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Title: Landscape in Green Infrastructures & Interscalar Planning

Year: 2015

Version: Final published version

Please cite the original version:

Galan, Juanjo. 2015. Landscape in Green Infrastructures & Interscalar Planning. 52nd World Congress International Federation of Landscape Architects "History of the Future". 11. 978-5-7422-4877-4 (printed).

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LANDSCAPE in GREEN INFRASTRUCTURES & INTERSCALAR PLANNING

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ABSTRACT:

The transversal and interdisciplinary quality of landscape makes it an essential and useful element in regional and local planning. On the other hand, Green Infrastructures provide an exceptional tool to put in relation different planning scales and offer new possibilities and functions for the design and management of open spaces.

The Strategic Plan for the Calderona Mountain Range (Valencia province, Spain) shows how these two concepts: Landscape and Green Infrastructure can work hand in hand to construct a more sustainable and harmonic territory.

The Plan defines a multifunctional Green Infrastructure with the aim to preserve and improve the ecological and visual quality of the territory and, at the same time, guide the future evolution of the agricultural, natural and urban areas. In order to fulfill these functions the work was structured in four stages.

Firstly, the Landscape Characterization of the whole area (200 km²) permitted, after studying the existing patterns, resources and socio environmental processes, the definition of a system of Landscape Units and Landscape Resources which were, in a second stage, assessed through a public participation process (Landscape Assessment).

Once the whole territory had been studied, the Strategic Plan formulates a set of Objectives and Strategies and in its fourth phase defines a set of ten thematic Plans regulating the most important activities and land uses. In this later stage, the “Landscape Plan” was given a leading role since it was guiding through the Green Infrastructure and through its determinations, the performance and evolution of most of the land uses and activities.

The Green Infrastructure was primarily based in natural and human systems which could be very easily recognized and incorporated in it. In contrast, the addition of some connectors and specially, of some areas for the control and shaping of urban land, required a more intentional approach.

Since the Calderona Mountain Range is part of a Natural Park, a high percentage of the whole territory, basically with a natural character, was included in the Green Infrastructure. In spite of their lower proportion, strategic agricultural areas proved to be a fundamental part of the Infrastructure for controlling urban sprawl. On the other hand, the most valuable open spaces in the urban and peri-urban contexts were essential to introduce the Green Infrastructure in towns, villages and housing estates through a capillary micro system including parks, squares and strategic streets.

KEY WORDS: Landscape planning; Green Infrastructure, Landscape characterization; Landscape assessment; Urban green systems; Landscape programmes; Landscape regulations; European Landscape Convention

1. INTRODUCTION

The outstanding environmental and visual resources of the Calderona Mountain Range have made it one of the favorite destinations for the 1.5 million inhabitants of the neighboring Metropolitan Area of Valencia (Spain); imposing at the same time a strong pressure for urbanization and public use. In this context, the creation in the year 2002 of the Calderona Natural Park, has positively released the pressure over the area but has emphasized some of the most typical periurban conflicts: Urban sprawl, ecological fragmentation, abandonment of agricultural activity, lost of local identities and heritage, promotion of unsustainable urban patterns, lack of coordination between local and regional administrations, etc.

All the before mentioned issues were the basis for the Strategic Territorial Plan for the southern area of the Calderona Mountain Range (Galan 2013), a Plan promoted by 5 of the 14 municipalities totally or partially included in the Natural Park, and prepared by a multidisciplinary team. The final document included a multilayer analysis of the territory, the

definition of a set of objectives, and, finally, 10 thematic Plans and 18 pilot projects exemplifying or concretizing some of the most important aspects.

STRATEGIC TERRITORIAL PLAN FOR THE CALDERONA MOUNTAIN RANGE	1_TERRITORIAL ANALYSIS (by themes)
	2_OBJECTIVES AND STRATEGIES (by themes)
	3_THEMATIC PLANS + PILOT PROJECTS:
	<ul style="list-style-type: none"> • Landscape Plan (includes Green Infrastructure) • Forestry and Natural Heritage Plan • Agriculture and Stockbreeding Plan • Hunting Plan • Urban Plan • Infrastructures and Transport Plan • Cultural Heritage Plan • Tourism and Public Use Plan • Socioeconomic development & Sustainability Plan • Governance Plan
	4_PUBLIC PARTICIPATION PROCESS

Table 1: Structure of the Strategic Territorial Plan for the Calderona Mountain Range

The Strategic Plan shows the benefits and synergies of transversal planning and was developed in parallel with a public participation process and in close collaboration with regional and local authorities.

According to the European Landscape Convention, landscape is the perceived dimension of any territory, and therefore, it permeated almost all the thematic analysis, strategies and proposals. In addition, landscape was the central topic of the first and leading thematic Plan (“Landscape Plan”), which was developed following the structure and methodology proposed in the Reglamento del Paisaje de la Comunidad Valenciana for “Landscape Plans” (Muñoz, 2006) and that included the definition of a System of Open Spaces or Green Infrastructure.

Apart from the spatial determinations of the Green Infrastructure, the Landscape Plan for the Calderona Mountain Range included a series of projects and normative determinations which respectively defined the main programmes to implement the Landscape Quality Objectives and a set of regulations or guidelines for the development of certain activities or for the construction of certain elements.

2. LANDSCAPE CHARACTERIZATION

The landscape characterization of the 5 municipalities which promoted the Strategic Territorial Plan for the Calderona Mountain Range (Naquera, Serra, Olocau, Marines and Gatova) comprised the definition of a system of Landscape Units covering the whole Plan's area and of their main Landscape Resources.

Landscape Units were understood as continuous pieces of land sharing similar patterns, potentials, problems and processes and, by considering not only their physical conformation but also their dynamics, they were expected to become functional and management entities prone to receive the same sort of policies, programmes and measures.

Due to the working scale of the Plan (1:20.000), the units (see Figure 1) were closely associated with land uses (residential, industrial, agricultural and natural) although the landscape perspective provided a far more proactive and richer sub differentiation.

Landscape resources included punctual, linear or surface elements of regional relevance and were separated in three categories: environmental, cultural and visual. A fast review of them shows the concentration of cultural resources in the three historic valleys; whilst environmental resources covered the extensive areas of natural land and became particularly dense near the watercourses. Finally, visual resources were directly associated with scenic routes or with natural or human elements of visual interest.

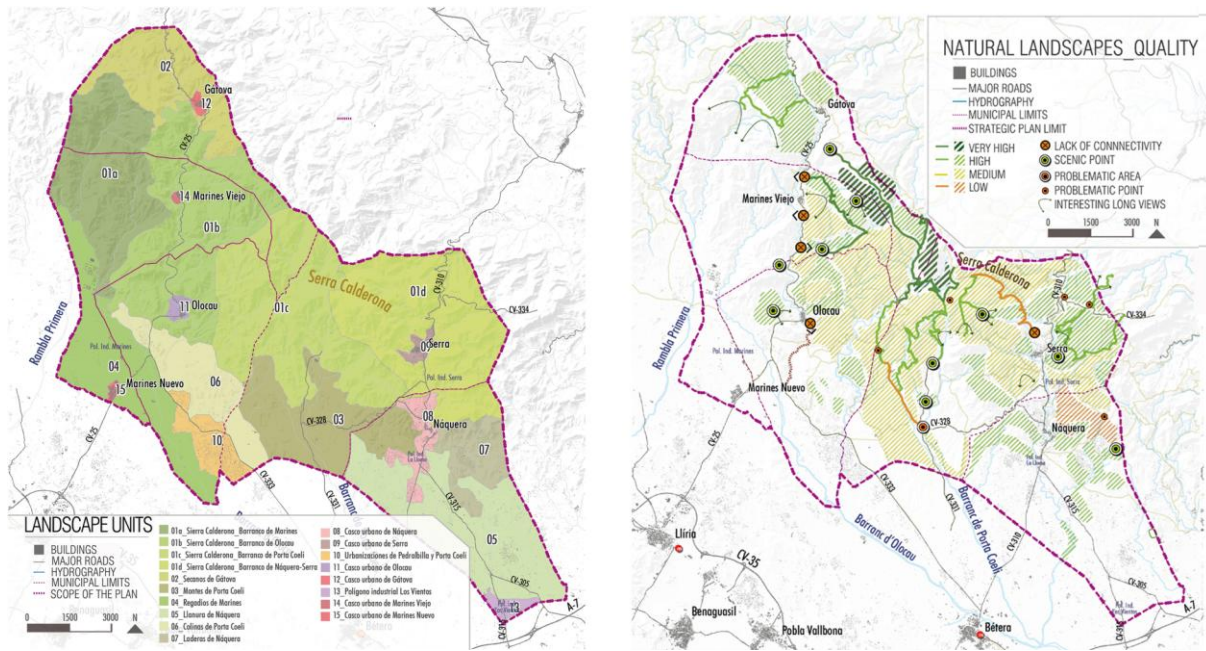


Fig1: Landscape Units and Landscape Quality in Natural areas

3. LANDSCAPE ASSESSMENT

Following the methodology of the Reglamento del Paisaje (Muñoz 2006), the landscape value of landscape units and resources was calculated by combining people’s preferences and experts’ judgements (landscape preference and landscape quality). This balanced solution tries to respond to the always conflictive task of giving values to the landscape and permits the rational and justified prioritization of actions and measures. In the same line, the determination of the levels of visibility for all the landscape units and resources provided another correcting factor by highlighting the areas or elements which presented a higher visual exposure.

As expected, the natural and more forested landscape units of the Calderona Mountain Range obtained the higher values but the assessment became much more useful in the urban landscape units or in the infrastructures of transport, where very significant differences occurred between different roads or urban areas. Due to the fundamental importance of those elements or spaces, a specific study was developed to analyze the inner and external landscape quality of all the urban areas (villages and low density housing estates) and along the major roads.

4. LANDSCAPE QUALITY OBJECTIVES & STRATEGIES

The definition of Landscape Quality Objectives permitted to pass from the analysis and diagnosis of the previous phases to the development of proposals. As a kind of bridge, the Quality Objectives envisioned a new and improved scenario for the Landscape Units and Resources, guiding the propositive parts of the Landscape Plan that, in particular, focused its attention in transversal systems (e.g. Green Infrastructure) or in the visual integration or improvement of specific activities or systems (Landscape programmes and regulations).

5. GREEN INFRASTRUCTURE

The proposed Green Infrastructure for the southern part of the Calderona Mountain Range is understood as an interconnected system of open spaces which should preserve and enhance the ecological, visual and cultural values of the territory. This infrastructure is also expected to be an essential tool to improve the levels of sustainability, both by regulating the evolution of the land uses mosaic, and by performing an active role in regional, local and punctual metabolisms. In order to fulfill these functions it was particularly important to consider, not only the inputs provided by the landscape, but also the ones given by the study of other territorial layers. Thus, the understanding of the agricultural or forestry activity, the analysis of the existing urban fabrics and systems of mobility, or the study of the existing metabolisms and levels of sustainability, proved also to be essential to define a multifunctional and more meaningful Green Infrastructure.

5.1. STRUCTURE AND SPACES

The Green Infrastructure for the southern part of the Calderona Mountain Range was defined by the progressive addition and connection of different areas and systems with different functions and degrees of protection (see figure 2).

Firstly, the Green Infrastructure incorporated a System of Protected Areas including the most valuable spaces of the Calderona Natural Park (Areas of Ecological and Landscape Protection), the Mountains of Public Utility and the Strategic and Non Strategic Forest Areas as included in the PATFOR (2015). These two latest zones were especially important to extend the natural network out of the park into the agricultural matrix which dominates the hilly and flat landform located at the south. In general, the areas included in this category

presented an extensive, natural and compact character and were concentrated in the most abrupt topographies.

Secondly, the Green Infrastructure incorporated a System of Territorial Networks including natural networks like the water system or human networks like the public domains flanking the principal roads, the main hiking tracks, the terraced traditional fields and the historical periurban orchards. In the case of the water and roads systems, both of them presented a high level of continuity and, by being part of the State Public Domain, their management and regulation could be easily implemented. In contrast, the terraced traditional fields and historic periurban orchards were part of fragmented networks with a very high cultural, ethnographic, scenic and ecological value.

Also as part of the System of Territorial Networks, the Green Infrastructure included a network of strategic pieces of land which were incorporated to preserve the most fertile soils, to avoid undesired urban sprawl and to maintain ecological corridors between some isolated patches and the natural matrix which covers most of the Calderona Mountain Range. Since this last network was not defined by a specific land use, land cover or administrative status, a more intentional and proactive approach was necessary for its delimitation. In spite of this, this network proved to be essential to regulate the negative dynamics which are now operating in the hilly and flat lands located at the Southern part of the Calderona.

After defining the regional green infrastructure, the working scale was increased to define its ramifications in the main urban areas (urban green infrastructures). This zoom was applied over the 6 existing towns (Naquera, Serra, Olocau, Marines Viejo, Marines Nuevo and Gatova) and on the biggest housing estates (Torre de Portacoeli and Pedralvilla). As displayed in the figure 2, the Urban Green Infrastructures included the historical periurban orchards, the main parks and public gardens, a network of selected hard urban spaces (squares, old city center streets, avenues, boulevards, etc.), the natural areas of public interest (rivers, gorges, periurban forests, etc.) and the sides of the local and regional roads giving access to the urban settlements. In addition to this, and in order to reinforce the role of the towns and villages as service areas for visitors, the Urban Green Infrastructures were connected to the networks of hiking tracks and with the existing and proposed parking areas.

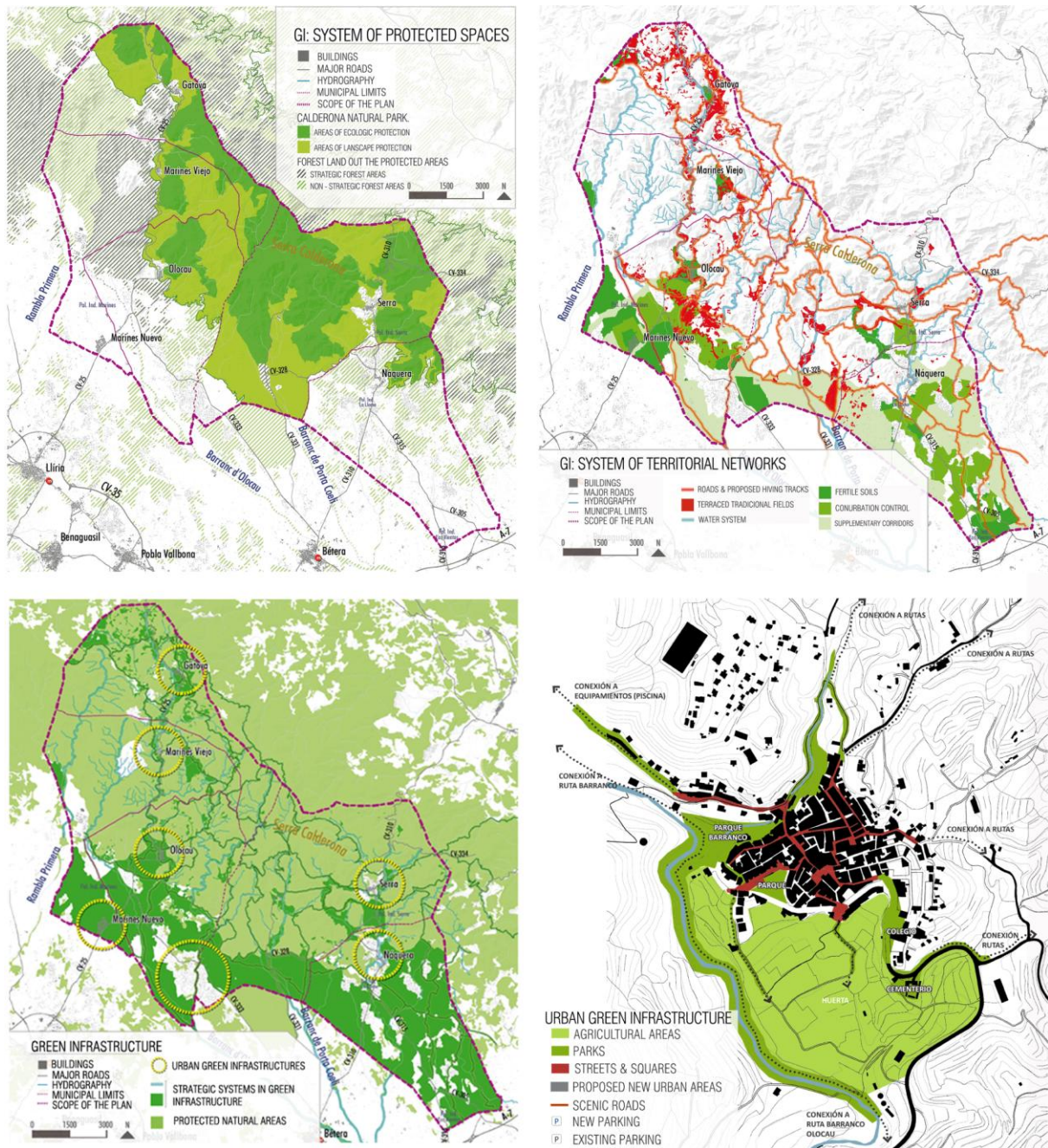


Fig2: Green Infrastructure: System of Protected Areas, System of Territorial Networks, Total Green Infrastructure and Urban Green Infrastructure.

5.2. FUNCTIONS

The regional and urban Green Infrastructure of the Calderona Mountain Range was defined to fulfil a wide range of functions.

In **ecological terms**, the Green Infrastructure was expected to protect the most valuable ecological areas, to integrate the floodable environments, to preserve the areas for groundwater recharge and to play an active role in erosion control, both in the forested areas and in the traditional terraced fields.

In terms of **production**, the Green Infrastructure tries to recover and reactivate the multifunctional mosaic which has historically characterized the Mediterranean rural areas and that used to integrate forestry, agriculture and shepherding in a deeply interrelated system.

Land Use regulation is the third main function of the proposed Green Infrastructure since it is expected to contribute to the control of urban sprawl and to the protection of the most fertile soils by incorporating some strategic periurban areas and the most productive agricultural lands.

Finally, in the urban context, the Green Infrastructure has been designed to improve the **environmental and visual conditions in all the villages, towns and housing estates** by providing a continuous and interconnected network of high quality public spaces (parks, streets, squares, etc.), by introducing the natural systems in the urban fabric, by promoting biodiversity and ecology friendly design and, last but not least, by redefining the relationship (visual and physical) of the urban settlements with their surroundings.

5.3. ASSOCIATED PILOT PROJECTS

In order to concretize and show the benefits associated with the implementation of the proposed Green Infrastructure, the Strategic Plan for the Calderona Mountain Range included 5 pilot projects. The first two projects were two ecological periurban parks highly influenced by the water and agricultural systems (Olocau Agricultural Park and Naquera River Park). The third project proposed a new and more consistent network of tracks in the Calderona Mountain Range. The fourth project established the criteria to improve the visual environment in one of the most problematic and used regional roads and, finally, the fifth project defined a masterplan to improve the environmental, visual and sustainability conditions in the Torres de Portacoeli and Pedralvilla housing estates, that with an area of 232 hectares and a population of 4950 inhabitants, represent one of the most clear examples of massive low density housing sprawl in the Valencian Region (see figure 3). For more information about the five pilot

projects see REF, Galan Vivas, J. (2013) *Plan Territorial Estratégico del área centro Sur de la Sierra Calderona* <http://www.tusierracalderona.es>.

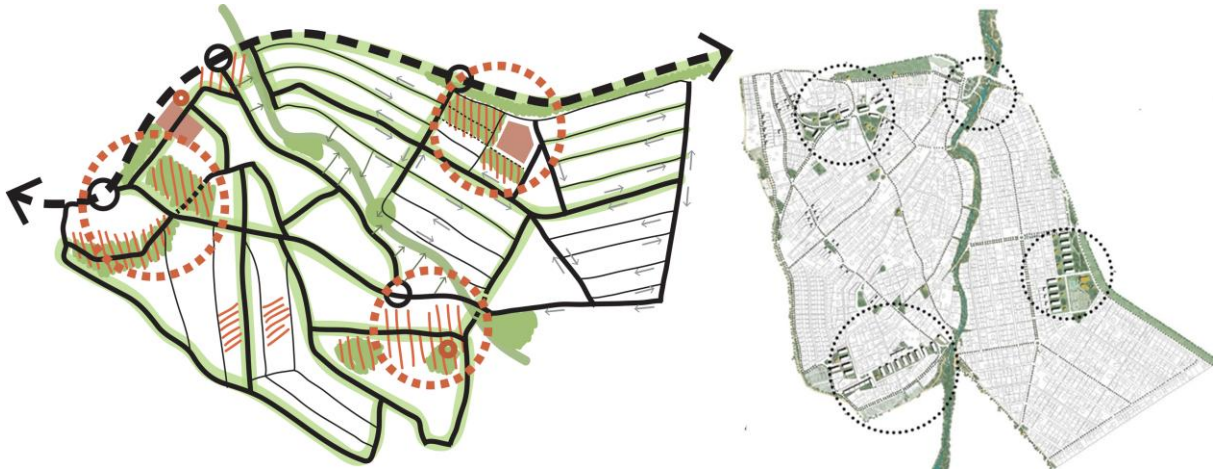


Fig3: Structural and Sustainability improvement for the Torre de Portacoeli and Pedralvilla housing estates.

6. CONCLUSIONS

The Strategic Plan for the Calderona Mountain Range showed the potential that landscape might have in the development of a more holistic and transversal regional, municipal and town planning. In addition to this, the definition of a multiscale Green Infrastructure, associated with an interconnected System of Open Spaces, proved to be an essential tool to regulate urban sprawl, to preserve and connect the most valuable natural, cultural and visual resources, to promote soft mobility and to encourage more sustainable territorial patterns. The main challenges ahead would be the implementation of the before mentioned Green Infrastructure by integrating public and private policies and the scientific assessment of its ecological, economic and social performance.

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