

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

Country Overview: Key findings and recommendations

A distillation of the Key findings and recommendations from the five Country
Reports and the international workshop in Oisterwijk 1-2 October 2008

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1 Executive Summary

There is now a clear need to support and actively drive the move towards the practical implementation of ecological networks throughout Europe. Spatial planning is a decisive sector in the planning of land use in space and should therefore play a crucial role in the implementation of ecological networks. Various social interests play a role and various actors promote these interests; spatial planning policy plays an integrating role with respect to the spatial placement of the various needs of modern society.

Now that spatial planning has penetrated to European, national and regional policy, it is important that spatial planners are well informed about the backgrounds and possibilities of ecological networks and how they can contribute without placing pressure on other social interests. The Dutch Ministry of Agriculture, Nature and Food Quality (LNV), in recognising the potential role of spatial planning, has sponsored the SPEN project; whose aim is to investigate the level of interaction between spatial planning and ecological networks (and to provide a catalyst for increased interaction) and to increase the involvement of spatial planning in the further development of ecological networks in Europe.

This report summarises the key findings and recommendations arising from the five country reports (the Czech Republic, Denmark, Germany, The Netherlands and Spain) and the international workshop: Ecological Networks: From Spatial Strategy to Implementation, held in Oisterwijk (the Netherlands) on 1 and 2 October 2008 where seventy participants from 18 European countries gathered to discuss the planning and implementation of ecological networks in Europe.

In particular, it was found that the processes of spatial planning and planning ecological networks both have different levels of development, elaboration, implementation and significance in different countries. These differences, as well as interactions between these two fields are the result of many factors.

These factors include country's geography and history. For instance in the Netherlands where the landscapes are predominantly cultural; its history is marked by a battle against the water; space comes in a short supply; all together leading to nature under increasing pressure. This has contributed to a high level of interaction between spatial planning and ecological networks.

The situation in Denmark is determined by almost a century long tradition of spatial planning; while the Czech Republic accepted the ecological networks concept in the late 1970s. In both countries a long tradition in either of the two disciplines resulted in a certain level of integration among the two fields.

Germany and Spain have federal government structures with highly decentralised powers. In Germany the federal government has a higher level of competence regarding ecological networks which occupy a prominent position in the federal Nature Conservation Act. In Spain however there is a lack of defined policy on ecological networks at the national level; thus, whilst there are some good examples at regional level these are isolated and, for the majority there is nothing tangible in place.

Observed differences in spatial planning-ecological networks between the five selected countries can also be attributed to cultural differences, which are also closely connected to their traditions, history and geography.

Spatial planning could and should play a crucial role in the implementation of ecological networks and this and many other recommendations for policy and research form the conclusion to this report.

2 Introduction

There is now a clear need to support and actively drive the move towards the practical implementation of ecological networks throughout Europe. Spatial planning is a decisive sector in the planning of land use in space. Various social interests play a role, such as the need for housing, mobility, production areas, open spaces and nature. Various actors promote these interests and spatial planning policy plays an integrating role with respect to the spatial placement of the various needs of modern society.

Spatial planning should play a crucial role in the implementation of ecological networks on the ground. Now that the approach has penetrated to European, national and regional policy, it is important that spatial planners are well informed about the backgrounds and possibilities of ecological networks and how they can contribute without placing pressure on other social interests. The Dutch Ministry of Agriculture, Nature and Food Quality (LNV), in recognizing the potential role of spatial planning, has sponsored the SPEN project; whose aim is to investigate the level of interaction between spatial planning and ecological networks (and to provide a catalyst for increased interaction) and to increase the involvement of spatial planning in the further development of ecological networks in Europe.

This report summarises the key findings and recommendations arising from the five country reports (the Czech Republic, Denmark, Germany, The Netherlands and Spain) and the international workshop: Ecological Networks: From Spatial Strategy to Implementation, held in Oisterwijk (the Netherlands) on 1 and 2 October 2008 where seventy participants from 18 European countries gathered to discuss the planning and implementation of ecological networks in Europe.

2.1 Overall project goals

The general goal of the project was twofold:

1. To map the level of interaction between policy on spatial planning and ecological networks in Europe; and
2. To contribute to enlarging the involvement of spatial planning in the further development of ecological networks in Europe.

2.2 Context: spatial planning as a key delivery mechanism for ecological networks

Ecosystems in Europe have been considerably fragmented by various forms of land use including agriculture. Nature areas – whether protected or not – are made up of small to large fragments which are isolated islands in the midst of intensive agriculture, construction or transport infrastructure. The ecological network approach has been developed over the past few decades. At first, these networks, particularly in Central and East European countries, were developed from an integrated approach to land-use zoning and environmental management within a strong national spatial planning system. West European countries were focused more on linking fragmented ecosystems with each other in order to promote exchange between populations of species and to enable the migration and the spread of species (landscape ecology approach). In general it is assumed that building up a coherent ecological network of core areas, corridors, buffer zones and nature development areas is seen as one of the most effective measures for the protection of species and habitats and sustainable development of nature and biodiversity, together with ensuring resilience to the effects of climate change.

There is now a significant weight of policy behind the gathering momentum for the practical delivery of ecological networks. The Environment Council Conclusions of December 2003 prepared for the 7th Conference of Parties to the Convention on Biological Diversity (CBD-COP7, Kuala Lumpur, 2004) call for the development, by 2010 on land and 2012 at sea, of comprehensive, ecologically representative and effectively managed national and regional systems of protected

areas and ecological networks integrated into a global network. These systems of protected areas and ecological networks should be integrated into the broader landscape and seascape so as to maintain ecological structure and function. COP7 adopted decisions that reflect this priority and the position has been reconfirmed in the Council Conclusions for COP8 of March 2006. At COP9 in 2008 further decisions with regard to practical implementation were taken. The Pan-European Biological and Landscape Diversity Strategy, adopted in 1995, includes a particular focus on developing a Pan-European Ecological Network. At the Sixth Ministerial Conference "Environment for Europe" in Belgrade, Serbia (10-12 October 2007) the conference ministers received a report from the Council of Europe, Committee of Experts for the development of the Pan-European Ecological Network: "The Pan-European Ecological Network: taking stock" which informed them on the progress of work in the constitution of PEEN as a follow up to the previous Ministerial Conferences (mentioned above). This clearly illustrates that within European policy ecological networks are becoming more important. Indeed, a growing number of European countries have already integrated the ecological network approach into their national legislation and or policy.

Strategic priorities based on international policy agendas have created favourable conditions for the realisation of the objective of creating a Pan-European Ecological Network, including political support, policy planning and implementation, scientific underpinning, and communication. In these processes, stakeholder involvement is a necessity and a well accepted concept in implementing nature conservation targets in many countries. The final aim is to have ecological networks fully understood and applied where appropriate, as a major instrument for sustainable management and use of all areas important for biodiversity, inside as well as outside protected areas with the involvement of relevant sectors, governmental organizations and key stakeholders.

The Pan-European Biological and Landscape Diversity Strategy (PEBLDS) states that the Pan-European Ecological Network (PEEN) should be finalised by 2015, and this aim has been reinforced and elaborated in the subsequent Kyiv Biodiversity Resolution and the Kyiv action plan for ecological networks (ECE/CEP/108). The EU has committed itself to the Kyiv Resolution on Biodiversity. This resolution was adopted at the 5th Ministerial Environment for Europe Conference in 2003, and includes the objectives:

- That by 2006, the Pan-European Ecological Network (core areas, restoration areas, corridors, and buffer zones, as appropriate) in all States of the pan-European region will be identified and reflected on coherent indicative European maps, as a European contribution towards the global ecological network. Furthermore within the framework of the CBD, a work programme has been developed for protected areas and ecological networks, which calls for the establishment of such networks where appropriate.
- By 2008, all core areas of the Pan-European Ecological Network will be adequately conserved and the Pan-European Ecological Network will give guidance to all major national, regional and international land use and planning policies as well as to the operations of relevant economic and financial sectors.

It was envisaged that PEEN should be based on existing initiatives and European directives, its backbone being Natura 2000 (comprising Special Protection Areas under the Birds Directive and Special Areas of Conservation under the Habitats Directive) and the Emerald Network. Thus, Article 10 of the 1995 Habitats Directive, specifically relates to land-use planning, the development of policies and the exploration of possibilities for improving ecological coherence between sites designated under the directive, and provides further strong direction for EU Member States. The focus of the European Commission on enhancing connectivity even further increased in 2006, with the EC Communication: 'Halting the loss of biodiversity by 2010 – and beyond' COM (2006) 216 final. Objective 1 of this Communication calls for member states 'to strengthen, coherence, connectivity and resilience of the (Natura 2000) network.

During a seminar (organized by ECNC and the Council of Europe in Strasbourg on 11 and 12 October 2006) the Council of Europe presented the role of spatial planning in reaching its goals with respect to sustainability. The CEMAT (European Conference of Ministers responsible for Regional Planning) in particular played a leading role in this. The theme of the 14th session of the CEMAT (26-27 October 2006, Lisbon) was '*Networks for sustainable spatial development of the European continent – Bridges over Europe*'.

The Netherlands actively supports the building of a Pan-European Ecological Network and of national ecological networks in Central and Eastern Europe. During a workshop organized by the Ministry of LNV on the involvement of other sectors in the development of ecological networks in

Europe ('PEEN and People', Den Haag, 21-23 April 2004), it was concluded that priority should be given to creating more insight into the awareness, relevance and appreciation of the ecological network approach in these sectors. The spatial planning sector was named as one of the four crucial sectors for a successful execution of the terrestrial part of PEEN. This sector is important because of its role in balancing the requirements of ecological networks with those of other spatial functions. These conclusions are in line with the priorities which were fixed earlier in the Action Plan Ecological Networks that was drawn up under the PEBLDS process.

Spatial planning is therefore a decisive sector in the planning of land use in space. Various social interests play a role, such as the need for housing, mobility, production areas, open spaces and nature. Various actors promote these interests and spatial planning policy plays an integrating role with respect to the spatial placement of the various needs of modern society.

In Europe we see two distinct differences as regards the integration of the ecological network approach into policy. In Western Europe the landscape ecology approach has been gradually embraced by government policy, especially in the environment and nature sector. Conversely, in Central and Eastern Europe the source is more in nationally controlled environment and spatial policy and an integrated translation to local level. The ecological network approach is currently included in policy and/or legislation in many European countries.

Spatial planning should play a crucial role in the implementation of ecological networks on the ground. Now that the approach has penetrated to European, national and regional policy, it is important that spatial planners are well informed about the backgrounds and possibilities of ecological networks and how they can contribute without placing pressure on other social interests. The following elements are therefore essential in using policy on spatial planning as an instrument for the implementation of ecological networks:

1. Availability of easily-accessible information on approach and practice of ecological networks.
2. Know who has got the necessary experience and knowledge on the subject.
3. Develop a dialogue between spatial planners and (landscape) ecologists.
4. Learn from practical experiences.
5. Build on existing processes, instruments and networks in order to reach a coordinated and standardized approach in a European context.
6. Full integration in spatial planning of the objectives that are aimed for through developing ecological networks.

Only when these elements have been elaborated can sustainable ecological networks be developed and supported by various space-using sectors; this can then provide the basis for working towards the sustainable protection of biodiversity.

2.3 Establishing the status of current knowledge

In recent decades a lot of research has been carried out on ecological networks, but this was mainly focused on the more ecological aspects of the networks. In both national and international research in this area the defining of corridors in particular has received much attention. Various overviews of the most recent insights, concepts and approaches with respect to spatial planning and ecological networks in European countries or regions are available. In addition, research has been carried out on the scientific basis of methodologies for mapping ecological networks. As part of the PEBLDS process, indicative maps have been developed for the Central and East European region and for South-East Europe. A similar initiative is currently being undertaken for West Europe, with financial support from the Ministry of LNV.

Only in the last few years has research been initiated in order to try to explain the fact that support for the ecological network approach can differ between countries and to examine the different ways in which countries take up the concept and incorporate it into policy and legislation.

There has not yet been a comparative study on the interaction between policy on spatial planning and ecological networks in Europe. The need for such a study has arisen, with the emphasis on international ecological networks, especially PEEN, and translation to national and regional

ecological networks and the role of spatial planning therein. Also, there is currently no European knowledge network that covers both fields. The ESPRID network (European Spatial Planning Research and Information Database) focuses solely on spatial planning with almost no attention to ecology. In the framework of a study for ESPON, to which ECNC contributed, the relationship between nature and spatial planning was analysed, in particular the development strength that can be produced by nature in spatial planning. This experience showed that the ecological network approach is still not at all integrated into European spatial planning thinking.

In 2003 the EPBRS (European Platform for Biodiversity Research Strategy) also formulated recommendations, albeit limited from the viewpoint of protected areas, for further study of buffer zones and connectivity and the relation between protected areas and social context.

More recently, in its biodiversity communication (2006) the European Commission has called for action to analyse and strengthen by about 2008 the coherence, connectivity and resilience of protected areas, and to support biodiversity actions in the wider surroundings. The latter in particular offers points of contact with spatial planning.

In implementing this policy, the question arises of how far spatial planning policy should use the ecological network approach as a starting point (for sustainable development or biodiversity). Is this approach seen as strengthening or hindering spatial planning? Which other sectors play a role, and what are the relationships in the determination of spatial planning? Which actors determine this policy and what is taken into consideration? Above all, where, how and from what source or individual do they obtain knowledge on this subject? Do we actually see a difference between European countries?

The project therefore aimed to answer the following specific questions:

1. To what extent are policy regarding spatial planning and policy regarding ecological networks based on the same conceptual and policy assumptions?
 - a. At European level: to what extent do initiatives such as the European Spatial Development Perspective (ESDP, EU) and Guiding Principles for Sustainable Spatial Development of the European Continent (GPSSDEC-CEMAT, Council of Europe) take account of the Pan-European Ecological Network (PEEN) or other ecological networks? To what extent are these initiatives compatible with PEEN? To what extent do instruments such as Natura 2000, the Bern Convention and the European Landscape Convention play a role in the interaction between ecological networks and spatial planning?
 - b. At national level: to what extent does national spatial policy take account of ecological networks? To what extent is spatial policy conceptually and technically compatible with the development of ecological networks? To what extent do landscape policy and policy aimed at protection of natural areas have a mediating role between spatial planning and the development of ecological networks?
2. What practical experiences are there in Europe at international and national level with regard to cooperation between the nature conservation sector and the sector of spatial planning with regard to designing and developing ecological networks?
3. To what extent is the 'ecological network approach' known to actors who are involved in developing and implementing national and international policy with regard to spatial planning, and to what extent is this approach seen as relevant and useful for their work?
4. What are the perspectives for enlarging the active involvement of the spatial planning sector in the development of ecological networks in Europe? To what extent can one build on existing processes, instruments and networks?

2.4 Methodology

The research methods applied to achieving the formulated objectives comprised the following elements.

Literature study: to review previous studies on ecological networks, interaction with spatial planning and the role of actors in these, as well as international and national/regional policy documents on ecological networks and spatial planning. Some of the authors of these studies were included in the project team. In addition to the European studies, the national/regional literature study focused on five countries: Czech Republic, Denmark, Germany, the Netherlands, and Spain. A partnership was created with institutes in the countries concerned (see below).

The selection of countries was based on the following considerations:

- The Netherlands: frontrunner in the field of ecological networks in Europe from the perspective of landscape ecology, promoter of PEEN, extensive network and knowledge on ecological networks as well as spatial planning, home base of the client. Project partners with excellent access to Dutch networks and knowledge.
- Denmark: developed physical regional planning according to the frame contained in the "Act on Planning". One key article here concerns that planning should secure conservation and nature protection interest in the open countryside, including considerations for nature areas with special protection needs. The guidance from the Ministry of Environment to the Counties indicates that ecological corridors between such areas should be considered, including considerations for strengthening and development of these corridors. There is extensive experience available in the country.
- Germany: federal structure with decentralized powers. This provides the opportunity to analyse what the effects are of decentralization of spatial planning policy on the implementation of ecological networks. There is extensive experience with implementing ecological networks. Partner has specific experience in the field of regional spatial development and with transnational cooperation with the Czech Republic. The focus will be on the regions of Saxony and neighbouring regions *Karlovarský kraj* and *Ústí nad Labem*.
- Spain: federal structure with decentralized powers. Same opportunity as for Germany with regard to decentralization. Represents southern European style of policymaking (more top-down and reactive). At regional level (e.g. Barcelona Regional Planning, Castel *et al.*, 2006) well advanced with regional spatial plans in which the most important corridors are included. Conflicts between protected areas and infrastructure development are common. Recent efforts (e.g. Madrid region) to develop guidelines for spatial compensation in line with art. 6(4) of the Habitat Directive. Partner with extensive experience in strategic impact assessment, including spatial planning and Natura 2000. This study can provide more depth to previous results of country research as carried out in the frame of the *Eurosites insights* survey (Neven & Kistenkas, 2005).
- Czech Republic: represents Central European region. Ecological network approach was already integrated into physical planning in the seventies (Territorial System of Ecological Stability) and included in legislation in 1992. Transition from communist regime to market economy and subsequent accession to the EU make this an interesting case for comparison with other countries. Partner has leading role with regard to TSES and geographic information in the Czech Republic.

Network survey: an investigation of which actors at European level and in the selected countries are essential in the interaction between spatial planning and ecological networks. An actor analysis was carried out in order to look into the most important institutes and individuals, their role in various networks, the way in which interests are determining in decision making, the knowledge used, and the information channels used.

Interviews: as a component of the network survey, interviews were held with a selection of the most influential individuals, both substance experts as well as decision makers. These interviews focused on the above-mentioned aspects.

2.5 The outcomes of the SPEN project

The end products resulting from the above activities are combined in a specially prepared project Portfolio (which includes this report) as follows:

1. Overview of most recent insights, concepts and approaches regarding spatial planning and ecological networks in European countries or regions.
2. Analysis of interactions and possible bottlenecks between both circuits and the position of territorial nature policy and landscape policy in relation to spatial planning (Literature report including overview of most relevant sources of knowledge).

The products listed above (1 & 2) appear as two separate papers in the Portfolio under the divider headed "European Review".

3. This report - the "Country Overview"; which consists of an overview of national policy fields regarding spatial planning and ecological networks in five countries –. This part also looks into the coherence between national policy in the selected countries, at regional and/or European level. The overview will also contain a list of concrete recommendations for further action based on the outputs from the international workshop: Ecological Networks: From Spatial Strategy to Implementation, held in Oisterwijk (the Netherlands) on 1 and 2 October 2008 where seventy participants from 18 European countries gathered to discuss the planning and implementation of ecological networks in Europe..
4. The five "Country Reports".
5. The Portfolio.
6. A International Workshop on Planning, Stakeholder Involvement, Practical Delivery and Cost-benefits of Ecological Network, held in Oisterwijk (the Netherlands), on the 1st and 2nd of October 2008: 'Ecological Networks: From Spatial Strategy to Implementation. This workshop was convened in order to jointly promote the SPEN and KEN projects. Note that there is a direct link to the Knowledge for Ecological Networks Project (KEN), presented in a 'sister' Portfolio to this one. The project has therefore allowed a better access to knowledge and information through the workshop and:
 - The creation, together with KEN, of an active network of experts, policy makers and practitioners.
 - An attractive and functional website: www.ecologicalnetworks.eu.

2.6 The project partners in the SPEN project

- Agency for Nature Conservation and Landscape Protection (Czech Republic);
- Leibniz Institute of Ecological and Regional Development, IOER (Germany);
- Orbicon (Denmark);
- SyZyGy (the Netherlands);
- Terra (Spain).

3 Key findings

3.1 The processes of spatial planning

Among the countries included in this review, we observe similarities, but also some significant differences with regards to the process of spatial planning.

In all of the countries spatial planning is defined in terms very close to the definition of spatial planning as adopted in 1983 by the European Conference of Ministers responsible for Regional Planning (CEMAT):

"Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organization of space according to an overall strategy."

In all of the five countries three levels of spatial planning can be distinguished:

- national planning
- regional planning
- local planning (e.g. municipal, urban etc.)

Related to each country's cultural and political history and current regional territorial constitution, the importance and level of implementation of different levels of spatial planning varies. Germany and Spain are examples of highly decentralized federal structures, while Denmark, The Netherlands and the Czech Republic represent more centralized models.

Although the German government is decentralized, the Federal Spatial Planning Act defines and gives guidance to lower level plans and planning procedures. To some degree it also determines their direction and contents. Within this framework each of the states (*Länder*) has its own spatial planning legislation for regional and local planning while often differs in organisational aspects.

In Spain however, all of the 17 regional administrations have full competencies in spatial planning with no federal interference at all. Due to a lack of basic national legislation there is therefore a wide variety of concepts, methods and instruments. Regional level planning is still at an early stage and is often missing altogether, so in some regions urban planning is the only planning mechanism. As a result of this any kind of strategic regional approach is often lacking.

Spatial planning in the Czech Republic, Denmark and The Netherlands is regulated by national Spatial Planning Acts. Overall, spatial planning policy is developed by the government and regional and local planning has to be in accordance with it. Lower level plans have to follow guidance and fit into the higher level plans.

Recently, both Denmark and Netherlands have undergone policy reforms leading to more decentralisation. The new Spatial Planning Acts of both countries (Denmark in 2007 & The Netherlands in 2008) gave more responsibility to regional and local level of planning.

The process of spatial planning itself, although differing in the specific steps and procedures, always includes some level stakeholder involvement and public consultation and participation in all five countries.

Stakeholder involvement methods are different and stakeholder groups involved depend on the level of plans being developed. The more local the level of planning, the more stakeholders appear, with increasingly locally based interests.

Spatial planning is a multidisciplinary activity relying on a variety of disciplines (including geography, economy, social sciences, information technology, engineering etc.). Knowledge and information relevant for the process of spatial planning is generated by various governmental and nongovernmental institutions and agencies.

Spatial planning also affects many fields of human activities thus being highly relevant to citizens. Therefore, besides having good information available for the development of the spatial plans, it is also necessary to have good channels for the dissemination of relevant knowledge and information to the wider interested public. The exact mechanisms differ from country to country but with today's development of easy to use interactive GIS applications and information technology in general, the information is becoming easier to access by everyone.

An important part of spatial planning is horizontal integration. It includes in-country cooperation between different regions (or federal administrative units in cases like Germany and Spain) or neighbouring municipalities, as well as a certain level of trans-boundary cooperation between neighbouring countries. Obligation and mechanisms for the collaboration and coordination at all levels are laid down in the each country's legislation.

In the Czech Republic, Denmark, The Netherlands and even in Germany the in-country horizontal integration between regions and municipalities is rather well organised, and takes into account all the relevant topics (e.g. trans-boundary sites, ecological connectivity and infrastructural plans). The example of Spain however, shows that horizontal integration almost exclusively concerns road and train infrastructure at regional and local levels.

As far as the trans-boundary cooperation between the countries is concerned, horizontal integration often doesn't reach further than infrastructure and international transport corridors, although the intensity of cooperation among countries depends on the intensity of physical interaction and dependence between regions.

Through its ministry, the Czech Republic informs its neighbouring countries if its spatial plans may affect them and offers consultations. The same is true in Germany which has several bilateral commissions on spatial planning and spatial development (e.g. with Poland, the Czech Republic and The Netherlands). However, these initiatives often work better at the lower administrative levels (e.g. Länder, provinces) than at the federal level. Due to its isolation interactions between Denmark and its neighbouring countries are rather limited but still exist (e.g. Sweden, Germany and The Netherlands). Again, the closest cooperation concerns traffic and other infrastructure projects such as bridges and power transmission lines, although there are examples of cooperation concerning sites designation, both marine and terrestrial.

Vertical integration mainly occurs with spatial planning rules and regulations of the European Union such as: the European Spatial Development Perspective (ESDP), the Environmental Impact Assessment (EIA) Directive and the Strategic Environmental Assessment (SEA) Directive, as well as the Water Framework Directive (WFD). Besides the EU spatial planning regulations, EU nature conservation regulations concerning Natura 2000 (Birds and Habitat Directives) are also integrated into national spatial planning.

There is also a higher level of vertical integration which concerns the Pan-European or even global level policies and instruments which are incorporated into the legislation of the selected countries. Examples include the Aarhus Convention, the European Landscape Convention, the Convention on Biological Diversity (CBD), the Convention on Migratory Species (CMS), the Bern Convention and Ramsar Convention. Spatial plans for areas designated under certain programmes (like UNESCO Man and Biosphere - MAB) also take into account the obligations arising from those programmes.

3.2 Ecological networks

The ecological networks concept has been developing over the last few decades (since late 1970s) as a response to the problem of growing habitat fragmentation. During that period methodologies and approaches have somewhat varied over time and across different parts of Europe but in essence all have the same goal.

The common idea behind ecological networks is to strengthen the integrity of ecological and environmental processes and maintain the functioning of ecosystems as a key tool for the conservation of species and habitats, while at the same time promoting the idea of sustainable use of natural resources in order to reduce the human impact on biodiversity.

Throughout Europe ecological networks concepts share a characteristic spatial architecture comprising:

- (1) **Core areas** – adequately managed areas with the primary objective to ensure the conservation of valuable habitats, species or landscapes;
- (2) **Corridors** – physical landscape elements or other structures that conserve ecological or environmental interactions by maintaining connectivity and coherence;
- (3) **Buffer zones** – areas around the core areas (or corridors) that serve as protection from damaging external influences and disturbance, particularly those caused by inappropriate land use;
- (4) **Restoration areas** – where measures are foreseen to restore the areas' ecological functions.

The ecological networks concept has been incorporated into the nature conservation legislation of all five countries included in the research. Although the exact definitions vary to some extent, depending on the time of the adoption of the laws in question, they all follow the same principle explained above.

In the Czech Republic, one of the pioneers in adoption of the ecological networks concept, it is referred to as the "Territorial System of Ecological Stability" (TSES) and the Czech law on nature conservation, dating back to 1992, defines it as: *a mutually interconnected complex of both natural and modified, but semi-natural ecosystems which maintains natural balance in the landscape.* Spanish Nature Conservation Act from 2007 provides a much more elaborated definition using the terms 'ecological network' and 'ecological corridor':

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.*

Despite the fact that its definition is well-developed, the concept of ecological network has been only recently introduced in Spain and is therefore not widely known and understood among land planners or even environmental authorities. Another problem is Spain's federal structure, and even though the law is applicable at the national level, it is still a novelty and there are many aspects that have not been developed at lower levels. However, some autonomous regions in Spain (Catalonia and the Basque Country) have a well-defined policy to develop ecological networks.

The situation is very similar in Germany where, in spite of the well-defined provisions for ecological networks incorporated into federal laws, accompanied by non-binding documents such as strategies and recommendations, the actual implementation significantly varies among 'Länder'. Some of the reasons for this situation are the inertia following the exhausting implementation of Natura 2000 and the fuzziness of the term 'ecological network' combined with its use in at least four different ways at different levels.

The Czech Republic, Denmark and the Netherlands all have defined and well developed ecological networks at different scales and levels.

There are three clearly distinguished levels at which ecological networks interact with spatial planning:

- national level
- regional level
- local level (e.g. municipal)

There are different approaches to elaborating ecological networks at different levels. One way is that each level is designed by the corresponding level of governance (e.g. the Czech Republic and

Denmark). In the Netherlands, the national government only produces a strategy, a rough map and guidelines while the actual planning of the National Ecological Network (NEN) is carried out by the provinces. Municipalities are obliged to incorporate the provincial NEN into their plans.

Both approaches can function well in principle. However, some examples from the Czech Republic show that a lack of horizontal integration between regions and especially municipalities can occur, as well as some issues in relation to the quality of definition of the local level ecological networks. In the Netherlands, most activities related to the actual implementation of the national ecological network are delivered at local level by the municipalities.

3.3 Horizontal integration

Horizontal integration between neighbouring countries regarding the establishment of trans-boundary ecological networks is still at an early stage and presents significant opportunities for improvement although good examples exist. This is definitely an area where more effort should be invested, as it is evident that habitats and species are not limited by administrative borders.

Regarding the vertical integration of the ecological networks with the EU legislation, the Habitat Directive and creating connectivity and coherence between the Natura 2000 sites according to provisions of Article 10 are beginning to be perceived as an important factor in establishing the ecological networks. The Water Framework Directive (WFD) is also considered as an important document showing some positive synergies with the implementation of the ecological networks.

At the Pan-European level the main policy is certainly the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) and the Pan-European Ecological Network (PEEN) concept; (see Section 1.2 above for more contextual information about this and other international policy frameworks).

In Germany, policies and instruments at the EU, Pan-European and global level have at the most an indirect role in the creation of ecological networks, although there are many practical interconnections with the Natura 2000.

In The Netherlands the situation is rather quite the opposite. The National Ecological Network (NEN) and the laws related to nature conservation are mostly based on the Birds and Habitats Directives, although not all actors involved in the ecological networks, especially at local level, are aware of these directives.

In most of the cases the stakeholders involved in the ecological networks are very similar or the same as those in the process of spatial planning. Land users and land managers are naturally very interested since they are the ones directly affected by the possible changes in land management practices, but also the first in line for the potential incentives. As far as knowledge and specific interests are concerned there are however some noticeable differences. Nature conservation organisations are much more involved in the ecological networks planning process, especially NGOs.

Ideally the planning team for ecological networks should include both spatial planners and ecologists at all three levels, but also including experts on agriculture, transport, exploitation of natural resources or cultural interests etc. The process should be fully transparent including consultations and public participation from an early stage.

3.4 Knowledge base

The knowledge base for ecological networks has its main foundations in (landscape) ecology, ecology, biology, environmental sciences and spatial sciences (including spatial planning). Most of the data used in ecological networks' designation is geo-referenced and comprises datasets such as: habitat maps, protected areas, land use maps, soil, vegetation, aerial images etc. Other data required (but which is often lacking) are species population size, distribution range, ecological needs, and sensitivity to environmental changes including climate etc.

Knowledge and information needed for planning of the ecological networks are generated through various government departments and institutions, universities and research institutes and various other non-governmental or even private organizations.

3.5 Integrating spatial planning and ecological networks

Spatial planning and ecological networks are similar in many ways. They share a similar knowledge base, as well as a similar group of stakeholders involved, not to mention their spatial component, the need for horizontal integration with the neighbouring areas and the actual elaboration process.

Spatial planning and ecological networks cannot coexist independently and without full integration. There is no spatial plan that can be complete without including the ecological network component, even if it is called some other way, nor there can be an ecological network implemented without being fully incorporated into the spatial planning documents.

In the Czech Republic ecological networks (TSES) at various spatial scales have been included into the country's spatial planning documents at all levels. From a spatial planning point of view, the TSES is one of the natural limits of land use within the particular territory, which has to be identified and taken into account during the spatial planning procedure. Therefore, the TSES becomes a general obligatory element to be considered within the process of approving land-planning documentation.

The interactions between spatial planning and ecological networks in Denmark are also detailed and a lot of the work is being done by administrative teams which cover both process. Some developments of ecological networks are done independently, for example, Natura 2000 sites which involves a hearing process that includes the views of spatial planners. Once a new ecological network element has been established it is required to be considered in relation to spatial planning.

The development of ecological networks and even the ecological network concept alone, create an additional planning 'layer' in relation to spatial planning. The potential for interaction and synergy between sectoral interests via the overall planning process and the subsequent integration of ecological networks is clear.

Ecological networks and spatial planning seem to be quite well integrated in The Netherlands. Good communication between most of the actors exists (but could always be improved). The planning of the NEN does seem to be well organised and based on solid ecological foundations. The staff working at the ministerial departments and provinces, which determine the nature and delineation of the NEN, have a wide range of backgrounds including ecology, hydrology and spatial planning. There is no lack of expertise and of communication between the various experts within the provinces.

The NEN in The Netherlands is not perceived merely as a means towards the conservation of biodiversity. Indeed, it also offers many additional benefits to society known as ecosystem services. Spatial planners have adopted this idea and have already creatively used the most evident ecosystem services provided by ecological networks, such as water buffering in nature areas, as a measure for flood control.

The federal Spatial Planning Act in Germany clearly defines the interactions between the spatial planning and ecological networks even if it does not specifically refer to ecological networks. By law, ecological networks have to be included in every spatial plan produced.

However, the federal structure of Germany makes it very difficult to plan and implement a coherent ecological network at national level. It would help if the federal government had more legislative and executive powers so that it could establish a binding ecological network plan for the entire national territory. Instead, each state plans its own network. Some states have not even yet begun to plan an ecological network at all.

As mentioned earlier, the concept of ecological network planning is new in Spain. It is therefore too early to consider its implementation or to assess its functioning. 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 spatial planning process (apart from 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 spatial planning process. In regions where the concept is more widely understood, ecological networks are considered during the spatial 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.

All together, no matter how well the spatial planning and ecological networks are integrated conceptually and policy-wise, there are of course barriers and limits between them.

In the context of national, regional and local planning, ecological networks are just one among many interests that need to be secured. As described in the definition, spatial planning should secure not only nature interests, but also infrastructure, agriculture, forestry, town development, cultural interests etc. In many cases this will create barriers for the optimal development of ecological networks, because of the need to secure the balance with general sustainable development of society.

In order for the barriers to be overcome there should be efforts to: improve communication (within and between sectors, public and private): simplify policy and procedures; and create better conditions for cooperation. Even if the barriers are not completely broken down, there remains the potential to make progress and improve the synergies and coordination between the two processes via advice, guidance and improved communication and access to information.

4 Conclusions and recommendations

This section summarises the conclusions and recommendations arising from the five country reports (the Czech Republic, Denmark, Germany, The Netherlands and Spain) and the international workshop: Ecological Networks: From Spatial Strategy to Implementation, held in Oisterwijk (the Netherlands) on 1 and 2 October 2008 where seventy participants from 18 European countries gathered to discuss the planning and implementation of ecological networks in Europe. The workshop was organized by ECNC-European Centre for Nature Conservation, with the active collaboration and support of the Dutch Ministry of Agriculture, Nature and Food Quality, the French Government and Alterra.

The aims of the workshop were to:

- To present and discuss the preliminary results of two international ecological networks projects financed by the Dutch Ministry of Agriculture, Nature and Food Quality (ANF), which address the links between spatial planning and ecological networks (the SPEN project) and the practical implementation of ecological networks through stakeholder involvement (the KEN project). The workshop sought to take stock of recent advances in the research, planning and implementation of ecological networks and to formulate clear recommendations to the relevant policy makers. The results will be integrated into research results of the SPEN en KEN projects.
- To provide an input into the Conference in the framework of the EU French Presidency of the European Union on "Biodiversity and Agriculture: Today's Challenges, Tomorrow's Research for More Sustainable Farming"(Montpellier, France, 4-5 November 2008). The second day of the workshop provided specific input for this conference.

4.1 Ecological networks: general recommendations

- Give a legally binding status to ecological networks at all geographical levels;
- National ecological networks establishment process could gain additional momentum and thrust if there were more specific concepts at the Pan-European level;
- To promote awareness on the need of ecological networks among those responsible for nature conservation at the national and regional levels and NGOs;
- To promote the design of ecological networks through NGOs led processes;
- Create specific budget lines and innovative funding schemes for the establishment and management of ecological networks at all geographical levels;
- There is a need for improvement of the science-policy interface, and the lack of monitoring, assessment and feedback;
- Investments into research and development concerning sustainable, innovative and multi-functional land use are necessary;
- Maintaining good collaboration between the land managers and nature conservation authorities can improve the implementation of ecological networks;
- Adopt a stakeholder approach based on situation analysis and cultural settings (and where appropriate involve them as early as possible in the process) particularly when implementing ecological networks;
- Full openness and availability of data can increase the quality and success of both the physical planning and the ecological networks;
- Any form of information exchange is beneficial, but the use of the Internet has shown to be an easy way to provide a lot of details on planning and networks to all parties concerned;
- Securing the implementation of EU regulation is often the country's priorities, while objectively the planning process and the establishment of ecological networks could probably benefit if more inspiration were sought and weight laid on obligations following from other international agreements like Pan-European cooperation (PEEN concept);

- Use Natura 2000 as a backbone for the ecological network (where appropriate) and find a way to improve the coherence and connectivity of its sites following the provisions of Article 10 as an alternative to starting the process from the beginning;
- Exchange experience and learn from good examples in other countries;
- Increase efforts in transboundary cooperation in ecological networks between neighbouring countries to improve horizontal integration;
- In federal structures with highly decentralized powers and well defined policies and legislation at the federal level, the states (regions) should be obliged to elaborate ecological network concepts within a reasonable timeframe and to update their landscape planning documents at regular intervals;
- The creation of a national working group bringing together the regional nature conservation authorities to create a national ecological network framework if one is missing;

4.2 Spatial planning and ecological networks

- Higher level of the spatial planning and ecological networks integration improves the quality of both;
- Establish discussion platforms at all levels of administration to improve the spatial planning – ecological networks integration and mutual understanding;
- Develop quantitative, measurable parameters/features which can be identified in the field in order to improve the understanding of ecological networks by spatial planners and other sectors;
- The concept of ecological networks is also beneficial to spatial planning insofar as ecological network concepts can further underpin the need to protect natural resources and to preserve open spaces;
- To contribute to the process of implementation of ecological networks spatial planning needs to be combined with other instruments such as:
 - o agri-environmental schemes,
 - o sector-planning in the fields of hydrology and forestry,
 - o conservation by contract and
 - o practical implementation projects that involve a broad range of actors;
- Once the ecological network has been integrated in the spatial planning next steps are made easier: channeling subsidies as part of agro-environmental schemes and impact mitigation funds. It can also justify local investments in ecological networks;
- Pro-active approach to planning and conservation should be applied, attaching the greater importance to research, and communication of the multiple benefits of biodiversity conservation (including the development of ecological networks) to society, by means of the ecosystem services they deliver;
- 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;
- Too much decentralisation in spatial planning could favour the local interests, putting the protection of nature including ecological networks at stake;
- A division of responsibilities where central administration secures international obligations and interests and local administration the national priorities (functions well under Danish traditions and legislative set-up);

4.3 Policy recommendations

A more effective planning of ecological networks, and in more general terms increase of ecological connectivity within, or ecological permeability of semi-natural, cultivated and urban landscapes can benefit from a number of specific policy actions such as:

- Increase the knowledge base of spatial planning and ecological connectivity and their interactions: support research into understating the biology and ecology of species and ecosystems in a spatial explicit manner
- Increase the amount and availability of spatially explicit data relevant to planning ecological networks: support inventories and monitoring of species and habitats
- Exchange expertise and capacity building: creating professional platforms for the exchange of spatial and ecological expertise and creating active networks bringing together spatial planners, spatial scientists, GIS experts, ecologists, policy and decision makers in the field of spatial planning and other representatives of sectors affected by spatial decisions. In some countries such as the Netherlands such platforms do exist and are considered very useful to spread the technical knowledge required to design and plan ecological networks among broad layers of relevant professionals.
- Raising awareness among professionals and stakeholders: Various stakeholder groups that are or should be involved in the process of spatial planning and the planning o and design of ecological networks are unaware of the need for and ecological networks.
- Exposing / promoting the implementation of existing policy: Giving a greater exposure to existing international policy and legal instruments that promote the creation of ecological networks and improving ecological connectivity such as the relevant articles from the Habitat Directive, the Convention on Biological diversity, and the European Landscape Convention.

4.4 Country specific conclusions and recommendations

The Czech Republic was one of the countries which started to implement ecological networks (in the early 1970s). As a result, the TSES concept has been included in most national policy documents dealing with sustainable development, environmental protection, nature conservation and landscape management.

By becoming a part of the country's spatial planning legislation the TSES has become a general obligatory condition within the process of approving land-planning documentation. As a result spatial planners are willing to allocate some lands for the purpose of nature conservation and landscape protection.

The TSES concept can be better understood by spatial planners and economists if it includes quantitative, measurable parameters/features which can be identified in the field.

Newly established elements of an ecological network are almost always, from nature conservation and environmental protection point of view, of higher quality than the previous one.

However, a more in-depth approach to landscape planning is lacking. The European Landscape Convention has not yet been fully integrated in the legal, policy and administrative documents in the Czech Republic.

A methodology on harmonization of approaches to the TSES designing and implementing at all levels should be urgently developed and approved by the appropriate authorities.

Denmark holds a long tradition of spatial planning and protection of nature areas. The planning is divided into two layers at national and local level and there is fundamental interrelationship between the different planning layers.

Ecological networks constitute a natural and important part for the planning. This concerns both ecological networks at the national and at the local level. These networks are mainly defined by what could be called international obligations and national decisions in relation to nature protection and conservation of biodiversity.

There are positive synergies between the spatial planning and the development of ecological networks, but also barriers or obstacles to the full development of the networks. This is caused by the many interests involved in spatial planning.

The major bottlenecks with regard to spatial planning and ecological networks in **Germany** are not the availability of data and only partly the interface between the two spheres. Instead, the most severe problems derive from the lack of binding technical standards and the lack of a federal landscape programme, the lack of legal obligations to prepare and update ecological network concepts and the limited scope of spatial planning. The insufficient vertical (or better: top-down) coordination of both ecological networks and spatial planning represents another barrier which is rooted in the constitutional principles of federalism and subsidiarity; it will therefore be difficult to change.

In order to improve the coherence of ecological networks between individual states, the federal government should get a legal competence to set up a federal landscape programme including a spatial concept for a nation-wide ecological network.

Spatial planning is the main instrument for the implementation of ecological network plans in Germany, although it is insufficient and cannot ensure a functional ecological network. Spatial planning can help safeguard existing linkages in the landscape, but it hardly can contribute to establishing new additional corridors and connections.

In **the Netherlands** the nature, policy and process of spatial planning and its interactions with the ecological networks have been very much influenced by history, physical and natural characteristics of the country's economy and population.

The need to protect nature by devising a national ecological network of connected protected areas was officially introduced before the EU Habitats Directive was adopted and integrated into Dutch policy resulting in the legislation and policy on spatial planning and ecological networks being highly integrated and regulated. However, there are some remaining barriers in the integration of these two areas, in terms of lack of sufficient financial resources, the need for improvement of the science-policy interface, and the lack of monitoring, assessment and feedback.

The high demand on land for various economic activities, combined with concerns for the environment and climate change have prompted the government to invest into research and development concerning sustainable, innovative and multi-functional land use.

Ecological networks present significant opportunities as a guiding principle for spatial planning, as they potentially provide a wide range of ecosystem services, challenging new approaches to multifunctional land use and other benefits to society.

The Netherlands promote a pro-active approach to planning and conservation. The government therefore attaches great importance to research into, and communication of the multiple benefits of biodiversity conservation (including the development of a NEN) to society, by means of the ecosystem services they deliver.

The development of an ecological network at national level is still lacking in **Spain**. This is a result of Spain's highly decentralised structure giving all powers of planning and spatial decision making to the autonomous regions. Population in Spain is highly concentrated in cities and large areas of countryside have a low population density. Transport infrastructure density is also quite low. Large tracts of (semi) natural countryside are still relatively well connected. Therefore ecological connectivity is not yet perceived as a pressing issue. The resulting lack of political interest in ecological networks in Spain means that the planning and implementation process is slow. However, the situation is changing and ecological networks are becoming an emerging issue.

4.5 Planning ecological networks: conceptual analysis and final conclusions

This international study focused on the planning stage of ecological networks and in doing so on the synergies that can be achieved with the field of spatial planning. This phase is an essential part of the whole problem identification, planning, implementation, evaluation process which is essentially and iterative and cyclical interdependent process. Because of these feedback loops with the implementation phase, it is quite artificial to analyse the process of planning ecological networks in isolation. Therefore the project has created as much synergies with the Knowledge for Ecological Networks (KEN) project which looks at the implementation phase of ecological networks. (See: www.ecologicalnetworks.eu for all of the downloadable products form the KEN project).

In order to achieve a good functional integration of ecological networks in spatial planning, policy makers must give particular attention to the following:

- Supporting the knowledge base
- Increasing understanding of the interactions between spatial planning and ecological networks and their horizontal and vertical integrations. This requires further and continued support to science and research into the many relevant fields: ecology, biology, social sciences, economy, spatial sciences. More particular interdisciplinary research programmes involving social and applied scientists can increase fruitful new insights. Research needs to generate further accurate knowledge about (for example):
 - spatial requirements of species biology (migration, dispersal) and habitat conservation (optimal areas)
 - effects of climate change
 - adaptation to climate change
- Generating and making available relevant spatial information, more in particular supporting the collection and census of species distribution and abundance through coordinated efforts at local, regional, national and especially international levels;

By reviewing the interactions between spatial planning and ecological networks in a number of countries across Europe, the SPEN project has been able to tease out and describe some of the factors that affect the level of integration between spatial planning and ecological networks.

The reports clearly indicate that the design of ecological networks and the process of spatial planning are natural allies. Both are profoundly spatial in nature and touch upon a wide range of policy areas and economic sectors. Balancing the spatial interests of these sectors is therefore an essential objective. Indeed in all countries both processes are intricately intertwined and the legal underpinning of spatial planning and ecological networks are often based on similar documents.

An analysis of the commonalities and differences in the level of integration between both fields can reveal factors and processes. The increased understanding of the factors that influence the level of integration between spatial planning and ecological networks increases our understanding of the wider processes that underlie them and allow us to draw out some practical conclusions and recommendations for wider use.

Political history, geography and culture play a determinant role in the way spatial planning is organised in a country and how it interacts with the design, planning and implementation of ecological networks. Key factors to take into consideration therefore include: historic; geographical; legal; policy-related; socio-cultural; demographic; pressure on land use; competition for limited space; urban sprawl; and political.

Lessons learned in regions with a particular geography, culture or political history are therefore not directly applicable to other regions without taking into account the nature and direction of these effects. The development of an ecological network at national level and its integration with spatial planning depends on such factors as intensity of and pressures on the land use.

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