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# A Multidimensional Indicator-Based Framework to Assess the Sustainability of Productive Green Roofs: A Case Study in Madrid

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**Abstract :** Cities are at the forefront of achieving the sustainable development goals set out in the Sustainable Development Goals of Agenda 2030. For these reasons, increasing attention has been given to the creation of resilient, sustainable, inclusive and green cities and finding solutions to these problems is one of the greatest challenges faced by researchers today. In particular urban green infrastructures, including green roofs, play a key role in tackling environmental, social and economic problems. The starting point was an extensive literature review on 1. research developments on the benefits (environmental, economic and social) and implications of green roofs; 2. sustainability assessment and applied methodologies; 3. specific indicators to measure impacts on urban sustainability. Through this review, the appropriate qualitative and quantitative characteristics that are part of the complex 'green roof' system were identified, as studies that holistically capture its multifunctional nature are still lacking. So, this paper aims to find a method to improve community participation in green roof initiatives and support local governance processes in developing efficient proposals to achieve better sustainability and resilience of cities. To this aim, the multidimensional indicator-based framework, presented by Tapia in 2021, has been tested for the first time in the case of a green roof in the city of Madrid. The framework's set of indicators was implemented with other indicators such as those of waste management and circularity (OECD Inventory of Circular Economy indicators) and sustainability performance. The specific indicators to be used in the case study were decided after a consultation phase with relevant stakeholders. Data on the community's willingness to participate in green roof implementation initiatives were collected through interviews and online surveys with a heterogeneous sample of citizens. The results of the application of the framework suggest how the different aspects of sustainability influence the choice of a green roof and provide input on the main mechanisms involved in citizens' willingness to participate in such initiatives.

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