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Implementation of Ecological networks in Different Socio-Economic Contexts

Guiding principles based on experiences in Central and Eastern Europe

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ABSTRACT

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This research assesses how different socio-economic systems may influence the successful implementation of ecological networks in different countries. The policy frameworks on ecological networks and related experiences of six countries in Central and Eastern Europe (Poland, Croatia, Ukraine, Slovakia, Hungary and Belarus) have been assessed and presented in this report. A number of similarities and differences have been identified in the use of different approaches in planning and implementation of ecological networks including strategic, legal, economic valuation and collaborative approach. The conclusion is that an assessment of the specific socio-economic factors in which the ecological networks are implemented is a necessary precondition for the success of this implementation process. In different socio-economic contexts, different combination of approaches would be most beneficial as the socio-economic systems in place influence the efficiency of these approaches in supporting decision making on ecological networks implementation. Five guiding principles are defined and recommended for improving the implementation process of the ecological networks strategy in different socio-economic systems.

Keywords: Ecological Networks, Socio-economic development, Land use planning, Integration, Economic valuation

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1 Executive summary

Rapid urbanization and landscape transformation of both public and private land threaten the efforts to conserve biodiversity worldwide. These human activities adversely affect biodiversity by reducing the total area of natural and semi-natural habitats and by changing landscape diversity by fragmentation of habitats and populations of important species. The growing awareness of the threat of habitat decline to biodiversity in combination with fragmentation has led to the conservation strategy of ecological networks. The most important part of this strategy is that conservation is focusing on maintaining viable natural species populations and meta-populations through the development, conservation and restoration of habitat networks. This includes not only protected areas, but also corridors to improve ecological connectivity by physically joining habitats at local to continental level. Many ecological networks are under development and still have to progress to the stage where beneficial conservation outcomes can be demonstrated.

While the modelling and designing of ecological networks as a planning tool takes into account various aspects related to the way natural habitats and ecosystems function, it is as well needed to consider the potential implementation approaches that support the decision making process and the socio-economic factors influencing their effectiveness in different countries.

This research project has been initiated within the framework of the *Policy Supporting Research Programme* of the Dutch Ministry of Agriculture, Nature and Food quality with the aim to gain more insight into the actual and potential role of ecological networks as a tool to conserve biodiversity. The focus of the project is on assessing approaches for implementing ecological networks in countries with different socio-economic systems in Europe. This includes the development of guidelines on how to evaluate plans for ecological networks in terms of costs and benefits and on how to finance these plans. The main project objectives are:

- to explore and describe the currently available approaches and policy instruments for planning ecological networks and the way they are used in specific socio-economic context;
- to compare practices for planning, development and/or implementation of ecological networks among different countries in Europe;
- to review the institutional frameworks, within which the planning process for ecological networks is and can be embedded;
- to develop recommendations for implementation of ecological networks approaches in different socio-economic contexts.

The research is based on theoretical and empirical analysis including a review of scientific literature, policy documents, economic, physical and policy-related data on implementation of ecological networks and a comparative analysis of experiences with ecological networks of six countries in Central and Eastern Europe: Poland,

Croatia, Ukraine, Slovakia, Hungary and Belarus. The comparative analysis based on assessing the current socio-economic, political and institutional factors per country illustrates major similarities and differences in the use of different approaches to ecological networks implementation. It indicates that these countries have adopted ecological networks in their policy or are currently elaborating their policies and legislation to address the general concept of ecological networks and/or to transpose the provisions of the Birds and Habitats Directives into their institutional framework and administrative practices on biodiversity conservation. However, in all six countries a number of important challenges are currently present in this process, particularly in the implementation of the ecological networks strategy and its integration in economic development sectors. Evidently, there is a relation between the different types of socio-economic systems and the efficient use of one or another approach that supports the decision making for implementation of ecological networks projects.

The main conclusion is that a proper assessment of the specific socio-economic factors in which the ecological networks are implemented is a necessary precondition for the success of this implementation process. In different socio-economic contexts a combination of approaches can be applied including legal, strategic, economic valuation and collaborative approaches. However the efficiency of each approach in supporting decision making on ecological networks projects should be considered in relation to the specific socio-economic and political system in place. Among the reviewed approaches, for most of the assessed countries the use of economic valuation tools such as cost benefit analysis is a new approach. This approach however is highly recommendable together with the use of innovative financing mechanisms for ecological networks initiatives. Yet, the application of this approach will require capacity building and training of experts.

As the implementation of the ecological networks is a complex, long term process a stable socio-economic and political system will be required. In countries in transition from one system to another such as from a state-control to a market economy the efforts should be on making a quicker shift from a defensive to a pro-active strategy on biodiversity conservation. This project recommends five guiding principles for the implementation of the ecological networks in different socio-economic contexts and indicates the needs for further research.

> *Principle 1*: Local initiatives and charismatic leadership are needed to balance between different interests and support the decision making process.
>
> *Principle 2*: The European or global agreements promoting the concept of the ecological networks are an important drive to their implementation; however they can only be implemented when considering the local values and culture influencing decision-making in each individual country.
>
> *Principle 3*: Applying a combination of approaches based on strategic, legal, collaborative and economic valuation mechanisms can contribute to more explicit integration of the ecological networks objectives within the social and

economic activities such as in spatial planning policies. None of the approaches are all inclusive. For parliamentarian/market oriented systems the use of the legal approach in combination with the economic valuation and collaborative approaches is likely to work best. For the semi-parliamentary, transition economies and the presidential state controlled systems next to the legal approach there is a need to strengthen the combined use of the strategic and collaborative approach and to introduce the economic valuation approach.

Principle 4: The changes in the socio-economic trends such as in land use development and ownership significantly affect the relations between private and public actors and the local communities in the implementation of ecological networks and should be taken into account in all countries where the land restitution process has not yet been accomplished.

Principle 5: In case development of ecological networks possesses real opportunity costs for competing economic activities both economic valuation approaches and financing mechanisms should be used as cost and benefits evaluation of ecological networks measures can support decision-making process.

2 Introduction

2.1 Project objectives

This project has been initiated within the framework of the *Policy supporting research programme* of the Dutch Ministry of Agriculture, Nature and Food Quality. The aims are to gain more insight into the actual and potential role of ecological networks as a tool for policy making on biodiversity conservation. The focus of the project is the assessment of approaches for ecological networks implementation in countries with different socio-economic systems in Europe. This includes development of guidelines on how to evaluate plans for ecological networks in terms of costs and benefits and the financing of these plans. In addition we consider how socio-economic factors may affect the use of different approaches to implementing ecological networks in practice. The objectives of the project are:

- To describe the currently available approaches and policy instruments for planning ecological networks and the way they are used in their specific socio-economic context;
- To compare practices for planning, development and implementation of ecological networks in European countries;
- To review the institutional frameworks within which the planning process for ecological networks is and can be embedded;
- To develop recommendations for implementation of ecological networks approaches in various socio-economic contexts.

2.2 Main problem addressed

Currently, land transformation through urbanisation, agricultural intensification and land abandonment threatens efforts to conserve biodiversity worldwide (Dale et al, 2000; Miller and Hobbs, 2002, Jongman 2002). These adversely affect biodiversity by changing habitat quality, reducing the area of natural and semi-natural habitats and changing landscape heterogeneity into fragmentation of habitats and populations.

In many countries nature areas are facing significant pressure through land development because economic competitiveness is not well integrated with nature conservation (Randolph, 2004; UNDP, 2007; Termorshuizen et al 2007). Although there are already several tools available for mitigating these concerns by land use planning including the ecological network approach, important barriers remain (Beatley, 1995, 2000; McKinney, 2006; Crist et al 2000, Theobald et al, 2000; Termorshuizen et al 2007). Barriers result from the difficulties to deal with conflicts between objectives of human welfare and nature conservation (Roseland, 2000; Campbell et. al., 2003; Theobald et al 2005). That is why we need to assess potential implementation approaches and the factors influencing its effectiveness.

2.3 Project approach

Theoretical study

Based on scientific literature and policy documents, economic, physical and policy-related data have been collected on ecological networks approaches. Economic data includes (1) assessment methods for costs and benefits and (2) financing tools for implementing ecological networks. Policy-related information includes institutional especially the state of art of policy frameworks related to ecological networks. The data was analysed on the following categories:

a) The concepts, approaches and methodologies on ecological networks;
b) The implementation of ecological networks in various socio-economic context on (1) the extent that ecological networks are (planned to be) implemented and (2) the efficiency in the use of different policy approaches;
c) Evaluation methods for ecological networks in terms of costs and benefits supporting decision making in plans for ecological network development.

Empirical study: comparative analysis of case studies-confronting theory with practice

A comparative case study analysis (Yin, 2002) has been carried out for ecological network approaches in six countries. We assess the differences in socio-economic developments influencing the policies on ecological networks. Therefore, the case studies include Poland, Slovakia, Hungary as EU-member states, Croatia as a candidate EU-member state and Ukraine and Belarus as non-member states. The analysis is based on the following aspects:

a) National socio-economic and political context:
   -socio-economic development trends;
   -political systems;
b) Relevant policy frameworks and legislation for ecological networks
   -spatial planning policy framework;
   -ecological networks policy framework;
c) State of art of the ecological networks development:
   -implementation of ecological networks;
d) Participatory planning and stakeholders involvement:
   -inter-organizational collaboration;
   -cultural aspects and local perceptions and awareness;
e) Integrating spatial planning and ecological networks
   -integration of ecological networks in other policy sectors;
   -environmental assessment tools.

The structure of this report is organized in four main parts:

- An overview of the ecological networks concept and its basis principles;
- An overview of the existing policy approaches to ecological networks;
- A case-study review of the main socio-economic trends and experiences with ecological networks implementation and comparison between the countries;
- Conclusions and guiding principles.

In reference to the objective of this study this report is structured as follows:

- Chapter 2 introduces the research objectives and the problem addressed in the study;
- Chapter 3 describes the emergence and the rationale of the ecological network concept;
- Chapter 4 discusses approaches for implementation of ecological networks, supporting decision making in planning ecological networks;
- Chapter 5 explores the relation between ecological networks implementation and various socio-economic systems;
- Chapter 6 presents the policy frameworks and experiences with ecological network in six case study countries;
- Chapter 7 discusses the results of the comparative analysis of the case study countries;
- Chapter 8 presents the results of the study including conclusions and recommendations.

3 The emerging need for ecological networks

3.1 Rationale of the Ecological Networks concept

In Europe Key Biodiversity Areas are in many cases isolated islands within an intensively used cultivated landscape. "Ecological communication" between natural and semi-natural areas and between the scattered sub-populations within them is increasingly hampered by distance and by anthropogenic obstructions. In many cases in Europe nature areas do not exceed 100 hectares per unit. The main distance between CORINE Biotopes is in average 13 kilometres, and the distance between similar biotopes is even larger (Bouwma, et.al., 2004).

Growing awareness of the isolation of species populations through the loss of connectivity and habitat fragmentation and its impact on biodiversity (Wilcox and Murphy 1985, Fahrig and Merriam, 1985) has led to the nature conservation strategy of ecological networks (Jongman and Pungetti, 2004). Barrier-free corridors are next to habitat quality improvement and habitat enlargement the third factor to guarantee ecological flows through the landscape. Corridors are intended facilitate biological movement, ecological processes and evolutionary adaptations in a changing landscape. Many ecological corridors still have to progress to the stage where beneficial conservation outcomes can be demonstrated (Biotani et al, 2007). Evidence does exist on the connectivity role of linear features in cultural landscapes such as in drove roads (Bunce et al, 2006, Manzano and Malo, 2006).

The term ecological network is widely used to describe one of the main practical conservation measures for protecting core areas of high quality habitat and maintaining and enhancing connectivity amongst them across the landscape (Jongman and Kristiansen, 2001). Various approaches are used for creating ecological networks (Jongman and Pungetti, 2004). These generally allocate specific functions to areas depending on their societal and ecological function and nature conservation potential. In general, an ecological network can be defined as a coherent system of natural and/or semi-natural landscape elements configured and managed with the objective of maintaining or restoring ecological functions as a means of conserving biodiversity, while also providing appropriate opportunities for the sustainable use of natural resources (Bennett and Mulongoy, 2006). Bennet and Mulongoy (2006) define the most common characteristics of all ecological networks such as:

- Focusing on conserving biodiversity at landscape and ecosystem scale;
- Maintaining or strengthening ecological coherence, primarily through providing connectivity between formerly disconnected subpopulations;
- Ensuring that critical areas are buffered from the effects of potentially damaging external activities;
- Restoring degraded ecosystems where appropriate;
- Promoting the sustainable use of natural resources in areas of importance to biodiversity conservation.

3.2 The scientific basis

In central and eastern Europe the ideas of Rodoman have had an important influence on land use planning and nature conservation policy. According to Rodoman (2007) economic development causes environmental problems during the industrialization period of any country. Consequently it might be assumed, that the ecological problems will increase in the future. According to Rodoman (2007) natural forests and meadows should compensate this by occupying about one quarter to one third of land surface throughout the whole country.

The traditional site/area protection approach is characterized by a polarized landscape strategy, namely the urban, infrastructure developed areas and wildlife nature as two separate poles of the environment, between which are transformed functional zones: natural area and agricultural lands (Rodoman, 2007). Development of an Environmental Sustainability Index (ESI) and mapping the relevant areas will help to find out proper environmental conditions for ecological network establishment. This has been the core of the theoretical basis for nature conservation in the former Soviet Union and its satellite states.

In Western Europe and at present also in the new EU member states insight on population dynamics have gained influence. In Central and Eastern Europe this is partly integrated in the polarised landscape concept. The role of ecological networks will be to maintain and where needed to restore these functions of migration food supply and shelter in the landscape.

The approach that can be used for assessments in man-dominated landscape in general and for designing ecological networks is the metapopulation concept (Levins 1970, Opdam 1991, Hanski & Gilpin 1997). A metapopulation is a set of populations in a habitat network connected by inter-patch dispersal. A habitat network is a set of habitat patches close enough to have a reasonable level of inter-patch dispersal. Habitat is a species-specific term for the set of conditions a species needs to feed, survive and reproduce.

One of the main functions of ecological networks in addition to site conservation is to prevent and reduce fragmentation, which is one of the major causes of loss of biodiversity both at habitat and species levels (Harris, 1984, Apps and McLellan 2006, Hepcan et al 2009). Fragmentation normally encompasses two components, the loss (or change) of habitat and the breaking up of the remaining habitat into smaller units. Impacts resulting from fragmentation vary among habitats and species. They can include changes in species composition, community structure, population dynamics, behaviour, breeding success, individual fitness and a range of ecological and ecosystem processes (e.g. Doherty and Grubb 2002, Huitu et al 2003, Opdam and Wascher 2004). Fragmentation by infrastructure development such as roads and railroads has particularly been addressed as major issue in the field of biodiversity conservation research (Van der Grift, 2005; Roedenbeck et al, 2007).

Habitat loss and change caused by fragmentation can break up continuous habitat into a series of smaller fragmented patches, which exacerbates habitat loss by species loss, increase the proportion of habitat edge and the isolation of remaining habitat patches. Isolation between patches is due to both of the distance between habitat patches and the permeability of the landscape matrix for species. The conditions found within this broader landscape matrix have a significant effect on the remaining habitat patches (Ewers and Didham 2006). Impacts need to be considered at a spatial scale relevant to the species and habitats of concern.

In highly fragmented landscapes, the occurrence of a species at a certain moment in time does not necessarily mean that the species is part of a sustainable population. The reason is that metapopulation dynamics, such as local extinctions and recolonisation processes are taking place constantly. Moreover, what we see as distribution patterns of species is the result of historical developments in land use and populations can be in a process of adapting to the present day landscape. Species also can be lagging behind the landscape changes (Devictor *et al* 2008). Therefore ecological networks cannot be based entirely upon actual species distribution data but have to be based on a more general long-term strategy.

To be effective in conservation planning ecological knowledge and modelling results must be translated into policy and technical solutions. Design and management of linkages for conservation can be viewed in a biological way, a socio-political way and as a design problem (Bennet 1999). An ecological network should be geared towards ecosystem functioning (forest, marshland, moors) or a key species. A strategic choice of such a focal species benefits many more species than an arbitrary species in the network design. Some focal species have broad-scale effects at the ecosystem level (Dale *et al.* 2000): turnstone species (top predators, such as the wolf, brown bear, otter) ecological engineers (beaver) and umbrella species (red deer). These can be used at the larger continental level, while species with local abundance and dispersal better function for local and regional networks.

An analysis of the benefits for flora and fauna is an important step and an essential basis for evaluating design and management of the landscape and of ecological networks. Within an ecological network corridors can be designed (1) species specific, (2) group specific or (3) with multiple functions. Knowledge of the ecological structure and processes in the landscape, combined with the behaviour and ecology of species is of utmost importance in the design of ecological networks and corridors.

Despite the theoretical basis for network designand the indications that connectivity is an important feature, the evidence base for the beneficial effects of networks is limited to a few or single species (Kettunen et al 2007). Yet many of the ecological networks around the world are at various stages of development and have not progressed to the stage where beneficial conservation outcomes can be shown (Bennett and Mulongoy 2006).

Connectivity can be expressed as the degree to which a landscape facilitates or impedes the movement of individuals or flows of energy or matter between habitat patches. There are two theoretical components:

- The ability of species to move trough a landscape mosaic. This will depend on various specific traits, such as dispersal capacity, movement and colonization abilities and dependence on specific habitat features (functional connectivity);
- Different landscape elements and habitat patches and their arrangements. These will create a mosaic of features that can either hinder or enhance movements (structural connectedness).

Efforts to enhance connectivity need to be carried out on a precautionary basis to address scientific uncertainties and risks. Its assessment would include monitoring schemes to measure the effectiveness of the ecological networks and other connectivity measures in relation to specific and quantifiable biodiversity and ecosystem service objectives. Consideration is given to:

- Protection of existing (semi-)natural habitat features, linking habitat patches, and increasing habitat connectivity through appropriate management;
- Reduction in land use intensity and protection of remaining semi-natural habitat features to maintain functional connectivity for species;
- Inability of a number of species to migrate between suitable habitats, leading to local or regional extinction as a result of land use or climate change.

Methodologies that are used for developing ecological networks may vary between different cases. However, the most common steps for the development of the ecological networks may consist of:

- Analysis of the initial nature conservation problems;
- Identification of the objectives of the network;
- Definition of the methodological approach and criteria for the design of an ecological network and its elements
- Analysis of existing databases, identifying the location of relevant data and possible gaps;
- Identification of potential core areas and ecological corridors;
- Decision on the implementation strategy.

Much of the rationale of the development of ecological networks is derived from scientific studies. However, subsequently the concept has moved from scientific research to a conservation policy planning tool and consequently there are yet few scientific studies of the effectiveness of ecological networks (Kettunen et al, 2007).

3.3 Ecological networks at European level

Several international and Global and European Multi-lateral Environmental Agreements have recognised the importance of maintaining ecological coherence and connectivity as a contribution to biodiversity conservation. The EU Member States are obliged to apply the measures described in these agreements and support the

maintenance of ecological connectivity in addition to requirements under EU legislation and other initiatives (CEC, 2007; Kettunen, 2007).

The Convention on Migratory Species (CMS) especially calls upon the protection of flyways and migrating species that make use of the wider landscape. One of the agreements under it is focussing on the European-African flyways that include species that use habitats in all Europe and Africa.

At the Pan-European level, the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, adopted in 1979) binds contracting parties to the protection of habitats and species of European concern and promotes cooperation between countries for the protection of migratory species. The Recommendation on the conservation of natural areas outside protected areas adopted within the Convention specifically addresses these issues (Recommendation 25, adopted in 1991). It encourages the conservation and, where necessary, the restoration of ecological corridors, habitats types and landscape features that are important for wildlife conservation.

The Species and Habitats Directive and the Birds Directive form the main legal framework for protecting nature and biodiversity in the EU and implement some of the international requirements outlined above, including the Bern Convention (CEC, 2007). In order to achieve their objectives both Directives include two main types of action. Firstly the protection of Special Areas of Conservation (SACs) designated under Articles 4 and 5 of the Habitats Directive (for habitats and species of Community interest) and Special Protection Areas (SPAs) designated under Article 4 of the Birds Directive (for birds listed in Annex I of the Directive and migratory species). These are combined under Article 3 of the Habitats Directive to form 'a coherent ecological network' referred to as the Natura 2000 network. Natura 2000 also includes Marine Protected Areas (MPAs) that will not be discussed here. The second type of actions are provisions for species protection that apply to the whole territory of the Member States and concern the physical protection of listed species as well as their breeding sites and resting places.

Both Directives include various connectivity conservation measures for protected areas and the wider environment. Firstly, connectivity measures are required to maintain or restore the coherence of the Natura 2000 network. In particular, paragraph 3 of Article 3 of the Habitats Directive states that '*where they consider it necessary, Member States shall endeavour to improve the ecological coherence of Natura 2000 by maintaining, and where appropriate developing, features of the landscape which are of major importance for wild fauna and flora, as referred to in Article 10.*' In addition, Article 6.4 stipulates that if a plan or project with negative impacts on a site is to take place (due to 'imperative reasons of overriding public interest') the Member States are to take 'all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected' (CEC, 2007).

The Directives also include more general connectivity provisions that relate to land use planning and development policies. These are set out in the Article 10 of the

Habitats Directive and Article 3 of the Birds Directive. It is important to note that all these provisions unequivocally subject the decision how and where to implement connectivity measures to the full discretionary power of the Member States.

It is recognised that the implementation of connectivity measures may be constrained by the lack of detailed knowledge of the ecological requirements of many species and habitats. Article 18 of the Habitats Directive, therefore calls for research and exchange of information and specially states that 'Particular attention shall be paid to scientific work necessary for the implementation of Articles 4 and 10, and transboundary co-operative research between Member States shall be encouraged'. Conservation actions under other EU legislation may also help to deliver connectivity measures required under the Birds and Habitats Directives. In particular, the Water Framework Directive (WFD) includes measures, such as the development of river basin management plans that will help to maintain and restore connectivity in the wider environment (EC, 2008)

The need to promote the implementation of Articles 10 and 3 of the Habitats and Birds Directives forms an integral part of the current EU biodiversity policy. These aspects have been supported by the recently adopted Commission Communication 'Halting the loss of biodiversity by 2010 – and beyond' and the new EU Biodiversity Action Plan (COM 2006/216). The Action Plan gives priority to enhancing the coherence and connectivity of the protected areas network (e.g. both Natura 2000 and non-Natura 2000 areas) In particular, it recognises that in addition to 'structural tools' (such as flyways, stepping stone and corridors), enhancing the coherence, connectivity and resilience of the Natura 2000 network requires actions that support biodiversity in the wider environmental matrix. The Action Plan also includes a specific set of actions related to supporting biodiversity adaptation to climate change. In this context, the importance of regional and local land-use planning, in particular the related responsibilities of the Member States, was stressed.

Three networks have been considered particularly important for biodiversity conservation at trans-national level (Bennet and Wit, 2001):

- The Pan-European Ecological Network (PEEN) under the aegis of the Council of Europe (CoE), the United Nations Environmental Program (UNEP) and the European Centre for Nature Conservation (ECNC);
- The Emerald network, also known as Network of Areas of Special Conservation Interest, launched in 1989 by the Council of Europe as part of its work under the Bern Convention and covering sites outside the European Union.
- The Natura 2000 network, established by the EU Habitat and Birds Directives which comprises Special Areas of Conservation (SAC) and Special protection Areas (SPA) (79/409/EEC, 1979) and forming the EU counterpart of the Emerald Network;

National and regional ecological networks have already been developed in several European Countries in the 1970s and 1980s where a strong land use planning tradition had created the institutional environment for allocation of functions at the

landscape scale and where habitats were becoming increasingly fragmented due to economic development. The Netherlands (Van der Grift 2005), Lithuania, Estonia Hungary and the former Czechoslovakia were among these first countries in which this strategy was investigated and promoted (Jongman and Kristiansen, 2001; Rientjes and Roumelioti 2003). Since then, ecological networks have received recognition in most European countries as a part of the national nature conservation strategy.

The need for connectivity conservation measures has been given additional importance and urgency as a result of the recognition that habitat fragmentation may exacerbate the potential impacts of climate change. Climate change adaptation measures for biodiversity under existing European agreements should therefore include actions to combat habitat fragmentation.

3.4 Conclusions

Ecological Networks did emerge in Europe since the 1980s as a reaction on the ongoing loss of biodiversity and the insight that next to habitat quality and habitat size also connectivity is an important issue for many species. In central and eastern Europe the approach of the polarised landscape has had an important influence on biodiversity conservation. Recent knowledge from population dynamics is being integrated with this. Connectivity is now mentioned in several conventions, in EU directives and policy documents as well as in national legislation and policy documents. Ongoing land use change and climate change have urged the need for it.

4 Decision-making for ecological network implementation

There are various approaches that can be used for the development and implementation of ecological networks. In some studies approaches are analysed and compared both from an ecological perspective based on the existing tools and methodologies per country such as legal, land use planning and nature conservation tools (Jongman *et al*, 2004; Kettunen *et al*, 2007). In this study we will more generally look at approaches for decision making in the field of environmental policy such as (1) strategic approach, (2) procedural approach, (3) collaborative planning approach and (4) approaches related to economic evaluation and the use of financial instruments in environmental planning (ECNC 2008, Simeonova and Van der Valk 2009). In this chapter we deal with the strategic and procedural approach first, we then elaborate on economic valuation process and financing approaches and finally we deal with the collaborative approach that includes several of these other approaches and the involvement of stakeholders.

4.1 Strategic approach

The *strategic approach* to development and implementation of ecological networks is based on devising and employing a set of objectives and long-term measures for the integration of the concept into the policy process at national, regional and/or local level. In most cases the strategic approach results in the generation of comprehensive strategy documents that incorporate objectives and related strategies within a policy field or between policy fields.

Usually these strategy documents do not have a legal status but are based on commitment and long term visions. These strategy documents are designed with the aim to reflect the degree of political commitment to – in this case – biodiversity issues from different policy sectors. An example is the Pan European Biological and Landscape Strategy (PEBLDS) that incorporates conventions and policies such as the Ramsar Convention on wetlands, the Bern Convention on the Conservation of European Wildlife and Natural Habitats and the European Network of Biogenetic Reserves in a Pan-European approach to implement the Convention of Biological Diversity (Council of Europe 1996). The strategic approach is as well used to develop thematic strategies at national or regional level such as strategic plans on biodiversity conservation by means of ecological networks.

The strategic approach has an inherent uncertainty concerning the implementation of these strategies into practice as the plans are not binding, but show commitment that has to be translated into action. In developing ecological networks and land use planning there is still a gap between the strategic plans and the actual policy implementation at regional and local level of governance (Bruff and Wood, 2000, Jongman et al 2004).

4.2 Procedural approach

The legal mechanism for integration of ecological networks into other policy sectors is embedded in the *procedural approach*. Using the procedural approach in developing ecological networks means integration and the use of the concept in nature conservation and other sectoral policies by legal interventions. These include legislation that establishes obligations, auditing and environmental appraisal procedures. The most important legal reference at the EU level with regard to ecological networks is the EU Directive on Habitats and Species and the Bird Directive. Based on these Directives a legally binding procedure is the obligation of the EU member states to implement the Natura 2000 network. The Directives are enforced through the national legislation in all member states and administrative structures at regional and local levels.

Several countries such as the Czech Republic, the Slovak Republic, Estonia and Germany as well as Moldova and Ukraine outside the EU have developed special acts to regulate the establishment of ecological networks. In the last years the designation of Natura 2000 sites has intervened with many other sectoral laws, regulations and procedures at European and national levels such as with land use planning procedures, which induced new legal provisions for public consultations with land owners and land users (IUCN, 2005).

4.3 Economic valuation of ecological networks

4.3.1 Valuation methods

In order to include environmental and ecological issues into economic evaluation and decision making *economic valuation approaches* have been developed. These approaches are widely applied in supporting decision-making processes in rural and urban development (Bos, 2007) and in the field of nature resource management to valuate forest and nature areas in economic terms (Lette and de Boo, 2002).

In evaluating the success and impact of ecological networks projects in social and economic terms it is important to decide which evaluation instruments could be used (Figure 1). A possibility can be the Costs Benefits Analysis (CBA) or the Societal Costs Benefits Analysis (SCBA). This instrument can be applied to value all impacts of an ecological network or corridor economically. However, because impacts such as an increase of biodiversity cannot be valued in financial terms and quantities as a market expression, this impact is expressed through non-market valuation. Because the reliability of such methods is subject of discussion, it might be attractive to express these impacts in physical terms such as in the Costs Effectiveness Analysis (CEA). A description of the methods is given in Appendix 1.

In Multi-Criteria Analysis (MCA) the value attached to an impact is given by interest groups or policy makers using certain criteria; this can of course differ substantially from the value attached between stakeholders and interest groups. By the use of several weight values sets MCA can be useful frame for analysing conflicting

objectives and arranging alternatives in a systematic manner. In CBA the conclusion on the desirability of an action is in principle based on economic arguments. In MCA the decision-maker can influence the outcome by modifying the weights. However, the policy analysis transparency remains as in the MCA concordance of weighting is part of the procedure.

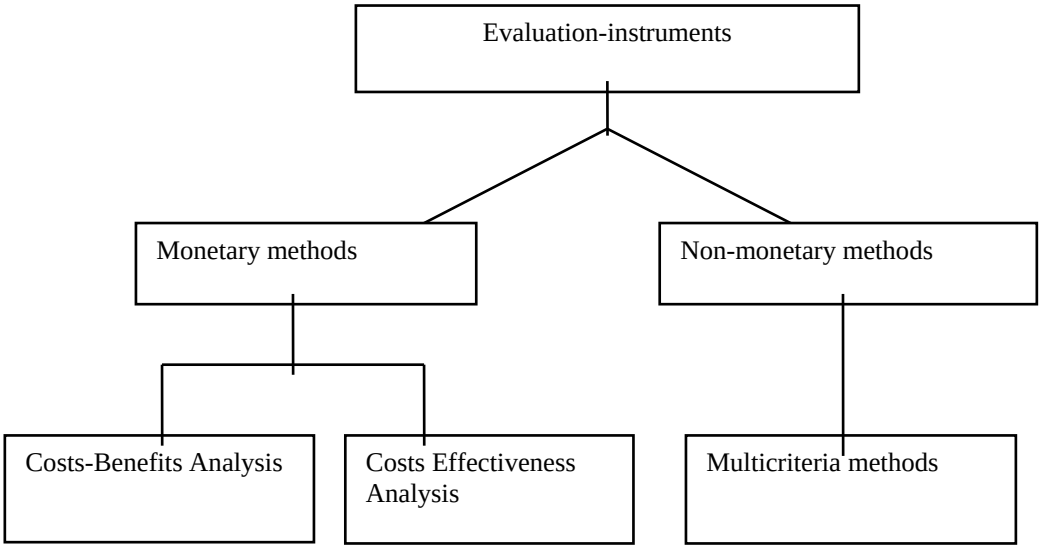

Figure 1 Overview of instruments for socio-economic evaluation. For description see Appendix 1

A point of difference between the approaches is the partitioning impact. These receive little attention within CBA: what counts is the net sum of the change in the benefits for the different actors and not the partitioning of the costs and benefits between actors. A policy action can lead to very large benefit differences between actors. Although in principle the winners could compensate the losers (Hicks-Kaldor-criterion), it is in reality mostly not the case (Rietveld, 2002). However, CBA can give input for decision-making concerning partitioning aspects by making transparent profits and costs concerning social actors the partitioning of transacts and benefits for different actors. Within the MCA the partitioning impact can be used as decision criterion. Finally, MCA does express all impact in weighting order and not in money, which is the basis of CBA.

There is insufficient knowledge on the socio-economic effects of ecological networks; especially the social and economic costs and benefits are just being explored. For defining the main costs and benefits basic figures are needed on the economic values that can be used for the assessment of ecological networks.

4.3.2 Economic valuation for decision making

Economic valuation is based on quantification of values assigned to various goods and services provided by natural resources. In the field of nature management the valuation approach is based on defining the functions of nature areas and the

valuation of their services by different stakeholders. When decisions have to be made about the use of nature areas, the effects of the decision can be deducted by comparing the plan scenario with the autonomous development. Subsequently, the effects are quantified in physical terms and then valued in economic terms. In this type of economic valuation, a function of the nature areas only has a value when one or more stakeholders attach some kind of interest (positive or negative) to it. This approach presents ways to analyze different types of values associated with functions of nature and ecological networks (Figure 2).

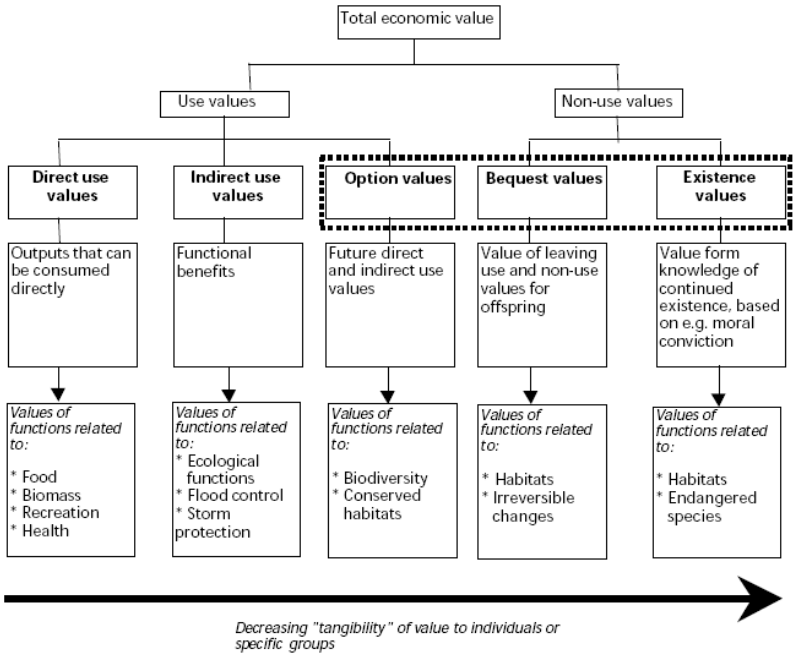

Figure 2 The total economic value of nature (Source: Munasinghe, 1992, adapted)

The economic valuation approach is essential for decision making and it places all values under a single common denominator: money. Three types of valuation methods can be distinguished relevant to the ecological networks development process (Lette and de Boo, 2002):

a) The first and simplest type of valuation is based on *market prices:* all costs and benefits associated with use values can be determined by the prices that are paid on the market, assuming that there are no market distortions.

b) The values of nature or ecological networks, however, are normally not revealed by market prices. Various valuation tools have been developed to estimate the *monetary value of the non-marketed goods and services.*

c) The third category is when dealing with the quantification of *values that can not be expressed in economic terms.* Some functions and uses of forests involving ethical issues cannot be converted into monetary terms. Some people also place psychological and ecological values in this category.

Goods and services of which the interaction with the market is not straightforward can be valued by tools such as the Related Goods Approach, Hedonic Pricing or the Travel Cost Method. An overview of values and valuation methods is presented in Table 1.

Table 1 Links between value category, functions and valuation tools (adapted from Barbier et.al., 1997)

	USE VALUES		**NON USE VALUES**		
USE	**1. Direct value**	**2. Indirect value**	**3. Option value**	**4.Bequest value**	**5. Existence value**
FUNCTIONS	Wood products (timber, fuel) Non-wood products (food, medicine, genetic material Educational, recreational and cultural uses Human habitat	Watershed protection Nutrient cycling Air pollution reduction Micro-climatic regulation Carbon storage	Possible future uses of the goods and services mentioned in 1 and 2 (Use Values) by actual stakeholders	Possible future uses of the goods and services mentioned in 1 and 2 (Use Values) by the off spring of actual stakeholders	Biodiversity Culture, heritage Benefits to stakeholders of only knowing of the existence of goods or services without using them
	Tool to be used:	**Tool to be used:**	**Tool to be used:**	**Tool to be used:**	**Tool to be used:**
VALUATION TOOLS	Market Analysis Related Goods Approaches Travel Cost Method Hedonic Pricing	Restoration Cost Preventive Expenditure Production Function Approach Replacement Costs	Contingent Valuation Method	Contingent Valuation Method	Contingent Valuation Method

The *Related Goods Approach* determines the value of a non-marketed good by using the price of another good for which the non-marketed good is exchanged through the process of barter (non-monetary trade).

The basic idea behind the *Hedonic Pricing Method* is that prices of land and property illustrate the value of environmental quality. An example is the generally higher price of houses in natural surroundings within reachable distance of urban areas than houses in city suburbs or in remote areas. The extra price paid is a proxy for the environmental value.

Another valuation tool for obtaining a monetary direct use value is the *Travel Cost Method*. This tool estimates the value of recreational amenities by using the travel expenditure (in terms of time and money) needed to reach the recreational site. An

example of the results of such a study is given Appendix 1. An increase in recreational expenses is a related effect.
Functions of nature areas from which we perceive an *indirect* use can also be valued by various tools, such as the Replacement Cost Technique and the Production Function Approach (Table 1).

The *Replacement Cost Technique* generates a value for the benefits of an environmental good or service by estimating the cost of replacing the benefits with an alternative good or service. The alternative should, as nearly as possible, produce the same level of benefits supplied by the resource or environmental function being valued.

The *Production Function Approach* is a tool to capture the indirect use value of regulatory ecological functions of ecosystems and biodiversity through their contribution to economic activities. An example of the use of this tool is given in Appendix 1.

In case of *non-use* values, no physical interaction with an area needs to take place. These values have an impact on welfare, but the effect is not visible in terms of money fluxes. It concerns societal benefits such as the value for maintaining biodiversity in areas that are closed to visitors, like the wetland area Naardermeer in the Netherlands.

Non-use values reflect the idea that flora and fauna have their own place and right to exist and that it should be maintained for future generations. To express such values in economic terms non-market valuation methods have to be applied. In a monetary valuation of non-market values the effect is first expressed in physical units (such as change in biodiversity) and then the monetary value can be determined through the willingness to pay mechanism. The willingness to pay measurement is done through non-market valuation methods. Much used is the 'Contingent Valuation Method (CVM) in which respondents (these can be visitors or people living in the area) are being asked for their willingness to pay for instance flora and fauna. Because the intentional character of the willingness to pay questions the method is criticised (Diamond and Hausman, 1994). However, in the USA CVM has a full-grown position in the context of CBA analysis. An example is given in Appendix 1.

It must be emphasized that none of these valuation tools provides comprehensive answers. All of them value only part of the goods and services provided by nature areas. They all have limitations and should be chosen and used with care. Using several valuation tools for a case, such as in studies by Kramer *et al.* (1995) and Beukering and Cesar (2001) could contribute to a more complete valuation. Despite these limitations, in the US the monetary appreciation of non-monetary goods is an official component of CBA to evaluate nature and environment in ex ante evaluation of public projects (Navrud and Pruckner, 1997).

4.3.3 Defining cost and benefits of ecological networks

The first step in the economic valuation of ecological networks is the identification of their potential effects. An effect is defined as the difference in development between the situation of taking measures to reduce adverse ecological effects, and the situation that these measures would not have been taken (i.e. the autonomous development). In general such an effect is relevant if it changes the quantity or quality of a good or service that is valued by the users (Hanley 2000). If that principle is fulfilled then there is a welfare effect and this effect has to be included in an economic analysis. In this study we only include effects for which it can be expected that an economic analysis will significantly contribute to decision making. For the analysis of the effects a description is needed of the autonomous development as well as that of the plan scenario. Effects can only be identified when the autonomous development as well as the plan scenario has been described. Table 2 gives an overview of methods that can be used for effect evaluation.

Table 2 Effects typical for ecological network projects.

Effects		**Valuation method**
Ecological	Barrier effect	Avoidance costs
	Disturbance effect	
	Mortality effect	
	Artificial lightning	
	Habitat effect	Restoration costs
Environmental	Effect on natural processes	Contingent valuation
	Air contamination	
	Effects from construction, maintenance and use of the road	
Recreation	Effects on number of visitors and recreational spending	Travel cost method and market valuation, respectively
Human health	Contamination	Hedonic pricing method
	Risk for drivers	Avoidance costs
	Noise disturbance to humans	

The next step is to value these effects in economic terms. Effects that reduce welfare for an actor are called costs and positive effects on welfare are called benefits. Within the context of SCBA it is common to make the earlier mentioned distinction between effects that are expressed on the market and other effects.

The use of the methods in Table 2 for a case study can be illustrated through infrastructural plans affecting ecological networks. For that situation the effects concerned are adverse effects and thus they all implied social costs. The ecological effects concern all non-use values which are normally not revealed by the market. In that case study the valuation of ecological effects was based on the preventive expenditure methods, avoidance costs and restoration costs (Bos et al 2007).

4.3.4 Financing mechanisms and related factors

Financing mechanisms

A positive outcome of a CBA is not sufficient for successful decision making and implementation. Project realisation might become problematic if a major part of the benefits consists of non-use values. This situation, where the market can not supply goods or services demanded by society, is referred to as a market failure. The relevance of market failure in nature development projects is emphasized by the CoP on the Convention on Biological Diversity 2008 in Bonn. The CoP agreed to look for innovative sources to meet the biodiversity goals such as private finance resources and to look for innovative large scale finance mechanisms.

The implementation of an ecological networks project generates various costs and benefits, for most of which no properly working markets exist. This is a problem because it might obstruct the financing and thus the implementation of a project that, by itself, might be welfare increasing for society.

In most nature development projects, where non-market benefits as public goods are involved, the net direct financial returns are at least at the short term negative and profit maximizing agents do not have an incentive to invest. It is also possible that both net social benefits and net financial returns are positive, but the financial benefits of a project accrue to others than those who bear the costs. Also in these cases profit maximizing agents do not have an incentive to invest in the project either.

In both cases, specific finance mechanisms are needed because there is a market failure although the type of failure is different. The transaction costs approach and principal-agent theory are often used in addressing these issues. For a theoretical analysis of these first and second order conditions, see Appendix 2

In case the *aggregate net financial returns are negative,* it is important to analyse the non-use benefits. Why are they considered 'non-market' goods and what causes the market failure? The problem is that non-market goods have characteristics of public goods. One of them is that no person can be excluded from deriving the concerned benefits (non-excludability criterion). The consequence is that the supplier cannot force an individual to pay for 'consuming' the good.

In the case that *aggregate net financial returns are positive, but for investing agents individually negative,* these might not be willing to participate (invest) in the project. Even in the case that the aggregate net financial returns are positive; it still might not be a sufficient incentive for the investors, such as when financial benefits of a project accrue to others than the investing agents. This is typical for nature development projects as they can generate benefits for various agents such as investment in flood protection.

Again, it is non-excludability that causes the problem. The investing agents cannot force others to pay for the benefits they enjoy. The difference with the previous situation is that benefits do occur on the market. This means that if the project

would not be implemented, this would not only be sub-optimal in terms of social welfare but also in terms of financial returns.

Financial and non-financial tools

Non-use benefits are public goods. An evident financing mechanism would be public finance such as subsidies. However, financing public goods efficiently by means of subsidies might not be as evident as it would seem on first sight. However, the utility that is being derived from the public good will, in general, be different for each individual. If some individuals derive more benefits than others from a public good of a certain size, then it would be Pareto improving when these individuals would pay more for this good than individuals who derive less utility from it. A temptation to cheat (become a free-rider) and to lie about true preferences for the public good constitutes optimal behaviour for utility maximizing individuals. There are no practical ways to deal with this (see Bos, 2007). In addition, subsidizing might induce specific problems like conservatism in decision making (Primdahl et al 2004).

The net returns of investing agents can be positive if the non-investing financial beneficiaries would sufficiently compensate the investing agents. In that case, all of the involved profit maximizing agents would have positive net returns. In order to prevent free-rider behaviour, institutions (regulations and enforcement) are necessary. Thereby, the role of a central planner (government) as a provider of regulations, monitoring and/or enforcement systems is often inevitable. An overview of the possible financial mechanisms for ecological networks is given in Table 3.

Table 3 Innovative financial mechanisms relevant to ecological networks projects

Financing tools	**Aggregate net financial returns are negative**	**Aggregate net financial returns are positive, but for individual investing agents negative**	**Principle of the financing mechanism**
Subsidizing	√	√	Direct government financing
Green saving / fiscal stimuli	√	√	Attracting private money by fiscal stimuli
Regulation	√	√	Allocating resources by means of institutions
Transforming public goods into club goods	√	√	Enforcing an entrance fee instead of free entrance
Selling private goods to finance public goods	√	√	Selling timber to finance cost of conserving biodiversity
Donations and sponsoring.	√	√	Marketing
Membership contributions	√	√	Marketing
Voluntary work	√	√	Enables financing in an indirect manner
Tourist tax		√	Allocating tax income to financing nature conservation activities
Red for green		√	Relevant when planning residential areas
Blue for green		√	Water board participation in financing nature

Most financing mechanisms for ecological networks are new and do not concern generally accepted approaches for which regulation and standardized guidelines are available. Non-economic factors like commitment, charismatic leadership, marketing and local acceptance are of particular importance. Non-economic factors affect decision making on ecological networks as well. The political – economic system of a country plays a role and needs to be considered. There are observations that in a more democratic political system with a market-based economy, the potentials for a successful involvement of non-governmental and private stakeholders in financing ecological networks will be higher (Figure 3).

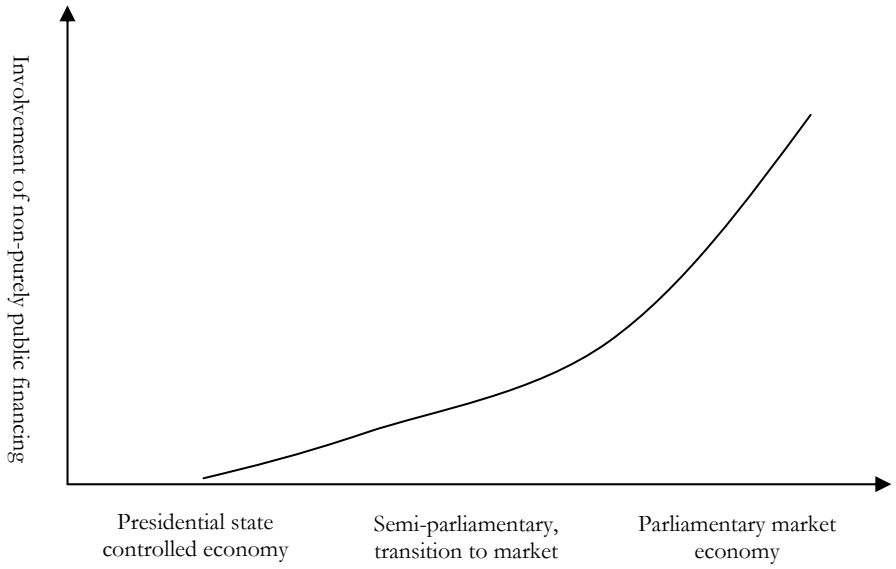

Figure 3 Relation between (i) involvement of non-purely public resources financing ecological networks and (ii) the political-economic context.

During the last decade in Europe practices have been developed in applying different methods for using financial and non financial tools for nature conservation. These practices illustrate success and failure factors. Some of these mechanisms are fully based on private sources, while others on public finance or a mix of both (Box 1). They can also be distinguished by financing investment costs (once-only costs) and financing conservation costs (continuous costs).

A proper embedding in society and its institutions seems important as well. A role for the government in financing ecological networks seems inevitable. Marketing and positive publicity are major incentives for profit maximizing agents to sponsor nature development projects. Various cases confirm this financing motive and show that sponsoring can be a significant source of financing.

Economic factors are not the only conditions for a successful establishment of investments in nature. Factors such as commitment, charismatic leadership can be crucial here. The general economic and political situation of the country can affect the decision making process.

Box 1 Best practices in using financial tools in nature conservation projects

Private financing and subsidizing conservation costs
Several pilot studies have been applied for multiple sustainable land use scenarios in Winterswijk, the Netherlands. The plan concerned the development of herb rich grasslands on agricultural land.
Financial factors: The pilots have been evaluated by means of a CBA (Bos, 2006), It was concluded that the application of the pilots on a large scale would yield positive net social benefits. Main financial benefits would concern income from recreational spending. Subsequently, the project focused on the development of a payment scheme as an additional financing source to existing subsidy payments. Together with the farmers involved, the municipality of Winterswijk is setting up a landscape fund to finance the farmers and landowners. The next challenge is to include private stakeholders (companies other than farmers, such as recreational business) in the project.
Other factors: A committed leader whith a network of contacts in the region led this project. He supervised various evaluation studies for the Winterswijk plan scenario, and communicated these to stakeholders.

Sponsoring and subsidizing investment costs for Ecoduct Crailo
The world's largest fauna pass-over is located in the region called 't Gooi, east of Amsterdam. The objective was to connect nature areas that were isolated by motorways and a railroad complex and to restore the interaction of species between these areas. In addition, the pass-over would enlarge also the accessible area for recreational visitors. The initiatiator was the regional nature conservation organization Goois Nature Reserve ('Goois Natuurreservaat').
Financial factors: The realisation of the fauna pass-over costed 15 M€. Organizations that participated in the financing include the initiating regional nature conservation organization the Goois Nature Reserve, the Province of North-Holland, the municipality of Hilversum, the real estate company of the Dutch railway lines (NS Vastgoed), the railtrack managing company (VoestAlpine RailPro), the National Lottery, the Dutch Ministry of Agriculture, Nature and Food Quality, the EU and the VSB fund (a Dutch bank).
Other factors: The general manager of this NGO was very committed to the project. He understood that local acceptance was crucial. Local citizens have often explicitly chosen to live in this green area and are willing to pay for it in terms of property values. To increase local acceptance to the project the co-use of the bridge was proposed for the animals and for recreation. .In the marketing of this project the unique financing was emphasized and the public was well informed about the contributing stakeholders. The investors were considered as corporate responsible, "sustainable" investors.

Well-functioning *forest markets in UK*
In the UK, there has been an increasing demand from business and households to buy (small) forests. The value of land under trees has increased together with the number of market transactions. The prime reasons for buying woodland are:
Financial factors: Fiscal stimuli: 'woodland is treated as business property and is subject to 100 per cent inheritance tax relief. No income tax is paid on any sale of timber and there is no capital gains tax on any gain in the value of the timber'. Demand for bio-energy and selling timber in general., reducing the carbon footprint as trees absorb carbon dioxide: CO_2 emission rights.
Other factors: Demand for transforming a public good into a club/private good. Have a quiet place for yourself where you can conserve the amenity, and have a site to recreate and to sport: woodland and trees are also fun and provide an amenity for family outings.

4.4 Collaborative approach

Successful implementation of ecological networks and its institutionalisation as conservation strategy can only be achieved through collaboration. Collaboration is required for improving communication and the 'calibration' of views and values among parties (Steurer and Martinuzzi, 2005). Communication is a major critical factor influencing the governance processes in which various stakeholders' interests are involved (Nilsson and Persson, 2003; Lafferty and Houden, 2003; EEA, 2005; Kooiman, 2006). One of the main impediments for efficient inter-organisational communication is the fragmented organisational structures of governmental agencies and departments (Hertin and Berkhout, 2001; Lenschow, 2002; Steurer and Martinuzzi, 2005; UNECE, 2003; Lafferty and Houden, 2003).

The objective of the collaborative approach is to facilitate communication between implementing agencies as well as between professionals within these agencies. The development of ecological networks should be seen as a continuous process of transformation and learning for organisations and individual actors involved. Such a transformation can take place when all parties aim to optimise the integration of their objectives. In this dynamic socio-economic and political environment communication is indispensable for the transformation process, as it results in a better mutual understanding of sectoral interests. The collaborative approach can particularly help ecologists, planners and developers to reach common understanding about the strategies for the establishment of ecological networks in combination with other projects (Simeonova & van der Valk, 2009).

In order to improve communication processes between professionals two aspects of the collaboration are considered essential i.e. *structural change* and *coordination*.

The *structural change aspect* represents the formalisation of relationships, roles and responsibilities between governmental organisations or units within them. It focuses on adapting the organisational structure of government agencies and departments to make ecological networks objectives better integrated in existing administrative tasks. Effective structures may differ for each organisation or governmental level. In some cases, it may be best to spread responsibility for development and implementation across various organisational units and governmental levels. In other cases it might be more appropriate to concentrate responsibilities into one unit.

The *coordination aspect* focuses on the establishment of a coordinative body that supports and directs subdivisions of government organisations to integrate the objectives they promote. Such coordination might be conducted along the vertical and horizontal dimension of governance, and the style of coordination may differ, ranging from installing supervision authorities to forming of advisory committees. The choice of coordination style will inevitably affect the process of decision making: a hierarchical supervision is linked with a more centralised and unified process and a variety of approaches will develop in a more decentralised process In the latter mostly various networks of inter- and intra-organisational advisory committees are involved promoting the objectives of the ecological networks.

The coordination aspect promoted by the collaborative approach also represents the opportunities for formation of temporary consultative bodies based on voluntary agreements (Memorandum of Understanding, etc.) related to specific groups of countries or stakeholders. An example of such coordination activities is the committee formed within the UNESCO initiative of the ecological network development on the BUG river accompanied by a trans-national memorandum of understanding between Poland, Ukraine and Belarus (Appendix 3).

Summarising, the main functions of the collaborative approach for the development and implementation of ecological networks are:

- To improve and facilitate communication and coordination between actors in the policy process;
- To calibrate views, change perceptions and raise awareness among actors;
- To stimulate structural changes in the organizations if needed;
- To improve the effectiveness of the policy and planning.

4.5 Stakeholder involvement

Ecological networks are not only biodiversity conservation tools, but also planning tools aiming to increase nature values in fragmented landscapes. The consequence is, that in its implementation a great variety of stakeholders are involved such as land owners, policy makers, developers etc. For an effective planning and implementation it is important to engage already in the initial phase all stakeholders.

Which stakeholders are involved is depending on the level on which the network project is developed. National plans need other stakeholders than local implementation. In the latter case stakeholder involvement should be bottom-up oriented to allow public involvement. Successful stakeholder involvement is the best way to prevent conflicts on land and resources and reach consensus between interests.

The first step in stakeholder involvement is identification of various interest groups. Stakeholders may profit from services provides by nature areas. The economic value of a nature function depends on its use and the service it provides. The combination of the various functions and users for whom those functions are relevant determines the value of ecological network. The economic value assigned depends on the groups of people or stakeholders and is inherently highly anthropogenic by nature i.e.:

Functions related to Stakeholders = Values (Lette and Boo, 2002)

Table 4 illustrates relevant stakeholders for forested nature areas. Stakeholders can be categorized by scale: local, regional, national and international, but also by time: current and future stakeholders. Individuals may fit into more than one interest group such as consumers of timber may also be forest dwellers with an interest in the forest for subsistence, but they may also be environmentalist.

The stakeholder involvement is considered a key factor for achieving integration of ecological networks in other policy sectors. It includes a few important steps:

- Identification of the stakeholders with direct or indirect interests;
- Identification site issues of concern;
- Background information about the stakeholders;
- Identification of stakeholders' main concerns;
- Identification of potential constraints and conflicts;
- A strategy for stakeholder involvement and communication.

4.6 Conclusions

Strategic and procedural approaches are rather general and are mainly applied at high governmental level. The collaborative approach is all inclusive and can make use of various approaches and valuation tools. It has to include stakeholders and proper communication tools. Valuation can make the functioning and the services of ecological networks more explicit and help to fit it in a policy and planning decisions.

The strategic approach is used for plan formulation, while the procedural and collaborative approaches can be relevant through the entire planning process. Economic valuation can be used in the natal and implementation phase (Bos, 2007).

It must be emphasized that none of the available valuation tools provides comprehensive answers. The institutional organisation and charismatic leadership are important as well and in practice they show to be key factors. It is important when developing Ecological Networks to identify a key person to lead such a project, to define the organisation needed, develop a good communication strategy and include all strategically important stakeholders.

Table 4 Stakeholder identification for nature areas on macro-micro continuum

Institutional level	Examples of stakeholders	Issues of interest in nature areas
Global and international	International agencies Foreign governments Environmental lobbies Future generations	Biodiversity conservation Climatic regulation Global resource base
National	National governments Macro planners	Timber extraction Tourism development Resource protection
Regional	Forest departments Regional authorities Downstream communities	Forest productivity Water supply protection Soil loss and degradation Tourism development
Local	Local authorities Local environmental councils	Urban development projects Land use planning Tourism and recreation Environmental quality
Private	Developers, farmers, foresters, hunters, tourism operators mining, utility companies	Use of land and other natural resources Production and consumption needs
Non-governmental Community based organizations	Nature conservation NGOs Media Volunteers	Conservation and sustainable use of natural resources Community based initiatives related to natural areas
Households	Non-commercial land users Forest dwellers	Use of natural resources

5 Ecological Networks in different socio-economic contexts

5.1 The wide context of ecological network strategy within Europe

In the last two decades there has been a rapid increase of initiatives undertaken worldwide do develop and implement ecological networks (Bennet and Wit, 2001; Jongman *et al*, 2004). Bennett and Wit (2001) emphasize the need for a more extensive inventory of ecological network approaches at the European and international level to draw lessons from and compare experiences. Such reviews could contribute to a global database of expertise providing a better insight in the success and failure factors of applying the ecological network concept in different countries. This is important for detecting implementation strategies matching the legal, political, institutional and administrative structure of specific countries.

In the past in central and eastern Europe biodiversity conservation and ecological networks were based on biological compensation as in Estonia or landscape stabilisation functions of 'biocentres' and their linkages (biocorridors) in systems such as the Territorial System for Ecological Stability (TSES) in the Czech and Slovak Republic. Both are based on the concepts developed by Rodoman (2007). In Western Europe more emphasis has been given on the protection of valuable sites and threatened species and only in the last decades landscape connectivity has been included (Jongman et al 2004). Traditionally, biodiversity conservation has been based on a separation of nature areas from intensive land uses, a strategy that is no longer effective in a rapidly developing countryside where land use, urbanization and transport systems cause fragmentation.

The implementation process differs also between countries because of administrative structures such as the legal responsibility, the involvement of NGOs and the available budget and the underlying concepts (Jongman et al 2004, Jongman et al 2008). The central and eastern European countries have to deal with a tradition of historically technocratic and top-down governance practices; stakeholder involvement here is young and authorities are often mistrusted. In western European countries with socio-democratic practice the role of interest groups is important. The challenge here is to communicate well between the different interests and not only in ecological, but also in economic, social and environmental terms.

Therefore, methodologies for developing and implementing ecological networks between countries may differ substantially and will change over time. There is a need for specifying definitions at an international level and analyse their applicability per country although the discrepancies are various. They can be related to historical experiences, natural conditions and differences in the political, legal and institutional systems.

But in general, for a design methodology of the ecological networks at European or international scale, in countries or between countries the following aspects are essential (IUCN, 2005):

- Aims and objectives of the ecological networks;
- Historical experiences in designing ecological networks;
- Natural values and environmental conditions;
- Threats to ecological networks, especially resulting from the land use policies;
- Existing initiatives for nature conservation and spatial planning;
- Available data resources;
- Available technologies such as GIS technologies;
- Legal, economic and administrative basis for implementation.

5.2 The impact of socio-economic systems

Recognition of the relationship between natural environment and socio-economic development has resulted in efforts to integrate environmental considerations into economic decisions and socio-economic considerations into environmental decisions. Underestimation of the value of the goods and services provided by the nature areas has been recognized as one of the major causes of the failure to protect and manage nature in a sustainable way. Not only the easily quantifiable costs and benefits of nature should be taken into account in decision making procedures regarding the use of nature resources, but also its intangible costs and benefits (Lette and de Boo, 2002).

This raises the need for proper valuation tools to quantify and visualize the multiple benefits, but also the costs of nature areas and their linkages. The valuation of intangible resources and services provided by ecological networks is considered an important tool to help gaining better understanding of these "hidden values" and make decisions. In human-dominated areas ecological networks present higher values for biodiversity conservation compared with isolated nature areas, as they ensure connectivity and a better potential for populations of natural species to adapt to environmental changes. To use these values in decision making requires economic valuation methods that weight the functions of ecological networks and their importance for stakeholders (Lette and de Boo, 2002).

Another important socio-economic perspective that influences successful implementation of ecological networks is the relationship between the three sectors in economy, private business, public sectors and community organizations (e.g. through public-private partnerships). This relationship can be illustrated through the *Social Enterprise Compass* indicating the links between the private and public ownerships of organizations and their primary objectives in the society (Figure 5).

The *Social Enterprise Compass* model helps to identify organizations within the private and public sector, which play important roles as stakeholders in the socio-economic development or nature conservation. The relationships between these organizations are determined by conditions that are directly related to economic benefits and that

determine social behaviour and viewpoints on non economic issues such as biodiversity conservation.

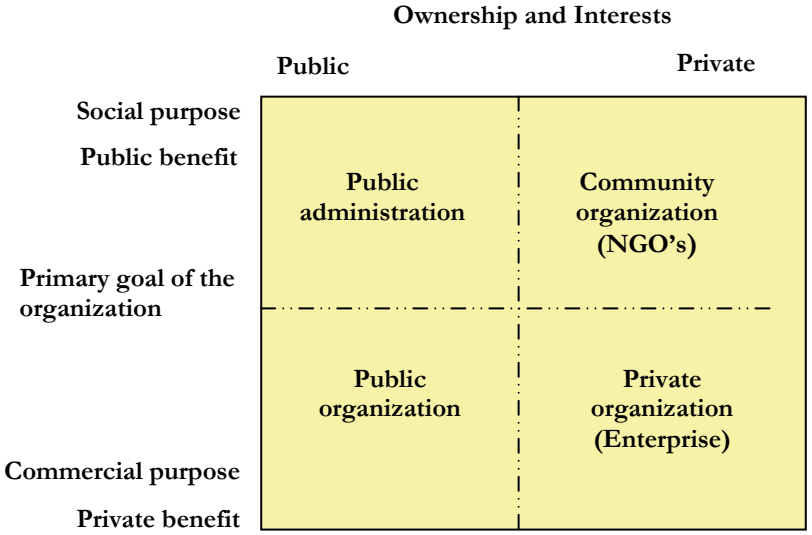

Figure 4 Social Enterprise Compass

The horizontal axis in Figure 4 categorizes each organization by its ownership. On the left side the ownership lies with the public authorities whereas on the right side the ownership lies with the private companies. In this axis the distinctive feature is the economic activity related to the ownership of the capital. On the vertical axes the organizations are categorized by their primary social objective (welfare, environmental protection, ethical issues etc.).

The use of the social enterprise compass for identification of the socio-economic role of relevant organizations gives an insight in the potential role in planning and decision making of stakeholder organizations. This is important in assessing if interests are supporting common social benefits such as biodiversity conservation and if this knowledge can be related to the development of an ecological network.

Socio-economic aspects that may influence the successful implementation of an ecological network include political and economic systems, involvement of countries in international political or socio-economic conventions and the relations between the public and private sectors.

5.3 Ecological networks in land use planning

5.3.1 Environmental Policy Integration principle

Political visions on ecological networks differ, as do the national policies and legislation. Accordingly, the incorporation of ecological networks into national or sub-national conservation strategies requires a tailor made approach. International

initiatives such as the Pan European Ecological Network (PEEN) provide a voluntary framework for the establishment of a European ecological network, in which national activities can be embedded. However, there are political and cultural barriers. Few cross-border initiatives in Europe such as the Bug River and the Carpathian Ecological Network development address these barrier problems. For ecological coherence it is essential to achieve better cross border integration. This also asks for integration in socio-economic policy sectors in all countries such as spatial planning, transport, agriculture and regional development. This integration principle is increasingly promoted especially at European level as the *Environmental Policy Integration* principle (Lenschow, 2002, EEA, 2005). The application of the environmental policy integration principle in biodiversity conservation measures is not yet well studied and a comprehensive model for it is lacking (Simeonova, van der Valk, 2009). Moreover, application of the integration principle appears to be dependent on the socio-economic and political context of a country (Jongman et al, 2004). Within the scope of the current project we have explored and identified the main factors influencing the integration process of ecological networks in land use planning.

5.3.2 Land use planning and ecological networks

Landscape configuration characteristics are important for the design of ecological networks. A functional network exists if the migration of individual species between ecosystem patches is possible. An ecological network can provide appropriate spatial conditions to a range of species (Opdam et al, 2003, Jongman et al, 2004). The spatial cohesion of ecological networks as proposed by Opdam et al (2003) can be assessed by two functional components:

- carrying capacity and
- connectivity of the network.

Carrying capacity is related to the maximum number of individuals of a species that a network can sustain, while the connectivity controls the flow of individuals of a species between habitat patches (Termorshuizen et al, 2007).

These functional components require a spatial structure and therefore the use of interdisciplinary planning including landscape ecology and land use planning (Lofvenhaft et.al., 2002, Theobald and Thompson, 2002; Termorshuizen et al 2007). It is essential to assure that these components are translated in compatible land use planning principles and integrated into the planning decision routines (Cort 1996, Duerkson et al 1997; Miller and Hobbs, 2002; Beunen, 2006; Theobald et al., 2000, Randolph, 2004; EEA, 2006; Gibbs et al, 2007; Thermorshuizen et al, 2007).

While ecological concerns become better understood by planners, ambiguity remains about how to address these concerns in different phases of the land use planning process, including the design of land use plans at different spatial scales (Duerkson et al 1997, Dale et al 2000; Borst, 2005). To a high degree this caused by insufficient coherence between the existing strategies, procedures and collaboration between professionals within the regional and local agencies (Kettunen et al, 2007; Simeonova

and Van der Valk, 2009). In the next phase there are also disparities between professionals and decision makers in recognizing the importance of nature as part of land use planning (Beunen, 2006; Gibbs et al, 2007).

The different role of spatial planning in different countries is an important factor influencing the possibilities to develop and implement ecological networks. Spatial development is embedded in policy frameworks, which determine the main institutional and legal aspects of the planning activities. Policies and legislation are interpreted and used differently by regional and local actors as they act in different administrative structures (ECNC, 2008). The institutional and legal frameworks for nature conservation and land use planning are not integrated in most cases. This influences the effectiveness of the development of ecological networks. Common hierarchical levels exist in land use planning and ecological networks design (Table 5).

Table 5. Relation between land use planning and ecological network design (after Külvik et al, 2002)

Land use planning level	**Spatial planning task**	**Ecological network design**
National plan	Prepared for strategic planning of a country, outlining guiding trends and measures in the spatial development of the country; serves as basis for lower levels plans	Indicates core areas of international and national importance and corridors and includes international nature conservation priorities: Natura 2000, Emerald, PEEN.
County (regional)	Prepared for the a region or part of it. It gives general guidance for the development of the region, defining conditions for development of settlements, infrastructure and services	Determines core areas (10-100 km^2) and connecting corridors between these areas (e.g. natural river valleys, semi-natural recreation areas for local settlements)
Comprehensive urban plan (general land use plan)	Prepared for the territory of a municipality (rural or urban) defining directions and conditions for the development of the municipality. It is the basis for land use plans and gives guidelines for land uses.	Determines the function of small habitats, woodlots, wetlands, grassland patches, ponds (<10 km^2) and connecting corridors (stream banks, hedgerows, field verges and ditches).
Detailed land use plan	Prepared for the municipality or a part the city or rural area in the municipality. Provides criteria and designation of the main land uses and spatial functions.	Ecological network design at this level is context dependent. Location of the municipality forests and wetlands determines which ecological functions are important.

5.4 Conclusions

Planning Ecological Networks in different socio-economic settings requires different approaches. There are a number of common issues in planning such as a hierarchy in planning, that accounts for the strategic character as a European or national decision document or the concreteness of the plan as it has to be implemented in the field. There are also differences especially concerning the political and social context in which planning takes place. In the new EU member states and former Soviet states a centralised planning tradition existed and in the past Ecological networks have been developed on the basis of the polarised landscape principle. It is now, at least within the European member states more integrating population ecology principles with

these originally landscape oriented approaches. Moreover the planning tradition was top-down and inclusion of stakeholders rather restricted. Where this situation still exists the establishment of National Parks is possible, but an integrated planning approach seems more difficult to apply. However, in planning ecological networks inclusion of stakeholders is a prerequisite.

6 Planning ecological networks in Central and Eastern Europe

Six countries have been selected for analysing and comparing the status of ecological network implementation. These countries are located in Central and Eastern Europe: Poland, Croatia, Ukraine, Slovakia, Hungary and Belarus. Poland, Slovakia and Hungary are full members of the European Union with relatively stable market economies. Croatia is expected to join the European Union in 2010. Ukraine and the European Union agreed to enter into intensified political, security, economic and cultural relations, including cross border co-operation and shared responsibility in conflict prevention and conflict resolution. Ukraine is not expected to become a candidate member state in the next years. Belarus is amongst the few states in Europe that have not requested EU membership. With their different political and economic conditions the six countries present interesting experiences and challenges on institutional and socio-political aspects.

This chapter reviews some of these challenges. It describes the state of art regarding the development of ecological networks in these countries by exploring the main economic trends and policy frameworks of importance. The chapter provides as well examples of the use and importance of the ecological networks in a transnational perspective.

6.1 Common development trends in Central and Eastern Europe

Fifteen years after the sudden collapse of the socialist system, many of the Central and Eastern European (CEE) countries announced the successful completion of their transition a to market-economy and democratic society. This transition presented both a challenge and an opportunity to put policies in place and incentives to minimize the environmental impact of increased economic development. Within the accession process to the EU most of these countries have made significant advances in implementing profound political and economic reforms including new nature conservation strategies. However, these efforts are proceeding at different rates in CEE with mixed results (Stanilov, 2007).

A major catalyst of the developments in the CEE countries has been their preparation for the accession to the European Union. The inclusion of the new member states in the policy process at a European level has resulted in facilitating the development of more effective governance structures by knowledge exchange between Western Europe and the CEE countries (Stanilov, 2007). In addition, EU membership provisions and the structural funds provide valuable support to complement the national funds and create powerful incentives in addressing nature conservation issues into policies that are promoting economic competiveness. Since Hungary, Poland, Slovakia joined the EU in 2004 these countries have made progress in strengthening and harmonizing their nature conservation policies with the EU requirements.

The developments in the CEE region present an opportunity for exploring the fundamental relationships between market and politics and the interrelations between the social and natural systems (Stanilov, 2007). A critical part in this is insight in how the socio-economic transformation is affecting the implementation of nature conservation strategies. However, within the large body of references produced over the last decade on the transformation of the CEE region, studies on nature conservation and ecological networks have been rare or are still under development.

6.2 Poland

6.2.1 Socio-economic trends

The Economic Transformation Program adopted by the Polish government in January 1990 aimed to convert the country from a planned economy into a market economy. Measures aimed at drastically reducing the budget deficit, abolishing trade monopolies and selling state-owned enterprises to private interests. Privatisation went slow but picked up somewhat in 1995 when 512 smaller state enterprises were transferred to private ownership under the Mass Privatization Program. However, large-scale industry remained in state ownership. The government subsequently made attempts to privatize banks, oil companies, weapon industry and the telecommunication sector. In the early 2000s Poland was in the process of bringing its economy in line with the EU standards. In 2002, the government announced a new set of economic reforms, including improvement of the investment climate (particularly for small- and medium-sized enterprises), and improving the country's public finances to prepare the way for the adoption of the Euro.

As all other post-communist countries, Poland suffered a temporary slow down in social and economic development, but it was the first to reach its pre-1989 GDP levels. Poland voted to join the European Union in a referendum in June 2003 and became a full member on 1 May 2004.

An important socio-economic development in the transition of Poland towards a market economy has been the restoration of private ownership. An important role in this process has been the restitution reform i.e. the reassignment of wrongfully lost proprietary rights to former owners. Despite the numerous attempts, there is no comprehensive restitution (Wyrzykowski, 1996). The lack of consensus among different political and social players still prevents the development of such a comprehensive approach.

6.2.2 The spatial planning system

The political transformations after 1989 led to a revision of the spatial planning system. The government passed the Act on Spatial Development in 1994, which replaced The Act on Spatial Planning from 1984. An important predecessor of the Act on Spatial Management was the Act on Territorial Self-Government from 1990.

Through this act local self governmental communities became legal entities endowed with a wide spectrum of tasks. The scope of their tasks covers all the public affairs of local importance, which have not been legally assigned to other bodies. This was the first step to create local self-governments in Poland. Regional (Voivodships) and district self-governments were established in 1998 and organized through an administrative reform of the country in 1999.

Current legal and policy framework

At present the basic spatial planning in Poland is regulated through the Spatial Planning and Management Act (27 March 2003). The role of this act is to:

- define the scope and procedure of issues related to appropriation of land for specific use and the establishment of principles for sustainable development;
- regulate the way of resolving conflicts of interests that might arise between citizens, self-governed communities and the state.

There are other important parliamentary acts which impose obligations on spatial planning related to building activities and environmental protection such as:

- the Environment Protection and Management Act (the framework for many detailed material regulations, e.g. forests management, water and waste management, protection of nature or arable land);
- the Building Code (construction and engineering activities);
- the Law on Real Estate Management.

The scope of spatial management in Poland covers the three levels of territorial division of the country (state, voivodships and communes). The spatial planning system covers the following important fields of development:

- Requirements of spatial order, including those of urban planning;
- Architectural and landscape qualities;
- Environmental requirements, including water management and protection of cultivable soils and forests;
- Requirements of preservation of cultural heritage;
- Requirements of health care, safety of people and property;
- Economic qualities of space;
- Ownership title;
- Security and defence needs of the state;
- Public utilities needs.

The governmental agency responsible for general coordination and standardization of Polish spatial planning is the Ministry of Infrastructure (MI). The responsibility for the implementation of the national spatial development policy lies with the Government Centre for Strategic Studies (GCSS). Another planning-related authority at the central level is the Ministry of Environment (ME), responsible for the 'protection plans', prepared for the National and regional Landscape Parks. Those plans, however, do not belong to the category of spatial plans in the sense of the

spatial development Act. In environmental issues related to the actual spatial plans, Ministry of Environment has a supervising role.

Many of the planning activities in Poland are carried out at the local and regional level by self-governmental institutions, meaning that the Local Self-government and Regional Self-government Acts must be taken into consideration as the source of procedural regulation.

Spatial planning is increasingly based on development strategies. Strategies cover mainly economic and social issues and they determine the spatial planning programs and plans that are based on these (Ministry of agriculture and rural development, 2007). The relation between the different plans is illustrated in figure 5.

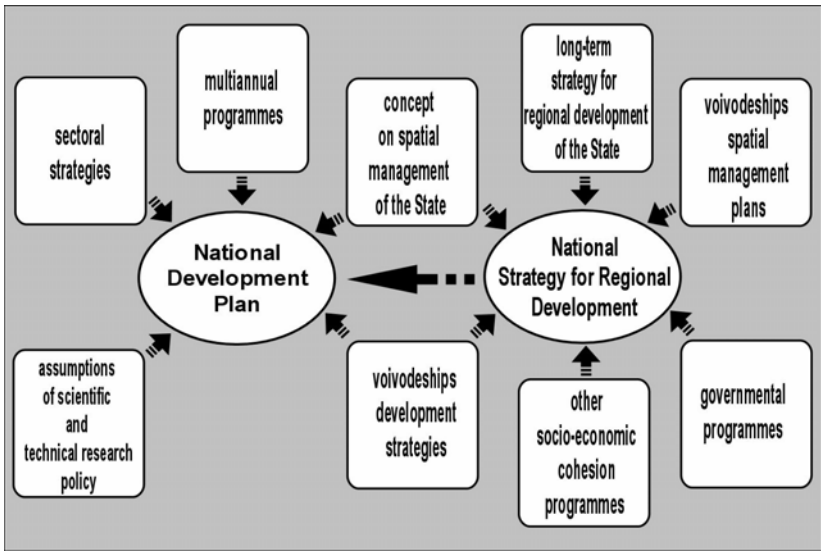

Figure 5. Relations between different documents

Spatial planning at different levels

National level

According to the law on spatial planning, strategic planning is required at national level. The GCSS develops a strategic spatial planning document called the Concept of National Spatial Development (Koncepcja Przestrzennego Zagospodarowania Kraju). This is a guiding document for structural development in the country, carried out through involving local governments and sectoral interest groups. The development of the spatial concept is a process of negotiations between institutional players in public administration and other important stakeholders. The objectives of this document are:

- Providing natural, cultural, social and economic analysis on the directions for national spatial policy;
- Establishing principles of the spatial system of settlement and infrastructure;
- Providing tools for balancing the development of regions;
- Establishing the basis for sectoral and regional public programs.

Complementary to the document, regular reports on spatial management are elaborated at the national level as part of the state monitoring system. In accordance with the Spatial Planning Act, these reports are prepared by the minister responsible for construction, spatial and housing economy.

Regional level
There are 16 administrative regions in Poland the Voivodships, with a population ranging between 1 ad 5 million and a surface area of 10,000 to 35,000 km^2. Regional self-government encompasses a Regional Assembly (parliament) and the Board of the Region (executive body), headed by the Voivod or Governor. The regional self-government has full responsibility for regional strategic and spatial planning. At this level the state has control functions restricted mainly to public safety, building, environmental and health standards and general conformity of laws. The Voivod's office is responsible for planning. They involve other institutions such as regional development agencies, non-governmental organisations and private actors.

Regional spatial planning comprises two different processes and documents.

Firstly, each Voivodship has to develop a strategy for regional development. This document is comprehensive and focuses mainly on social and economic issues. Regional programs (action plans with priority tasks and actions to be carried out by regional authorities) have to be based on this strategy and coordinated with the voivodship's spatial development plan.

Secondly, the regional spatial development plan must formulate the spatial policy of the Voivodship based on:

- Socially agreed objectives and directions of development;
- Spatial development and settlement system organisation;
- Location of main public infrastructure;
- Integration of natural and cultural heritage into spatial policy;
- Balancing regional and local interests with national and international aspects.

Regional spatial development plans should thus consider national and regional tasks as formulated in the regional programs.

Local level
Municipalities or communes are named gnima and these are the local self-governmental units. They comprise urban communes (towns, cities), urban-rural communes and rural municipalities. There are 2,489 gnimas, highly varying in size and social, economic and environmental features. A number of communes form a county or poviat. There are 373 poviats including 68 cities with the power of independent municipal counties. The average county population is 103,000 and the area is 836.4 km^2. Most municipal counties are cities with more than 100,000 people. The county generally has a self-governmental character, while also performing specific tasks commissioned by the state (central government).

The communes have a weak enforcement power with the exception of the 68 cities with municipal county status. At the lowest level of public administration all local) self-governing communes are obliged to prepare and approve a strategy document for local development, and a study on the preconditions and directions for the commune's spatial development. These policy studies are obligatory for all communes and must consider national and regional goals and directions, spatial development policies and programs the region and any other laws and conditions concerning land use and natural resources. The planning object is the territory under the administration of a commune. The Spatial Planning Act prescribes their tasks as:

- Identification of the physical development conditions and directions;
- Establishment of sustainable territorial and economic development;
- Functional zoning and indication of areas for housing and other investment;
- Proposals for technical infrastructure, main roads and other networks;
- Identification of the most important areas for conservation due to their natural, economic (e.g. agricultural) and cultural value;
- Establishment of a local planning policy (plans and monitoring);
- Designation of the boundaries of areas indicated for organized development or revitalization and sites intended for public objectives.

The final planning document is the Local Spatial Development Plan. Such plans are generally prepared for some parts of a municipality or rural commune only when necessary. The proposal for this plan is made by the head of a rural commune or a mayor. The plan is a legal basis for the detailed spatial management (zoning) of a territory. The local council adopting it in the form of a local by-law divides the allocation of land between different functions and also provides a legal basis for land reclamation for important public tasks. As a rule the common tasks proposed by a higher tier of government can be introduced into the plan through negotiations only. The plan is developed in consultation with the voivodship board and other territorial bodies. The main tasks of local spatial development plans include:

- Land use and infrastructure services (amenities);
- Establishing and observing local standards and building conditions;
- Dividing a given area (covered by the plan) into building plots.

6.2.3 The ecological network

Many valuable natural areas are protected as national parks (23, covering 317,233.8 ha), nature reserves (1,395 covering 165,244.7 ha), landscape parks (covering 2,516,855.7 ha) and protected landscape areas (449 covering 7,044,459.7 ha) (Box 2). The nationally and regionally protected nature areas cover 32.5% of the country.

The ecological network of Poland is currently under development at the regional level as the voivods are the responsible authorities. It includes the Natura 2000 network (Figure 6). The national policy for the establishment of ecological networks is based on the implementation of the EU Habitats and Species Directive and the

Birds Directive and their joint output, the Natura 2000 network. The Natura 2000 network is based on the existing national nature conservation policy.

Box 2 Definitions of protected Areas in Poland

National Park - according to Art. 14 of the Nature Conservation Law of 1991 a national park includes a protected area distinguishable through particular natural, social, and educational values, covering an area of at least 1,000 ha, in which the entire nature and all landscape features are be protected.
Nature Reserve – an area, which encloses a natural ecosystem preserved in their original form; particular species are protected in the reserve. The reserve is taken care of on the basis of a specific conservation plan.
Landscape Park – an area protected due to its particular natural, historical and cultural values; agriculturally exploited areas may be located within the park's borders.
Protected Landscape Area – an area with a characteristic landscape including different ecosystems, it can be farmed only if the natural ecological balance is sustained.
(source: http://nature.poland.pl)

Nature areas proposed in 2007 as Natura 2000 sites covered 15.45% (4,194,457 ha) of the land area of the country. The Natura 2000 areas are composed of forests (54.67%, 2,293,079 ha) including National Treasury forests (49%), municipal forests (0.27%) and private forests (5.4%), agricultural land (19.26% of UAA, 807,724,09 ha). By 30 May 2007 the Polish Government officially notified the EU Commission about the structure of the national Natura 2000 network consisting of:

- 107 Special Areas Protection areas (SPAs), covering 11.8% of the country;
- 286 Special Areas of Conservation (SACs), covering 5.1% of the country.

In total, the list includes 393 Natura 2000 areas, i.e. about 13.5% of the country area. In 2008 a new proposal has been developed that covers about 30% of the country's territory (Trzeciak, 2008).

The policy framework

In Poland the Ministry of Environment, the regional nature conservation offices, the regional water management boards, the Landscape Park administration and the State Forest Directorate are responsible for the implementation of ecological networks. The voivodships are developing ecological networks and ecological corridors in the regional development plans.

The voivodships are responsible for setting up a comprehensive database on the ecological networks including Natura 2000. One of the problems is data availability. Data is scattered among various public and research organizations and not always easily accessible. The overall nature conservation data is divided over several themes: hydrology and water quantity, water quality, biodiversity, land use and ownership. The Landscape Parks administration provides data on biodiversity in Landscape Parks. Relatively much data is collected by NGOs and academic institutions; access to this data is difficult unless published.

Management plans for Natura 2000 areas are not yet made. Pursuant to the national legislation on nature protection issues, the management plans for Natura 2000 areas

are the responsibility of the managing body, the *Voivode* in the case of non-marine ecosystems. The voivodes are undertaking actions in this respect. Besides, since 2006 a project PL04/IB/EN/03 *"Development of renaturalization plans for nature and species habitats within Natura 2000 areas and management plans for selected species covered by the Bird Directive and Habitat Directive"* is being implemented under the Transition Facility. Preparation of such plans is the first step towards establishment of legally authorized management plans for Natura 2000.

High Nature Value agricultural land (HNV) are not defined because of the lack of a clear and coherent definition. However, protected areas can also cover agricultural land and forests. The farmland bird index over the period 2000–2005 shows slow negative changes in the biodiversity resources. Abandonment of habitats which are of marginal importance for agriculture, simplification of landscape structure and in some areas intensification of agricultural production threatens the biodiversity of rural areas (Ministry of Agriculture and Rural Development, 2007).

For biodiversity conservation in rural areas in Poland the main problem is maintaining the resources under conservation in good (favourable) condition and avoiding the impacts of intensification or abandonment of agricultural land. A limitation to farming intensification is the Nitrate Directive (91/676/EEC) and specifying the Nitrate Vulnerable Areas (NVZs), where particular conditions are imposed on agricultural production. In Poland, 1.7% of the country area has been specified as NVZs.

Planning ecological networks

The Natura 2000 designation procedure in Poland is co-ordinated by the Ministry of the Environmental Works. The first initiative was in the project "Implementation of the Birds and Habitats Directive in the Karkonoski Park Narodowy (PL) and Krkonoski Narodni Park (CZ)". Its follow-up was the project "Conception of the Natura 2000 network in Poland" in 2000 that helped developing a preliminary concept of the Natura 2000 network. Most of the Natura 2000 sites were selected in the framework of the project "Implementation of a Natura 2000 network in Poland", carried out by a consortium of institutions (the National Foundation for Environmental Protection, UNEP/GRID-Warsaw, the Department of Ornithology of the Polish Academy of Sciences and the Institute of Nature Conservation of the Polish Academy of Sciences).

In the first stage the above concept plan was validated by comparison with CORINE biotopes from the project carried out between 1992 and 1996. This was combined with information on species and habitats of EU importance and sites meeting the criteria of the Birds and Habitats Directive. Because of gaps in data, the selection of species and sites was mainly based on bird data and data on other well-researched species. No habitat inventory was available and some data was not accessible. For these reasons, the quality and reliability of the results is relatively low. Indicative maps at a scale 1:100 000 and 1:50 000 were produced. The approach for site designation was to select a few large areas covering different habitats and species. The current Natura 2000 network is presented in Figure 6.

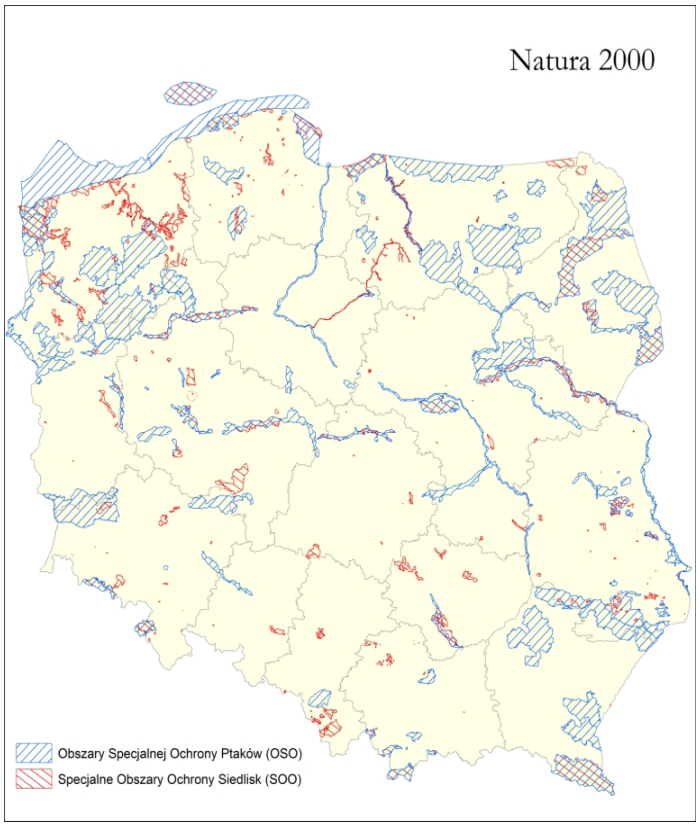

Figure 6 Natura 2000 in Poland, status 2007 (source: National Strategy on rural development 2007-2013)

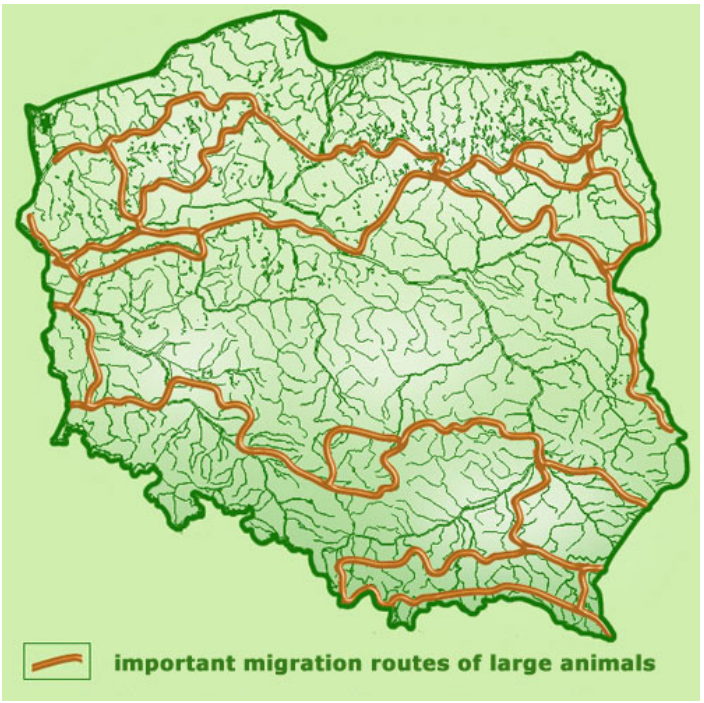

Figure 7 Ecological corridors for large mammals in Poland

During the last years a number of initiatives have taken place in Poland contributing to the improvement of the connectivity through ecological corridors between protected areas. Several ecological corridors have been identified for big mammal species. The main international corridors extend mostly from east to west along rivers and river valleys (Figure 7). Yet, some of these corridors are fragmented by roads and motorways. For birds a number of migratory corridors have been identified along the Baltic coast, forests, bushes and coastlines in the valleys of big rivers and all water basins.

Within the Natura 2000 network sites have been selected that potentially cover parts of these corridors but it does not give complete opportunity for the species to migrate or disperse. To achieve a connected national ecological network legally protected natural areas should be included such as the nature parks and reserves, Natura 2000 areas, large forest complexes, but also landscape strips important to connect elements of the network (Figure 8, Jedrzejewski and Jedrzejewski, 2005).

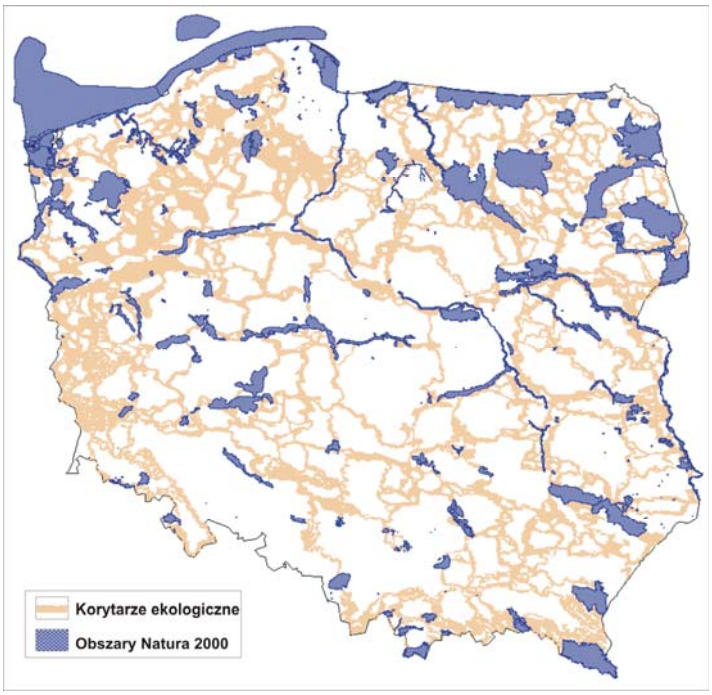

Figure 8 Ecological corridors and the proposed Natura 2000 sites in Poland (Jedrzejewski et.al., 2005). Blue: Natura 2000 sites, pink: ecological corridor.

In Poland the spatial planning system does not have possibilities for enforcement of strategic decisions such as on ecological networks, nor are there effective procedures for coupling the system with bottom-up feedback. There are no well defined rules incorporated into the regional planning procedures for settling possible controversies regarding the governmental programs at national level. At the local level the communes and local communities in general, have many opportunities to avoid the imposition of unwanted projects, for example through prolonging the procedures on the preparation of local plans, sustaining social and legal processes.

Thanks to actions at the national and voivodship level the plan for a national ecological network is on the strategic agenda. Currently voivodships are developing ecological networks and ecological corridor plans such as in Silesia (Baksik et al 2008), Lublin (Michalczuk 2008) Kujawsko-Pomorskie province (Flanz, 2008).

Recent amendments of the environmental legislation introduced the requirements to the spatial planning process at regional and local level to perform environmental assessment of the impact of spatial developments on the ecological connectivity. This assessment process should cover all expected negative impacts. These new legal requirements particularly stress the importance to the following aspects for the development of ecological networks (Kistowski, 2008):

- Adequate criteria for determination of ecological corridors
- Provide ecological contents of the spatial policies formulated for the corridors' areas
- Extent to which the solutions to potential spatial development and ecological conflicts have been considered.

6.2.4 Participatory planning and stakeholders involvement

According to IUCN (2005) the involvement and participation of local communities in Poland is not well organised. There is no reliable information about the Natura 2000 network for local communities. The awareness how an ecological network functions is low. Moreover, in many cases lack of information is causing a negative picture of the ecological network. Natura 2000 is perceived as another form of restrictive nature protection policy by making reserves and national parks that mean more limitations to the people. The benefits and opportunities for development arising from Natura 2000 have not been presented to stakeholders and local communities. In most cases they are not aware of the possibilities to gain additional income such as through agri-environmental programmes. The result is that opinions are negative, when local communities and authorities are asked to comment on proposed sites in their region.

Within one of the projects for development of management plans for Natura 2000 sites the importance of stakeholder involvement has been demonstrated. Unfortunately the final amendment of the regulation which has been adopted with this regard does not explicitly require such an involvement. Taking into consideration the low awareness of local communities and the occasionally negative attitude towards the network, the chances for conflicts are high among the stakeholders in implementation and management of Natura 2000 sites in Poland.

6.3 Slovakia

6.3.1 Socio-economic trends

Slovakia has gone through a difficult transition from a centrally planned economy to a modern market economy. Major privatizations are nearly complete. The financial sector is currently in private hands, and foreign investments have been increasing. Currently the country has a sustained high economic growth. Slovakia has become an attractive country for foreign investors mainly because of its lower labour cost, low tax rates and well educated labour force. In recent years, Slovakia has been pursuing a policy of encouraging even more foreign investments. The country has adopted the Euro on 1 January 2009.

Despite a sufficient number of researchers and a solid secondary educational system, Slovakia, along with other post-communist countries, still faces many challenges in the field of modern knowledge economy. Private and public research and development expenditures are below the EU average. In March 2008, the Ministry of Finance announced that Slovakia's economy is developed enough to stop being an aid receiver from the World Bank. The country announced to become an aid provider by the end of 2008.

6.3.2 Spatial planning system

The recent political and economic transformation of the Slovakia creates new conditions for strategic development and spatial planning. After a breakdown of the territorial planning system at the beginning of the 1990s, Slovakia has transformed its spatial planning system.

In 1994 the national strategy for the spatial development of Slovakia was developed. In 1995 the implementation of the new planning system began. The Ministry of Environment is responsible for developing and implementing the strategy; it has the authority for spatial planning in the Slovak Republic. The strategy itself is developed by the Slovak Environmental Agency (SAŻP), Department of Spatial Planning.

The legal and policy framework

The main spatial planning institution at national and regional levels is the Ministry of Construction and Regional Development and the regional authorities. These are also responsible for environmental protection and conservation. Other key players in spatial planning are the Ministry of Environment, Ministry of transport, Ministry of Agriculture and Rural Development and the Slovak office for cartography.

The transition of the political system and the transformation to a market economy brings substantial changes for spatial planning as well as the need for a new vision on the integration of environmental, economic and social issues. Spatial planning in Slovakia is relatively complex. The emphasis is on the application of decision-making power by the executive authorities at national regional and local level as self-governing principle. However, the changes and the new relationships between the

planning at these levels are not yet sufficiently reflected in the planning practice, due to the uncompleted state of the self-governing institutions at regional and local level.

The legal framework of spatial planning consists of the Act on Land Use Planning and Building Regulation No. 50/1976, revised in Acts No.103/1990 and No. 262/1992 and No. 136/1995. According to this Act every land use scheme and every development must follow rules laid down in the Land Use Law and the Building Code. Apart from above legislation, protection of several components of the environment (such as water, air, soil, forests) and economic activities (forestry, hunting, fishing) are subject to special legislation and are reflected in the land use plan. The main planning instrument is the land-use plan allocating land and aiming to integrate social, economic and environmental issues at regional or local level.

The process of spatial planning

The spatial planning process in Slovakia is based upon number of strategic and legal documents at national, regional and local levels (Table 6).

National level

At national level the spatial planning in Slovakia is laid down in national strategic policy documents. The national government is responsible for development of the national strategy on spatial planning. The strategy must be reflected in the land use plans at regional and local levels, in the form of blueprint allocation of land-uses.

Table 6 Spatial planning framework

Document	***Processing and actualization***
Strategy for spatial development and arrangement in Slovakia	SAŽP's permanent activity. Issued annually
Concept of territorial development in Slovakia	Periodical actualization in approx. 4-year
General structural plans of regions (=large territorial units)	Actualization once per decade
Master plans of settlements (cities, towns, communes)	Actualization once per decade

The spatial planning strategy is developed in an interdisciplinary document, which addresses the various sectoral strategies and conceptions for territorial development. The graphical part of the Strategy contains 11 maps of Slovakia whith key aspects such as geology, landscapes, geography, supra-regional system of ecological stability including the comparison of the National Territorial System of Ecological Stability (TSES) in general and including the ECONET concept (SAZP, 2008)

Regional level

The Slovak Republic is divided into 8 administrative regions (kraj) named after the capitol of the region. Each region, in turn, is divided into counties (okres) and counties are divided into districts (obvod), in total79. (Kluvankova-Oravska, 2004).

The regional development in Slovakia is focusing on development of strategic regional corridors. The ongoing structural changes in the economy have generally enforced interregional competence. This is influenced by a complex of potential

dispositions such as economic and human resources. The spatial planning strategy identified the regions Bratislava, Košice and the Váh river valley between Hlohovec and Žilina with the highest development potential. In Prešov, Trenčín, Poprad, Banská Bystrica, Zvolen, Nitra and Martin there is growth as well. Other regions are developing more slowly and the economic least favourable regions are in the border areas of Eastern, Northern and Southern Slovakia.

Local level

At local level, the municipality is the main spatial planning authority. There are 2922 municipalities in Slovakia including Bratislava and Košice as individual entities. Decision making is based on the subsidiarity principle in which the higher level cannot interfere with lower level decisions that are built upon approved regional or local spatial plans. The relation between the different administrative units is based on co-operation and coordination and there are legal duties to inform the public and various stakeholders as well as to review plans and negotiate the improved solutions. The use of different planning instruments and the responsibilities among the levels of government are presented in Tables 7 and 8.

Table 7 Instruments and acts of spatial planning in Slovakia

Level	Strategic planning	Land use planning
Supra-national		
National	Act on Planning and Building Regulation No. 50/1976	Act on Planning and Building Regulation No. 50/1976 National Regional Development Plan the Building Code
Republic of Slovakia		
Sub-National		
Divisional (meso-level)		
Regions	Regional spatial/land use plan	Regional spatial/land use plan
Counties		
Super-Municipal		
Municipal	Development Strategy of the City Master Plan Local spatial/ land use plan	Local spatial/ land use plan
Sub-Municipal (Zone)		Urban study of zone

Communication instruments are used in the process of decision making and coordination of planning documents. Informal instruments help to improve integration of the economic, social and environmental interests that are represented by the sectors and to co-ordinate the national and regional activities in compliance with the community interests at the municipal level.

Table 8 Division of responsibilities for spatial planning at different levels

Commissioning of spatial plan	Decision - maker on spatial plan	Assessing body	The spatial planning level	Spatial planning instrument
National Ministry for the Building Construction and Regional Development	National government		National level	National spatial development policy of Slovakia
Regional Council	Regional Council	Ministry for the Environment	Regional level	Regional spatial/land use plan
Community/municipality	Local Council	Regional public administration authority	Local/municipal level	Local spatial/ land use plan
Community/municipality	Local Council	Regional public administration authority	Local/municipal level	Spatial/land use plan of zone

6.3.3 The ecological network

The legal and policy framework

The total area designated under Natura 2000 is the largest for the EU (25.1%). However, efforts are needed to ensure that relevant habitats are within designated sites. The pressure of the rapid economic development makes ecological fragmentation of landscapes a growing issue in Slovakia. Therefore efforts are also needed to form an ecologically coherent network. To reach these objectives several environmental obligations have been regulated in Slovak legislation.

One of the most significant legislative elements to ensure the establishment of an ecologically coherent network of protected areas is the Act on Nature and Landscape Protection (initially Act 287/1994, replaced by Act 543/2002 in 2003). This Act integrates the EU Habitats and Birds Directives in the national legislation. The Act also provides the basis for the establishment of the Territorial System of Ecological Stability (TSES), defined as *'an integrated spatial structure interconnected to other ecosystems, their components and elements, which ensure a diversity of life conditions and forms in the landscape'*. TSES introduces bio-corridors as landscape elements essential to biodiversity conservation. The concept of bio-corridors enables Slovakia to develop a systematic approach for linking habitats that are currently isolated or threatened to become fragmented due to land-use change (developing the transport and real estate sectors). As the concept is embedded in the national legislation, new opportunities are created for mitigating negative impacts caused by the fragmentation of landscapes (Drdoš and Hrnčiarová, 2003. Nowicki *et al*, 2005).

The implementation of bio-corridors enables the movement of species between habitats, including Natura 2000 sites (Nowicki *et al*, 2005; Krnacova and Hrnciarova, 2006). The Landscape ecological planning approach (LANDEP) is the main tool for land-use planning in Slovakia (Ruzicka, 2004). The approach builds on environmental aspects of sustainable development and it aims at creating a landscape structure with balanced relations between landscape elements, socio-economic activities and ecological conditions of the area. In practice, the LANDEP approach is

a combination of systematically arranged landscape-ecological tools. Landscape-ecological plans form an integral part of the approach and they are an obligatory part of spatial planning documentation at the regional level. The elaboration of the landscape-ecological plan is a complex process of mutual harmonisation of spatial requirements of human activities with landscape-ecological conditions. The LANDEP method has 5 steps: Landscape- Ecological (L-E) analysis, L-E synthesis, L-E interpretation, L-E evaluation and L-E proposals and measures. The final plan identifies the major land use related threats to the environment, including aspects related to ecological connectivity. As an outcome, the landscape-ecological planning provides alternative proposals for the functional division of landscapes and possibilities for maintaining the relationships among landscape components.

Planning ecological networks

TSES and NECONET

An extensive section in the National Strategy and in LANDEP is devoted to the Territorial System of Ecological Stability (TSES) on the supra-regional and regional level (Figure 9). This is an important input for territorial planning documentation. Synthesis of regional systems of ecological stability enables the structuring of the general, supra-regional Territorial System of Ecological Stability and its comparison with the European Ecological Network (EECONET).

In 1995 IUCN developed a proposal for an ecological network for Slovakia, combining the key areas of TSES at the national level (Koren *et al*, 1995). The National ecological network of Slovakia (Národná ekologická sieť NECONET) was established in 1996 (Figure 10). The strategic goals of the NECONET are:

- To ensure the effective conservation of biodiversity in Slovakia at the level of habitats and ecosystems;
- To ensure ecological stability and connectivity of nature areas (nature parks).

The difference between the TSES and the NECONET map is that TSES is embedded in legislation and the NECONET is an NGO proposal.

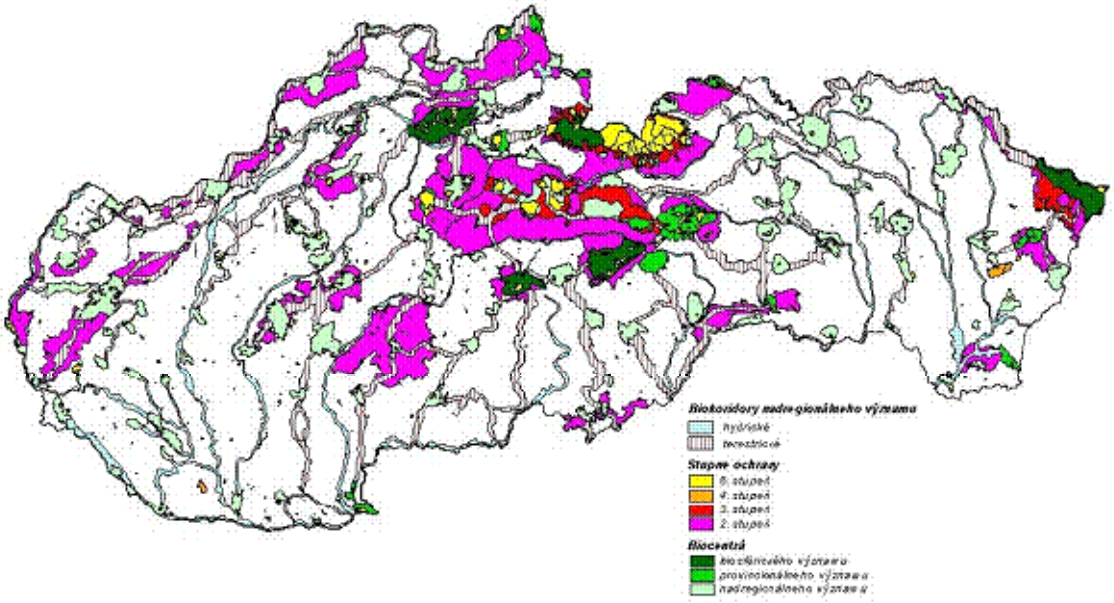

Figure 9 Scheme of national parks, biocentres and biocorridors http://enviroportal.sk/

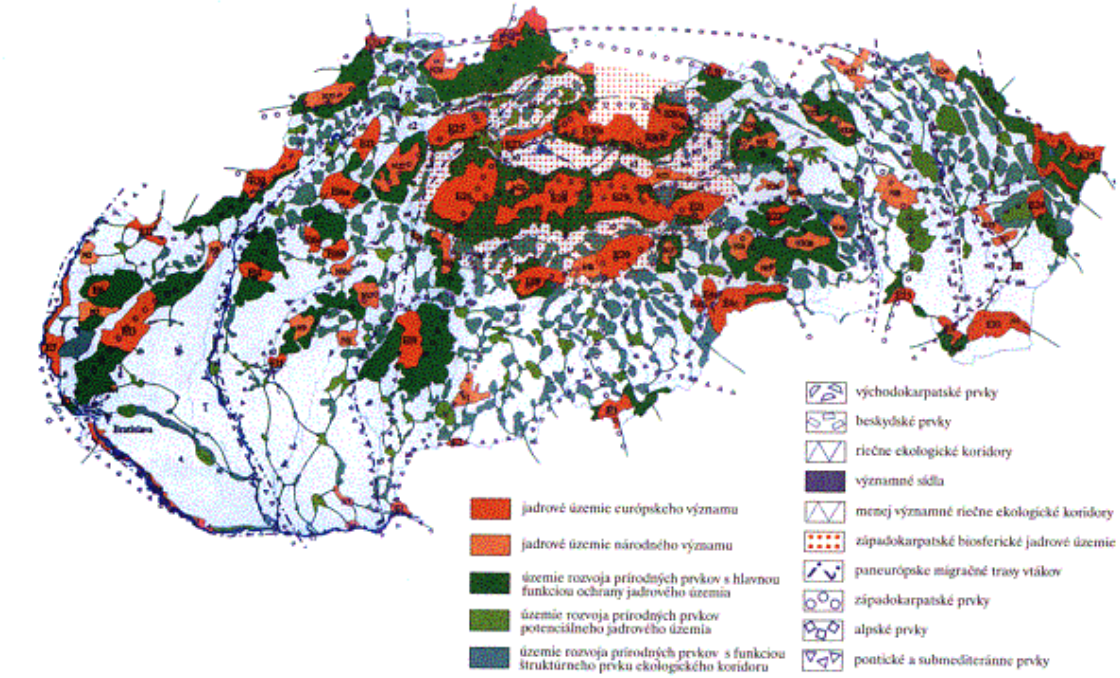

Figure 10 NECONET (source: http://www.seps.sk/zp/iucn/eng/projekty/nnp/6.htm*)*

Designation procedure and methods for Natura 2000 network

The Ministry of the Environment and the State Nature Conservancy have led the process of Natura 2000 compliance and it included many academics from universities and NGO experts. The TSES process has been abandoned for a while, because Natura 2000 required all available manpower and time.

The governmental institutions have recognized the need for cooperation with all relevant actors in meeting the challenge of establishment of Natura 2000 network. The Netherlands provided support to the Slovak Republic in this task through the project entitled "Establishment of the Natura 2000 network in the Slovak Republic", funded under the pre-accession programme. With the help and guidance by Dutch experts, the Slovak Republic started to create solid foundations for its Natura 2000 network. A consortium of Slovak and Dutch institutions and organizations was established, which included Wageningen International (then IAC), SOVON, AVALON in then Netherlands and in the Slovak Republic Daphne – Institute of Applied Ecology, the Institute of Botany of the Slovak Academy of Sciences (SAS), the Institute of Landscape Ecology (SAS), the Faculty of Natural Sciences of the Comenius University, the Society for the Protection of Birds in Slovakia (SOVS – Slovak Birdlife partner) and the Group for the Protection and Research of Owls and Birds of Prey in Slovakia.

The overall objective of the project was to contribute to full compliance with international agreements concerning nature protection and securing the natural heritage of the country on a long-term basis. The immediate objective was implementation of the Birds Directive and the first implementation stage of the Habitats Directive, including legal compliance and capacity building for development of the Natura 2000 network before the end of 2003.

This was a key project for the establishment of Natura 2000 in Slovakia. After the project was finished the NGOs continued the collaboration with the governmental institutions to prepare the final SPAs and pSCIs lists.

The established Natura 2000 Centre at the State Nature Conservancy is currently operational with a well-equipped meta-database on species and habitats. Here, data from various institutions have been collected and processed and the data can be used for management activities in the Natura 2000 sites. For preparation of the SPAs and pSCIs it was necessary to review the quality of all existing databases, as well as their accessibility and usefulness. The databases held by the Slovak partners of the consortium were reviewed and use to identify the potemtial network of Naura 2000 sites in Slovakia. Also relevant "soft" information (i.e. the present structure of protected areas, the National Ecological Network, Ramsar sites, IBAs, Wetland Shadow List) were used. Gap analyses guided the field research in 2001 and 2002. The final list of Natura 2000 sites contained 23 SPAs with an area of 236.545 or 25% of the land area and 382 SACs with an area 382.573 690 or 12% of the country area (Figure 11).

Habitat fragmentation is addressed in various Slovakian laws related to land-use and development. The Act on Nature and Landscape Protection and TSES offer a framework for providing different levels of protection for landscape elements. The Law on Spatial and Development Landscape (50/1976 with later amendments) supports the practical implementation of protected sites. This Act provides specific provisions for the protection of important landscape elements such as riverbank vegetation, forests, peat bog, rivers and cliffs. The use of approaches such LANDEP

improves the integration of environmental and ecological considerations into the spatial planning processes. Consequently, the approach can positively contribute to rational and considerate utilization of natural resources and conservation of overall landscape quality and stability, including ecological connectivity.

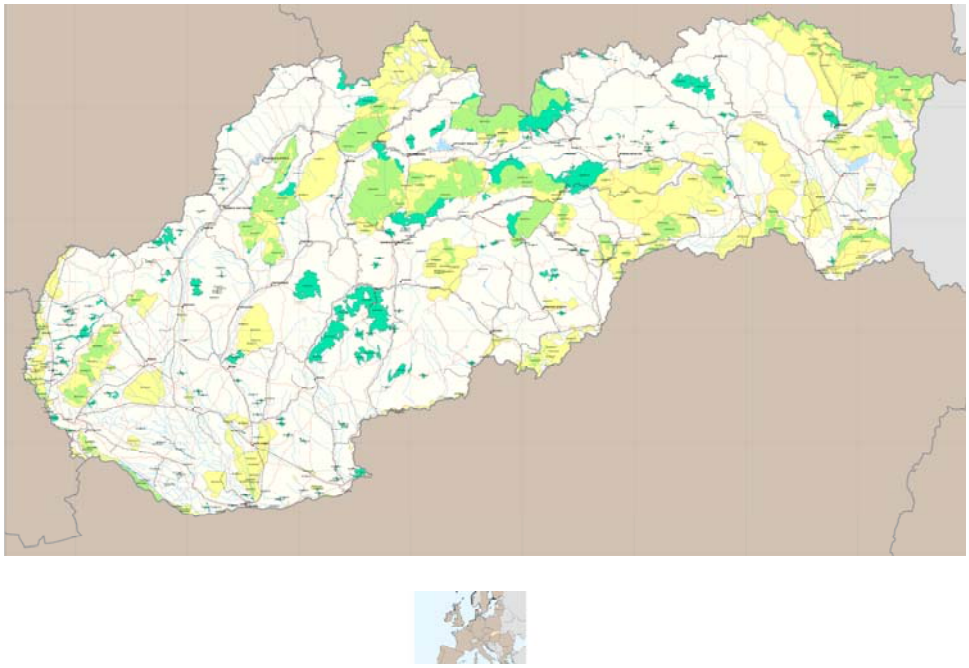

Figure 11. Natura 2000 areas in Slovakia (Source: EEA, http://ec.europa.eu/environment/nature/natura2000/db_gis/pdf/SKn2k_0802.pd)

Several studies have been carried out about the role of the Strategic Environmental Assessment (SEA) in integrating ecological issues in spatial planning (Drdoš, and Hrnčiarová, 2003; Belcakova, 2004). SEA in spatial planning helps in the preparation of decisions and has a possibility to combine information on expected environmental impacts resulting from planning measures. SEA in spatial planning explains the ecological, social and economic context of the planning process and can give a warning signal for environmental risks and other potential dangers. Therefore SEA is considered essential in presenting information on environmental impacts. However, the conflicts between environmental protection and sectoral interests can not be solved by the SEA process.

6.3.4 Participatory planning and stakeholders involvement

In Slovakia a number of information campaigns were carried out to inform all stakeholders about the ecological networks and Natura 2000. Until now, the Ministry of the Environment, the State Nature Conservancy and some NGOs have been active in preparation of several information brochures as well as a series of conferences and seminars focusing on Natura 2000. National conferences have been organized on Natura 2000 (three for experts and one for stakeholders). However, yet

a full understanding about the ecological networks and Natura 2000 has not been achieved, especially regarding its implications.

At the local level, the most important awareness-raising activities have been the meetings held during the preparation phases in the proposed protected areas. These meetings provided an opportunity to explain in detail the reasons for and implications of the ecological network, as well as potential opportunities and benefits. Not all protected area administrations and stakeholders used these opportunities optimally, so a lot of misunderstandings still exist among different stakeholders in the planning process of the national ecological network. Many investors, foresters and hunters have negative attitudes, while farmers and a few investors do understand well the philosophy of the promoted ecological network issues and its potential benefits in development (WWF, 2003).

6.4 Hungary

6.4.1 Socio-economic trends

Hungary held its first multi-party elections in 1990, following four decades of Communist rule and has transformed its centrally planned economy into a market economy. Both foreign ownership and foreign investment in Hungarian firms are widespread. At present the government needs to reduce government spending and reform its economy in order to meet the 2012-13 target dates for accession to the Euro zone.

Hungary continues to demonstrate moderate economic growth (3.7% over 2004-2007). The private sector accounts for over 80% of GDP. Hungary receives nearly one third of all foreign direct investment flowing into Central Europe, with cumulative foreign direct investment estimated of over € 20 billion since 1989. It enjoys strong trade, fiscal, monetary, investment, business, and labour freedoms. Investment in Hungary is easy, although it is subject to government licensing in security-sensitive areas. Foreign capital enjoys virtually the same protections and privileges as domestic capital. The rule of law is strong, a professional judiciary protects property rights, and the level of corruption is low. Total government spending is high, and many state-owned enterprises have not been privatized. Business licensing is also a problem, as regulations are not applied consistently.

6.4.2 Spatial planning system

The legal and policy framework

The first and the second Spatial Development Concept of Hungary are the major documents for Hungarian spatial development policy and regional development. The concept sets up the principles of a spatial development policy, which must be integrated into all other policies. At the same time these policies also should be integrated through the development of regions by decentralization

The National Spatial Plan was elaborated in 1999-2002. The purpose was to outline the future national spatial structure with particular regard to balanced, sustainable development of the national territory and to provide an overall framework for the allocation of infrastructure and regulation of land use. An important aspect of the elaboration process was the consistent interagency co-operation both at the governmental and the planning level. In the development of the plan local authorities as well as non-governmental environmental and professional organisations were consulted to influence decision making. The National Spatial Plan was adopted by the Parliament in 2003 in form of a Law. This has been the first national spatial plan that is enacted by the Parliament. It provides a regulative framework for the elaboration of the spatial plans of regions and administrative counties.

Spatial planning at different levels

The planning responsibilities in Hungary are subdivided according to the administrative division of the country. Hungary is divided into 19 counties, of which there one is capital city (fváros): Budapest. The counties and the capital city of Hungary are subdivided into 173 micro-regions (kistérségek), with the City of Budapest being its own micro-region. There are about 3168 municipalities.

According to the spatial planning policy at the national, regional and county level it is mandatory to develop strategic development plans while spatial plans are developed at national, county and local levels (Table 9).

Regional level

The regions are administered by a Regional Development Council consisting of representatives of the central government and local authorities. The regions have the responsibility for regional development as well for the administration of European Union structural funds.

Within the regions the *counties* and micro-regions are responsible for the implementation of land use planning policy. At the county level it is mandatory to develop a spatial plan, which is approved by the county assembly.

Local level

The municipalities have authority and supervision in the fields of local spatial development including urban utility supply and management such as water supply and water treatment, waste collection, housing, transport, tourism, education, healthcare and sport. The activities are reflected in the development strategy of the municipality and are elaborated in the municipal land use plans approved by the local assembly.

Table 9 Spatial planning In Hungary at different governmental levels

Level of administration	Strategic plan		Spatial plan	
	Preparation	**Approval by:**	**Preparation**	**Approval by:**
National	Mandatory	Parliament	Mandatory	Parliament
Regional	Mandatory	Regional development council	-	-
County	Mandatory	Country development council	Mandatory	County Assembly
Micro-region	Optional	Micro-regional development Council	-	-
Municipality	Optional	Local Assembly	Mandatory	Local Assembly

6.4.3 The ecological network

The legal and policy framework

Hungary ratified the Convention on Biological Diversity in 1994 which was reflected into the national law in 1995. Next to this a national biodiversity strategy was prepared and accepted by the Ministry of Environment and Water.

The Hungarian accession to the EU had a significant impact on the progress in biodiversity conservation policy. The fact that the European Union signed the Convention on Biological Diversity became a significant driving force for Hungary to implement the Convention at national level. "Since each EU task counts as priority in Hungary, decisions made by the EU have a greater emphasis at home as well" has been stated by a public administration specialist. As a result of the EU policy on nature conservation emphasis is made on the sectoral integration. Since biodiversity protection occurs in several important EU political documents and is on the agenda of the Commission's meetings, not only the Ministry of Environment and Water, but also other ministries have been obliged to address the requirements defined in the Convention on Biological Diversity.

The practical implementation of the Convention on Biological Diversity, however, is accompanied by difficulties, since the described objectives are in contrast with present developments and decision-making.

The development of nature conservation is difficult due to the growing economy, the privatisation of property, land use change and social stress (Ministry for Environment and Regional Policy, 1994).

Four categories of protected areas are defined: national parks, landscape protection reserves, nature conservation areas and natural monuments. National parks and landscape protection reserves are exclusively to be designated by the Minister. The Minister may designate (parts of) national parks, landscape protection reserves and

nature conservation areas as biosphere reserve, if they are of internationally outstanding scientific value.

There are nine Nature Conservation Directorates responsible for organising and co-ordinating the direct site management in co-operation with partner authorities (water management, forest management etc.). The National Authority for Nature Conservation of the Ministry for Environment and Regional Policy and the Nature Conservation Directorates of the administrative regions are responsible for species protection. The 1996 Nature Conservation Act protects the surroundings of some protected animal breeding sites. Protection of flora and fauna is linked to the protection of their habitats; therefore, special attention is given to the fragments of isolated habitats with unique plant species and communities. Protection of fauna includes direct measures of populations and animal communities and the protection of their habitats. Habitats should have minimum sizes and the protection of habitats should exceed local level protection. The establishment of a National Ecological Network is considered of major importance for the protection of fauna.

No analysis has been made on the effectiveness of the Hungarian biodiversity policy framework, but the Ministry of Environmental Protection seems to have insufficient political power to make the National Strategy and Action Plan on the Conservation of Biodiversity adopted and renders it as a higher-level political document. Thus, the enforcement of the biodiversity conservation policy is not adequately realized in the various economic and social sectors.

Planning ecological networks

As in many western European countries in Hungary also the majority of the natural values are found in forested and agricultural areas, in ecosystems established under human influence. The activities pursued in these areas have significant impacts on the success of endeavours aiming at the conservation.

The designated Natura 2000 sites in Hungary cover 1.91 million hectares, or 21% of the country (Figure 12). There are 467 Special Areas of Conservation with a total of 1.41 million ha, as well as 55 Special Protection Areas covering 1.36 million ha. The overlap between these two types of conservation areas is nearly 41%. The Natura 2000 network in Hungary is built around existing protected areas (37%); however, it involves newly protected areas as well. Natura 2000 areas consist of 480.000 ha pastures, 520.000 ha arable lands and a little more than 770.000 ha forests (Figure 13).

The threat of habitat fragmentation and deterioration is serious; so their conservation may only be realized by additional measures. Because of the distinctive geographical characteristics and land use in Hungary, nature conservation objectives can mainly be met by adaptation of agricultural and forest management to the ecological objectives. As almost all protected areas are cultivated lands, land management should be brought under CAP agri-environmental measures to conserve natural values. Of the CAP funds 37% is spend in pillar 2 and from this budget 64% is spend for agri-environmental measures. Nature management and environmental friendly land use

has been integrated in the agri-environmental measures of the National Rural Development Strategic Plan (NRDP).

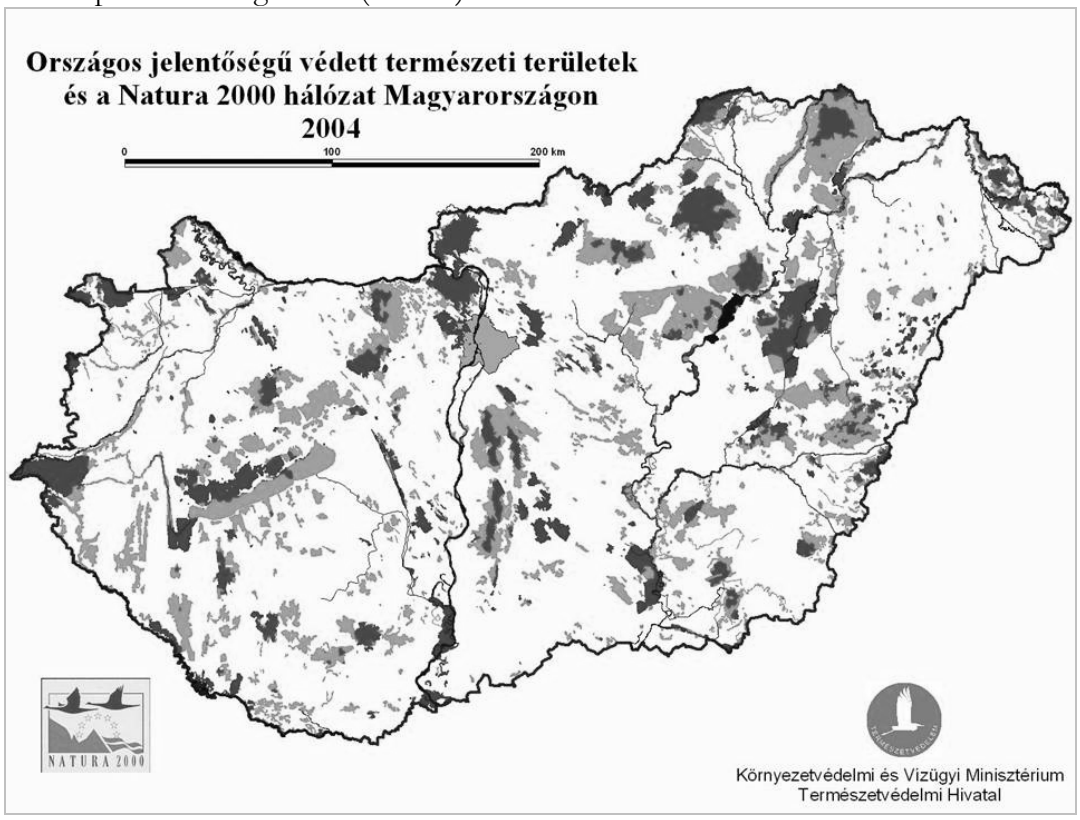

Figure 12 Natura 2000 sites in Hungary (status 2004, Ministry of Environment)

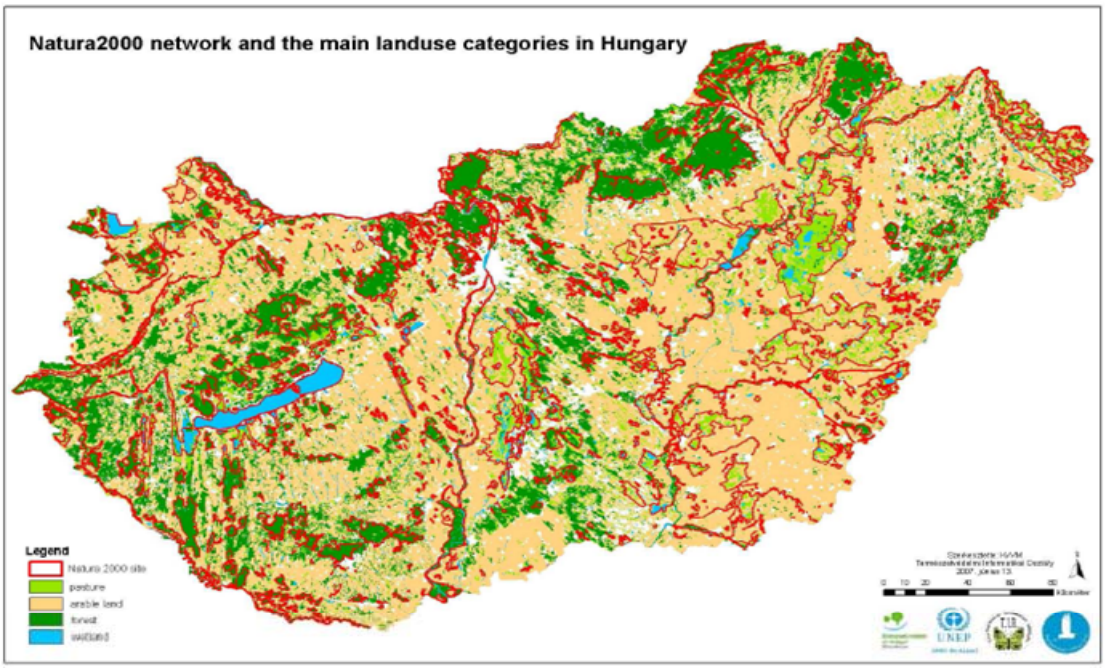

Figure 13 Natura 2000 network and main land uses (source:Strategic Environmental Assessment of the New Hungary Rural Development Program, Ministry of agriculture and rural development, 2007)

Agri-environment payments are contract-based incentive aids for the application of environment-friendly methods for a period of at least 5 years, in some cases up to 20 years. The grassland farmers still have to suit the Right Farming Practice's requirements (Forgó, 2007). They have to choose farming methods adapted to the local environmental/agricultural conditions with special attention to relevant environmental protection aspects. Such adapted methods provide benefits in terms of soil, benefits for biodiversity and the wider landscape through the use of appropriate grassland management (Forgó, 2007).

Sustaining the favourable condition of Natura 2000 habitats is one of the objectives of the agri-environmental schemes. One of the specific objectives of the NRDP is to provide effective tools for the implementation of the NATURA 2000 network. The Natura 2000 network covers important areas of grasslands.

Designation procedure and methods for Natura 2000 network
The designation procedure for Natura 2000 sites in Hungary was carried out in two steps. Firstly, a consortium was established, including the Ministry of the Environment and Water. Consultation process took place between the Ecological and Botanical Institute of the Hungarian Academy of Sciences, BirdLife Hungary, and the Royal Society for the Protection of Birds. Furthermore an assessment of available and recently-collected information helped to prepare a proposal for SPAs and pSCIs in the framework of a PHARE project "Preparation for Implementing the Habitats Directive in Hungary". Secondly, based on these preparations, the ten National Park Directorates and the Ministry made a more detailed plan including local information from national parks, researchers and NGOs. There were some misunderstandings during the consultation, and some problems with data provision, but finally these procedures provided a sufficiently well-designed network covering 21% of the country's area.

The designation of SPAs was based on the BirdLife IBAs "C" criterion method. The method was used for the whole country. The designation was made in a partnership by the Ministry, the National Park directorates and BirdLife Hungary. The preparation for designation of pSCIs included a country-wide survey, data collection and monitoring programs, i.e. the Hungarian Biodiversity Monitoring Program, a program for creating the National Ecological Network, a survey of designated fens and alkali habitats, a country-wide programme for collecting habitat/species/plant data and the CORINE Habitat Mapping Programme. The assessment resulted in consistent GIS databases (EVITA). Based on the analyses of the databases, the expert group gave a proposal for pSCI sites. The final step of designation was made by experts from the national parks authorities.

In Hungary the integration between the spatial planning and ecological networks is mainly based on the legal approach. The integration process is embedded in the two governmental decrees, the decree on Natura 2000 definition and its network of sites and the Decree in Environmental Impact Assessment of Plans and Programs (EIA). The latter includes the rules on the assessment of plans and programs taking into

account the objectives of the Natura 2000 network based on the transposition of the European Strategic Environmental Assessment Directive in Hungary. Yet there are several insufficiencies observed in the content and in the implementation of these decrees that impedes the successful integration of the ecological networks in spatial planning. These include the insufficient provision of information on the aims and rules of the Natura 2000 network. The decrees can not assure the commitments needed for the conservation goals to be achieved. There is as well a lack of clear provisions on the implementation of the article 6 of the Habitat Directive.

The implementation of the ecological assessments required by the two decrees is particularly problematic for land use plans. The main difficulties are that the assessment of plans and programs is defined for all types of development and spatial plans at all levels of government. Among the many plans developed across the country it is difficult to differentiate the requirements and the scope of the environmental assessments of these plans. Other difficulties are the limited resources, administrative capacity and knowledge in SEA of spatial plans with regard to ecological issues.

6.4.4 Participatory planning and stakeholders involvement

In Hungary NGOs are playing an important role in the implementation of local protective measures, monitoring of biodiversity and education. In the process of designation of the Natura 2000 sites local communities were only involved through some of these nature conservation NGOs. Local communities were informed of the Natura 2000 network, the designation process, the proposed sites, the reasons, the aims and their possible future benefits by the so called "NGO Natura 2000 coalition" (CEEWEB, BirdLife Hungary, the National Society of Conservationists and the WWF Hungary).

Within the national policy documents and project reports three important factors are mentioned, on awareness raising and participation in biodiversity conservation and ecological networks development in Hungary:

- The low social prestige of environmental protection;
- The society is not pro-active in influencing decision making processes;
- The failure to develop approaches for biodiversity conservation, since „only a handful of people – NGOs, researchers, full-time conservationists – whose task (now) is to protect natural values

NGOs address the need in making people understand that biodiversity protection is a fundamental economic and health protection interest. An NGO expert stated that there is a need for a strategy to get biodiversity accepted in the widest circles of society. Different social groups should have a discourse on new values and a paradigm shift in order to change the attitude toward biodiversity conservation. There is progress achieved with producing number of policy documents, however the implementation of these documents in practice is still a long way ahead in Hungary.

6.5 Croatia

6.5.1 Socio-economic trends

Croatia's economy has suffered during the 1991-1995 Yugoslav war as export and tourism collapsed. Since 2000, however, Croatia's economy has begun to improve slowly, with moderate but steady GDP growth led by a revival in tourism. Currently, Croatia has a relatively stable functioning market economy. In 2007, 7.2 percent of the economic output was accounted for by agriculture, 32.8 percent by industry and 60.7 percent by the service sector. Tourism is an important source of income with over 10 million foreign tourists in 2006.

The unemployment rate is still high; there is a growing trade deficit and unbalanced regional development. The state still has an important role in economy, as privatization efforts often meet public and political resistance. While macroeconomic stabilization has largely been achieved, structural reforms lag behind because of the deep resistance among the public and lack of strong support from politicians. In addition the backlogged judiciary system and the inefficient public administration are currently of particular concern, especially on issues of land ownership and restitution. Corruption that is still present.

In February 2005, the Stabilization and Association Agreement with the EU officially came into force. The country is preparing for membership in the European Union in 2010. EU member states are the most important trading partner and most tourist are from the EU.

6.5.2 Spatial planning system

The basic organization of the state administration and the regional and local self-government, as well as the national territorial division is regulated in the Law on the State Administration System. Several ordinances have been issued on the basis of this law such as the Law on Local and Regional Self-government, the Law on Counties, Towns and Municipalities, and the Law on the City of Zagreb. State administration work is carried out ministries and its state administrative organizations with regional units in counties, towns and municipalities.

Croatia is divided in 21 regional self-governmental units (20 counties and the City of Zagreb that functions as a county). The county is a unit of regional self-government of which the area is a natural, historical, economic, social and self-governing entity. Each county is divided into local self-governmental units (towns and municipalities), within which local committees are formed. There are 546 local self-governmental units, whereof 123 towns and 423 municipalities.

The legal and policy framework

The backbone of the legislation on physical planning in Croatia consists of the Physical Planning Act and a number of other subordinate laws. The Physical

Planning Act (1994) regulates spatial planning, monitoring of the state of the territory, adoption of planning documents and supervision its implementation.

The main goal of the spatial planning system of Croatia is to develop the territory of the state as a valuable and limited national resource. The physical planning policy is based on an integrated approach. It aims at ensuring a balanced socio-economic and cultural development, protection of the environment and cultural monuments. The Croatian system of physical planning regulates:

- The organization and obligations of actors in planning and its implementation;
- Monitoring of the state the land, resulting in a four-year assessment report and a program of measures for its improvement at all levels;
- Preparation and adoption process of spatial planning documents (National Physical Planning Strategy and Program, and physical and urban development plans);
- Implementation of spatial planning documents through location permits and detailed development planning;
- Administrative supervision and inspection on implementation.

The planning documents consist of a textual and a cartographic part, implementation provisions and other elements of relevance to any plan implementation. A physical plan of a smaller area shall conform to the physical plan of the larger region where it belongs to. In case of their non-conformity, the regional plan applies. In order to implement the physical planning policy, the Croatian Parliament and representative bodies of regional and local self-government have the obligation to adopt physical planning documents for their own territory and administrative level.

Spatial planning at different levels

National level
The *Physical Planning Strategy and the Program of the State* are the main national documents that set out the long-term objectives of spatial development in Croatia. The Strategy contains the most essential elements for harmonization of spatial development, spatial organization of the state and priority activities. The Program addresses the main objectives of the spatial development including criteria and guidelines for physical planning. Based on natural, economic, social and cultural principles, the Program provides a basis for the organization, protection and use of the territory including environmental protection and the development of settlements and infrastructure. The Physical Planning Strategy and Program of the State are adopted by the national parliament.

Regional level
The county physical plan contains the spatial and economic structure of the county, the system of settlements of regional importance, the regional infrastructure, criteria and guidelines for economic development, for conservation of natural, cultural, historical and landscape values and environmental protection measures. These

physical plans are adopted by the county and the City assembly upon and require to be conforming to the Physical Planning Strategy and Program of the State.

The "physical plan of an area of special features" is prepared for areas with natural, cultural or other features of common interest. It is obligatorily for a national and nature park and for areas for which this is obligatory by the Physical Planning Program of the State or the county physical plan. The physical plan of an area of special features is adopted by the county and the City assembly. Physical plans of a national nature park and for areas for which this has been made obligatory by the Physical Planning Program of the State are adopted by the national parliament.

Local level
The physical plan for a municipality or a town lays down the conditions for the development of a municipal and urban area and determines the use, rehabilitation and restoration of the built-up areas and other land, including environmental protection and protection of cultural monuments and valuable parts of nature within a municipality. The physical plan sets the planning objectives, criteria, guidelines, measures and conditions for development. The physical plan for a municipality or a town is adopted by the municipal and the town council respectively and has to be approved by the county confirming the conformity of the plan with the county physical plan. For islands with several local self-government units a unique physical plan is prepared.

Coordination of the planning documents
Provisions in the Physical Planning Act (PPA) lay down the obligation to coordinate physical planning documents. This means that a physical planning document of a lower administration must be coordinated with the physical planning document of the higher administration. A county cannot adopt their physical plan without securing the necessary approval of the Ministry of Environmental Protection, Physical Planning and Construction. It also has to be coordinated with the physical plans of neighbouring counties, and the representative bodies of municipalities and towns in the county area. Pursuant to a special Regulation, for areas within the protected coastal area, approval to all physical plans covering the area is issued by the Ministry of Environmental Protection, Physical Planning and Construction.

Amendments
The Physical Planning Institute in the Ministry of Environmental Protection, county institutes or the City of Zagreb Physical Planning Institute, and administrative bodies of towns and municipalities continuously monitor the state of spatial development. The results of such monitoring are reported every two years at the level of the state, county, town or municipality. The report contains an analysis of the implementation of physical planning documents and other documents, an assessment of the implemented measures and their impact on spatial management. On the basis of this report the Croatian Parliament, or representative bodies of units of regional and local self-government, adopt a four-year program of measures for improving spatial development and the environmental conditions of the territories.

6.5.3 The ecological network

The legal and policy framework

The Croatian Knot in the European Net

Croatia is one of the most species rich countries in Europe for plants. It is also rich in mammals; it harbours lynx, bear, wolf, reptiles and amphibians; over 65% of all known fish species in the Mediterranean and over 230 species of birds. The Croatian biodiversity is very important for the European EMERALD and – after accession – the NATURA 2000 network of protected areas.

At the time of its accession to the EU, Croatia will need to implement the Birds and Habitats Directives on its territory. Already, many of the provisions of these two EU Directives have been transposed into the Nature Protection Act (OG 70/05). Like other EU countries, Croatia will also have to propose sites for the NATURA 2000 Network for over 250 species and 70 habitat types that occur in Croatia and that are considered to be of EU importance, such as the Eurasian lynx, griffon vulture, marsh fritillary butterfly and the Adriatic lizard orchid. In anticipation of this, the State Institute for Nature Protection (SINP) has coordinated a detailed inventory of the distribution of these species and habitats in Croatia. From this extensive baseline information, SINP has identified around 1000 sites that should be proposed for the EU NATURA 2000 Network.

These potential sites are currently subject of public consultation. This consultation process has two roles:

- To inform all those potentially concerned or interested in NATURA 2000 what it is and how it will work in practice;
- To give people an opportunity to comment on the selection of sites – for instance, if they have extra information about the location of a particular species or habitat in a specific site.

Once the public consultation is accomplished, a final revised list of the potential NATURA 2000 sites will be sent for government's approval before being submitted to the European Commission in Brussels.

The main legislation covering nature protection in Croatia is the Nature Protection Act (NPA). This law includes obligations of Croatia deriving from all relevant international agreements and EU Directives. It considers nature protection as an integrated activity based on species, habitat and protected area conservation. It also aims to ensure rational and sustainable use of natural resources by all sectors (forestry, hunting, water management etc.). Ecological network is defined by this Act as "*the system of interrelated or contiguous ecologically important areas which by their well balanced bio-geographic distribution substantially contribute to the conservation of the natural balance and biological diversity*"

The ecological network defined in the NPA is regulated by the Decree on the ecological network that has been passed by the government in October 2007. Its main mechanism is regulated by the Ordinance on the evaluation of admissibility of

intervention to nature (August 2007). According to NPA, the SINP is established as the central institution for expertise in nature conservation. These tasks include, among others, responsibility for organizing and implementing biodiversity inventories, monitoring and operating a nature protection information system. The SINP is also responsible for evaluation of the management plans for protected areas, technical tasks in the evaluation of admissibility of intervention to nature, preparation and implementation of project and programs in the field of nature protection and organization and implementation of educational and promotional activities.

Since 2003 the Ministry of Culture is the competent authority for nature protection at the national level, performing primarily administrative tasks in nature protection. The State Institute for Nature Protection is responsible for scientific expertise in nature protection.

At the regional level, the County offices for environmental protection and physical planning operate as administrative units responsible for nature protection. However, their performance is very poor due to lack of human resources and their emphasis is on environmental protection rather than on nature protection. There are established nineteen public institutions for management of national and nature parks. Nineteen counties have also established public institutions for managing protection areas designated at county level.

In addition the Environmental Protection Agency (EPA) as an independent public institution is responsible for collection, integration and processing of environmental data. Next to EPA also the scientific institutions and the Non-governmental organizations in Croatia contribute to the development of the nature conservation policy and particularly the ecological network. Biodiversity data in Croatia have always been collected by scientific and/or high education institutions, like universities, institutes and museums. There are about 200 non-governmental organizations dealing with the protection of nature and environment.

Planning ecological networks

The preparation of the ecological network in Croatia started in 2000 through the Emerald network pilot project which was financed by the Council of Europe in the framework of the Pan-European Ecological Network (PEEN). In 2003 the CRO-NEN project (Building the National Ecological Network as a part of PEEN and NATURA 2000) has been initiated, through which the first draft of the national ecological network was made (http://www.cro-nen.hr/, ECNC, 2008).

In the years 2005 and 2006 a revision of CRO-NEN was done on the basis of newly collected data (Figure 14). Through the second phase of the Emerald project, financed by the European Environment Agency and in co-ordination with the Council of Europe, a map and database of potential NATURA 2000 sites was prepared that contributed to the national ecological network map. In 2007 the final proposal (including a GIS map and related database) of the National Ecological Network was made for designation by the Government of the Republic of Croatia

(Figure 14). In October 2007 Government passed the Decree on Ecological network (ECNC, 2008).

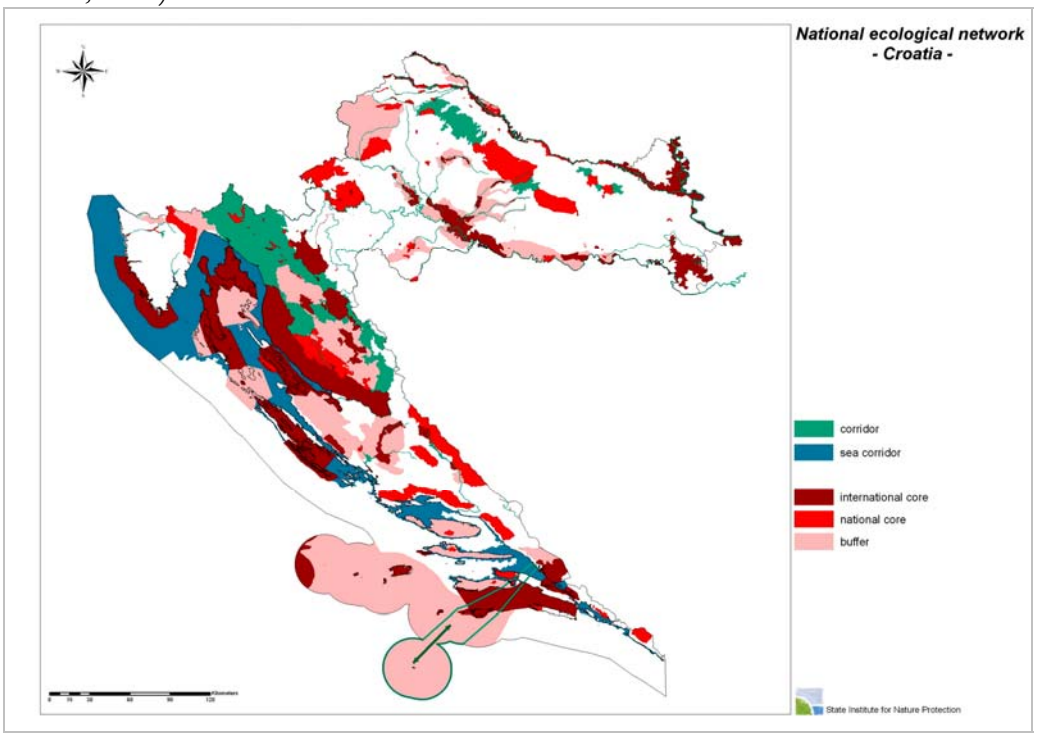

Figure 14. The National Ecological Network of Croatia (CRO-NEN; http://www.cro-nen.hr/home1.php?_lang=enand_site=1andid=1).

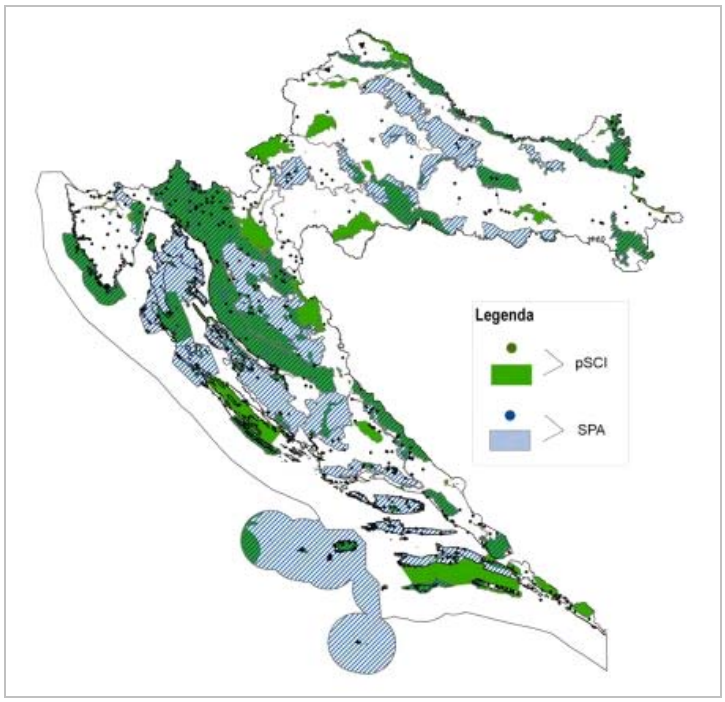

Figure 15. The current proposal of NATURA 2000 sites in Croatia (source SINP, 2008; http://www.cro-nen.hr/home1.php?_lang=enand_site=1andid=1)

The State Institute for Nature Protection (SINP) has drafted the proposal for the Natura 2000 network based on analysis of collected data on distribution of Natura 2000 species and habitat types (Figure 15). All available data (literature, museum collections, and unpublished data) and data from recent research have been analyzed. Since the biodiversity in Croatia is still not completely explored, the data used is not complete and new research is initiated to continue this process. It will than gradually shift to monitoring, which has to be carried out according to EU Directives.

At this stage of planning of the ecological network the expected changes will mainly consist of updating target features and boundaries of proposed sites depending on new data received; addition of new smaller sites; delineation of boundaries of ecological network sites on the Basic Map (scale 1:5000).

The integration between the spatial planning and ecological networks is done through the implementation of Environmental Impact Assessment that is mandatory for an larger works and it has become the subject of a separate administrative procedure. It has been singled out from the physical planning department and is based on a special administrative decision for granting or withholding consent for the planned development in the environment. The methodology applied for the development of the environmental impact study is in conformity with the methods on which the EU Directive on Environmental Impact Assessment (EIA) is based.

As physical planning is based on principles of sustainable development and rational land use and environmental protection, elements of the strategic environmental assessment are already taken into account in the procedure of physical plans preparation. Strategic Environmental Assessment shall apply to plans and programs of sectors as prescribed by the EU Directive on SEA, whereas its mandatory implementation will be regulated by the new Environmental Protection Act of Croatia that is under preparation.

6.5.4 Participatory planning and stakeholders involvement

Both the spatial planning documents and the nature conservation policy documents indirectly address the need for coordination of responsibilities between state agencies and involvement of the general public during the process of planning of the ecological network. Public consultation is the currently used approach for stakeholder involvement.

According to a recent research conducted by ECNC and SINP in stakeholder involvement in ecological network development (2008) in Croatia most of the key institutions are well informed about the Natura 2000 and Emerald networks and are relatively well familiar with the definitions and concepts related to ecological networks. However, yet there is insufficient involvement of the general public, particularly of local people in the areas part of the ecological networks, in the process of site selection and in the implementation activities of the ecological network.

There are number of problems in the communication among state agencies, stakeholders and the general public that impede the participatory planning process. These are the lack of understanding on the benefits that ecological networks and the lack of awareness how the implementation of the ecological networks will influence their daily activities. On the other side problems in mechanisms to address different interests were insufficient staff capacity, inflexibility of the state administration and lack of motivation among local people were the main problems in involving stakeholder groups (ECNC, 2008).

6.6. Ukraine

6.6.1 Socio-economic trends

In Soviet times, Ukraine was the second largest economy in the Soviet Union, being an important industrial and agricultural part of the planned economy of the USSR. With the collapse of the Soviet system, the country moved from a planned economy to a market economy. The transition process was difficult for the majority of the population that was plunged into poverty. Ukraine's economy contracted severely following the years after the Soviet collapse.

In 1991, the government liberalized most prices to combat widespread product shortages, and was successful in overcoming the problem. At the same time, the government continued to subsidize government-owned industries and agriculture by uncovered monetary emission. The loose monetary policies of the early 1990s pushed inflation to hyperinflationary levels. In the early 2000s, the economy showed strong export-based growth.

Following independence, the government formed a legal framework for privatization. However, widespread resistance to reforms within the government and from a significant part of the population soon stalled the reform efforts. A large number of government-owned enterprises were exempt from the privatization process.

6.6.2 Spatial planning system

The legal and policy framework

Although Ukraine has a long experience in spatial planning this experience has been based on governmental monopoly of property rights on land and real estate. This partly explains the current problems with the implementation of spatial plans, construction permits and land use control. Political, economical and social changes that are taking place in Ukraine from the beginning 1990s until present demand adaptation and development of spatial planning instruments and land management mechanisms that correspond to the new socio-economic conditions (Petrakovska, 2008).

In Ukraine spatial planning is regulated under so-called urban legislation. The first urban law ("About urban planning fundamentals") was adopted in 1992. The

purpose of this law was the delegation of responsibilities among authorities at the spatial and urban planning field. In 2000 the law "About planning and building up of the territory" has been passed. This determines the framework of urban planning documentation at the various levels of planning and the tasks, which are regulated by the different plans. "The concept of sustainable development of the regions in Ukraine" (1999), defines the main directions of activities in the field of urban development. Simultaneously, a number of issues in spatial development are under the responsibility of the local governments and their local regulations.

The Ministry of Ecology and Natural Resources has the administrative competence in the territorial management of the country. The decision making process is divided among different levels of administrative units (administrative districts, oblasts, cities of state subordination). The spatial planning system in Ukraine is operating within number of administrative territorial divisions, which are established by constitution. This administrative-territorial division includes the autonomous Republic of Crimea, oblasts (provinces), rayons (regions), cities, districts in the cities and villages.

The current spatial planning system is in a critical situation. The laws foresee that spatial planning should provide a general scheme for spatial development of the territory of Ukraine including schemes for regional planning, general plans, detailed plans of settlements and plans for development of individual land plots. However, many components of this system are missing or are out of date. Spatial planning projects take place mainly at the level of individual land plots and this means that spatial planning as a whole is fragmented.

Spatial planning and land reform issues in Ukraine
Land reform plays a significant role in the spatial development in Ukraine. The state land management activities as part of the overall spatial development is lacking consistency. Currently, public land is sold and leased out by the Cabinet of Ministers of Ukraine, local state administrations, local councils, State Committee on Land Resources and the State Property Fund. The division of land management competence is characterised by obscurity and corruptibility. As a result, legal offence, abuse and crime is increasing. General effects of inefficient state land management and unjustified restriction on transactions with land led to the situation that vast areas of agricultural land are not in use.

Land reform has been carried out in Ukraine for seventeen years. The fundamental changes have been in adjustment of the legislation in the following aspects:

- Legal definition of new conception of property right;
- Substitution of the state as only owner on means of production to unlimited number of owners and entrepreneurs;
- Separation of right on land and building;
- Monopolistic centralized system of financing of territory development from state budget turned into one with independent investors;
- Declaration of local self-government rights transferred management mechanisms to local level and made the relations between different levels of authority more complex.

The land reform and land policy are connected with a land market development. In the beginning of this century, about 50% of the built-up land has been transferred into private property. The main peculiarity of the land market is the existence of primary and secondary markets. The first one concerns state and municipal land and second private land. State and municipal land turns to the second market by privatization and selling. It is important to notice that the first possibility of privatization of the land for commercial purposes appeared after 1995 only as a consequence of President's Decree about the privatization and rent of land for entrepreneurship. Later a few more decrees have been developed such as the Decrees about sale of non-agricultural land (1999) and Decree on measures for development and regulation of municipal land" (2000).

In the land market the main actors are the state authorities, land owners, lawyers, financiers and developers. The state on the one hand provides the control of land use and environmental protection and on the other hand can be the owner and investor. During the past decade of land reform a new cadastre has not yet been developed. This makes the land registry process difficult. Although the law on registry was adopted in 2004, it has not yet been implemented so far; ministries are still disputing the right to do land registration (Petrakovska, 2008). Private interests are deeply intertwined with public administration; this explains partly the cumbersome and unreliable process acquisition and protection of land rights (Petrakovska, 2008).

The process of spatial planning at different levels

In Ukraine the spatial planning and decision making process are taking place at national, regional and local level. At each level different plans are developed and implemented (Table 10).

National level

At national level the spatial planning of Ukraine is based on the "General scheme of territorial planning of Ukraine", which includes a comprehensive analysis of social, economic and ecological conditions of the territorial development of the country. On the basis of this analysis the discrepancies in spatial development are identified. This policy document provides guidelines for the long term spatial, social and economic development of the country.

Regional level (oblast)

At regional level, regional spatial schemes are developed. These include the territory of an individual region (oblast). These regional planning schemes facilitate the decisions for the realization of the national spatial planning scheme, taking into account the specific historical, geographical, demographical, economical, ecological peculiarities, cultural and ethnic traditions of the individual regions.

Local level

At the local level the General Spatial Plan is the major plan. The general spatial plan integrates economical, environmental, cultural, infrastructural, housing and other aspects. However, although its local scale this plan only solves strategic tasks and

does not give grounds for decision making concerning land properties. With the purpose of detailed zoning the Detailed Plan and Building Plan has been developed.

Regarding specific property uses in urban areas a new kind of urban plan has been established as the Territory Division Plan. The plan covers micro-districts or blocks and delimitates land around dwellings and other buildings. Additional legal documents were established such as "Rules for building up territory" that regulates generalization of possible land use conditions and restrictions and popularization among population. This document contains textual part and zoning schemes. By means of zoning schemes, areas with preferable use of land and special conditions for use are determined.

Coordination of the planning documents

In this time of constantly changing intergovernmental relations and practices of public service one of the largest problems for owners and investors is the complexity of the communication process. The search for an authority with competence for the settlement of an issue appears a complicated task in Ukraine and considering that the majority of the authorities are organized vertically (hierarchical), there is often a need for a complex process of approval of issues between departments and their subdivisions. This is made more difficult by the instable organizational structures and the division of management functions and power between public and private actors. Open access to information and documentation is difficult. This results in a situation that only after the approval of land use permits (building permits) a land owner has information on the needed restrictions regarding the use and development of the land.

Table 10 Spatial planning documents at different level

Levels of planning	**Name of planning document**
National	– General scheme of Ukraine territory planning (accepted in 2001) – Scheme of territory planning for extra valuable land (by special decree of government)
Regional	– Scheme of territory planning of autonomous republic of Crimea – Schemes of oblasts territory planning – Schemes of rayons' territory planning
Local	– General plan – Detailed plan – Territory division plan – Building up plan – Urban substantiation

6.6.3 The Ecological Network

The legal and policy framework

The former way of development in Ukraine has resulted in exhausting natural resources, environmental pollution, negative health impact and landscapes' degradation. The recent political changes, however, led to the introduction of new policy for nature resource management (Movchan, 1998).

The process of establishment of the ecological network in Ukraine has started in the 1990s (Movchan, 1998). Ukraine has expressed commitment for contributing to the UN Convention on Biodiversity and its implementation through the Pan-European Biological and Landscape Diversity Strategy. In 1997 the Cabinet of Ministers of Ukraine has endorsed the Conception on Biodiversity Conservation in Ukraine. The Conception defines main trends and priorities in this field. One of the key tasks is the implementation of the national ecological network that will be an element of the Pan-European ECONET. This activity is in line with the Convention on Conservation of European Wildlife and Natural Habitats (Bern Convention) and on World Heritage, which have been ratified by Ukraine. Next to this Ukraine has signed as well as a number of other international documents supporting conservation of biodiversity such as the Convention on protection of Birds, the Ramsar Convention on Wetlands, the Convention on International Trade in Endangered Species (CITES) and the Convention of Migratory species (Bonn Convention).

The government's policy for the establishment of the national ecological network is aiming at development of at least seven ecological corridors which will cover key protected areas, buffer zones, green belts around settlements, recreation zones and, respectively, three nature areas and lowlands of the four main water courses (Figure 16). The basic principle to create the national ECONET is the "no net loss" principle (Movchan, 1998).

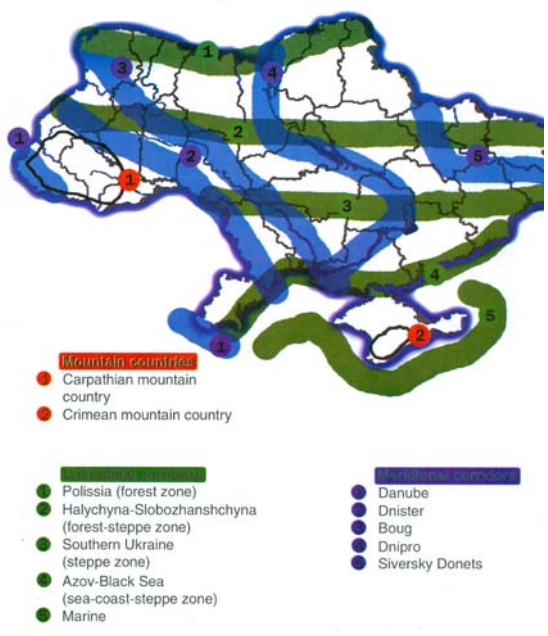

Figure 16 The Ecological Network of Ukraine. Red: mountain regions, green: latitudiinal corridors, blue: meridional corridors.

The main governmental body responsible for the ecological network development in Ukraine is the Ministry of Environmental Protection. According to the Law on Environmental Protection, the Ministry has the responsibility for overall management and control over the use and protection of the natural environment. The State Agency for Protected Areas of the Ministry of Environmental Protection is responsible for the management of the Nature Parks and biosphere reserves at national level. Special ministerial bodies at oblast and local level have been organised for the practical implementation of the nature conservation policy. Therefore the Ministry of Environment and its regional and local divisions are responsible for the creation of the national ecological network. In 2001 a *Coordination Council for formation of the national ecological network* was established by the Resolution of the Cabinet of Ministers of Ukraine, which is responsible for coordination of the activities for the implementation of the *National program of formation of the national ecological network in Ukraine from 2000 through 2015* at regional and local levels. The Council is a consultative body with members from the local and central governmental administrations, scientists and representatives of public organizations. Similar coordination Councils have been established as well in some of the regions oblasts such as the Western Bug Basin Council.

The *Law of Ukraine "On the ecological network in Ukraine"* (No. 1864-IV of 24 June, 2004) defines the ecological network and its structural elements and specifies the main ecological corridors. These include river and wetlands corridor such as in the Western Bug valley. A special section of the Law is dedicated to the creation of trans-boundary elements of the national ecological network and addresses the establishment of the Western-Polissya cross-border eco-net and biosphere reserve. The law on the national ecological network specifies as well the responsibilities of governmental bodies at various levels with regard to the ecological networks, their design, implementation and monitoring. The Program for establishment of the ecological network determines categories of land, which will be designated for the creation of the ecological network.

The national ecological network needs to be developed in compliance to the Pan-European ecological network. The aim is to improve and considerably expand the area of reserves, preserves, national parks. The rather declarative character of the current laws in this respect often affects their effective enforcement into specific land use management requirements for designation of land use restrictions in the areas part of the ecological networks. In this regard the spatial planning laws such as the *"General Scheme of Planning of the Territory of Ukraine*" have an important role in addressing issues related to the spatial coherence of the ecological network. The formation of the national ecological network was for the first time addressed within the land use planning law "On Land Protection" (No. 962-IV, 2003). The ecological systems as such are addressed in the list of measures as part of the land protection articles of this act.

System of Protected Areas.
From 1994 onwards the system of protected in Ukraine has been determined by a National Programme on the development of Nature Reserves. The programme,

endorsed by the Supreme Council of Ukraine provides a strategy for scientific research and monitoring, legal and financial aspects of management, enlargement of protected sites and conservation of biodiversity. The following types of protected areas are present in Ukraine: strict nature reserves (zapovedniki), biosphere reserves, natural national parks, and wildlife sanctuaries, monuments of nature, protected sites and regional landscape parks.

Planning ecological networks

The process of the implementation of the ecological network in Ukraine is slow. Not long ago it has been restricted to the formation of protected areas such as regional landscape parks and national parks. The practical creation of the ecological network such as core areas, corridors or buffer zones is in progress. The Ministry of Environment and the scientific organizations such as the Institute of Botany of the National Academy of Sciences have published a Manual on creation of the ecological network to introduce a common methodology of the ecological networks development.

The implementation of the Ukrainian ecological networks has been initiated by a number of activities in different parts of Ukraine. One of the first initiatives is the creation of the Ecological Network of Kiev. It envisages the creation of a GIS database of the network and its current condition. The Ecological Network of Kiev deals with and mainly includes the territories and the sites of natural reserves and public green areas.

Another imitative which has been commenced in 1998 by the Ministry of Environment is the development of the Galytsko-Slobozhansky Ecological Network, as part of the National Ecological Network and as an element of EECONET. This network covers an area from the San River in the west, including Roztochchya, Opillya, Prycarpallya, Podillya, Pridniprov'ya, Poltavs'ka oblast and Slobozhanschyna, to the rivers of the Siversky Donets and Don basins in the East.

The Black Sea office of the Wetlands International has developed projects such as the Integrated Management Approach for the Sivash wetlands, development of the Dnepr River Ecological corridor and the indicative map for the South Bug river corridor. Not long ago, as well few regional committees were established to address the trans-border issues of the ecological network of the Western Bug River. Such as committee is the state committee of Ukraine for water resources in Lutsk, the Western Bug river department.

With the purpose to prepare cartographical data of the national ecological network the Board of the Ministry of Environment addressed the need of cartographical support for the development of the ecological network by the geodesy agency.

Because the laws specify main ecological corridors at the national scale, the Ministry of Environment required an additional research on the development of the scheme for some of the ecological corridors including:

- Landscape and bio-geographic elaboration of the spatial scheme of Galytsk-Slobozhany ecological corridor;
- Conceptual design of Azov-Black Sea ecological corridor;
- Concept of the ecological network of the Dniester river;
- Concept of the ecological network of Polissya region and a draft scheme of the Polissya corridor (Figure 17).

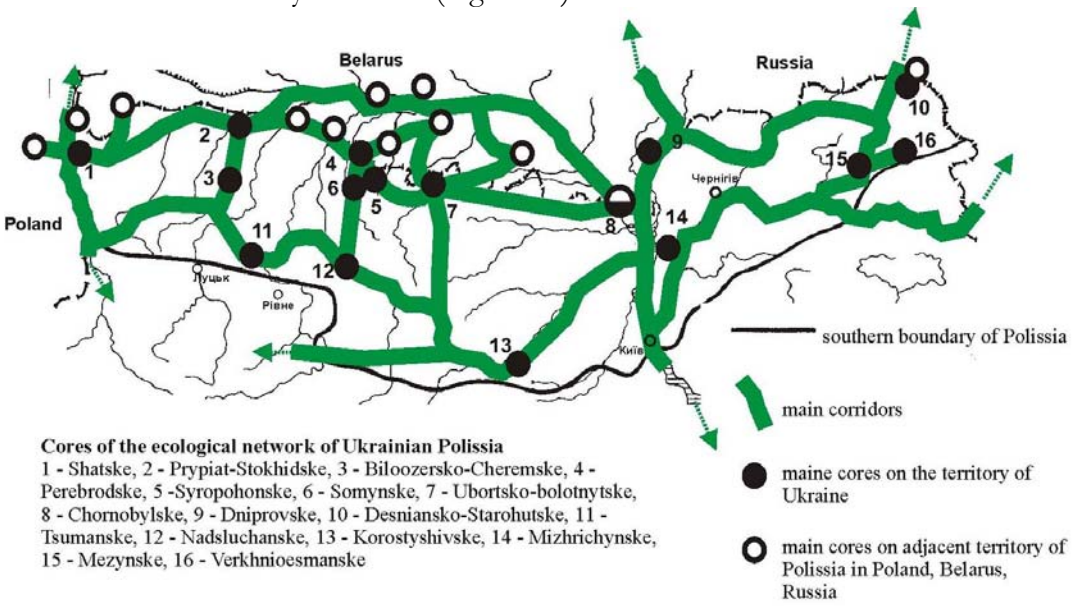

Figure 17 The Ecological Network in the Polissya region (from http://science.basnet.by/unesco/pol_eco_eng.htm)

Recently the regional Departments of the Ministry of Environment have been developing the programs for the creation of ecological networks and the schemes of the networks at the regional level. According to the report of the Ministry of Environment, the programs for regional ecological networks were developed and approved at the end of 2006 in the following nine regions: Vinnitsa, Dnipropetrovsk, Zakarpatye, Ivano-Frankovsk, Kirovograd, Odessa, Ternopil, Kharkiv, and Chernigiv. Draft programs are under development in the Autonomous Republic of Crimea, Donetsk, Zhytomyr, Lugansk, Lviv, Mykolayv, Poltava, and Khmelnitsk regions. Projects also started in 2007 in Volyn, Zaporizhya, Kyiv, Kherson regions and in the city of Sevastopol.

The ecological network implementation in Ukraine is funded by the state. However, a number of international and bilateral project initiatives have been supporting this process. The main challenges identified in the ecological network development are related to the following factors:

- Insufficient legislation and its enforcement in practice;
- No common methodologies for of the design of ecological networks;
- Lack of funding and complicated procedure of work remuneration;
- Instability and fallibility of the land use management relations

According to the recommendations of the last meeting of the special *Coordination Council* of Ukraine the formation of the national ecological network must be continued by the following actives of the competent authorities:

Activities of the Ministry of Environment:

- To develop draft law of Ukraine on amendments and changes in the National program of formation of the national ecological network of Ukraine from 2000 through 2015 (hereinafter, Program), to ensure its approval with the central interested bodies of the executive power and submission according to the established procedure to the Cabinet of Minister of Ukraine;
- To finish the Procedure of inclusion of territories and objects to the list of territories and objects of ecological network and ensure its agreement with the interested bodies of the executive power and work out corresponding legal document for its approval;
- To approve methodological recommendations on the development of the schemes of regional ecological network and forward them to the interested bodies of the executive power to use them in their work;
- To work out recommendations for the mechanism of economic encouragement of the subjects of land use and landholding as to measures directed to the development and support of the ecological network.

Activities of the Land State Committee:

- Propose to the Ministry of Environment to work out regulatory enactments, methodological documents and instructions with regard to the state accounting of the territories and objects of the ecological network within the state land cadastre.

In addition the establishment of cooperation for the development of the trans-boundary ecological network in the West Polesie region between Poland and Belarus is a growing priority of the national and regional authorities (Figure 18).

The legislation on spatial planning and ecological networks in Ukraine is fragmented. The integration between the two policies has no practical application. It is not embedded into the land use planning process, which is one of the reasons for an unbalanced redistribution of important spatial functions.

Another impediment to the integration of ecological networks into spatial planning is the lack of a coherent database and agreed methodology. In Ukraine there is information on nature management including some GIS databases. This data, however, is spread between a numbers of different organizations, which do not have direct interrelations. Often the data regarding landscapes, hydrology and biodiversity is part of different information systems and programs.

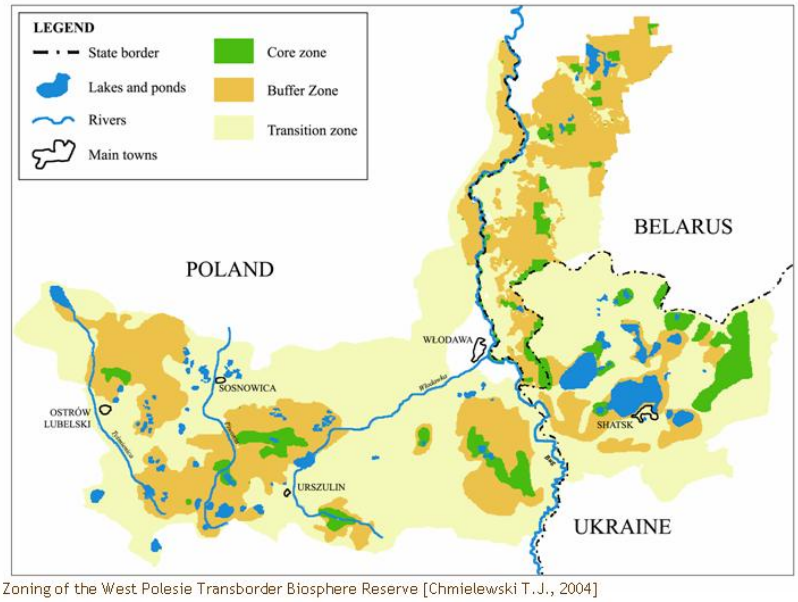

Figure 18. The Trans-boundary Biosphere reserve West Polissya (Chmielewski, 2004)

6.6.4 Participatory planning and stakeholders involvement

Despite the increase in number of project initiatives promoting ecological networks in Ukraine stakeholder involvement is not yet a common practice. Until now few success stories can be mentioned such as the achievement of commitment among different actors for the Bug river ecological network cross-border initiative. The stakeholder involvement process in ecological networks still remains difficult in terms of public-private partnerships and decision making in land use planning process. While officially there is no land market in Ukraine, in reality the land is under control of powerful private actors via long-term rent. The tenants, not being owners of the land, are focusing on maximizing their profits. They are not interested in nature conservation. The currently observed weakness of the public authorities and fallibility of the legislation towards the private actors create additional difficulties in land use issues related to ecological networks development. This means that if agreement is not achieved with these private actors it will be difficult to establish any ecological network that includes cultivated land in Ukraine, which is about 70% of the entire territory of the country.

6.7 Belarus

6.7.1 Socio-economic development trends

Most of the economic activities in Belarus are state-controlled. About 51.2% of the Belarusians are employed by state-controlled companies, 47.4% by private Belarusian companies (of which 5.7% are partially foreign-owned), and 1.4% are employed by foreign companies. The country strongly relies on imports such as oil from Russia. As from 1994, the biggest exports from Belarus were heavy machinery (especially tractors), agricultural products, and energy products.
http://en.wikipedia.org/wiki/Image:Image-Belarusion_GDP_grow_(1995-~2008).pnghttp://en.wikipedia.org/wiki/Image:Image-Belarusion_GDP_grow_(1995-~2008).png
At the dissolution of the Soviet Union in 1991 Belarus was a strong, industrially developed state by percentage of gross domestic product (GDP) as well as the richest CIS state. Belarus involved itself in the CIS, Eurasian Economic Community and Union with Russia. During the 1990s, however, industrial production plunged because of the decrease in import and in investments. Only in 1996 the gross domestic product started to rise again, which coincided with the government putting more emphasis on using the GDP for social welfare and state subsidies. As Belarus has a state controlled economy there are no adequate conditions for private entrepreneurships in development activities in the country.

6.7.2 Spatial planning system

The legal and policy framework
While being part of the Soviet Union Belarus did not have its own national legal framework. The process of creation of the national legislation began in 1991. According to the old normative approach, spatial and urban planning regulation was part of the Building Regulation System. Currently, part of the old normative documents of the former Soviet Union is still used in urban planning and building. Proceeding from the Agreement on the Commonwealth of Belarus and Russia, the process of unification of the legal framework in this field is ongoing. However, it is not always in favour of the interest of Belarus as often the Russian policy dominates.

In 1994 the Parliament of the Republic passed the law "On Architectural and Town Planning Activity in of Belarus". The Law has a general character and does not regulate the procedures in spatial and urban planning. It provides definitions of sustainability principles, spatial and urban planning activities in the context of architectural creativity and a list of basic planning documents. The basic components of spatial and urban planning activities include:

- Regional and urban cadastre as an information basis for planning;
- National research programs in the field of spatial planning and architecture;
- A fund for spatial development, the financing source for national planning and research.

The process of spatial planning

Spatial planning is carried out at three levels of government, national, regional (oblast) and local. At regional level the Oblast Committee for Territorial Development, Urban Planning and Architecture is responsible. Four types of spatial plans are developed:

- National plan
- Regional plan
- Master plan
- Detailed plan

Planning projects are approved by the Decision of the Council of Ministers. The procedure of urban planning is based upon the "Building Rules in Urban and Suburban areas". It is authorized by Oblast Executive Committees.

The Ministry responsible for spatial planning is the Ministry of Architecture and Construction. Other planning-related authorities at the national level are the Ministry of Economy, the Ministry of Natural Resources and Environment Protection and the State Committee for Land Resources. The body responsible for regional and local planning is the Committee of Territorial Development, Urban Planning, Architecture and Land Management

6.7.3 The Ecological Network

The legal and policy framework

In Belarus there is a national strategy for development of ecological networks which is based on the legal provisions of the state scheme for complex territorial organization (spatial planning). This scheme includes the classification of the most important protected nature areas and their protection regime. In 2007 the council of ministers of Belarus agreed to elaborate and approve a national strategy for development and management of the network of protected areas in the country by 2015.

Information on biological diversity is currently not unified in a common database. The data is fragmented and stored in different databases of scientific organizations. The Brest Regional Committee of Natural Resources Use and Environmental Protection is responsible for the database concerning the management of the protected areas. The Ministry of Natural Resources and the Forestry Institution are managing the data on forests and afforestation including the description of protected flora and fauna species and habitats.

In Belarus the regional committees of Natural Resource Use and Environmental Protection are responsible for biodiversity conservation activities. Additionally three other institutions are involved in these activities: the Ministry of Natural Resources and Environmental Protection, the regional branches of the State Institute of Land Use Design and the Central Scientific Institute of Complex Use of Water Resources of the Ministry of Natural Resources and Environmental Protection.

Planning ecological networks

In Belarus the concept of ecological networks is included in the definition of the National Ecological network. The National Ecological Network is currently being established. Its main structural elements are the least anthropogenic transformed natural complexes i.e. core areas characterised by high indexes of biological and landscape diversity (Figure 19). Part of these areas has status of strictly protected natural areas such as reserves, national parks, sanctuaries. The current ecological corridors are mainly existing migration routes such as river valleys, forests, and special parts of the agricultural landscapes, which have a special management regime. The current strategy on the ecological network of Belarus is developed according to the State Scheme for spatial development and organization of the country and aims at increase of the total area of strictly protected natural areas from 7,9% in 2005 to 8.1 % in 2010 and to 9.3% in 2015 from the total country's territory.

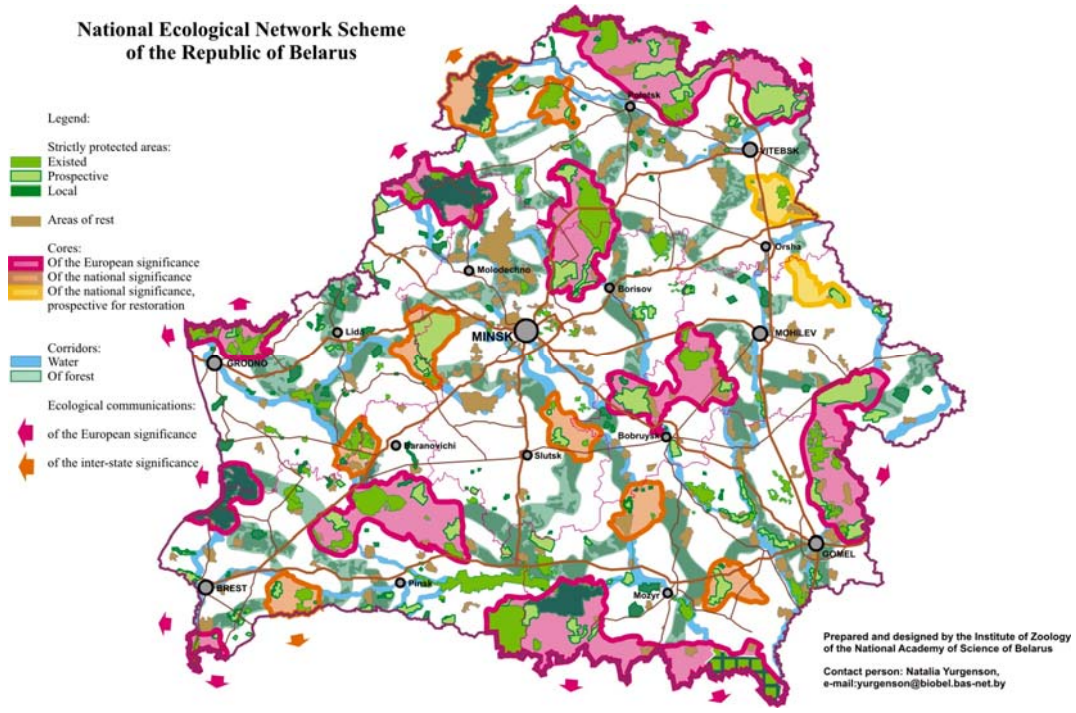

Figure 19 The Ecological Network of Belarus

The components of the national ecological network are classified at international, national and regional levels. The key elements of international significance in the ecological network include the ecologically stable natural systems with a minimum area of 20,000 ha for natural forest ecosystems and 5,000 ha for other ecosystems that are considered as part of the Pan-European Ecological Network. The key elements at national level are ecologically stable ecosystems of over 10,000 ha for forest ecosystems and over 2,000 ha for other ecosystems. These are habitats within migration corridors and are nationally protected. The key elements of the ecological network at regional level are ecosystems with a high biological diversity and a special regime of use for nature purposes and economic activity.

It is the ambition of the development of the national ecological network of Belarus to integrate it into the Pan-European Ecological Network. An example of a current progress towards the achievement of this goal is the involvement of the national and regional authorities in the initiative for establishment of the Bug river transboundary regional ecological network and a tri-national biosphere reserve in cooperation with Poland and Ukraine.

6.7.4 Participatory planning and stakeholders involvement

The current political situation in Belarus calls for the reinforcement of civil society and a productive co-operation between governmental, non-governmental and private actors. In order to achieve this in Belarus there is a need to establish the principles of democracy and public involvement in decision making process.

Despite the small number of active NGOs and an unfavourable political environment for their operation, the NGOs in Belarus have gained considerable experience and developed capacities which will be useful to enhance further development of local communities. Examples include the realization of the Bug river ecological network initiative in which different stakeholders such as scientific organizations, regional authorities and NGOs has been involved. Another reported participatory initiative has been the development of nature management plans for the sensitive wetlands in the Polesie region of Belarus, realized by UNDP and APD-BirdLife, the largest environmental NGO in Belarus. This initiative has established new administrative units beyond the national legal requirements for nature conservation aiming to better manage these protected areas. This initiative secured the support of different stakeholders including relevant ministries such as the Ministry of Environment of Belarus (http://www.waterwiki.net/index.php/Belarus).

There is still a lack of tools and models of a participatory approach for the co-operation between NGOs, authorities and businesses. In spite of the general uneasiness of the central government towards the existence of NGOs and other private stakeholders some governmental institutions such as the current Ministry of Environment have shown to co-operate with civil society in nature conservation projects. The creation of the Public Council, established at the Ministry for Environment, of which some of the major environmental NGOs and other stakeholders can be part of, is a positive step towards a better communication and co-operation. However, this process has to be developed further in the future.

7 Comparative analysis

7.1 General

The comparison between the case-study countries shows that all six countries have adopted or are currently elaborating their policies and legislation to address the general concept of ecological networks and/or to transpose the provisions of the Birds and Habitats Directives into their institutional framework and administrative practices on biodiversity conservation. However, this research as well indicates, that in all six countries a number of important challenges are currently present in this process, particularly in the use of different approaches to implementation of ecological networks. Table 11 illustrates the main similarities and differences in the ecological networks implementation between the studied countries.

In most of the six countries the strategic and legal approaches have been used and dominate compared to the use of other approaches such as economic valuation and collaborative approaches. The strategic approaches resulted in most of the countries in the development of comprehensive documents such as national or regional strategies including spatial development strategies, biodiversity conservation strategies and action plans, which to different extent embed the objectives of the ecological networks to improve the connectivity between important nature areas. In all countries the legal approach is used primarily to change the regulative policy framework. This includes revision of the legislation on biodiversity conservation and spatial planning and harmonization of the environmental laws with the objectives of the EU Habitat and Birds Directives, Bern convention or other international agreements.

The term ecological network is not always explicitly mentioned in the legislation; however, the laws do refer to measures for improvement of connectivity between nature areas. In Hungary and Ukraine special decrees on ecological networks have been developed such as a decree on Natura 2000 and a law on the national ecological network respectively. In Slovakia ecological planning tools such as the landscape ecological planning tool have been embedded in the national legislation and are applied as a legal procedure in the territorial planning and development process. Concerning the use of the strategic and legal approaches in Ukraine and Belarus the legal approach dominates compared to the strategic approach. Both nature conservation and spatial planning policies in these two countries are strongly based on following the hierarchy of the legal procedures

However, while the current strategic documents and legislation addressing ecological networks can be seen as a significant progress in the case study countries in renewing policies on biodiversity conservation, yet there are certain problems identified with the efficient use of these two approaches. A common problem is that the strategic policy documents prepared at national or regional level appear to be strongly sectoral and to a high degree disintegrated from the actual administrative practices on the

implementation of the ecological networks objectives at regional and local level. The main reason for this appears to be the structurally fragmented framework of institutions responsible for transforming these strategies into action. While some of the countries such as Hungary, Poland, Slovakia and Croatia have transposed the provisions of the EU Directives into their national legislation it seems that these provisions are still not sufficiently reflected in policies and legislation of the economic development sectors such as transport and spatial planning. This is especially the case regarding the integration of the ecological networks concept into land use planning procedures.

The comparative analysis with regard to the application of the economic valuation approach indicated that this approach is not used as a common practice in ecological networks implementation initiatives for the countries considered here. This is valid for the assessment methods for cost and benefits of ecological networks such as Cost-benefit analysis (CBA) or Social Cost-Benefit Analysis or other evaluation methods. In Hungary, Poland, Croatia and Slovakia the Strategic Environmental Assessment and the Environmental Impact Assessment tools are promoted as approaches to evaluate the impacts of economic activities on nature areas. However these assessment tools are not designed to assess the long term economic benefits of the development of ecological networks to preserve biodiversity. In all of the countries there is a lack of consistent information on the available knowledge concerning the use of economic valuation tools in supporting decision making on nature conservation projects. There are no specific experiences or best practices found in the countries in this study with regard to the assessment of cost and benefits of establishment of the national or regional ecological networks. All of the countries, however, do have certain experience in dealing with financing mechanisms for supporting ecological networks initiatives and the establishment of Natura 2000. These include national, EU and international financing mechanisms. The member states or candidates member state of the EU, Poland, Slovakia, Hungary and Croatia, seem to have greater access to financial instruments in the form of targeted EU subsidies, compared to Ukraine and Belarus, which are not always eligible for this type of funding. Generally most of the financial mechanisms are based on subsidizing mechanisms at European or national level, a significant part of this is based on structural funds and the National Agri-environmental Programs.

As with the other approaches the use of the collaborative approach in implementation of ecological networks varies between the countries depending on the local socio-political and economic environment. Belarus is still in a reinforcement process of the civil society and there is a lack of collaboration mechanisms between NGOs, governmental structures and private actors. Collaboration between different institutions and stakeholders is usually unprecedented. In contrast in Slovakia, Poland, Hungary and Croatia information campaigns have been realized to increase the awareness of different stakeholders about the need for development of ecological networks and their benefits to preserve biodiversity. Most of these campaigns were held within the framework of the Natura 2000 initiatives. Despite the increasing number of project initiatives on promotion of the ecological networks in Ukraine stakeholder involvement is not yet a common practice. A common trend observed in

all six countries with regard to collaboration practices is the presence of certain resistance for collaboration among different actors. This resistance is based on the lack of full understanding on how the ecological networks function and what social or economic benefits they can bring. In some of the countries there is a tendency among stakeholders to form a negative image on the ecological networks as a tool for biodiversity conservation as it is sometimes perceived as a restrictive measure impeding development opportunities.

For the establishment of collaboration practices in development and implementation of ecological networks nature conservation NGOs play an outstanding role in all case study countries. Collaboration and coordination between the governmental institutions in all countries is not strong. As observed this causes disintegration of the decision-making process for development of ecological networks including the lack of agreements on common methodologies, lack of comprehensive database and database management, and discrepancies between the planning process of the ecological networks and the land use planning procedures at different levels of the government. In some countries coordinating bodies has been established for the purpose of the ecological networks development. For example in Ukraine this is the governmental coordination Council for the national ecological network development.

Table 11. Comparison of the use of approaches supporting decision making on ecological networks. Legend: ✔ ✔ ✔ = strong; ✔ ✔ = moderate; ✔ = weak; - = lacking; ? = lack of data

Policy approaches	**Poland**	**Croatia**	**Ukraine**	**Slovakia**	**Hungary**	**Belarus**
Politico-economic system	Parliamentarian Market economy *EU member*	Parliamentarian Market economy *Accession to EU*	Semi-parliamentary Transition to a market economy	Parliamentarian Market economy *EU member*	Parliamentarian Market economy *EU member*	Presidential State controlled economy
Strategic approach						
-national policy plans and programs	✔ ✔ ✔	✔ ✔ ✔	✔ ✔	✔ ✔ ✔	✔ ✔ ✔	✔
Legal approach						
-legislation in nature conservation, and land us planning	✔ ✔ ✔	✔ ✔ ✔	✔ ✔ ✔	✔ ✔ ✔	✔ ✔ ✔	✔ ✔ ✔
Economic valuation approach						
- cost benefit analysis	-	?	?	✔	?	?
-ecological assessment tools: (SEA.andEIA)	✔ ✔	✔ ✔	-	✔ ✔	✔ ✔	
-Financing instruments	✔ ✔	✔ ✔	✔ ✔	✔ ✔ ✔	✔ ✔	✔
Collaborative approach						
-stakeholders involvement	✔	✔	✔	✔ ✔	✔ ✔	-
-inter-organizational communication and coordination	✔	✔	✔ ✔	✔ ✔	✔ ✔	?

The comparative analysis made evident that the use of different approaches varies according to the specific political and economic system of the studied countries. While in parliamentarian and market economy system the strategic approach scores high in a state controlled system this approach is not applied. The type of political and economic system, however, does not affect the use of the legal approach. In all presented socio-economic systems this approach remains highly used. However, a parliamentarian-market economy scores better on the use of the collaborative approach than the presidential systems and state controlled economies as in Belarus. Furthermore, the use of economic valuation approaches shows to be weak in all systems, while ecological assessment tools tend to increase in the countries with market economy and more democratic political system.

7.2 Financial instruments for ecological networks implementation

The establishment of a comprehensive funding mechanism for the development of ecological networks is not yet accomplished in most countries and also not in the countries assessed in this study. Most of the current funding instruments are aimed to support the establishment and implementation of the national ecological networks under the umbrella of the Natura 2000 network and the PEEN initiatives. According to the assessment of IUCN (2005) the main sources of financing in the region are linked to specific sites within the range of the existing protected areas such as agricultural land, forests, water within the territories of national parks. According to the land use and types of ecosystems Natura 2000 sites are usually categorized as agricultural areas, other terrestrial land, inland waters, and wetlands, coastal and marine areas (Miller et. al., 2006). The main financial instruments related to these types of sites include National Agri-enviromental Programs, National Rural Development Plans such as in Hungary and Poland, sectoral operational programs on development of infrastructure such as in Slovakia and the EU structural funds including LIFE and pre-accession funding instruments in Poland, Croatia, Ukraine, Slovakia and in Hungary. In Belarus the main funding sources are based upon government budgets and different bilateral agreements such as with the Dutch government or multilateral funding programs of international organizations such as UNDP and others.

Substantial part of the national financing sources however, is based on European funds most important of which are the European Agricultural Fund for Rural Development (EAFRD) and the European Regional Development Fund (ERDF). In addition the Cohesion fund, the LIFE financing instrument and the 7th Framework program do provide as well a significant contribution to the ecological networks development and establishment of Natura 2000 in these countries (IUCN, 2005, Miller et. al., 2006).

In some of the countries the funding opportunities have been legally embedded. For example in Slovakia according to the Act on Nature and Landscape Protection, land owners can obtain a financial contribution from the state budget if they maintain a part of the landscape that is not possible to maintain via common cultivation or if

they maintain buildings or underground premises created by a human activity if these buildings or premises are necessary for the protection of protected animals associated with them (IUCN, 2005). Moreover, according to this act, the land owners are obliged to obtain compensation for restriction of common cultivation and owners of the land on Natura 2000 sites are supposed to be paid.

Based on the agri-enviromental measures developed under the Common agricultural Policy (CAP), financial mechanisms have been introduced within the National Agri-enviromental programs for management of the Natura 2000 network. These mechanisms include compensation costs for farmers and foresters for the implementation of specific Natura 2000 sites. The national agri-environmental programs are budgeted partly from EU and partly from national financial resources. The activities of other stakeholders such as NGOs, developers of ecological infrastructure and of measures for nature protection are often funded by different sectoral programs such as for example in Slovakia are the Sectoral Operational Program for Industry and Customs and the Sectoral Operational Programme for Basic Infrastructure. Activities of state nature protection agencies and some private environmental institutions are funded by the main EU structural funds and other international resources. In cases analysed the direct contribution from CAP to Natura 2000 is low. How much the contribution is to land outside Natura 2000, but within a national Ecological Networ could not be established.

The main beneficiaries within the currently available national financial sources for the assessed countries are the farmers, nature protection services, NGOs and land owners. Generally, the main financing in case of these countries is based mostly on public resources such as the EU and the national programs and plans.

7.3 Transboundary ecological networks

In Europe the transboundary cooperation for nature conservation is increasingly promoted. The main emphasis on trans-boundary cooperation is on meeting the connectivity needs of different species. For that connectivity needs to be comprehensively assessed in border regions and cooperation should be established when there it is clear that populations need measures that cross borders (Kettunen et al, 2007).

A number of trans-boundary initiatives in Europe involve shared ecosystems which are predominantly associated with mountain ranges (e.g. Pyrenees, Alps and Carpathians) or river systems (Rhine, Danube, Sava, Bug). Some such as the Commission for the Protection of the Rhine (ICPR) respond to specific threats, which for the Rhine were extreme pollution and degradation of the river quality (Kettunen et al, 2007).

The Pan-European Ecological Network (PEEN) aims to develop a 'physical network of core areas and other appropriate measures, linked by corridors and supported by buffer zones, thus facilitating dispersal and migration of species' (Council of Europe

et al 1996). The PEEN, which has developed overview maps for Central-Eastern (Bouwma et al 2002), South Eastern Europe (Biro et al, 2006) and Western Europe (Jongman et al 2006), provides the basis for a unifying framework to promote synergies between national and sub-national approaches. One of the important functions that PEEN can serve is to draw attention to the need for transboundary cooperation between connectivity measures. National and sub-national initiatives tend to limit their focus to national boundaries, whereas the dispersal of species across borders is obviously an important consideration (Kettunen et al, 2007). Central and Eastern European countries are actively involved in the development of the PEEN. There are number of examples of currently on-going regional transboundary initiatives such as the Bug River, the Sava River and the Carpathian ecological networks development.

8 Results: conclusions and recommendations

This research has made clear that progress has been achieved with planning ecological networks, but also that governments at all levels and in different socio-economic conditions are facing serious challenges in their efforts to implement ecological networks in practice.

Firstly, the theoretical part of this research clearly indicates that for policy sectors promoting economic development spatial planning may play important role in mitigating ecological impacts by improving connectivity between natural habitats and ecosystems at national and transnational levels. For the integration of the ecological networks objectives in different policy sectors relevant legislation and strategic documents are crucial. To achieve this integration, strengthening of the decision making process between the environmental and socio-economic sectors is needed at European, national and sub-national levels.

Based on the review of the socio-economic aspects of ecological networks implementation and the comparison between the selected case study countries it can be concluded that implementation of the ecological networks requires both a scientifically based methodological approaches and approaches that support the decision-making processes at different levels of governance. The use of these approaches varies greatly between countries depending on the socio-economic and political systems and other specific factors per each country.

In this research we identified four main approaches that play role in supporting decision-making for the implementation of ecological networks and assessed their use and applicability in different socio-political and economic contexts. These approaches are (1) strategic, (2) legal, (3) economic valuation and (4) collaborative approach.

While most of the countries have established a strong legal basis to regulate planning and implementation of the ecological networks by using a legal approach at national level (framework legislation), some have as well developed strategic policy documents dedicated to prioritisation of different objectives and measures for ecological networks development. While the legal approach is often used by the national governments to prove that their policy complies with the European and International legal agreements on biodiversity conservation, the strategic approach is used to guide the implementation process of this policy.

In addition to these two approaches the economic valuation approach has been assessed as highly applicable in supporting decisions for implementing ecological networks. However, as indicated in the comparative analysis this approach has not yet been commonly applied. Among the assessed economic valuation tools Cost Benefit Analysis shows to be particularly suitable for different socio-economic systems to evaluate ecological network projects. It can be concluded, however, that

while a positive outcome of a Cost-Benefit Analysis is strongly necessary to support the decision-making in implementing ecological networks, other economic requirements such as financing ecological networks projects are essential as well. This is due to the fact that the costs of establishing ecological networks are mainly financial, while the benefits to a large extent are non-financial. Marketing and positive publicity are some incentives for profit maximizing agents to sponsor ecological networks projects.

The collaborative approach is gaining more prominence in the assessed countries, but it presents a number of challenges in its use in the different political and economic systems. While the approach can be suitable for improving the understanding on how ecological networks function among stakeholders and on the potential social and economic benefits of such nature conservation measures, it can as well improve the coherence in decision-making between governments. The success of the collaborative process, however, strongly depends on the socio-economic and political environment of the country. In the countries with state controlled economies collaboration can be hindered by the lack of transparency of governmental policies and the decision making process. In state controlled economies fewer stakeholders are involved in economic development, while the state has the main supervision role. Differently, in democratic societies and market driven economies more stakeholders participate and can influence decision making processes at all governmental levels. Collaborative practices are indispensable in these countries, for meeting the objectives of biodiversity conservation together with economic development activities that often affects nature conservation. It should be considered, however, that the decision making process in this systems tends to become more complex due to the increasing variety of socio-economic interests that needs to be considered.

The main conclusion of this research is that assessing the specific socio-economic factors that determine the environment in which the ecological networks are implemented is a necessary precondition to increase the success of its implementation. In different socio-economic contexts a combination of approaches can be applied. However, the efficiency of any approach in supporting decision making on ecological networks projects should be adapted for each socio-economic system. For most of the assessed countries the use of economic valuation tools such as Cost Benefit Analysis is a new approach. This is, however, highly recommendable in combination with the use of innovative financing mechanisms for ecological networks projects.

As the implementation of the ecological networks is a complex, long term process a more stable socio-economic and political system is important for it. In countries in transition from a state-controlled to a market economy the efforts should be on making a quicker shift from defensive to a pro-active strategy on biodiversity conservation. Based on the theoretical study and the comparative analysis we defined five guiding principles which we recommend to be considered during the decision-making on implementation of ecological networks in different socio-economic contexts:

Principle 1: Create local initiatives and charismatic leaderships. They are essential to balance between different interests and support the decision making process. The changes in attitudes and behaviour of people and a better knowledge of the ecological networks among different groups of stakeholders can significantly improve the success of the ecological network implementation.

Principle 2: Use the European or global agreements, promoting the concept of the ecological networks as an important driving force for their implementation. However they can only be implemented when considering the local values and culture influencing decision-making in each individual country.

Principle 3: Only a combined use of strategic, legal, collaborative and economic valuation approaches can ensure more explicit integration of the ecological networks objectives within the social and economic activities such as in spatial planning policies. None of the approaches are all inclusive. The use of a single approach can not ensure the consideration of all different aspects in decision making concerning the implementation of the ecological networks. A recommended combination of approaches includes:

- For countries with parliamentarian/market oriented systems the use of the legal approach in combination with the economic valuation and collaborative approaches is likely to be the most beneficial. Such a combination may strengthen the effectiveness of the ecological networks implementation by balancing between the more rigid-formalized aspects of policy making and the dynamic character of the stakeholder involvement processes.
- For countries with semi-parliamentary, transition economies or the presidential state controlled systems the use of the legal approach should not be dominant, but instead the combined use of strategic and collaborative approach should be improved and economic valuation approach should be introduced.

Principle 4: Consider the public-private relations in land use developments influencing the implementation of the ecological networks. The changes in the socio-economic trends such as in land use development and ownership significantly affect the relations between private and public actors and the local communities in the implementation of ecological networks and should be taken into account in all countries where the land restitution process has not yet been accomplished.

Principle 5: Use economic valuation tools to define the costs and benefits. In case development of ecological networks possesses real opportunity costs for competing economic activities both economic valuation approaches and financing mechanisms should be used. Evaluating the cost and benefits from implementing ecological networks can support decision-making process by

identifying and quantifying the important economic and social values for different stakeholders involved.

More knowledge is needed about the possible ways to assess the outcomes of the different approaches to ecological networks implementation. Particularly, the question remains to what degree one or the other approach can contribute to the integration of the ecological networks concept into sectoral policies, promoting economic development. It can be recommended to test and evaluate the different approaches to ecological networks implementation in specific regional and local projects realized worldwide. Identification and analysis of specific success and failure factors in each individual case can provide more knowledge about the strengths and expected benefits of the different approaches for decision making on implementing ecological networks.

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Appendix 1 Economic valuation methods in nature conservation

Costs-Benefits Analysis (CBA)
In Costs-Benefits analysis it used to express welfare from goods and services in prices and quantities. The term welfare or usefulness comes from micro-economics and is that which individuals experience through the produce of goods (tangible) and services (not tangible). Welfare can therefore be linked to both from the consumption of goods and services (further called 'goods') and to its production. Welfare from consumption is named consumer surplus and have been defined as the maximum amount which the consumer is prepared to pay for a good, reduced with the amount really paid. In an analogous manner welfare is linked to production, named producer surplus. Producer surplus has been defined thereby as the amount which the producer receives from the consumer, minus the production costs.

A part of the welfare from nature development projects however can not be expressed in this way as a market good, for instance the benefits in outdoor recreation of enjoying a beautiful landscape and the conservation of biodiversity. It is possible to estimate these items with specific appreciation methods such as the Travel Expenses Value Method (TEV), the Hedonic Prizing Method (HPM) and the Contingent Valuation Method (CVM). In appendix 1 these methods are described in more detail. Societal Costs-Benefits Analysis for making ecological network connections gives insight if the project has an added value. If the social profits are higher than the social costs, then it can be concluded that the project has a social benefit.

Cost-Effectiveness Analysis
In a Cost-Effectiveness Analysis (CEA) is based on the comparison of the effect or outcome with different plan alternatives. This allows determining which alternative has the proposed effect at the lowest cost. ('least cost method'), or which effect is feasible within a certain budget ('constant cost method'). With the help of Figure 2 it can for instance be determined which alternative plan reaches a certain objective (species) for the lowest costs.

Application of CEA leads to ordering in scenario studies. The result of a CEA does however, not provide insight in profitability of alternatives. This is the difference between CEA and CBA, because in the latter alternatives are ordered on the basis of their profitability. This allows determining if a project is profitable for society. A CBA selects projects with the highest profit for society, while a cost-effectiveness analysis is used when benefits of a project cannot be expressed in monetary values. In other words, if only the costs can be expressed in monetary values and the benefits cannot, then a CEA is an appropriate method.

The applicability of a CEA is less than that of a CBA because a CSBA includes all societal costs and benefits of a measures or a policy alternative. This makes CEA a partial instrument to be used in cases where alternatives are difficult to be made operational.

A CEA avoids difficulties in measurement as can happen in contingent valuation. Huetings' vertical curve of demand (Daly, 2002) can be explained by CEA. Hueting states that the de democratic political decision to preserve a certain area of nature includes a vertical curve of demand. The "costs" of the nature area or what people are willing to pay is determined by the curve of supply or costs (see Figure 20).

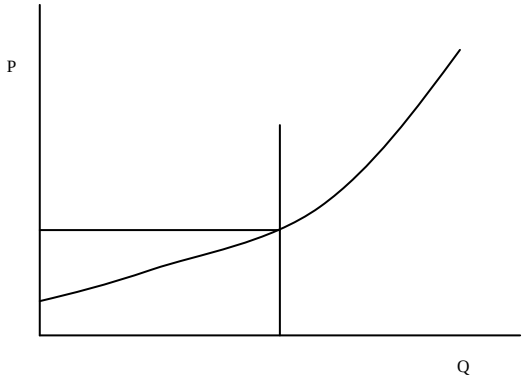

Figure. 20 Costs curve according to Hueting. Legend: P: costs of maintenance of a nature area, Q: size of the nature area

Multi Criteria Analysis
Multi Criteria Analyse (MCA) differs from CBA because not all effects are expressed in monetary values. Policy alternatives and can be judged with the help of scores on effects that are named criteria (Janssen, 1991; Ministry of Finances 1992; Janssen en Munda, 1999; Rietveld, 2002). Examples are design and realisation costs, quality of landscape, change in biodiversity, landscape management and prioritizing brook restoration based on hydrology, costs and ecology (Jongman 1990). Each criterion has a weight that expresses the importance of the criterion for the decision maker.

If weighting is done by applying a social perspective the weights reflects preferences of groups from the population for the different criteria. In practice weighting is done by policy makers. The value attached by a policy maker to a certain criterion can of course differentiate substantially from the value attached by stakeholders and interest groups. By the use of several weight values sets MCA can be useful frame for analysing conflicting objectives and arranging alternatives in a systematic manner. At CBA the conclusion on the desirability of an action is in principle based on economic arguments. This depoliticizes after careful analysis consumer preferences and producer prices. At MCA the decision-maker can influence the outcome by modifying the weights. However, the policy analysis transparency remains as in the MCA concordance of weighting is part of the procedure.

The *direct* use value of goods and services traded on the market can be easily translated into monetary terms by taking their *market price*. Goods and services of which the interaction with the market is less straightforward can be better valued by valuation tools such as the Related Goods Approach, Hedonic Pricing or the Travel Cost Method.

The *Related Goods Approach* determines the value of a non-marketed good by using the price of another good for which the non-marketed good is exchanged through the process of barter (non-monetary trade).

The basic idea behind the *Hedonic Pricing Method* is that prices of land and property illustrate the valuation of environmental quality. An example is the generally higher price of houses in natural surroundings within reachable distance of urban areas than houses in city suburbs or in remote areas. The extra price paid is a proxy for the environmental value.

Another valuation tool for obtaining a monetary direct use value is the *Travel Cost Method*. This tool estimates the value of recreational amenities by using the travel expenditure (in terms of time and money) needed to reach the recreational site. An example of the results of such a study is given Appendix 1. An increase in recreational expenses is a related effect.

Functions of nature areas from which we perceive an *indirect* use can also be valued by various tools, such as the Replacement Cost Technique and the Production Function Approach.

The *Replacement Cost Technique* generates a value for the benefits of an environmental good or service by estimating the cost of replacing the benefits with an alternative good or service. The alternative should, as nearly as possible, produce the same level of benefits supplied by the resource or environmental function being valued.

The *Production Function Approach* is a tool to capture the indirect use value of regulatory ecological functions of ecosystems and biodiversity through their contribution to economic activities.

The basic idea behind the *Hedonic Pricing Method* is that prices of land and property illustrate the valuation of environmental quality. For example, houses in natural surroundings within reachable distance of urban areas generally command much higher prices than houses in city suburbs. The extra price paid is a proxy for the environmental value. Another valuation tool for obtaining a monetary direct use value is the *Travel Cost Method*. This tool estimates the value of recreational amenities by using the travel expenditure (in terms of time and money) needed to reach the recreational site. An increase in recreational expenses is a related effect.

Functions of nature areas from which we perceive an indirect use value can also be valued by various valuation tools, such as the Replacement Cost Technique and the Production Function Approach. The *Replacement Cost Technique* generates a value for the benefits of an environmental good or service by estimating the cost of replacing the benefits with an alternative good or service. The alternative should, as nearly as possible, produce the same level of benefits supplied by the resource or environmental function being valued. The *Production Function Approach* is a tool to capture the indirect use value of regulatory ecological functions of ecosystems and biodiversity through their contribution to economic activities.

In case of non-use values, no physical interaction with an area needs to take place. These values have an impact on welfare, but the effect is not visible in terms of money fluxes. It concerns societal benefits such as the value for maintaining biodiversity in areas that are closed to visitors, like the wetland area Naardermeer in the Netherlands. Non-use values reflect the idea that flora and fauna have their own place and right to exist and that it will be here for future generations. To express such values in economic terms so-called non-market valuation methods have to be applied. In a monetary valuation of non-market values the effect is first expressed in physical units (such as change in biodiversity) and then the monetary value will be determined through the willingness to pay mechanism. The willingness to pay measurement is done through non-market valuation methods. Much used is the 'Contingent Valuation Method (CVM) in which respondents (these can be recreants or people living in the area) are being asked for their willingness to pay for instance flora and fauna. Because the intentional character of the willingness to pay questions the method is not without critics (see among others Diamond and Hausman, 1994). That does not prevent that CVM is having a full-grown position in the United States of America in the context of costs and benefits analysis of larger projects.

It must be emphasized that none of these valuation tools provides comprehensive answers. All of them value only part of the goods and services provided by nature areas. They all have limitations and should be chosen and used with care. Using several valuation tools for a single 18 object case, such as in the studies by Kramer et. al. (1995) and Beukering and Cesar (2001) could contribute to a more complete valuation. Despite these limitations, in the US the monetary appreciation of non-monetary goods has been linked with nature and environment as an officially recognised component of CBA in ex ante evaluation of public investment projects (Navrud and Pruckner, 1997). This applies under the condition that nature appreciation Directives are followed.

Defining cost and benefits of ecological networks

The first step in the economic valuation of ecological networks is to identify their potential effects. An effect is defined as the difference in development between the situation of taking measures to reduce adverse ecological effects, and the situation that these measures would not have been taken (i.e. the autonomous development). In general such an effect is relevant if it changes the quantity or quality of a good or service that is valued by the users (after Hanley, 2000). If that principle is fulfilled then there is a welfare effect and this effect has to be included in an economic analysis. If this is not fulfilled then the effect is not further considered. In this study we only include effects for which it can be expected that they will significantly contribute to an economic analysis. For the analysis of the effects a description is needed of the autonomous development as well as that of the plan scenario. This means that effects can only be identified when the autonomous development as well as the plan scenario has been described. Table 12 gives an overview of effects evaluation methods that can be used for ecological network projects.

Table 12 Effects typical for ecological network projects.

Effects		**Valuation method**
Ecological	Barrier effect	Avoidance costs
	Disturbance effect	
	Mortality effect	
	Artificial lightning	
	Habitat effect	Restoration costs
Environmental	Effect on natural processes	Contingent valuation
	Air contamination	
	Effects from construction, maintenance and use of the road	
Recreation	Effects on number of visitors and recreational spending	Travel cost method and market valuation, respectively
Human health	Contamination	Hedonic pricing method
	Risk for drivers	Avoidance costs
	Noise disturbance to humans	

The next step is to value these effects in economic terms. Effects that reduce welfare for an actor are called costs and positive effects on welfare are called benefits. Within the context of societal costs and benefits analysis it is common to make the earlier mentioned distinction between effects that are expressed on the market and other effects.

The use of the methods in Table 12 for a case study can be illustrated through infrastructural plans affecting ecological networks. For that situation the effects concerned are adverse effects and thus they all implied social costs. The ecological effects concern all non-use values which are not normally being revealed by the market. For that particular case study, the valuation of ecological effects was, due to the available of data, based on the Preventive expenditure methods, Avoidance costs and Restoration costs (see Bos et al, 2007).

The Travel Cost Method
Menkhaus and Lober (1996) used the Travel Cost Method to estimate the value that US eco-tourists assign to Monteverde Cloud Reserve in Costa Rica. They arrived at a total annual US ecotourism value of USD 4.5 million. Values such as this can be used to calculate revised (higher) entrance charges that more adequately reflect the ecotourism benefit for the area. This study arrived at an average entrance charge of USD 40, which is considerably higher than the USD 5- 10 usually charged at national parks in Costa Rica.

The Production Function Approach
Kramer et al (1995) used the Production Function Approach in combination with other valuation methods to estimate the value of a national park currently being established in Madagascar. The establishment of this park benefits farmers in terms of reduced crop losses as a result of reduced flooding, due to the fact that deforestation in the park is prohibited. Deforestation rates in the Mantadia area were first estimated by using remote sensing data. Future deforestation rates were projected on the basis of the historical analysis. These land use changes were used to project effects on flooding. Finally, the predicted reductions in flooding brought about by the park and buffer zone were used to predict reduced crop losses; these were estimated and valued in economic terms.

Applications of the Contingent Valuation Method
Hadker's study (1997) estimates Bombay residents' willingness to pay for the maintenance of Borivli National Park, which is located within the city limits of Bombay. The study arrives at a Willingness-to- Pay of 7.5 rupees per month per household. This amounts to a total present value of USD 31.6 million. This figure could be used to influence policy decisions, given that the National Park currently runs on a budget of USD 520,200. Another interesting finding for policy-makers was that businessmen are willing to pay significantly more than other professionals, as it is this group who may be able to finance environmental improvements.

Appendix 2 Theoretical analysis of first and second order economic conditions for ecological projects

First order economic condition: Net social benefits are positive

An economy consists of goods and services, agents that produce these goods and services (referred to as producers), and agents that consume these goods and services (referred to as consumers). We assume rational behaviour. In other words, we assume a producer whose behaviour is solely based on profit maximization and a consumer whose behaviour is solely based on maximizing its own utility. In case a transaction takes place, a consumer pays $x_i \times P_{Xi}$ to the producer of good X_i ($i \in \{1, \ldots, n\}$), when consuming (x_i units) of good X_i with price P.

Whether or not an individual is willing to consume a good or service, depends on the consumer surplus (CS_c) he will derive from it. Consumer surplus is defined as the difference between the amount that individual c ($c \in \{1, \ldots, C\}$) is willing to pay for x_i units of the good X_i, and the amount of money the individual actually pays for these x_i units (price P). Only if this consumer surplus is positive, an individual will consume the good.

Whether or not a producer is willing to invest in a project depends on the net return he is expecting from it. Only if this net return is positive, a producer will invest. This net return is also referred to as producer surplus, PS_{ps}, which is defined as the amount of money that producer ps ($ps \in \{1, \ldots, PS\}$) receives from a consumer, minus the costs he has made to produce the good. According to welfare economic theory an investment project should be undertaken if total net social benefits (consumer surplus plus producer surplus) are positive. Assuming that ecological network projects induce various goods and services, the associated total net social benefits can be expressed as follows:

$$\sum_{ps=1}^{PS} PS_{ps} + \sum_{c=1}^{C} CS_c = CBA_{tot}$$

When CBA_{tot} is positive, the concerned plan scenario should be implemented as it induces a welfare increment for society. However, positive net social returns are not a sufficient economic condition for the implementation of a project. A second economic condition is financing. Assuming CBA_{tot} to be positive, financing might be a problem when either 1) Aggregate net financial returns are negative or 2) Aggregate net financial returns are positive, but for investing agents individually negative.

Second order economic condition: financing

Categorizing natures' benefits

The two referred situations where there is a financing problem are typical for nature development projects. Therefore, some basic insight in nature's benefits is inevitable. Nature is not a single homogenous good but is composed of several goods and services we derive benefits from. In this subsection we will briefly categorize nature's

main goods and services, and point out for which of these well-functioning markets exists and for which of these this is not the case.

First, there is the distinction between goods that are associated with (direct) use and goods where this is not the case. An individual is said to derive use-benefits from nature when he physically interacts with a nature area. Examples are the production of fish, timber and reed. Another example is the supply of clean water. As this benefit is based on a function of nature (nature's water cleansing function), this type of use benefit is also referred to as indirect use. For use-benefits, markets do exist, for instance the market for timber and fresh (drink) water.

In the case of non-use-benefits, no interaction with the nature area takes place. This applies for example the knowledge that biodiversity is conserved for the possibility of future use (option benefits) or for future generations (bequest benefits). Another example of non-use is the satisfaction that individuals experience from just knowing that species exist, without any physical interaction now or in the future (existence benefits): see also Van der Heide et. al. (2006). Non-use- benefits are not revealed on a market and are therefore referred to as 'non-market goods.

Appendix 3 Example of socio-economic factors influencing the ecological network development along Bug River

The Bug River Basin is located within different administrative regions in Belarus, Ukraine and Poland and is influenced by the socio-economic development of these specific regions. In Poland within the Bug River Basin area there is arable land which provides the main economic income of the neighbouring towns and villages (Dorohusk, Husynne, Uchanki and Dubienka). During the last decades the migration of young people from these villages to the Warsaw region has increased which caused abandonment of the land and decrease in the low income agricultural practices. The other two important socio-economic trends are the afforestation of arable land supported by the financial mechanisms under CAP and the recreation in the towns of Koden and Starosiel. The increase in tourism investments in these areas results to uncontrolled construction of summer houses and infrastructure, which is related to the transformation of the agricultural land to recreational lad use. The tourism activities are mostly taking place in the summer reason and are limited to: canoeing, hiking, bicycling and recreational fishing.

The Ukrainian part of the Bug River Basin is located in the region of Lviv and Volyn. The main socio-economic activities in these two regions are industry, agriculture, forestry and tourism. In Lviv the industry and agriculture are developed, while in Volyn region important sector is tourism related to the Shatsk Lakes. The Lakes are visited by more than 130 000 people per year. During the last decade there is a decrease in the economy of the region due to migration of the population abroad. Reduction of industry and agriculture led to reduction of pollution. However, forestry has been intensified and local forests suffer from over cutting.

Currently, there is a consideration to establish trans-boundary passages between Domachevo-Slovatyche (Belarus-Poland) and Tomasovka-Pulemets (Belarus-Ukraine). This idea became one of the accelerating factors for the Brest regional economic development. Moreover, the Belarusian and Polish governments are currently negotiating on the possible establishment of a Tomashovka-Vlodava (Belarus-Poland) trans-border passage. The development of the Bug river ecological network within the current socio-economic trends raises the awareness for developing more sustainable trans-boundary regions between the tree countries.