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OPERATIONALISING URBAN RESILIENCE ASSESSMENT THROUGH NATURE-BASED SOLUTIONS: A METHODOLOGICAL PROPOSAL

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Abstract – The increasing implementation of Nature-Based Solutions (NBS) as strategic interventions to address climate, environmental, and social challenges in urban and peri-urban contexts underscores the urgent need for robust, comprehensive evaluation methodologies to assess the resilience performance resulting from their introduction. While NBS are widely recognised for their capacity to deliver multiple co-benefits, including climate change adaptation and mitigation, enhanced Ecosystem Services (ES), biodiversity conservation, and improved human well-being, their contribution to urban and peri-urban resilience is often assessed in a fragmented, non-standard, or mainly qualitative manner, limiting their effective integration into spatial planning, investment prioritisation, and policy-making processes. Despite abundant literature on the identification and discussion of NBS benefits, significant methodological gaps remain in developing operational, transparent, and replicable evaluation frameworks to support decision-makers and practitioners in systematically designing, comparing, monitoring, and prioritising NBS interventions based on their resilience performance. In this context, the paper provides a comprehensive and critical synthesis of the state of the art in NBS evaluation frameworks, resilience indicators, and decision-support tools, with specific attention to their methodological robustness, scalability, and applicability in urban and peri-urban settings. Building on this review, the study proposes a novel Multiple-Criteria Decision Analysis (MCDA)-based evaluation framework to assess the level of urban resilience enhanced by NBS interventions. The proposed methodology explicitly addresses the multidimensional, systemic, and multifunctional nature of both NBS strategies and the urban resilience concept by structuring interconnected evaluation dimensions encompassing environmental, social, economic, and governance-related criteria. The framework is conceived as a flexible, adaptable tool that supports evidence-based decision-making and enhances the strategic role of NBS in urban resilience-oriented planning processes. The scientific added value of this paper lies in integrating resilience theory with operational MCDA techniques to bridge the gap between conceptual NBS benefits and practical decision-making.

Keywords – Decision support tools; multi-criteria decision analysis; nature-based solutions; resilience assessment; urban resilience