

ECOLOGICAL CONNECTIVITY INTEGRATION INTO REGIONAL SPATIAL PLANNING AND TERRITORIAL MANAGEMENT INSTRUMENTS: A REVIEW

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Processes of habitat reduction and fragmentation are cited by the scientific community as one of the main, if not the main, causes of the current biodiversity crisis. There is growing awareness of the importance of addressing the serious ecological consequences derived from the processes of habitat fragmentation, which, from the point of view of conservation, call into question classical territorial planning policies in general, and nature conservation policies in particular. Global planning and conservation is thus required, focused on the generation of ecological networks.

Of the horizontal ecological flows and interactions that occur in the territory, those of displacement between resource patches and genetic interchange among wildlife populations are fundamental for the survival of taxa that are sensitive to the fragmentation of their habitats. Landscape connectivity or permeability indicates the degree to which the landscape facilitates or impedes movement among resource patches. Strips of land considered to be of particular interest to support such displacements are generically referred to as ecological corridors.

The development of coherent ecological networks as tools for the preservation of ecological connectivity is still incipient and as yet only at a mainly theoretical stage.

At present, the level of development of instruments to prevent processes of habitat fragmentation and loss of landscape permeability is still limited, although significant progress has been made at the conceptual level in recent years and the first initiatives have started to develop. It is therefore necessary to carry out an analysis of the existing legislative and planning documents at different political-administrative levels. The present paper seeks not only to establish the cascade of institutions, administrations and competences, but also to analyse the degree to which the different scales, institutional levels, legislative codes and planning documents take into account the concept and the need to generate true connected networks of protected areas.

At a global or worldwide scale, international conventions have attached increasing importance to the need to guarantee the geographical mobility of species and genetic interchange in order to prevent population isolation. From conservation based on the protection of specific species and places, we have progressed to the promotion of a more global view of conservation, one in which the integrity of ecological processes and ecosystems has acquired increased importance. Already in 1980, IUCN, UNEP and WWF, in their formulation of the World Conservation Strategy, cited the need to maintain essential ecological processes. Taking this as the starting point, during the 90's the main worldwide strategies progressively incorporated a holistic view to their guidelines on the conservation of biodiversity, in particular after the Convention on Biological Diversity was signed (United Nations, Rio de Janeiro, 1992).

At the 4th IUCN World Parks Congress (Caracas, 2002), calls were made to adopt integration planning in order to overcome the existing framework of isolated protected areas and evolve towards ecological networks, consisting of core-areas, linkage corridors and buffer zones. To that end, a call was made to advance in the integration of conservation and territorial planning policies.

At the European scale, and almost parallel to the Rio de Janeiro Conference, the European Community Programme of policy and action in relation to the environment and sustainable development (1993-2000) was launched, and later approved by the European Commission (1993). The Programme puts forward the integration of the environment in the configuration and implementation of EU sectoral policies and strategies. Among its main objectives in terms of conservation, the programme contemplated the creation of a coherent European network of protected areas.

Within this context, the EU approved the Habitats Directive, which together with the previously approved Birds Directive, is the most important normative document adopted by the European Union in the field of conservation. Both Directives regulate the establishment of the European ecological network called Natura 2000, consisting of Special Protection Areas. Article 10 of the Habitats Directive calls for the management of landscape elements that are necessary to maintain connectivity between Special Protection Areas, thus promoting the coherence of the Natura 2000 network, although it is not officially binding.

At the European level, the first document drafted to implement the Convention on Biological Diversity (1992) was the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) in 1995, an initiative of the European Council, the United Nations Environment Programme (UNEP) and the European Centre for Nature Conservation (ECNC). One of the principles of the PEBLDS refers to ecological integrity based on the protection of ecological processes responsible for the survival of species, and on the conservation of habitats in which these are distributed. The commitment of the PEBLDS to connectivity is directly reflected in its first Action Plan, in which the establishment of a Pan-European Ecological Network (PEEN) constitutes the first of the seven actions it develops. The PEEN is structured into core-areas, ecological corridors, stepping stones, restoration areas and buffer zones.

Subsequently to the Pan-European initiative under PEBLDS, the European Commission presented the European Community Biodiversity Strategy (1998). Among its spatial planning objectives, it points to the need to pay special attention to ecological corridors in protected areas, non-protected sensitive areas with a high degree of biodiversity, as well as rural zones,

in order to guarantee greater synergy between the development objectives and the need to conserve biodiversity.

Over the last 15 years, biodiversity conservation in Spain has been based on Act 4/1989 on the conservation of natural areas and of wild flora and fauna. In practice, the instruments provided for in this act to integrate conservation criteria outside protected areas have not been effective, due to the fact that they have not been used to the extent required. The first attempts to establish ecological corridors through legal mechanisms were focused on linear structures within the framework of the Public Water Supply and Drivers' Roads, on the basis of the provisions of the Water Act 29/1985 and the Drivers' Roads Act 3/1995.

However, maintaining connectivity in the landscape requires a more global approach and should not be restricted to linear elements in the landscape that have a limited connecting function for many species. In addition, both the Water Act and the Drivers' Roads Act have not been complied with in practice, and this has led to an increased need to include ecological connectivity criteria in open space and species conservation policies.

In terms of strategic documents, the Spanish Strategy for the Conservation and Sustainable Use of Biological Diversity was approved in 1998. The Strategy aims to be the natural bridge between European Union strategy and the strategies that the different Spanish autonomous regions, directly responsible for the implementation of the required measures and actions, would have to develop. Meanwhile, as a consequence of the recommendations derived from the 3rd World Park Congress (Caracas, 1992) and the document «Parks for Life: Action for protected areas in Europe» (IUCN 1994), an Action plan for protected natural areas of the Spanish State (Europarc-Spain 2002) was developed within the framework of the forum of organisations responsible for conservation policies in Spain created for that purpose. They specifically mention the need to generate networks of protected areas linked by corridors.

The aforementioned Act 4/1989 has been superseded by Act 42/2007 of 13 December 2007 on Natural Heritage and Biodiversity, which incorporates the concepts of connectivity and ecological corridors. The Act incorporates the contents of the Habitats Directive regarding the coherence and connectivity of the Natura 2000 network. It confers a prominent role to riparian corridors and mountain areas as elements for the promotion of connectivity, however it does not sufficiently integrate the significant role of rural and agrarian landscapes in this respect.

At the level of the Spanish Autonomous Regions, different situations and degrees of implementation are found. Some Autonomous Regions still do not include the ecological connectivity criteria in their conservation policies, while others have developed or are in the process of developing specific projects to establish ecological corridors between protected areas and to implement them in their landscape planning and in the processes of environmental impact assessment of plans and projects.

All in all, it is observed that in general terms, the integration of ecological connectivity criteria into nature conservation policies is being gradual. The process is still incipient, given that the majority of the initiatives around the world to develop ecological networks are still in their planning stages and have not yet been fully implemented.

There is still a long road ahead and high levels of activity in the field of territorial planning and management in relation to ecological connectivity are foreseeable in the coming

years. Indeed, a significant and desirable effervescence is to be expected in the development of regional spatial planning instruments for the development of true ecological networks.

At any rate, the full consideration of ecological connectivity criteria in decision making, for preventive and management purposes, will require such criteria to be included, with a binding nature, in the processes of renewing the territorial and environmental normative framework.

The integration of ecological connectivity criteria should also be reflected in the regulation of the whole of the landscape permeability modelling sectoral policies, in particular town planning, transport, agricultural and forest policies. In this respect, harnessing the potentialities of certain sectoral instruments, such as sustainable forest management certification schemes, agri-environmental schemes, and sectoral territorial plans, can largely facilitate such integration.

In addition, beyond any preventive criteria, programmes or plans for the restoration of connectivity in priority areas must be designed and realised, and the relevant budget allocation earmarked. Of particular significance in this respect are the defragmentation programmes undertaken in several European countries to permeabilise roads with a considerable barrier effect on wildlife.

Lastly, it is worth mentioning the complementary role that non-government organisations and other social agents can play in the process of integrating ecological connectivity criteria into territorial management, in that they can undertake programmes for the custody of the territory.