively without retreatment. A two- cell design that incorporates a forebay is recommended for bioretention with the available space and high sediment load drainage areas. Several pretreatment measures are feasible, depending on the method of conveyance and the drainage area: Two-cell design (channel flow): Forebay ponding volume should account for 25% of the water quality storage requirement and be designed with a 2:1 length to