

Green roofs as a biotechnological tool to urban climate change mitigation

Ana Mafalda Mendes¹, Cristina M. Monteiro², Cristina Santos^{1,3}

¹ FEUP- Faculdade de Engenharia da Universidade do Porto, Portugal

² Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Portugal

³ CIIMAR – Centro Interdisciplinar de Investigação Marinha e Ambiental, Terminal de Cruzeiros de Leixões

Highly densely populated urban areas in the present days, are facing serious environmental problems due to the lack of natural permeable areas that are replaced by impermeable construction facilities. As such, urban citizens also have to deal with the problem of rainwater management by the drainage systems, when extreme precipitation events occur, that usually ends with the flood of the cities. In this regard, green roofs (GR) as a nature-based solution, has been highly disseminated especially in Mediterranean countries, due to the major role that they can play regarding climate change mitigation. GR are a biotechnological type of construction with a multilayer system, including vegetation on the top. This solution is an opportunity to bring vegetation back into cities. Due to the presence of vegetation and their metabolism, GR help to improve air quality and, at the same time, to deal with extreme precipitation events, by retaining some of the water into their drainage layer and growing substrate. This will help to attenuate the flood peak, while contributing to the decrease of the runoff volume, playing a major contribution to the achievement of both European Green Deal and the SDG 11 (sustainable cities and communities) and 13 (Climate action).

In the present study, an extensive GR pilot-system available as a kit (developed and commercialized in the Portuguese market by Leca, S.A.) has been implemented at the university hydraulic laboratory to study its hydrological efficiency. Several simulation events were performed varying both time and inlet water amount, in order to evaluate the effect of GR implementation on the runoff coefficient and on the drainage systems downstream.