

Article

Green Spaces over a Roof or on the Ground, Does It Matter? The Perception of Ecosystem Services and Potential Restorative Effects

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Abstract: Cities are becoming more vulnerable to climate change and need appropriate adaptation measures. Previous studies demonstrated that urban green spaces provide multiple ecosystem services, improving the health and well-being of urban residents. Yet different urban green spaces provide different services—provisioning, regulating, cultural, or supporting ones. This work aims first to understand if urban green space users perceive the different supplies of provisioning and regulating services offered by different types of urban green spaces. Second, this work seeks to determine if green roof type conditions, as well as vegetation type and access, affect the users' perceptions of the cultural ecosystem services. This work presents the results of an image-based online survey performed among 376 Portuguese undergraduate students between March and April 2021. The survey is based on nine alternative urban space designs, varying the roof access type and vegetation types. The results show a general preference for urban green spaces with more vegetation, regardless of the type of roof, and a general preference for green spaces with better accessibility. In addition, users' preference for no-roof conditions appears to be linked to the abundance of vegetation and quality of urban design and not to awareness of an existing roof structure and its influence on the natural processes.

Keywords: ecosystem services; urban green spaces; green roofs; perception; preference; perceived restoration



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1. Introduction

Cities are major contributors to pollution, consumption, waste, and habitat loss, accelerating the loss of biodiversity around the world [1]. Dense urban areas usually have high overall soil sealing and lack of urban greening. In addition, biodiversity losses and soil sealing affect other ecosystem services as well as the quality of life of urban citizens, causing increased air temperatures and reduced water infiltration. Thus, cities are becoming more vulnerable to climate change and need appropriate adaptation measures. The Sustainable Development Goal 11 aims for cities and communities to become more sustainable, valuing the promotion of universal access to safe, inclusive, and accessible green and public spaces [2].

Previous research has explored strategies to link green spaces to promote biodiversity and ecosystem services [3]. As there are multiple classifications of ecosystem services, TEEB (2010) condenses them into four categories: provisioning, regulating, cultural, and supporting services.

Green spaces promote urban ecosystem services [4], namely to support biodiversity [5], ecological processes [6], or food production, e.g., urban farming [7]. At the same time, they