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Greywater treatment by livings walls in an urban context

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The effects of climate change and the ongoing urbanization, influence the quality of life in cities tremendous and need to be urgently addressed (UN, 2010). Thereby it is crucial to implement technologies which serve their purpose in mitigate heat islands, urban flooding, water scarcity, pollution control and conservation as well as are sustainable in its self. Natural based solutions (NBS) as well as urban green infrastructure (UGI) are fundamental concepts showing the role nature can play in providing multiple services to the urban population (Pauleit et al., 2017).
One major challenge for UGI is the water demand needed for maintaining its function. Using potable water for UGI is thereby not a sustainable approach. On the building scale one major resource namely wastewater is wasted. By separating the wastewater stream at the source into water from toilet use and water from kitchen and bathroom sinks respectively, two resource streams for reuse are created. While human excreta is a valuable nutrient source (Masi et al., 2017), greywater is an attractive alternative for non-potable water use (Fowdar et al., 2017).
In this work, the treatment performance for greywater in an adapted living wall (LW) design is under investigation. In comparison to the existing vertical flow design (Scharf et al., 2012), a horizontal flow regime is chosen. Depending on the building type and use different greywater compositions can be determined. Based on existing literature three main compositions are identified by the type of use, namely domestic from apartment buildings, commercial buildings and industrial buildings. In a first stage an indoor LW using three vertically mounted elements is used, where greywater is horizontally flowing through each stage. Water balance, loading volumes and concentrations as well as the influent and effluent concentrations are under investigation. The outcome of this experiment should provide a low-tech solution for the treatment of greywater and its reuse which will be implement in an outdoor pilot scale LW for long term investigation on qualified plant species, water demand, biomass growth and cooling effect.

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