

THE MANAGEMENT OF THE LANDSCAPE ECOLOGICAL CONNECTIVITY IN SPAIN: INITIATIVES AND CHALLENGES

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I. INTRODUCTION

For the last decades it has widely been agreed that nature conservation policies focused on the designation of protected natural spaces do not efficiently work by themselves. Habitat defragmentation processes fundamentally caused by infrastructure networks, housing development and the intensification of agriculture are regarded as the main causes of the global biodiversity crisis. Therefore, to prevent and, in turn, restore the loss of the ecological connectivity of the landscape understood as the capability of this to allow the displacements of organisms among the resourceful tesseras are one of the main challenges to be tackled in order to stop the loss of biodiversity.

To tackle the challenge to integrate the ecological connectivity into the decision-making process impacting on the landscape which necessarily implies to create a series of positive synergies among the nature conservation policies and the ones regarding landscape and sectorial land use planning. The desirable scenario in which the integration of biodiversity would be accommodated in the sectorial policies and the ecological connectivity criteria into the spatial planning has been conceptualized at international level by means of ecological networks. These ecological networks may, in board lines, be regarded as any coherent system of natural, rural or periurban spaces which are built and managed in order to maintain or restore the ecological functions as a means to preserve biodiversity. The ecological networks are identified, from a structural view-point, by the inclusion in the landscape pattern, at different spatial levels, of connecting-interest areas located out of the protected natural spaces.

Within the European Union framework 92/43/EEC Directive or Habitats Directive regulating the development of the network for the protected Natura 2000 spaces urges to improve the ecological coherence thereof by means of the management of those elements of the landscape resulting fundamental to guarantee the geographical migration and distribution and the genetic exchange among species.

II. ADVANCES REGARDING THE ECOLOGICAL CONNECTIVITY IN SPAIN

1. Integration of elements of connecting interest within the regional planning

The autonomous administrations having competences both for the conservation of nature and for the Land Use Planning of landscape are the ones responsible for developing coherent ecological networks in Spain.

As for Catalonia, in 2006, the Generalitat Department for the Environment passed the binding rules for the ecological connectivity guidelines within such a Department and as a guidance for the rest of the public administrations in Catalonia. Recently the Generalitat has commissioned the drafting of the Ecological Connectivity Sectorial Plan in Catalonia. Catalonia is the Autonomous Community where decidedly most of the progress regarding planning has been achieved in terms of ecological connectivity.

In the Basque Country since 2005 – the Autonomous Government of the Basque Country commissioned the delimitation of a series of ecological corridors among Natura 2000 spaces– these ones are used as a non-binding reference information regarding the environmental-assessing processes for plans and projects. This is showing an unevenly effectiveness when taking decisions confirming that the prevention of impacts on the corridors are mostly materialized when they coincide within the space with other planning instruments aimed at preserving the rural character of the land. Currently the Guidelines laid down for the Land Use Planning of Landscape in force since 1997 are being reviewed. Within this review such a network of ecological corridors will be included under the concept of the superimposed determining factor within the autonomous landscape pattern.

In Navarre, in 1998, some ecological corridors were defined to complete the conservation regional network. The importance of the ecological connectivity was expressed in 1999 within the autonomous strategy for the conservation and sustainable use of the biological diversity, and such corridors are borne in mind in a non-binding way for the planning processes. This precedent has facilitated the inclusion of several requirements regarding the ecological connectivity within the regional planning in such a way that the on-going sub-regional plans for the Land Use Planning of the landscape define various connecting-interest areas.

The Government of Murcia, at regional level, also commissioned the delimitation of a network of ecological corridors among Natura 2000 spaces with the intention to include such network in the environmental-assessing processes of plans and projects. As for Asturias, a network of ecological corridors has been defined at regional level, from the academic context, with the intention to complete the autonomous conservation network. Also Communities of Valencia and Madrid are working in the development of their green infrastructure and ecological corridors.

2. Integration of connecting-interest elements within the sub-regional and local planning

The sub-regional plans for the integrated landscape planning, derived from the autonomous laws set forth for the Land Use Planning of the landscape at intermediate level,

constitute a relevant instrument for the integration of connecting-interest elements in such a way that there are an increasing number of plans which incorporate them.

Especially in Catalonia important advances are being achieved in this sense in such a way that the sub-regional landscape plans add a special protection, non-developing land network, aiming at the ecological & landscape connectivity among the protected natural spaces. Besides, both Barcelona County Hall and Girona County Hall are taking into consideration their competences regarding connectivity criteria when taking decisions. In Castilla y León ecological connectivity is beginning to integrate in provincial and local planning.

Nevertheless, among the Autonomous Communities a global integration of the connecting-interest areas within the sub-regional plans is not specified, but a wide diversity of methodologies, approaches and editor teams. Moreover, a wide part of the national territory does not enjoy passed sub-regional plans yet. Besides, these plans work as a reference more than regulating or binding plans, for which this generation of plans in force have often been passed.

The integration of connectivity criteria within the urban and metropolitan landscape planning implies the acknowledgement of ecological, social and landscape functions of unbuilt free spaces. These represent an important potential both for the harmonic integration of the urban fabric within the surrounding vicinity and for the conservation of the biodiversity. In the past years an increasing attention is being paid to such kind of planning, albeit they are still initiatives applied in certain cases in Spain.

3. Integration of the prevention criteria within the environmental-assessing processes

Those plans and projects that may negatively affect the coherence of the Natura 200 network is subjected to the 92/43/EEC or Habitats Directive.

The application of the environmental-assessing devices has required the adoption of new methodologies including integrated criteria for the assessment of the affection of the plan upon connectivity. The incorporation of such criteria regarding connectivity within the environmental-assessing processes has meant in some cases the withdrawal of projects of great impact upon the coherence of the Natura 2000 network i.e. Toledo-Cordoba highway and Cuenca-Teruel freeway, whose completion date was included in the Strategic Plan for Transportation Infrastructures by the Ministry of Public Works and Development (PEIT 2005-2020). In this sense the non-consideration of the coherence of the Natura 2000 network with PEIT's initial design caused the service of a letter of citation by the European Commission to the Spanish Government in 2006 within a process of infringement which is still open.

As for the prevention of the barrier-effect upon the biota (wild fauna & flora) within the construction projects of several infrastructures the demand of establishing fauna passages exists in Spain since 2001. At methodological level, in the last years, we have obtained several detailed technical prescriptions related to the adoption of measures to favor the transverse permeability of infrastructures for the various affected groups of fauna. However, the strict application of these prescriptions for the projects and for their environmental assessment have not been deployed yet, albeit it is more and more taken into consideration their observance nowadays.

4. Defragmentation of habitats affected by infrastructures

In the last years some permeability measures have been executed in Spain aimed at restoring as much as possible connectivity which has been deteriorated by linear barriers built in past decades. This kind of actions are still incipient in Spain though they had already been designed and executed in several countries i.e. The Netherlands, Switzerland and Germany years before. Prior to the execution of permeability measures the location of critical spans allow us to decide where to carry out such priority actions. The materialization of these actions requires the approval of the needed budgets by the competent administrations. In this sense, nowadays previous diagnose works are more numerous in Spain than the actions executed, such as new fauna passages within various problematic infrastructures.

5. Improving the connectivity of the habitat of endangered species

Under the approach of the Biology of Conservation connectivity among populations is a priority aspect included in the conservation plans of certain endangered species with fragmented populations. Within the Iberian fauna three emblematic endangered species are highlighted: the brown bear (*Ursus arctos*), the Iberian Lynx (*Lynx pardinus*) and the grouse (*Tetrao urogallus*).

Currently the LIFE + Communication Corridors project is being executed for the conservation of the brown bear (2009-2011) fundamentally aimed at improving connectivity among the western populations and the eastern populations along the Cantabrian mountain range suffering from serious kinship problems.

Regarding the feline the LIFE Conservation and reintroduction of the Iberian Lynx in Andalusia (2006-2011) is being executed. To communicate both population nuclei existing in the Andujar mountain range is among its goals, and to cut down the mortality of such a species as they are mainly run over by vehicles in Doñana.

The grouse is seriously affected by the loss of quality of its habitat and by the forest fragmentation — both for the Cantabrian sub-species and the Pyrenees one. The conservation of the grouse contained in the national strategy passed in 2004 urges to set up connection areas and corridors among the population nuclei by identifying the elements that may act as a barrier and envisage conservation or restoration plans for such corridors.

6. Other initiatives

The ecological restoration works of the fluvial and riversides of the Guadamar river, which started after the mining spillage of Aznalcollar in 1998, have set forth the groundwork for establishing a performance framework aimed at promoting the ecological connectivity through the corridor and by bearing in mind the natural spaces of the area, particularly Doñana and Sierra Morena. This is one of the accomplishments of the declaration of the Green Corridor of the Guadamar river of 2003 as a Protected Landscape in Andalusia.

On the other hand, an initiative promoted in 2005 by the Fundació Territori i Paisatge is aimed at favoring the ecological connectivity among the Cantabrian Mountain range, the Pyrenees, the French Central Mountains and the Western Alps. Due to the width of

the concerned territory the materialization of such goals of such an initiative requires the coordination of several administrations, which means an important challenge.

III. OTHER OPPORTUNITIES TO TEAM UP WITH CONNECTIVITY

Firstly, the application of a socio-environmental vision of the landscape based on sustainability principles and a «new culture of the landscape» within planning has a high potentiality to foster the maintenance of the ecological connectivity. One of the principles supporting this vision consists of the positive planning and management of landscape by appreciating the matrix of free spaces as the drive of the landscape pattern capable of guaranteeing the continuity of the ecological processes and hold back the urban development. Another of the principles consists of adopting concentrated urban patterns avoiding the urban development, dispersion and fragmentation, processes which soared in Spain in the past decades.

Secondly, spaces included in the Hydraulic Public Dominion, Maritime-Land Dominion and in the Livestock Routes comprise a vast surface as a whole. Their inclusion in the landscape patterns and appropriate management has a great potentiality in promoting the continuity of natural interest spaces in Spain.

Thirdly, funds for the Common Agricultural Policy aimed at developing agro-environmental measures and regional programs for the rural development have a remarkable potential to team up with connectivity. The PAC reform of 2013 constitutes a chance to face growing efforts thereof.

Fourthly, the overcoming of the traditional vision of the Land Use Planning of forests by stands through planning at landscape level, which means an important opportunity to contribute to the ecological connectivity. The Plans for the Land Use Planning of Forest Resources (PORF) at regional level may play a relevant role in this way.

Finally, but not less important, territory custodial programs may play a leading role in the management of the ecological connectivity. The custody of the territory may be especially interesting regarding the initiatives aimed at fostering the continuity of the ecological processes owing to the capability of the custodial entities in establishing agreements with the owners of such lands both out of and within the protected spaces.

IV. DISCUSSION & CONCLUSIONS

Currently it has been stated that the ecological networks including the criteria regarding the ecological connectivity within planning is not as relevant in Spain as it is in other European countries. A series of possible specific reasons have been pointed out thereof i.e. the lack of a framework coordinated by the state regarding connectivity, the low priority of this subject-matter in the autonomous environmental administrations' agenda, which have to manage a surface area included in Natura 2000, certainly extensive at European level, the still incipient scope and development of planning instruments derived from the autonomous Land Use Planning laws, the existence of several low densely populated regions with lower rates of territorial fragmentation in relation to other European regions.

The performed review reveals that the initiatives regarding the ecological connectivity set in motion in Spain show a growing trend fundamentally during the last lustrum. It is stated that there is still a long way to go to widely integrate such criteria related to the ecological connectivity in the spatial planning in Spain. It is also stated that there are instruments and chances to properly implement the ecological connectivity within the landscape planning in Spain, therefore the materialization of such an integration is feasible.

The planning instruments listed in the autonomous Plan Use Planning laws are to play a fundamental role. It is essential the development of regulating instruments for the comprehensive Land Use Planning and its prevalence over sectorial plans.