

# NATURE AND THE CITY. PROSPECTS FOR THE INTEGRATION OF GREEN INFRASTRUCTURE IN SPANISH METROPOLITAN PLANS

**José María Feria Toribio**

Departamento de Geografía, Historia y Filosofía. Universidad Pablo de Olavide. [jmfertor@upo.es](mailto:jmfertor@upo.es)

**Jesús Santiago Ramos**

Departamento de Geografía, Historia y Filosofía. Universidad Pablo de Olavide. [jsanram@upo.es](mailto:jsanram@upo.es)

## I. INTRODUCTION

In recent years, green infrastructure has become a key tool for planning metropolitan natural areas and environmental features from a strategic and multifunctional perspective. This notion supposes a new perspective for planning green spaces and natural elements, assuming as basic principles the network interconnection, the multifunctionality and a smart and a proactive approach (EEA, 2011).

It is a concept that can be implemented at different scales –for local to regional or national– and with diverse aims –since conservation of valuable natural areas to the promotion of ecosystem services or local development–. In the context of spatial planning, green infrastructure is a very useful tool to control and to diminish the impacts of urban sprawl. Given the increasing importance of this last phenomenon, it seems very suitable to deepening on in the benefits of green infrastructure for large urban areas and to evaluate the potential mechanism and tools to its right implementation.

In order to cope with this aim, it is necessary to choose an adequate analytical and planning scale. At the present time, this urban scale is not local but metropolitan, as can be verified in an empirical and normative level (OECD, 2012). In that sense, the hypothesis of this work is that metropolitan plans are an adequate tool to an optimal implementation of green infrastructure because they allow to deal with, in an integrated way, the two basic components of the metropolitan territory: the urban fabric and the open spaces. From that hypothesis, the paper has two objectives: first, to address a critical review of the concept of green infrastructure and secondly to evaluate its potential implementation through metropolitan-scale spatial plans. To this end, the article presents a comparative analysis of the three main Spanish metropolitan plans: Barcelona, Bilbao and Seville.

## II. THE CONCEPT OF GREEN INFRASTRUCTURE

Although the origin of the concept of green infrastructure can be found in the United States in the 1990s, where it arises as a response to the environmental and territorial impacts of the urban sprawl phenomenon, its theoretical foundation can be linked to a long tradition in the field of urbanism and territorial planning. In this sense, the *greenway* concept, the design of ecological networks to restore habitat connectivity, or the creation of urban corridors for the interconnection of urban parks and other green areas, are clear precedents. The concept of green infrastructure incorporates and updates this set of ideas and references, proposing a strategic approach to planning of open spaces oriented to the challenges of today's city, and posing as a priority the physical and functional connection between urban green spaces and peripheral natural habitats. Green infrastructure is therefore defined as the opposite of "grey infrastructure" (i.e. the sum of all artificial infrastructures), in an attempt to equate the importance of both components of the territorial system and, above all, overcome the subordinate character traditionally given to non-built spaces in urban and metropolitan planning.

The concept of green infrastructure has experienced a rapid diffusion since its emergence, gaining an increasing attention in the international arena in the last few years. The case of Europe is particularly remarkable, since green infrastructure has been adopted by different EU institutions as a strategic tool within the policies of territorial cohesion, nature conservation and urban sustainability. The European Commission has developed a Strategy on Green Infrastructure under the title "Enhancing Europe's Natural Capital" (European Commission, 2013), which is in line with the progressive integration of the concept into EU actions and programs such as the 7th Framework Program (2013), the European Biodiversity Strategy (2011) or the European Strategy on Adaptation to Climate Change (2013). In the Spanish context, the concept is also progressively assimilated, having been adopted in several urban and regional planning initiatives.

Although there is not a single, universally accepted definition of green infrastructure, it is possible to identify three essential issues that are common to most definitions (EEA, 2011). The first of these issues is the search for a high level of connectivity between the spaces that make up the infrastructure, in order to achieve its complete integration in both a structural and a functional level. A second essential issue of green infrastructures would be their openly multifunctional vocation. The aim is to maximize the total amount of benefits that can be extracted from the green infrastructure, an objective that requires reinforcing the complementarities and synergies that exist between the different components of the system. The third characteristic feature of green infrastructures is the adoption of a strategic approach to their planning and management. In other words, this means assuming a perspective of active preservation or, as it is sometimes called, a *smart conservation* approach.

The metropolitan scale seems particularly adequate for the articulation of a fully functional green infrastructure, as it allows integrating the green/natural components associated with both urban and regional scales in a single, comprehensive planning proposal. Thus, it makes it possible to approach the whole urban system and the rural and natural environment in which it is inserted from a unitary perspective. Additionally, the great diversity of elements that can be incorporated into a metropolitan green infrastructure fosters the simultaneous provision of a wide spectrum of ecosystem services.

### III. COMPARATIVE ANALYSIS OF SPANISH METROPOLITAN PLANS

Given that none of the plans under study explicitly uses the term “green infrastructure”, the comparative analysis focuses on their treatment of the metropolitan open space, understood, in a broad sense, as the fraction of the metropolitan territory which is not strictly dedicated to urban uses. In the case of Barcelona, this issue is addressed through the concept of “*sistema de espacio libre*” (open space system). In the case of Bilbao, the metropolitan plan develops the concept of “*mallá verde*” (green network). Finally, in Seville, the plan adopts the more generic concept of “open space” to refer both to the metropolitan public spaces and the so-called “territorial protection system”.

The three documents studied represent, even partially and with important differences among them, a first approximation to the articulation of green infrastructures of metropolitan scale in Spain. Out of the three previously cited basic issues of green infrastructures, connectivity is the one that is more explicitly reflected in the plans. However, although the three plans adopt the idea of connectivity as a basic principle of intervention, each of the plans does so from a different perspective. In the case of Barcelona, the plan understands connectivity as a guarantee for the preservation of the ecological processes and flows present in the metropolitan landscape. In contrast, the Bilbao plan focuses exclusively on public use, defining a set of routes linking the different open spaces included in the *mallá verde*. The resulting proposal draws a well-defined and cohesive structure, albeit limited from the point of view of its ecological functionality. Finally, in the case of Seville, two complementary types of network are defined: one consisting of an interconnected system of green corridors, and the other built around the fluvial system. In both cases environmental aspects are taken into account, but the approach is mainly oriented to public use.

Although none of the documents analyzed explicitly refers to the idea of multifunctionality, the three plans assign a relatively wide and diverse range of functions to metropolitan open space. However, both the specific set of functions considered by each plan and the orientation and level of detail they are addressed show significant differences. Thus, in the case of Barcelona, the functional approach has a clear environmental bias, emphasizing the ecological and landscape-related functions. The Bilbao plan puts more emphasis on public use, complementing this function with the protection of rural areas with outstanding landscape and natural values. Finally, the Seville plan is perhaps the most advanced in the conceptual level, mentioning a large set of social, cultural, environmental and productive functions, although it does not reach this same level of development and detail in its proposals.

The difficulty to adopt a strategic, proactive, approach in the planning and management of open space could represent the main weakness of metropolitan plans for an effective implementation of the green infrastructure concept. In the case of Barcelona, the delimitation of metropolitan open space is proposed in a subsidiary way, being dependent on current municipal-scale master plans. Accordingly, its approach has a fundamentally preventive character, essentially oriented to the control of urban sprawl in open spaces. In the case of Seville, the foundations on which the planning proposals are based are ambitious, but fail to materialize in a true strategic approach to intervention. The plan establishes the protection

of the areas associated with the open space system and recommends –without binding force– the creation of a supra-municipal management entity to coordinate public action in this area. However, the specific development of the proposals is largely delegated to municipal-scale master plans and sectoral intervention instruments. Finally, the plan of Bilbao is perhaps the one that presents a more concrete, structured and systemic proposal of management, a fact which is undoubtedly related to the smaller extension of the territory under planning.

#### **IV. CONCLUSIONS**

The notion of Green Infrastructure is emerging as a key concept in the field of spatial planning, due to its intrinsic value as a “bridge-concept” for interdisciplinary communication and the fastness it is being adopted in the international scene by institutions and professionals. Its relevance is not based upon in the novelty of the theoretical background but in its ability to join a set of specific planning criteria and measures in a flexible and easy to apply conceptual framework, which is very useful for sustainable urban development s strategies and policies.

However, beyond its successful spread, it is possible to identify various weaknesses and deficiencies in relation to its theoretical basis. The lack of consensus about a precise and unique definition of green infrastructure provokes a dispersed and even confused use of the concept, especially in the planning practice, being observed numerous divergences in relation to its concrete aim and implementation scale. In the specific case of metropolitan green infrastructures, this research has tried to move along in the identification and definition of their structural and functional features, allowing to check how, at least in the Spanish context, a meaningful part of such features are already being assumed by the main metropolitan plans in regards of open spaces.

In that sense, from the structural point on view, the plans under analysis include in their proposals a significant number of areas and elements linked to the notion of green infrastructure, assuming connectivity as basic principle. Also, from the functional point of view, the plans assume, at least in the discursive level, the principle of multifunctionality required to these systems. It is in the nature strategic and proactive of green infrastructure where plans are far from its theoretical assumptions. The three plans made an important effort for to identify and protect natural resources elements and resources against urban sprawl, but they do not abandon the traditional pre-active and subsidiary position of planning practice in relation to open spaces. The comparative analysis shows also some insufficiencies proper of the metropolitan scale adopted, referred basically, first, to the insufficient level of development and detail of the proposals and secondly to the guarantees for its implementation and management.

According to the above it is possible to point out two ways for improving the effectiveness of policies and measures in relation to green infrastructure moving along out of a strict conservationist focus. The first of them implies to take advantage of the capacity of metropolitan plans to build up the green infrastructure, not only protecting or recovering preexisting resources, but generating new elements when necessary in order to cope with specific demands and for improving the functioning of the entire system.

The second way is related with the establishment of management and monitoring procedures and mechanisms. In this line, it seems fundamental to develop a new governance

framework capable to assign specific policy and planning responsibilities; multilevel and multi-agent coordination; and a detailed design and budgetary resources for the proposal.

Anyway, the plans under scrutiny represent –at least in the Spanish context- a clear breakthrough in relation to the prior experience, linked to the municipal master plan and with an insufficient planning scale. In these metropolitan plans, the set of natural elements and open spaces starts to be understood as a cohesive structure, both at the physical configuration and the functional dimension, emerging as a an active and valuable component of the territorial system. Although this fact is not enough to consider the proposals as a complete and adequate implementation of the concept of green infrastructure, they can be understood as an starting point, and even a reference, for future planning initiatives in order to get its future effective and coherent development.

Accordingly, as a final remark, it can be asserted that metropolitan planning has enough conceptual and instrumental resources to advance towards a greater equilibrium between the natural and the artificial dimensions of present urban systems.

