Doctoral Dissertation
Doctoral Program in Urban and Regional Development (36th Cycle)

# SPATIAL PLANNING & ECOLOGICAL TRANSITION
# How to integrate Green Infrastructure into the Urban Plan


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Politecnico di Torino - Università degli Studi di Torino
October, 2024

# Summary

The research is positioned within the framework of the current disciplinary debate, which acknowledges spatial and urban planning as an institutional and technical activity of 'territorial governance and government' (*Governo del territorio*), representing an exercise of public powers and competences defined by law. The first fundamental assumption is that, while spatial planning remains relevant and necessary today, its instruments and processes require reconfiguration to better and more effectively address contemporary challenges, such as climate change mitigation and adaptation, land take containment, urban and territorial regeneration, biodiversity conservation, and nature restoration. These issues are not new to the discipline but have become increasingly critical and often prioritised in contemporary planning and political contexts.

In Italy, the long-standing discourse on the form of the urban plan considers crucial to overcome a national model still anchored in the 'Fundamental' urban planning Law 1150/1942, which was designed during a period of expansion that is no longer congruous in the present context. The perspective is to shift from the traditional plan, primarily focused on conformity and prescriptive regulations, to a new instrument useful for addressing the paradigm of ecological-environmental regeneration.

What characterises urban planning across different contexts is the intention to assign to the plan the role of a reference framework for identifying, coordinating, and implementing diverse policies through coherent and territorially specific actions and projects. Among the various reasons supporting the present-day imperative to innovate spatial planning is the need to strengthen its role in facilitating the ecological transition.

Ecological transition has the potential to find effective operational support and deliver better outcomes in spatial planning through the integration of green infrastructure (GI), particularly within the urban plan. GI is considered a central structuring planning content due to its multifunctional and multi-scale characteristics, which align with the broad principles of sustainability. Despite the extensive production of policy documents and scientific literature on GI, urban planning practice still encounters difficulties in convincingly addressing the issue of methodological integration in design and regulatory terms.

The thesis explores the relationship between GI and spatial and urban planning, investigating both theoretical and normative underpinnings and modalities of practical implementations. In better detail, the objective is to investigate how urban plans technically conceptualise and design GI with respect to the distinct features of each urban planning instrument and context. The investigation employs a methodology based on comparative case study analysis organized according to specific criteria. The selection of case studies comprises five European cities commonly located in metropolitan areas: Turin, Bologna, and Milan in Italy, Stuttgart in Germany, and Grenoble in France.

By examining how the 'green space content' structures and qualifies urban planning activity and instruments, the analysed local experiences could confirm that GI represents an enduring paradigm for contemporary spatial planning. The study seeks to extract key insights from different approaches to the integration of GI, taking into account the nature, form and contents of the urban plan. The discussed value of GI emphasises its potential to drive innovation in urban planning in Italy as a central content of the structural-strategic framework.

Based on the lessons learned and open issues from the case study comparison, the research contributes to the ongoing debate regarding the revision of the Italian urban planning paradigm, facilitated by the proposed Law of fundamental principles and general rules for *Governo del territorio* and spatial planning, promoted by the National Institute of Urbanism (INU). The future success of GI integration depends on its institutionalisations within an updated national-to-local planning strategy for ecological and environmental regeneration.

Finally, the research proposes a conceptual framework of essential contents and documents for integrating GI into a new general urban plan, and outlines three concluding profiles to support the role of GI in urban planning innovation:

- green infrastructure as a key content of the structural-strategic function (related to the form of a new general urban plan);
- green infrastructures as a tool to operate in accordance with the principle of coherence (related to the nature of a new general urban plan);
- green infrastructure as a tool for co-planning and collaboration among planning levels, stakeholders and interests (related to the method for developing a new general urban plan based on the principle of subsidiarity).

The thesis is structured into three main parts: Part 1 frames the research topic; Part 2 covers the research development, including the literature review and comparative case study analysis; and Part 3 concludes with the discussion and conclusions.