

SPEN – Interactions between Policy Concerning Spatial Planning and  
Ecological Networks in Europe

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## Country Study for Spain



September 2008

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**List of abbreviations**

ECTP – European Charter of Town Planning

EIA – Environmental Impact Assessment

ESDP – European Spatial Development Perspective

NCA – Nature Conservation Act

NRMP – Natural Resources Management Plan = NRMP - Plan de Ordenación de los Recursos Naturales

PEEN – Pan-European Ecological Network

PSNI - Plan of Sites of Natural Interest = PEIN - Pla d'espais d'interès natural

RPTS - Regional Plan for Territorial Strategy = PRET - Plan Regional de Estrategia Territorial

RSPP – Regional Spatial Planning Programma = POT – Planes de Ordenación Territorial

TENT – Trans European Transport Network

SEA – strategic Environmental Assessment

# 1. EXECUTIVE SUMMARY

## Spatial planning

The Spanish regions have full competencies in spatial planning, and each of them has passed laws on land planning. However, the lack of basic national legislation has resulted in a wide variety of concepts, methods and instruments.

The land planning process is taking place very slow. The first sub-regional plan was approved in 1991 and the second was not until 10 years later. Since then, others have gradually emerged, but most of the territory still lacks planning.

## Ecological networks

Until December 2007, nature conservation policies in Spain have been developed under the 1989 Nature Conservation Act, which contains no reference to ecological connectivity. In December 2007 a new national Nature Conservation Act was passed. It states the need to consider ecological networks, but this hasn't been developed yet.

In spite of the fact that there is no State policy framework for ecological networks, five regions have started to define their ecological network, but without any national coordination. Because of this, Europarc-Spain has taken the lead to coordinate and promote the development of ecological networks. At present only two regions, Catalonia and the Basque Country, have a clear policy on ecological networks.

## Integrating spatial planning and ecological networks

Because of the lack of political interest, ecological networks have not been developed, and thus incorporated into the land planning process, with the exception of the Catalanian region. However, the situation is changing and the question of ecological networks is becoming an emergent issue.

The main barriers for the planning and implementation of ecological networks probably are:

- The huge extension of nationally protected and Natura 2000 areas. The former extends over a surface greater than Greece or 3,2 times the size of The Netherlands;
- In many regions the low population density and the vastness and continuity of open spaces, seems not to encourage the development of ecological networks;
- Most regions prioritize other conservations issues in their agendas;
- the "ecological network" is still a concept that is still not widely known and well understood.

In this context it is worth noting that the regions clearly committed in the development of ecological networks have a dense infrastructure and have known a rapid urban development and have suffered a fast and intensive ecological degradation in the recent decades. They are also among the richer Spanish regions. Undoubtedly this situation contributes to the need to adopt new strategies for biodiversity conservation in the long term

## Conclusions of the questionnaires

Eighteen Spanish spatial planners filled out questionnaires during the 5<sup>th</sup> International Congress on Spatial Planning, held in Malaga (Spain) the 23-25 of November. The main conclusions of the analysis of the questionnaire are:

- The interviewees have no clear idea about the concept of "ecological network".
- There is a great potential for the development of ecological networks and their integration into land planning.

## **2. INTRODUCTION**

This report reviews the current levels of interaction between policy concerning spatial planning and ecological networks in Spain within the framework of the SPEN (Interaction between Policy Concerning Spatial Planning and Ecological Networks in Europe) project, coordinated by ECNC-European Centre for Nature Conservation.

In order to understand the situation with regards to the interactions between spatial planning and ecological networks, it is necessary to realise that Spain is a country that is politically and strongly decentralized, where responsibility for land planning and nature conservation belongs to the regions. Each of them has its own parliament, laws and policies.

It is also a country where the bulk of urban and infrastructure development is concentrated in coastal areas and in the central region, around Madrid. In the rest of the country population density is low and there are large regions where nature is continuous, with many high ecological value areas, which apparently makes the development of ecological networks less of a priority. However, since the mid-nineties, the interest about the issue has increased, certainly promoted by efforts coming from central Europe to promote the development of the Pan-European Ecological Network (PEEN).

While at national level there is still no defined policy for the development of ecological networks, there are many studies and some regions are developing an effective policy of ecological networks integrated into regional planning.

This report provides a general introduction to the issue in Spain and presents some examples of the interactions between spatial planning and ecological networks.

## **3. METHODOLOGY**

For the preparation of this report available on the Internet was reviewed. Websites of all the Spanish regional Governments related to land planning and nature conservation were included in this search, and two experts with experience about the issue in the Madrid, Navarra and Basque Country regions were consulted. All the regional legislation on land planning has been reviewed, together with some regional and sub-regional land plans, especially the most recent, to analyze how ecological networks were considered.

## **4. THE PROCESS OF SPATIAL PLANNING IN SPAIN**

### **4.1. Definition**

The Spanish constitution of 1978 attributes full competencies in spatial planning to the regions. For this purpose, the 17 regional administrations have passed laws concerning the management of their territory, but the lack of a basic national legislation has resulted in a wide variety of concepts, methods and instruments (Mata 2005).

Nevertheless, the concept of spatial planning in Spain approaches the one set out in the European Charter of Town Planning (ECTP) - Torremolinos 1983. In other words, it determines uses and activities within the territory, coordinates the policies that affect the territory, promotes territorial balance, and determines the action of the different authorities with relevant competencies on the issue (Benabent 2005). The most recent laws (Navarre, Valencia, La Rioja) also reflect the concepts, models and objectives of the European Spatial Development Perspective (ESDP, 1999).

## 4.2. Legal and policy framework

Although the regions have full competence in matters of spatial planning, the General Administration of the Nation has a number of competences that influence land planning:

- Setting the bases and the coordination of the general economic activity and aspects necessary to meet collective needs, to balance and harmonise regional and sectoral development and to stimulate the growth of income and wealth and its spatial distribution;
- Seaports and airports of general interest as well as interregional highways, railways and roads. Water resources when river catchments extend to more than one region.
- Public works of general or interregional interest.
- Basic legislation, including nature conservation.

The existence of 17 regional legislations leads to a variety of situations. In some cases the laws integrate spatial planning and urban planning, while in others it has been preferred to keep both disciplines separate. There are also regions whose legislation integrates natural resource management, spatial planning and urban planning, in an attempt to focus land planning towards sustainable development (Canary Islands).

However, spatial planning is always supra-municipal, horizontal, with a broad material content, and it is developed through plans. The legislation regulates these plans and the mechanisms for cooperation and coordination between administrations in order to assure their implementation.

Spatial planning is developed through three instruments:

- Regional planning (guidelines, strategies or regional plans)
- Sub-regional planning (districts comprising several Municipalities or other supra-municipal territories)
- Sectoral planning (major infrastructures, etc.)

### • Regional planning

Not all legislations structure spatial planning around a plan with a regional scope. In fact there are only three regions that currently possess a regional plan: Catalonia (1995), Navarre (2005) and Andalusia (2006). In other regions legislation sets out general guidelines for sub-regional planning (such as the Basque Country in 1997).

Regional plans determine spatial planning at regional level but need to be developed at a sub-regional level. The territorial model is generally organised around the town and city system, territorial relations system and the natural system.

### • Sub-regional planning

As far as sub-regional planning is concerned, there are also many differences between the regions. Some organise their territory on the basis of administrative divisions (groups of Municipalities, homogenous areas, etc.), others by geographic areas (coastal zone, mountains areas, etc.). There are also legislations that do not impose any type of territorial scope for planning, which must thus respond to needs which generally arise in the most densely populated areas, where the public authorities need to intervene to address the disorderly occupation and use of the territory.

In the island regions (Canary and Balearic Islands) sub-regional planning is organised at an island level, since each island has its own Government with competences related to planning.

The first modern Spanish sub-regional plan was approved in 1991 (Lanzarote Island, in the Canaries). The second was not approved until 10 years later, and since then others have gradually emerged. Around 30 sub-regional plans have now been approved and a similar number are at an advanced stage of development<sup>1</sup>.

At present<sup>1</sup> there are ten regions that have published some kind of sub-regional plan, and the regions in which the regional planning process is more advanced are the Balearic Islands, Canary Islands, Basque Country, Navarre, Catalonia and Andalusia.

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<sup>1</sup> November 2007

- **Sectoral planning**

Sectoral plans are plans with a territorial thematic incidence that can be developed by the different departments following specific sectoral legislation. Although there is a long tradition of sectoral planning in Spain, it has had an important development since the mid-nineties because of the needs imposed by the programming of the EU regional development funds, especially during the last three programming periods 1994-99, 2000-2006 and 2007-2013. This has led to the production of many different regional and national sectoral plans with an important impact on land planning, as those related with transport, energy, agriculture, forestry, river basin management, etc.

## Other planning instruments

Besides the planning capacity that emanates from spatial planning legislation, mention should be made on two other important instruments:

- **Urban plans**

These are a municipal competence and are developed at a municipal scale, but must take into account higher level legislation, such as spatial planning, protected areas, public domain, etc. For their definitive approval they are sent to the corresponding bodies of the regional administration, which can make suggestions or restrictions in relation with regional planning.

However, most regional legislations do not require that regional or sub-regional plans should be made prior to the urban plans (see below "The dynamics of spatial planning"). In fact, as mentioned before, regional and sub-regional spatial planning is still in an early stage, which means that most of the territory lacks any strategic supra-municipal planning. Because of this, in practice urban planning is too often the only existing planning instrument in many regions. In those territories where there is no legally approved supra-municipal land plan, town planning ends up being applied just to take local interests into account. Although they are subsequently reviewed and finally approved by the regional administration, the latter frequently lacks a strategic regional planning vision and the legal tools to ensure that specific regional criteria are included in the decision-making. This is even more critical when the plans deal with nature. In some of these cases only legally protected areas are completely left out of the urban planning process (Table 1).

<b>Table 1 Legally protected sites</b>
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- |   |
|---|
| <ul style="list-style-type: none"><li>- Sites protected by national legislation</li><li>- Natura 2000 network</li><li>- Public domain: rivers, coast, drover roads, etc</li><li>- Public utility woodland</li></ul> |
|---|

- **Natural resources management plans**

The Nature Conservation Act (NCA) of 1989 (Ley 4/89) stated that sites declared as national parks, nature parks or reserves must have their own Natural Resources Management Plan (NRMP). Today there are over 375 conservation sites protected by the NCA, of which 85% have a NRMP (Europarc 2004).

NRMPs are developed by the environmental administration, and cover the area of influence of protected areas, which includes the entire area of the affected Municipalities. They are legally binding and take precedence over all other spatial planning instruments. Besides promoting the application of measures for the conservation, restoration and improvement of natural resources, they include criteria that seek to orient sectoral policies and public and private economic and social activities.

### **4.3. Institutional framework**

As a consequence of the diversity of laws and the absence of a national framework, the institutional framework can be quite varied. However, it can be said that in all regions the planning process begins at the initiative of the regional government, which is responsible for drawing up the land planning.

To do so, most regions have developed specific departments within their administration. These are usually linked with the department of the environment, housing or infrastructure. In Navarre the regional land planning strategy is developed by a public company which depends on the Department of Housing and Land Planning. In addition to planning, this company, promotes the processes of public information, generates useful information, etc.

However these processes simply serve to deliver the technical follow-up required for the plan. Nevertheless, in view of the broad scope of planning per se, this is clearly not sufficient and ideally requires the configuration (organisationally) of political management bodies and institutions. In addition, the economic and financial programs of the plans, when they exist, limit themselves to the assignment of responsibilities to specific organisations, and because of their cultural internal structure this does not guarantee its execution. The solution put forward in some instruments to assure the execution of the plan is to provide for the setting-up (constitution) of management consortiums or the signature of agreements before their approval (Benabent 2005).

### **4.4. The Spatial Planning Knowledge Base**

For the preparation of land planning a wide variety of spatial information is used, mostly in georeferenced format. Much of the information is available to the public on the Internet on the regional official web sites, some of which have developed specific map servers.

### **4.5. Horizontal integration**

To analyze horizontal integration, we have reviewed three sub-regional plans sharing a border with France (*Advanced Plan de Ordenación Territorial (POT) Pyrenees in Navarre 2007, Advance POT Atlantic Navarre 2007; POT Alt Pirineu and L'Aran in Catalonia 2006*) and one sharing borders with Portugal (*POT West Coast of Huelva in Andalusia 2006*). All of them also shared border with other Spanish regions.

At the international level, horizontal integration focused solely on road and train infrastructure. At the inter-regional level horizontal integration is somewhat better, but remains almost exclusively focused on road and train infrastructure.

### **4.6. Vertical integration**

During the spatial planning process the proposal is directly consulted with the different administrations in order to assure the integration of the different sectoral interests. However, land planning always takes into account existing Spanish legislation and therefore the EU legislation in force, but it is difficult to know the extent to which it takes into account policies that are not legally supported. As quoted before, the most recent laws reflect the concepts, models and objectives of the European Spatial Development Perspective-ESDP (see point 4.1). Other general policies that use to be taken on to account are the UN Programme Agenda 21, the Trans-European Transport Networks (TENT-T), those promoting the use of renewable energies, etc.

At this point it should be noted that there are four major territorial units that are biosphere reserves under the UNESCO-MAB programme, the islands of Menorca, La Palma, El Hierro and Lanzarote. Here land planning and sectoral planning takes into account the obligations arising from the MAB programme.

## 4.7. The Dynamics of Spatial Planning in Practice

### • Preparation

The formulation of spatial plans is carried out by the spatial planning departments of the regional Governments. Occasionally, the regional Governments create a specific body for this purpose but in most cases it is contracted to a private company.

In general, the procedure is quite similar for all the spatial planning processes, but differences may be found. It is an open process that encourages the participation and interaction of all territorial and economic actors concerned in order to achieve the greatest possible consensus in the definition and subsequent implementation of the plan. For this purpose, most plans involve the setting up of working groups with a wide range of participants.

In the drafting of the plans the following are considered:

- Existing legislation
- Current uses of the territory
- Protected sites (including the Natura 2000 network)
- Public domain land (river banks, coast, drover roads)
- Public utility woodland
- Sectoral plans, etc.

Once a preliminary outline has been prepared it is submitted for consideration to the different regional departments, supra-municipal local bodies, Municipalities, bodies set up for consultation and participation, other interested parties in the territory, etc. All suggestions are incorporated in a special memorandum. Sometimes special working meetings are held, seminars, forums on the Internet, public surveys, etc.

All this information is used to prepare a first version of the plan, the Advance of the Plan, which is then sent to public information (1-2 months) and it is also directly consulted with the administrations concerned. The draft plan includes the following documentation:

- Memorandum
- Spatial planning regulations
- Maps
- Economic and financial study
- Environmental report, in accordance with Directive 2001/42/EC.

The inputs from this process are used to draft the Plan, to which approval is again subjected to public information (1-2 months) and a consultation with the interested parties (different departments, NGOs, Municipalities, etc).

Regional plans or regional land planning guidelines must be approved by the regional parliament, and sub-regional plans or sectoral plans are approved by the regional government. The enforcement and monitoring of the plan is the responsibility of the departments responsible for land planning (see also point 4.3).

### • Implementation

The law establishes a hierarchical order of regulations. Generally sub-regional planning is subject to regional planning, but sectoral planning is not always subject to land planning. Urban planning is always subject to land planning and sectoral planning. However this ranking system does not imply that planning should follow a certain order. In fact, most legislations do not require that the regional plans should be made prior to the sub-plans (Benabent 2005) (See also Urban planning in point 4.2).

The approval of any plan or project subject to a sub-regional plan must pass through the responsible authorities, that control its level of compliance with spatial planning guidelines.

- **Evaluation**

The evaluation of the plan is hardly considered in the legislation and only some regions incorporate it as necessary content of the plans (Benabent 2005). It should also be noted that the land planning process in Spain is still at an early stage which explains the lack of experience about monitoring and evaluation.

## **5. PLANNING ECOLOGICAL NETWORKS IN SPAIN**

### **5.1 Definition**

As in other European countries, protected sites have gradually been designated according to the need for their protection, media pressure, territorial opportunity, etc. In this way, each of the 17 regions has built up a set of protected areas, which in many regions is referred to as a protected areas network. This network of protected areas has been established under the 1989 Nature Conservation Act, which contains no reference to ecological connectivity. The current situation has resulted from of a process where the concept of a protected areas network is used to designate a group of legally protected sites which share a conservation strategy. It is, therefore, an administrative concept, rather than a physical one.

Subsequently, the Habitats Directive to a certain extent incorporated the concept of an ecological network by pointing out the need to conserve the functionality of Natura 2000 sites through the establishment of biological corridors. However, it does not provide or establish any specific instruments or criteria that provide guidance on how to integrate biological corridors in the Natura 2000 structure.

Nevertheless, the application of the Habitats Directive has served as an incentive to review nature conservation policies, extending this concept beyond a simple list of protected areas. Some regions have responded to the challenge and have developed specific policies in this direction.

The Law on Nature Conservation in Extremadura (Ley 8/1998) incorporates a definition of ecological and biodiversity corridors. These may include water courses or water bodies and their waterside areas, mountain chains, areas of vegetation, lowland plains, traditional field boundaries, ponds and waterside woodlands, if they contribute to the more coherent structuring and sound implementation of the protected natural sites network of Extremadura and their biodiversity. Is the only regional law considering corridors.

In Catalonia the concept of an ecological network has been defined as: a network of natural sites, consisting of a conjunction of sites of high natural value, which are generally protected, surrounded by buffer zones and joined together by other sites of a smaller size that are well conserved and situated in such a way as to allow the movement and dispersion of flora and fauna species and the maintenance of the flows that guarantee the functionality of ecosystems (Mallarach and Germain 2006).

- **Definition in the new Nature Conservation Act (Law 42/2007)**

More recently, in December 2007, the Spanish Parliament adopted a new national Nature Conservation Act (Ley 42/2007) which includes ecological networks, and provides the following definitions:

- Ecological network (Art. 17): a network composed of sites of high natural value which allows the movement and dispersion of flora and fauna species and the maintenance of the flows that guarantee the functionality of ecosystems.
- Ecological corridor (Art. 3): a territory of a variable size and configuration which, due to its position and its state of conservation, functionally connects natural sites of special importance for wild flora or fauna, which are otherwise separated, allowing, among other ecological processes, genetic exchange between wild populations or the migration of specimens of these species.

Therefore, it is a concept which has only very recently been incorporated into the Spanish conservation policies, also exploring the fact why it is not widely known and its meaning is still not

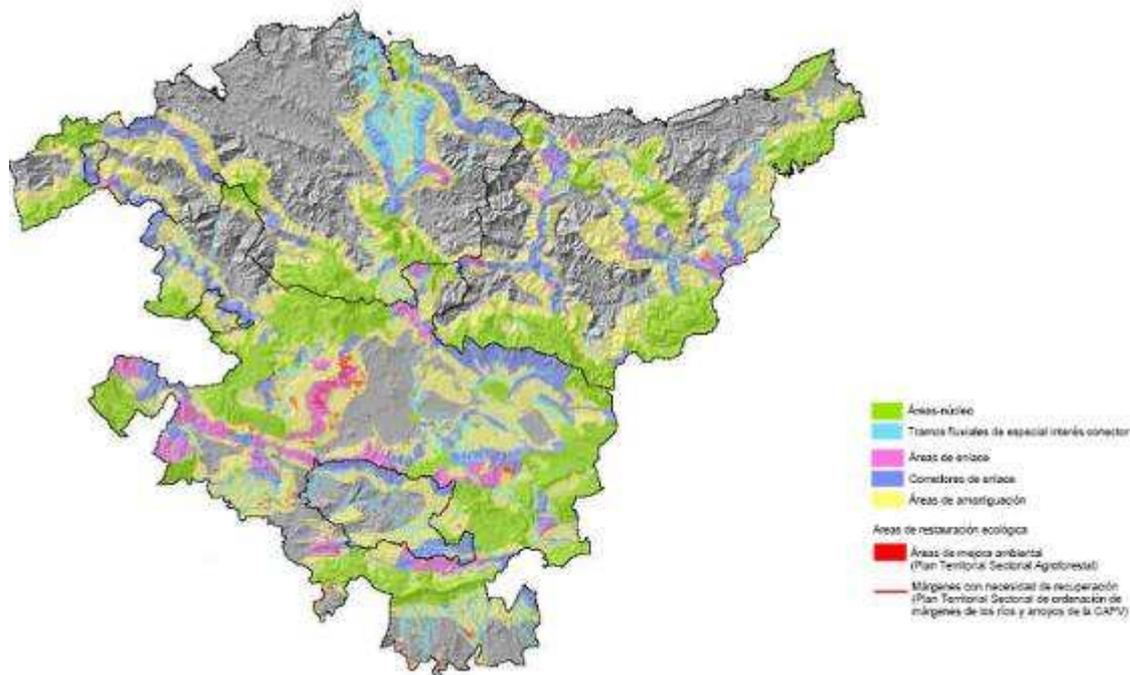
well understood among land planners and even also among environmental authorities (see annex 1).

## 5.2 Development. Legal and policy context

The concept of an ecological network emerged in Spain as a result of the EECONET initiative (Bennett, 1991). Soon after this, the first Spanish studies on the issue were carried out (CIFGB 1995; de Lucio *et al.* 1997) and little by little awareness on the issue grew.

Until 2007, the national nature conservation legal framework was based on the law 4/89 on natural conservation which did not even mention the ecological networks. At the national level, there is not yet today a comprehensive general policy framework or guidelines for the development of ecological networks, and it is not expected to be developed in the coming years.

However, some regions have moved in the direction without any national coordination. The first initiatives for the development of ecological networks emerged when the work on the Natura 2000 network started and when technical assessments were made for the Madrid (CIFGB 1995), Basque Country (IKT 1996; Gobierno Vasco 2005), Navarra (García 1998) and Catalanian (DGPNTM 1999) regions. Since then only one other region has approached to it, the Murcia region, which has made an initial technical study (ATECMA 2007).



**Figure 1. Map of the ecological network of the Basque Country region (Gobierno Vasco 2005).**

Aware of the need to develop ecological networks, the Action Plan for Protected Areas developed by Europarc-Spain (2002)<sup>2</sup> included various recommendations to this end. The first chapter of the plan is about planning in spatial management, and includes a number of urgent recommendations to be developed, such as:

- To develop regional protected areas systems including buffer areas and ecological corridors.
- The need to establish action frameworks including the overall territorial model, the natural environment conservation strategy and the protected site system, seeking to achieve its articulation with sectoral policies.

Also a specific monograph was published on the issue (Mata 2005). The plan has been reviewed recently and the recommendations it contains will be included within the first phase of the 2008-2013 working programme (Europarc 2008). This is to say that Europarc-Spain, a non governmental

<sup>2</sup> It is important to note that this is not an official strategy of the administration but a declaration of the persons responsible for protected sites meeting under the auspices of Europarc-España

organisation, has taken the lead in coordinating and promoting the development of ecological networks in Spain in the absence of leadership from the Ministry of the Environment in the central administration.

In spite of the initial developments, at present only two regions (Catalonia and the Basque Country, see case studies) have a well-defined policy to develop ecological networks. In the three regions mentioned before, work has come to a halt and in the remaining regions it has not even been initiated.

It is worth noting that the regions with a clear commitment to the development of ecological networks have a dense infrastructure and rapid urban development as a result of which they have suffered a fast and intensive ecological degradation in the recent decades. Undoubtedly this situation contributes to the adoption of this new strategy as a need for biodiversity conservation in the long term. In the rest of the country, low population density and the vastness and continuity of open spaces, seems to make the issue of ecological networks as a conservation strategy less urgent.

Another barrier to the development of ecological networks in Spain is the scarcity of resources for nature conservation. At present, protected areas under the national law cover 67.335 Km<sup>2</sup> and the terrestrial area covered by Natura 2000 is 134.150 Km<sup>2</sup>, which is equivalent to more than the surface of Greece, Bulgaria or 3,2 times the size of the Netherlands. The whole country has to "digest" this new situation, which means more people, more management plans, more legislation, new conflicts with local stakeholders, a higher budget, etc. In this sense it is important to note that Catalonia and the Basque Country are among the richer Spanish regions.

In some regions conflicts between urban interests and new protected areas or the lack of a specific legal framework are blamed for the lack of interest in Ecological networks. In fact the law on nature conservation in Extremadura (Law 8/1998) is the only regional law affording legal support to this concept in Spain. In its regional law, ecological and biodiversity corridors are conceptualised as another category of protected natural sites in the region. However in practice this concept has not yet been implemented in the region.



**Figure 2. The Spanish Natura 2000 covers 134.150 Km<sup>2</sup>, which is equivalent to more than the surface of Greece, Bulgaria or 3,2 times the size of the Netherlands. For some regions is difficult to "digest" the need of more conservation measures.**

Although there is a lack of legal support, in regions where technical work on ecological networks is taking place, the results are usually taken into account in environmental impact studies and land planning. However the level of consideration of ecological networks depends on the willingness of the parties involved.

In any case the environmental authorities in all regions tend to require that ecological corridors be taken into account at project scale; this is to say at the level of environmental impact assessment.

- **The new Nature Conservation Act (Law 42/2007)**

The new Nature Conservation Act, approved in December 2007, is applicable at national level, making it the framework law by which regional developments must abide. Because of its novelty, there are still many aspects that have not been developed. It specifies that protected site management plans (NRMP) must contribute to the establishment and consolidation of ecological corridors<sup>3</sup>. For this purpose, new NRMP must include mechanisms designed to achieve the ecological connectivity of the territory, establishing or restoring corridors (Art. 20). In this sense the law attaches priority to river courses, drover roads, mountain areas and other elements of the territory, irrespective of whether or not they are legally protected. It also places special importance on the connectivity of Natura 2000.

These site management plans are legally binding and take precedence over all other spatial planning instruments, which means that urban planning and spatial planning must be adapted to the provisions of the NRMP. For this reason, since the new conservation law has been enacted, the ecological corridors established in the new NRMP must be incorporated in all other planning.

### **5.3. Institutional framework**

There are no specific structures or administrative provisions concerning the planning of ecological networks. At present, ecological networks are promoted and developed by the departments responsible for nature conservation. So far, most of the drafts for ecological networks have not passed the stage of technical proposal and therefore have been carried out on the basis of technical criteria without following any structured administrative process. They have therefore not yet been presented to the public for information. In the case of Catalonia, where these are included in the sub-regional land plans, they are part of the land planning process (See 4.9 and case study).

### **5.4. The Ecological Networks Knowledge Base**

From a technical point of view there is a good knowledge base concerning Ecological Networks. In recent years, various contributions have been made to the design of ecological networks at various scales, from the municipal level to regional (García 1998; Marull and Mallarach 2002, 2005; Mallarach 2003, 2004; Pascual-Hortal and Saura 2007; Saura and Pascual-Hortal 2007; Gurrutxaga 2007) and many different mapping approaches have been produced, mostly in Catalonia and the Basque Country.

There also is a wide range of studies on permeability of infrastructures (Velasco *et al.* 1995; Yanes *et al.* 1995; Rosell *et al.* 1996; Rodriguez *et al.* 1996; Rosell and Velasco 1999; Mata *et al.* 2003, 2005; MMA 2006), habitat fragmentation and connectivity (Santos and Tellería 1998; Blanco and Cortes 1999, 2001; Marull and Mallarach 2005; Palomino and Carrascal 2007; Santos *et al.* 2002).

For the design of ecological networks different kind of geo-referenced information is used, including:

- Habitats, wetlands, sites of geological importance, landscapes
- Protected non urban areas (coasts, river margins, drovers roads, public use forests, etc)
- Protected areas (regional legislation, Natura 2000, etc.)
- Unsuitable areas for urban development: natural risks (geologic, flooding), slopes, technological risks, etc.
- Land use and occupation (infrastructures, urban areas, etc)

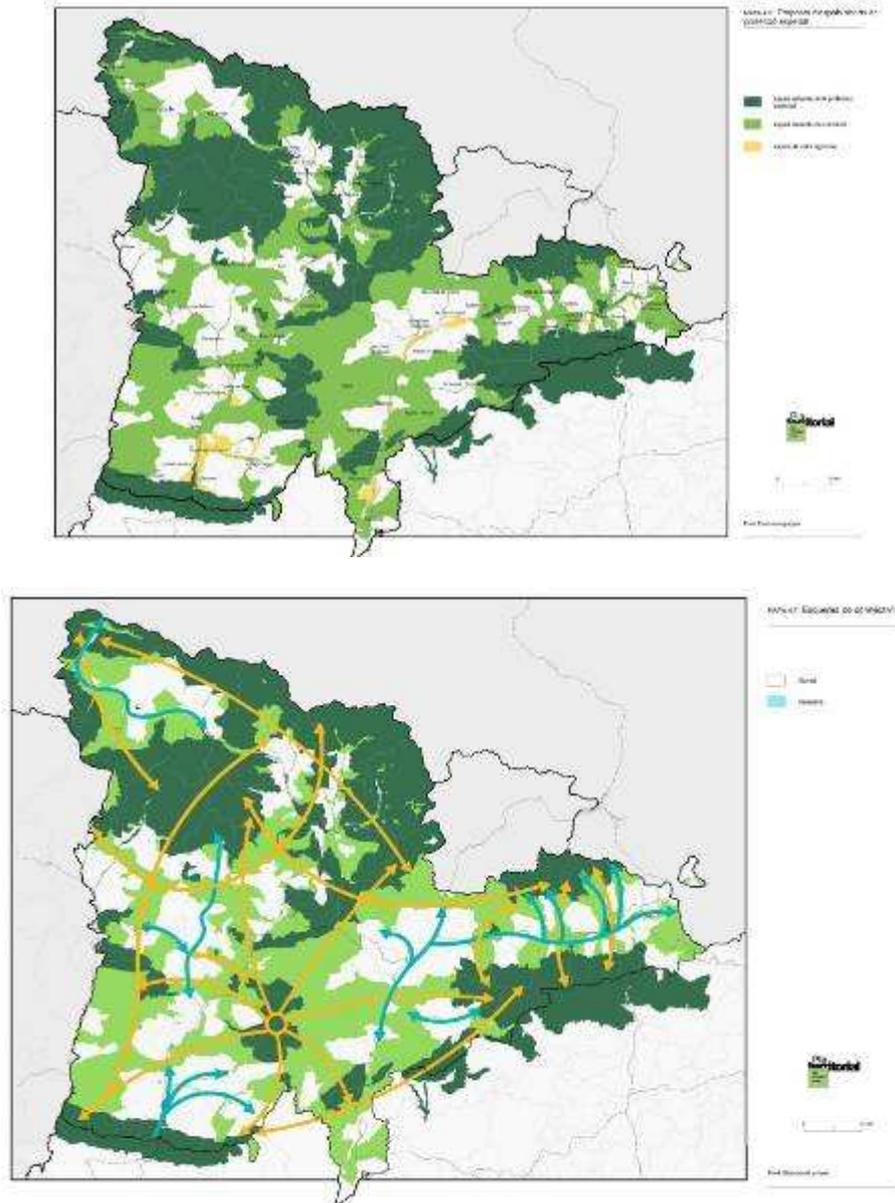
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<sup>3</sup> To see its definition, see point 2.1

Most of this information is accessible through the Internet.

## 5.5. Horizontal integration

The lack of horizontal integration also concerns ecological networks. A good example is the spatial planning of L'Alt Pirineu Aran 2006 in the Pyrenees, a district with high ecological values. This Catalan region is bounded on the North by France and East by the Aragon region.



**Figure 3. Extract from the L'Alt Pirineu Aran spatial plan (2006). The top map shows protected areas (dark green), connectivity areas (light green) and agriculture value areas (yellow) in the district. The bottom map outlines the desired connectivity. The Northern border is with France and Andorra, the West with the Aragon region, and the South and Southeast with other regional districts**

The ecological network map shows that connectivity with France and Aragon is not taken into account (Figure 3). This "lack of connectivity", which is noticeable in all the regional or sub-regional ecological network plans drafted up to date in Spain, is not due to a lack of collaboration between regions, but rather a lack of coordination, as not all regions are moving at the time in the same direction (see point 5.2).

## 5.6. Vertical integration

In Spain, interest in the ecological networks arose from the mid-90ies as a result of the development of the Habitats Directive, which encouraged a review of the existing policies regarding protected areas, and the initiatives on the Pan-European Ecological Network carried out in other European countries. In this sense, the most quoted document would probably be Bennett (1991).

The existence of a clearly defined and accepted ecological network is essential to minimize the potential impact of certain plans and programs that affect large areas, such as transport networks, spatial and town planning, etc. Since the enforcement of the Directive on Strategic Environmental Assessment (Directive 2001/42/EEC) and its transposition into Spanish legislation (Ley 9/2006) there has been a boom in strategic environmental assessment studies.

These assessments require good background information on protected areas, habitats and species, landscape and ecological networks. Very good information is available on these subjects with the exception of ecological networks, which can therefore hardly be considered in the strategic assessment. However, some research has been carried out on the integration of ecological networks in the Strategic Environmental Assessment (Marull *et al.* 2007).

At the project level, Environmental Impact Assessment (EIA) studies include field work, and usually take into account the local connectivity needs (see also 5.2). Therefore, it is rather a local and punctual approach, far away from the strategic vision of ecological networks.

## 6. INTEGRATING SPATIAL PLANNING AND ECOLOGICAL NETWORKS

So far most of the nature conservation policies in Spain did not consider the concept of ecological networks. As a consequence there is no legal support or available information for their inclusion in the land planning process (See case studies for some exceptions). Therefore, the problem is not a lack of communication between the two sectors, but a lack of definition, technical and legal, which makes it nearly impossible for planners to integrate ecological networks in the land planning process.

In regions where the concept is more widely understood, ecological networks are considered during land planning as one of the key elements. As most of these networks have no legal backing in most cases their existence depends on the goodwill of the parties concerned.

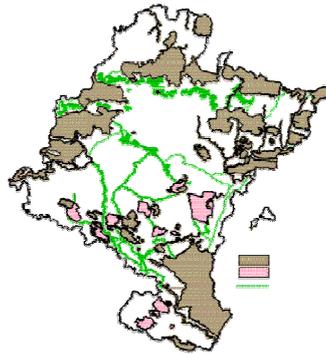
The concept of ecological network planning is a new one in Spain. It is therefore too early to consider its implementation or assessment.

## 7. CASE STUDIES

### 7.1. Navarra's regional ecological network.

The Navarra region lies in the North of Spain, and shares borders with France. The region has been one of the pioneers in including the concept of ecological networks in its conservation strategy. In 1997, the regional Government produced a first draft on how the regional ecological network should look like (Figure 4) as a useful and effective complement to the Natura 2000 network (García 1998). A year later, during the ex-ante assessment of its Biodiversity Conservation Strategy the regional Government recognised that the protected areas network was somehow incoherent, since sites were not interconnected, a factor of main importance for the functional maintenance of ecosystems (Gobierno de Navarra 1999). The aforementioned document stated that "...the network of natural sites must be transformed into a real sustainable network which guarantees the spatial and temporal integrity of all the protected territory and the corridors that serve to interconnect it by means of the corresponding management plans".

As a consequence, the concept of ecological network was included as an objective to be developed in the 1999-2004 Strategy for the Conservation and Sustainable Use of Biodiversity. This allowed its recognition as one of the guidelines for the region's spatial strategy (Agrupación Navarra XXI 2003).



**Figure 4. First draft of Navarra's ecological network (1997). In brown Natura 2000 sites, in pink nodes and in green ecological corridors.**

In spite of all the previous work, no further efforts have been made regarding the regional ecological network and the initiative is stopped at present. Meanwhile the work on the regional spatial strategy is being developed through five sub-regional plans. Although an official ecological network is lacking, during the land planning process the recommendations arising from the first draft approach are usually included.

**Conclusion:** the preparation of maps of ecological networks, even if they don't have a legal or official backing, is a very useful tool for the integration of ecological networks in land planning.

## 7.2. Catalonia's regional ecological network.

The Catalonia regional Spatial Plan was adopted in 1995 and is the master plan for all sub-regional and urban planning. Its guidelines state that planning should take into account the connection and the interaction of the areas considered within the regional Plan of Sites of Natural Interest (PEIN). Later, in 1998, a resolution of the regional Parliament called the regional Government to adopt strategic guidelines for ecological and landscape connectivity and this produced a connectivity plan of the Sites of Natural Interest (DGPNUMF 1999).

It is important to note that since the second half of the nineties dozens of studies on ecological connectivity took place in the region, mostly in relation to the Barcelona metropolitan area, but also for other Municipalities, counties and sub-regions and even for the PEIN (DGPNUMF 1999). Undoubtedly all this work contributed to raise awareness on the issue among policy makers in region.

In order to fulfil the provisions of the regional Spatial Plan, in 2006 the Department of the Environment published its guidelines for ecological connectivity (Mallarach and Germain 2006). This document includes a total of 68 guidelines for the following areas: spatial planning, protected areas, threatened and protected species, linear infrastructures, rivers, agriculture, town planning, use of biological resources, environmental impact assessment, research, information and public participation. Their application will be achieved through the different planning instruments used in environmental, territorial, town and sectoral planning legislation, including environmental impact assessment and SEA procedures. At the same time maps on connectivity indices and sites of special interest for connectivity were produced (ARDA 2006; Marull *et al.* 2006)

As a result of this policy, all the new Catalanian spatial plans include the principle of connectivity, and are structured in three systems: open spaces, settlements and mobility infrastructures (Figure 3). The system of open spaces includes the non-urban land component, and is given the same importance as infrastructure policy or town-planning, thereby making sure that ecological connections are maintained. It includes (see also Box 2):

- Special protection land: high agricultural and ecologic importance areas, including ecological connectivity;
- Territory protection land: at present not urban;
- Preventive protection land: not urban due to ecological or technological risks, landscape interest, strategic interest.

**Box 2. Extract of the l'Emporda guiding spatial plan showing how the system of open spaces have been considered for protection**

Category		Area			
Special protection	Protected areas	74,964 ha	45 %	166.083 ha	86%
	Ecological and landscape connectivity	56,979 ha	34 %		
	High agricultural value	22,522 ha	13 %		
	Natural interest, ecological, landscape and agricultural connectivity	11,616 ha	7%		
Land for territory protection				5,992 ha	3%
Land for preventive protection				1,385 ha	10%
Total non-urban land				191,421 ha	100 %

**Conclusions:** Two interesting issues arise from this case study. The first one is that research and definition of ecological networks may be a key element to help raising awareness of their importance and facilitating their implementation.

Second, the case study shows that the integration of ecological networks in land planning, is possible even without a legal framework, but when considered as a principle for land planning.

### 7.3. Implications of the lack of regional planning. The case of Madrid

A significant example is that of the of the Madrid region. It is located in the middle of the country, with an extension of 8.021 Km<sup>2</sup> (The Netherlands 41.526 Km<sup>2</sup>) and a population density of 758 inhab/Km<sup>2</sup> (The Netherlands 392 inhab/Km<sup>2</sup>).

Despite an impressive urban pressure, the region still has well preserved habitats and holds important populations of endangered species (27 pairs of Imperial Eagle, 1.295 Great Bustards, 262 pairs of Griffon Vulture, 15 pairs of Golden Eagle,...). Because of this 39% of the region has been designated as Natura 2000.

Madrid city, which together with its surrounding towns has a population of 4,5 million, is at its geographical centre. The rest of the population, up to 6 million is distributed in towns of different sizes. This huge population concentration puts a great pressure on the environment, as well as demand for land for first or second homes, for infrastructure and communications, for industries and services, water, as places for recreation or entertainment. Also it is important to note that Madrid is the main communication node in the country. Because of its central position all railways, roads and motorways radiate in all directions, while the Natura 2000 sites are disposed as an outer ring (Figure 5).

This region was probably the first where the idea of ecological networks started to be developed (CIFGB 1995; de Lucio *et al.* 1997). At the same time the regional Government started to prepare the guidelines for the regional land planning strategy (Plan of Territorial Strategy PRET) which included guidelines for the ecological networks (Fundicot 1997). However, the PRET has never been approved, although the regional law states it should. Legally, therefore it does not exist.

At present all the land planning in Madrid relies on town planning, which only take into account the interests of sectoral plans (energy, water, transport,..) and legally protected areas (Table 1).

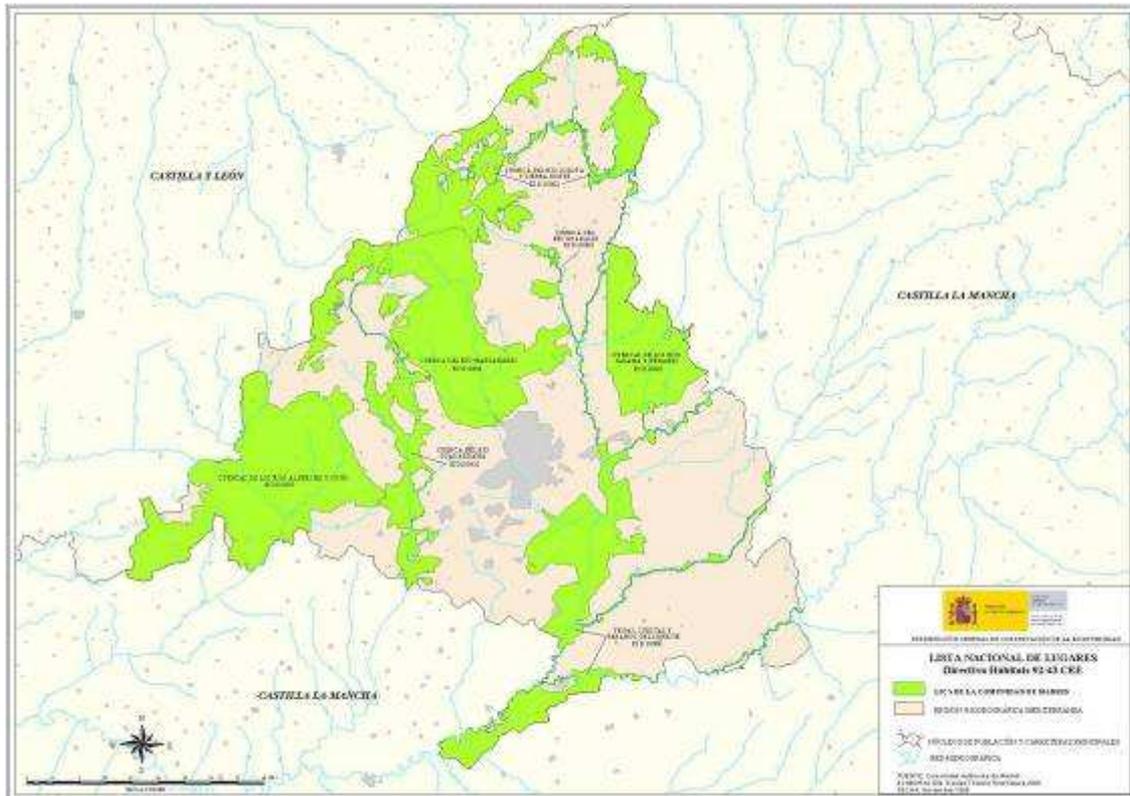


Figure 5. Map of Natura 2000 areas in the Madrid region.

During the town planning process, regional environmental authorities request urban planners to consider ecological corridors, but they are powerless because they don't have legal backing to defend them before local interests. However, urban planners often adopt an open attitude towards integrating ecological networks in their plans, but they do not possess enough background information or budget to carry it out.

As a result, it can be said that land planning in the region of Madrid is the sum of town plans, designed to attend local interests only. This assertion can be extended to many other Spanish regions in the same situation.

**Conclusion:** The future of nature conservation in high densely population regions needs both land planning and ecological networks.

## 7.4. Asturias Brown Bear Endangered Species Recovery Plan

The national 1989 Nature Conservation Act established that the regions must develop recovery plans for endangered species. Since then, recovery plans have been developed for numerous species (Lynx, Imperial eagle, etc.). One of the first was for the Brown Bear.

The Brown Bear population at the Cantabrian Mountains ranges across the territory of three regions: Asturias, Castile-Leon and Cantabria. This population is split into two populations separated by a corridor used by transport infrastructures.



**Figure 6. Distribution of the Brown Bear in the Cantabrian Mountains. (Source: Fundación Oso Pardo)**

Each of the three regions has developed its own recovery plan. These were adopted successively between 1989 and 1991. These plans were approved by decree and their content is legally binding, which means that all the different bodies and administrations must comply with their guidelines in the territorial area affected by the plan, with regard to the granting of licences, administrative concessions or any other type of authorisation or execution of works.

In 2002 the Asturias's bear recovery plan was revised, and the objective of connecting both populations was significantly reinforced (Box 3). The area covered by the plan includes all the areas currently occupied by the species, as well as areas for potential occupation and a corridor for communication between the two populations.

### **Box 3. Extract of the Asturias Brown Bear Recovery Plan (Decreto 9/2002)**

Objective 3. Assure connectivity between populations and population nuclei.  
3.1. Favour the natural connection between the two populations.  
3.1.1. Demarcate with the greatest precision the communication corridor between the two populations.  
3.1.2. Identify the elements that may hamper the dispersion of individuals.  
3.1.3. Prepare a special plan for restoration of the corridor, in coordination with the regional Government of Castile-Leon.  
3.2. Avoid any possible fragmentation of the habitat in the western population, identifying internal communication corridors.

**Conclusions:** In this case the legal backing of an endangered species recovery plan is being used for ecological connectivity, showing that this can be achieved through different instruments.

## **8. CONCLUSIONS AND RECOMMENDATIONS**

Because of the lack of political interest in ecological networks, these have not been developed in most Spanish regions and thus incorporated into the land planning process. However, the situation is changing and ecological networks are becoming an emerging issue.

Probably the main barriers for the definition of ecological networks are:

- The ecological network concept is still not widely known or well understood, even within the nature conservation community;
- Protected areas, and even more so Natura 2000 areas, cover large areas of the country. Together they cover a surface greater than Greece, Bulgaria or 3,2 times the size of The Netherlands. In addition, there are many regions with a low population density and a vast continuity of open spaces. This situation does not encourage the development of ecological networks in many regions, where there are other priority issues in the agenda.
- There is no national framework for the development of ecological networks.
- There is a lack of legal backing. However this should not be used as a main excuse for not developing ecological networks, because when these are well defined they are usually taken into account in land planning and strategic environmental assessment.

Other important conclusions are:

- The preparation of maps of ecological networks, even if they don't have a legal or official backing, is a very useful tool for their integration in land planning and strategic environmental assessment.
- Regional research on ecological networks can be a key element to raise awareness of their importance and facilitates their implementation.

To counteract these barriers we suggest:

- To promote awareness on the need of ecological networks among those responsible for nature conservation at the national and regional levels and NGOs. This will improve the knowledge about the concept, promote the need of ecological networks for long term biodiversity conservation, except in regions with low urban and infrastructures development.
- To promote the design of ecological networks. If it is not on the agenda of the regional administrations it could be done through NGOs. The same was done with Important Bird Areas, a non officially recognised document, to promote the designation of Special Protection Areas under the Birds Directive.
- The creation of a national working group bringing together the regional nature conservation authorities. Its first task should be to create a national ecological network framework.

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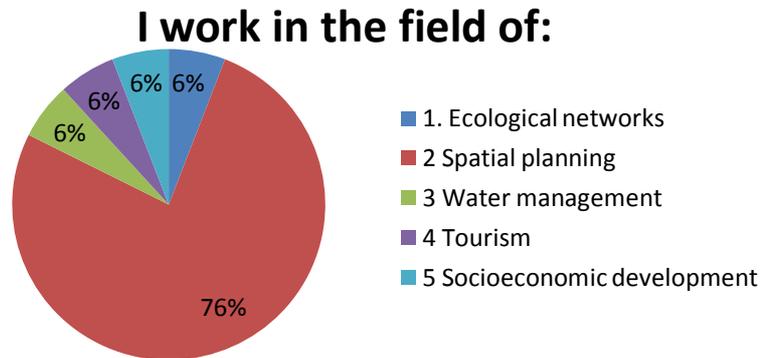
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## ANNEX 1. RESULTS OF THE QUESTIONNAIRE

### Background

Nineteen questionnaires were filled out during the 5<sup>th</sup> International Congress for Spatial Planning, held in Malaga (Spain) on 23-25 November 2007. This analysis includes only the eighteen questionnaires filled out by Spanish delegates to the Congress. Most of them worked in spatial planning.

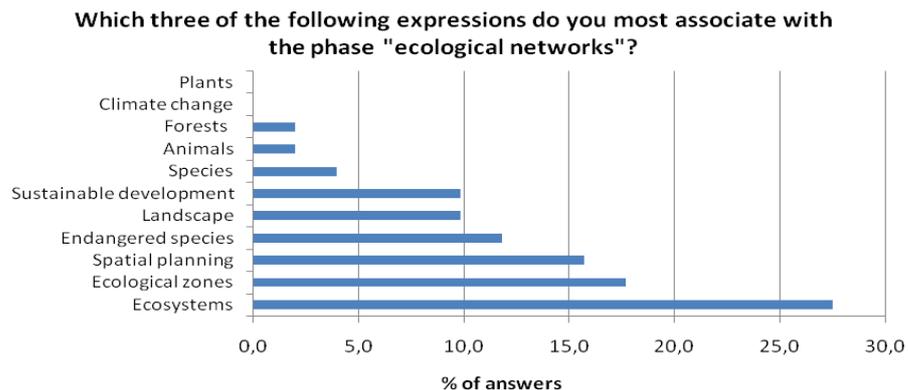


## SECTION 1. Awareness/understanding of the concept of ecological networks and spatial planning

### 1a. Understanding of the concept of ecological networks

1.1 72% of the people replied to be aware of the concept of ecological network, and of its different methodological approaches. A higher percentage (83%) indicated to be aware on its purpose.

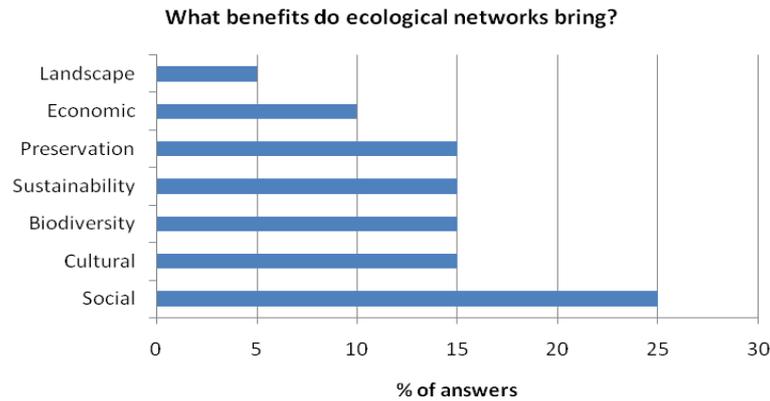
1.2 The expression most associated with ecological networks is "ecosystems" (27% of the answers), followed by "ecological zones" (17%) and "spatial planning" (16%).



1.3 Most of participants were not aware of the Pan European Ecological Network (84%) and its indicative maps (72%).

1.4 However 70,5% said to be aware of the Natura 2000 network.

1.5 To the question on what benefits do ecological networks bring, 25% of the answers said to be social and 15% said to be cultural, biodiversity, sustainability or nature conservation.



### **1b. Understanding of the concept of spatial planning**

1.6 Nearly all the participants said to be aware of the definition of spatial planning (94%) and a similar percentage of the Spanish definition for spatial planning.

1.7 However, people were less aware of the spatial planning system (76%). Of the four people that indicated not know, two worked in different areas than land planning, one worked on land planning, and the remaining didn't say were.

## **SECTION 2. personal involvement with ecological networks and spatial planning**

2.1 All the respondents (100%) said that the ecological network concept has a value in spatial planning. The most common answers for it were, because:

- it's a main issue for spatial planning
- it's a value that must be considered
- protected areas can not be understood without it
- for environmental integration

2.2 Only the 27% of the participants said to be involved in the creation of ecological networks. Of the remaining people, 46% indicated being interested working on the issue only at sub-national level, a 23% at any level and one said only at the national level. The former worked in remote sensing applications. Another 23% said not being interested to be involved in the issue.

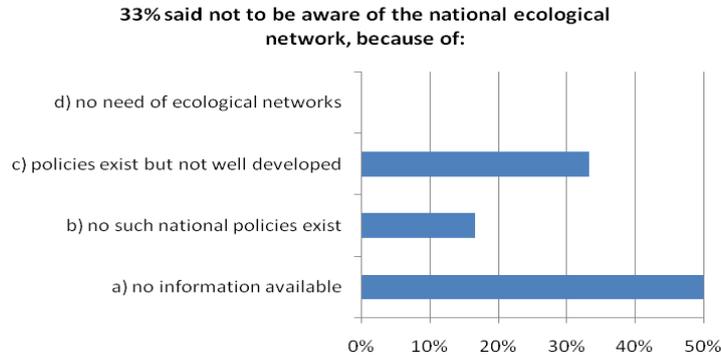
2.3 Most of the people (94%) said that spatial planning has a value in creating ecological networks, because of:

- the spatial planning definition;
- it being an instrument;
- to add value to ecological networks;
- for nature conservation.

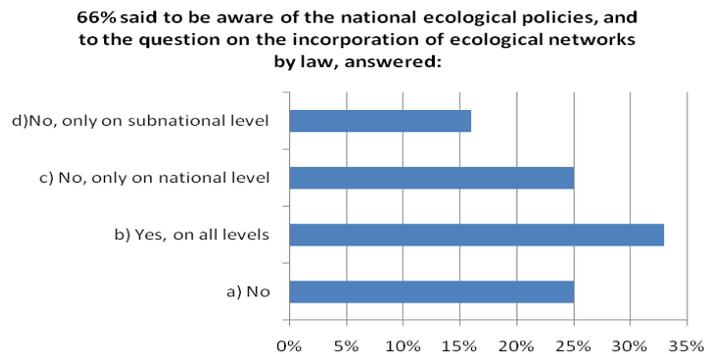
2.4 The only negative answer was argued because spatial planning should consider ecological networks, and no the other way round.

## SECTION 3. Awareness of policies with regards to ecological networks and spatial planning

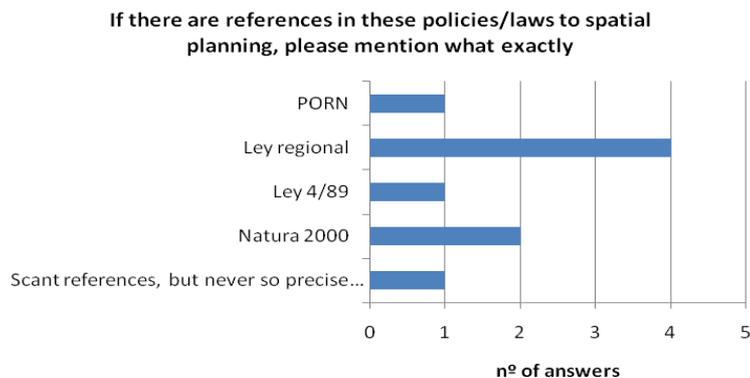
3.1 66% are aware of the national ecological network policies. Those not aware said it was because there was no information available (50%), no such national policies exist (16,6%) or policies existed but were not well developed (33,3%).



3.2 The rest of the respondents (66%) indicated being aware of the national ecological network. Of these, 25% said that ecological networks are not incorporated by law, 33% that they are incorporated at all levels, 25% only at national level and 16% just at sub-national level.

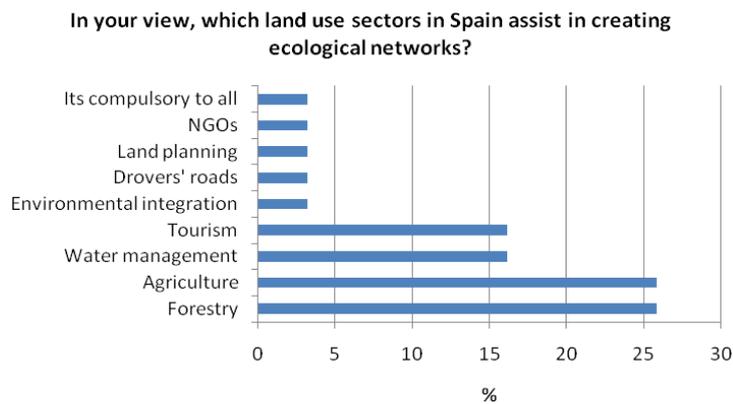
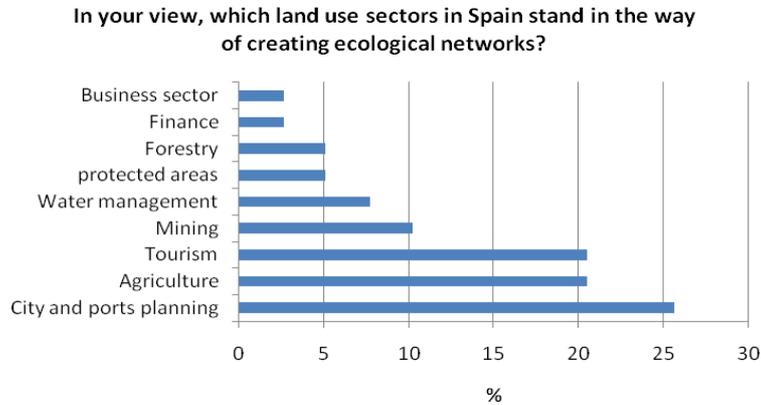


3.3 Of the people saying to be aware on the national ecological network, a 53% said that in these policies/laws there are reference to spatial planning, more specifically in the following:



3.4 32% didn't know if in those policies there were any references to spatial planning. 12% said not knowing.

3.5 Only 32,3% of the people said that ecological networks in Spain were fine-tuned with the European Ecological Network, and specifically by means of Natura 2000. The rest said that the ecological networks were not tuned-in with the EEN, didn't know or just didn't answer, which could be interpreted that they didn't know.



3.6 For the participants, the land use sectors standing in the way of creating ecological networks are city and ports planning, agriculture and tourism. On the other hand, the sectors that contribute most are forestry, agriculture and water management.

3.7 66,6 % of the people were aware of national planning policies in Spain. 71% of these said that within these policies there are references to ecological networks, and more specifically some references to green corridors, Natura 2000, protected areas and environmental legislation.

3.8 82,3% see spatial planning as a positive sector for assisting the establishment of ecological networks.

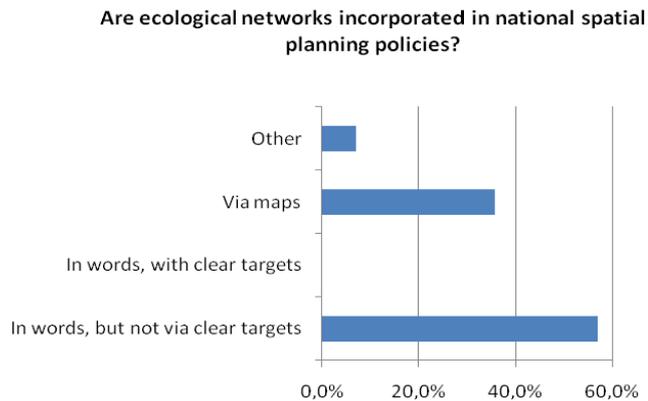
3.9 The land planning items they would like to change with respect to ecological networks include:

- Better coordination is needed;
- Definition of ecological networks;
- Strategic environmental assessment;
- Monitoring;
- Role of agricultural landscapes;
- Land use;

- Building;
- Infrastructures;
- Planning scale;
- Enforcement;
- Law.

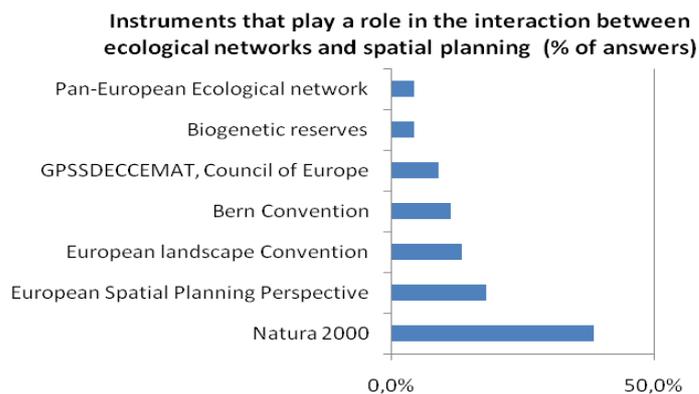
3.10 For 55% of the respondents, spatial planning was conceptually and technically compatible with the development of ecological networks.

3.11 In relation to the incorporation of ecological networks in national spatial planning policies, they said:



3.13 50% said that spatial plans are incorporated by law on all levels, and 37% that they were so only at sub-regional level.

3.14 Instruments that participants said to play a role in the interaction between ecological networks and spatial planning were:



## **SECTION 4. Cooperation between ecological networks and spatial planning sectors.**

4.1 Most of the people (72%) were not aware of practical experiences with regard to cooperation between nature conservation the and spatial planning sector, or with regard to the design and developing of ecological networks. Experiences were mentioned in relation to river corridors (public

river domain), coordination in relation with the enforcement of legislation, and the share of information.

4.2 The most mentioned barriers for the inclusion of ecological networks into spatial plans were:

at the national level:

- the lack of competences (44%);
- growth pressures (44%).

at the regional level:

- Growth pressures (40%);
- Lack of knowledge (20%);
- Lack of coordination with other levels (13%).

At the local level:

- Growth pressures (44%);
- Lack of coordination with other levels, private interest, lack of resources and lack of knowledge (14,3% each).

4.3 Finally, when asked about their ideas for increasing the active involvement of the spatial sector in the development of ecological networks, most respondents recognised that it offered great potential and substantial possibilities.

## **CONCLUSIONS**

**It does appear that the respondents have no clear concept of ecological networks.**

Although in their first replies say that they are (1.1), some other replies suggest they may not. For example:

- They said that the main benefit of ecological networks is cultural followed, at the same level, by cultural, biodiversity, conservation or other interests,.. (1.5).
- The majority said to know the ecological networks policies (3.1), when the reality is that at the moment that the questionnaire was done, there was no national policy, and a few regions have a policy on ecological networks. Even 58% say that ecological networks are built by law at the national / or all levels (3.2). This response suggests that the majority of respondents assimilates the Natura 2000 network to ecological network since its implementation in Spain has been done at the national level.
- Later, the majority of respondents who say to keep pace with the land planning policies, say these include references to ecological networks (3.7), while this is not true. Indeed when asked to specify, they answer: green corridors, Natura 2000, environmental laws and protected areas. In fact very few (27%) are aware of practical experiences of cooperation between management and ecological networks (4.1).

It is striking at this point, to note how little knowledge there is about the Pan-European Ecological Network (1.3, 3.14). However, it should be mentioned here that some of the people aware of the PEEN were land planners.

**There is a great potential for the development of ecological networks and their integration into land planning**

Almost all would like to participate in the establishment of ecological networks (2.2), especially at the regional level, which is logical because it is where the competences are. But very few do, and mostly belong to the world of land planning.

Most believe that spatial planning has value to create ecological networks (2.3), and that it is a positive sector for assisting its establishment (3.8).

Finally, the majority found a great potential for the future development por ecological networks (4.3)