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Abstract

Exploring five concepts of green roofs, their ecosystem services and economic benefits

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Abstract:

There is an increased awareness on what benefits application of nature-based solutions in urban environments can have as they deliver ecosystem services, which can make cities more resilient and sustainable. Creating roofs with vegetation, i.e. 'green roofs', have the potential to increase the available ecosystem services in urban settings. Still such roofs are not mainly designed and implemented, and knowledge is limited regarding how different designs of green roofs influence the delivery of ecosystem services and the economic costs and benefits for property owners and society. Therefore, the aim of this study was to investigate what impact different designs of green roofs have on delivery of ecosystem services and economic cost and benefits for property owners and society, and how a market driven development could be stimulated. This was studied by designing five different concepts of green roofs using a multidisciplinary design process. Then, possible contributions to different ecosystem services were analysed, and the economic costs and benefit for property owners and society were investigated. These five concepts were combined in a case study in Uppsala, Sweden, to exemplify what impact a green roof could have. The results showed that the five developed concept roofs: the water roof, designed to capture storm water, the energy roof for energy production and vegetation, the farming roof, the biodiversity roof, and the recreational roof, deliver different ecosystem services and at a varying degree. The thickness of the roof substrate and the possibility for people to enter and experience the roof have large impact on the roof's contribution to the different ecosystem services. Thick substrates increase the possibility to capture storm water and enable abundant vegetation, which contribute to: decreasing heat island effect, pollution prevention,

Biography:

Dr Wallhagen is a lecturer in Environmental Science at the University of Gävle in Sweden with a PhD from KTH in Stockholm with the thesis 'Environmental Assessment Tools for Neighbourhoods and Buildings in relation to Environment, Architecture, and Architects'. Her research involves environmental assessment methods and design for sustainable buildings and districts, ecosystem services, life cycle assessment, participatory design, environmental decisions and behaviors. She is a leader for the research program Urban Transition with the mission to accelerate the transition to a sustainable attractive society through extensive changes in technical, ecological and socio-technical systems. Currently, she is leading a Local Action within the EU-funded project Augmented Urbans with focus on creating more attractive, sustainable and resilient outdoor environments; and the project Environmental requirements, Energy use and Climate impact investigating the environmental impact of assessment tools, which she also holds courses about. Besides academic work, Wallhagen is still active in building projects as an architect and is always passionate about developing designs and research for more sustainable architecture.

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