

Nature-Based Solutions between Urban Density and Climate Resilience: Barriers, Opportunities, and the Role of the Private Sector

Margherita Dagnino ⁽¹⁾

- ⁽¹⁾ Iuss Pavia, Brescia, Italy

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Abstract As cities increasingly face the dual challenges of climate change and urbanization, numerous conflicts arise. One critical tension lies between the push for the densification of existing urban areas as an alternative to further land consumption and the growing need to allocate space for climate adaptation measures. Nature-Based Solutions (NBS) are now widely recognized as a more sustainable alternative to conventional infrastructure, offering a broad range of co-benefits - from enhanced biodiversity and microclimate regulation to improved public health and the delivery of essential ecosystem services.

Despite their potential, the implementation of NBS remains limited, particularly in high-density urban areas and historic centers - contexts that are especially vulnerable to climate change impacts due to their impermeable surfaces, high building density, and exposure to heat stress and flooding. These areas also face significant challenges related to integration with existing infrastructure, limited design flexibility, and, in many cases, the need to preserve built heritage. If cities opt to pursue densification as an alternative to further land consumption, the spatial conflict between development pressures and the need for climate adaptation will only intensify.

In these environments where the availability of public space is scarce, the engagement of the private sector is crucial to expanding NBS implementation beyond publicly owned land. However, private actors often remain marginal due to high upfront investment requirements, delayed financial returns, and a lack of targeted incentives or supportive policy frameworks.

This research proposes to examine the barriers and enablers for implementing NBS in dense and heritage urban contexts, with particular attention to strategies for mobilizing private sector participation. Through a literature review and comparative analysis of case studies, the study intends to identify key research gaps, especially in relation to context-sensitive design approaches, collaborative governance models, and integration within planning and regulatory systems. It will also assess best practices where public-private cooperation has successfully facilitated NBS in compact, historically sensitive environments.

This study represents the initial phase of a doctoral research project that has the final objective of contributing to the broader integration of NBS into urban planning and policy by generating insights to inform future decision-making. Practical applications may include the design of incentive schemes for private stakeholders, integration of NBS in heritage-sensitive redevelopment plans, and formulation of flexible regulatory models that balance conservation with innovation.