"WETWALL" — an innovative design concept for the treatment of wastewater at an urban scale

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ABSTRACT

Rising temperatures, increasing food demand and scarcity of water and land resources highlight the importance of promoting the sustainable expansion of agriculture to our urban environment, while preserving water resources. Treating urban wastewaters, such as greywater and hydroponic wastewater, may represent a strategic point for the implementation of urban farming, ensuring food security, reducing pressures on water resources and promoting climate change mitigation. The WETWALL design concept proposes a unique ecotechnology for secondary wastewater treatment at an urban scale, which brings the novelty of a modular living wall hybrid flow. This concept is based on the integration of two established nature-based solutions/ecomimetic designs: constructed wetlands and a modular living walls. First presented is an overview about the state of the art in the scope of living walls treating wastewater, in order to identify the main design aspects related to the performance of such systems, which mainly concerns the removal of nitrates and phosphates. Second, the WETWALL design concept is presented. A scheme regarding the selection of the main components, such as plants and substrate, is proposed, and potential structure developments and operation strategies are discussed. In addition, considering the scope of integrating the circular economy with the design process, potential interactions between this technology and the urban environment are discussed. The main goal of this article is to substantiate the potential of the WETWALL design concept as an innovative wastewater treatment at an urban scale.

Keywords: Wastewater; Circular economy; Living wall; Constructed wetland; Nature-based solutions

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