37

Multicriteria design tool for selecting Treatment wetlands systems for urban wastewater management in insular territories

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Abstract

Wastewater treatment solutions using nature-based solutions (NBS) are numerous and diverse. Finding the most appropriate solution for a given context is challenging more over when developing such technologies in insular territories where climate conditions, local available material or human skills can be selective. Based on this issue, CARIBSAN project aims to develop a design and treatment chain selection tool that take into account local and characteristic of insular territories in defining adapted wastewater treatment NBS technologies.

One of the goals is to develop a methodology that can automatically combine and size different treatment wetlands systems to achieve specific treatment objectives while taking into account local context characteristics. Those characteristics can be define, among others, according to technical local constraints (available materials, risk of electricity cuts, geological characteristics ...), climate characteristics (storm events, temperature seasons ...) and governance and local skills for operation.

In order to select the most appropriate treatment chain, we use a multi-criteria analysis (technical, economic, social and environmental criteria). The technical component aims to define a treatment system chain able to achieve the desired level of treatment for a specific sizing (which type of treatment wetlands systems, which surface and which material depths) with a precise degree of reliability. As local constraints (climate, material dependence, operation ...) can have an impact on the reliability, a specific tool as been developed to help decision makers in selecting the most suitable NBS treatment chain.

Developed in Python, the code allows designing and comparing different treatment chains, validated in various climatic conditions that are ranking by TOPSIS methodology to take into account different criteria.

The proposed oral presentation aims at explaining the concept, methodology and validation based on the Caribbean regions.

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