SUSTAINABLE TREATMENT OF DOMESTIC GREYWATER BY GREEN WALLS FOR REUSE

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The rapid growth in world population, together with rising standards of lifestyle and intensive exploitation of natural environment, has resulted in resource scarcity and water pollution with a widening gap between water demand and supply. The emerging scenario pertaining the future global trends in matter of water demand and water management is calling for the development of more efficient treatment technologies and innovative ways to recycle and reuse wastewater, that represents a cheap and sustainable secondary source of energy and nutrients.

Domestic wastewater can be separated in two different components: greywater – including wastewater produced by showers, bathtubs, washing machines, and hand washing sinks – and blackwater – including the most organic-rich fraction of wastewater generated from toilets. Greywater represents the most suitable fraction of wastewater to treat because the contaminant content is much lower than in black water. The lower level of pollution, consequently, facilitates a removal degree that make greywater suited for non-potable reuses such as irrigation, industrial purposes, toilet flushing, and others, that would otherwise employ clean water. The reuse of wastewater represents a valid and convenient solution to water scarcity and water management problems. The use of nature-based solutions (NbS) has been proposed to find innovative solutions for greywater treatment, coupling environmental, economic and energetic benefits. However, it is still not clear if nature-based solutions are appropriate for greywater treatment, efficiently removing the contaminants.

In this work, a sustainable and innovative system consisting in green walls for treatment and reuse of greywater in urban areas is shown. The system is composed of several panels with pots disposed in vertical columns and filled with different materials and plant types. An irrigation system guarantees a batch feeding with synthetic greywater, reproducing a flow vertical constructed wetland system. The input greywater is chemically analyzed with regards to different pollution parameters (BOD, COD, nitrogen, phosphorus, E.coli, etc.), together with the effluent of each column. In this way, the removal efficiency of the wall is evaluated for each contaminant so as to identify the most efficient configuration in terms of treatment capacity. First analyses showed good removal efficiencies, indicating good treatment performances and promoting the use of green walls as suitable systems for purification of greywater. A wider set of experiments is currently being performed to verify differences in removal efficiency among different system configurations in terms of type of growing material.

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