BACKGROUND DOCUMENT ON ECOLOGICAL NETWORKS

Development of the National Ecological Network in FYR Macedonia (MAK-NEN)
Background document on ecological networks

Project: Development of the National Ecological Network in FYR Macedonia (MAK-NEN)

Skopje, 2009
# Table of contents

Abbreviations .......................................................................................................................... 7
Summary....................................................................................................................................... 8
1. Introduction............................................................................................................................... 9
   1.1 Status of biodiversity in Macedonia .................................................................................. 9
   1.2 Brown bear in the MAK-NEN project .............................................................................. 11
   1.3 Background document ...................................................................................................... 12
2. Ecological networks ............................................................................................................... 13
   2.1 About the concept ............................................................................................................. 13
   2.2 History .............................................................................................................................. 16
   2.3 Existing networks ............................................................................................................. 19
       2.3.1 Pan-European Ecological Network (PEEN) ............................................................... 19
       2.3.2 Emerald Network ....................................................................................................... 21
       2.3.3 Natura 2000 Network .............................................................................................. 21
3. Legal framework for implementation of the PEEN .............................................................. 23
   3.1 Global legal instruments ................................................................................................. 23
       3.1.1 Convention on Biological Diversity (CBD) ............................................................... 23
       3.1.2 Ramsar Convention on Wetlands ............................................................................. 23
       3.1.3 Bonn Convention .................................................................................................... 24
   3.2 European framework ........................................................................................................ 24
       3.2.1 The Bern Convention ............................................................................................. 24
       3.2.2 European Landscape Convention ........................................................................... 25
       3.2.3 EU Birds and Habitats Directives .......................................................................... 25
       3.2.4 Water Framework Directive (WFD) ........................................................................ 27
   3.3 Other related programmes ............................................................................................... 27
   3.4 Networks of protected areas at national level .................................................................. 28
   3.5 Spatial planning and ecological networks ....................................................................... 28
4. National legal framework and strategic documents ............................................................... 30
   4.1 National legal framework ............................................................................................... 30
       4.1.1 Law on Environment ............................................................................................... 30
       4.1.2 Law on Nature Protection ....................................................................................... 30
       4.1.3 Law on Forests ....................................................................................................... 31
       4.1.4 Law on Hunting ..................................................................................................... 31
       4.1.5 Law on Pastures ..................................................................................................... 31
       4.1.6 Law on Agriculture and Rural Development ........................................................... 32
       4.1.7 Law on Agricultural Land ....................................................................................... 32
   4.2 National strategic documents ......................................................................................... 32
       4.2.1 Spatial Plan of FYR Macedonia (2002–2020) ........................................................... 32
       4.2.2 National Biodiversity Strategy and Action Plan of FYR Macedonia ......................... 33
       4.2.3 Second National Environmental Action Plan (NEAP2) ............................................. 34
       4.2.4 Agriculture and Rural Development Strategy .......................................................... 34
5. Current progress of the work on ecological networks in Macedonia .................................... 36
   5.1 Indicative map of the PEEN in South-East European countries ....................................... 36
   5.2 Development of the Emerald Network in FYR Macedonia ............................................ 37
   5.3 National protected areas system ..................................................................................... 38
   5.4 Other initiatives .............................................................................................................. 41
       5.4.1 Important Bird Areas (IBAs) .................................................................................... 41
       5.4.2 Important Plant Areas (IPAs) .................................................................................. 44
       5.4.3 Prime Butterfly Areas (PBAs) ................................................................................ 45
       5.4.4 Balkan Green Belt ................................................................................................... 47
   5.5 Work ahead - national aspects of Natura 2000 ................................................................. 49
6. Development of National Ecological Network (MAK-NEN) ............................................... 52
   6.1 Goals .................................................................................................................................. 52
   6.2 Activities ............................................................................................................................ 52
   6.3 Key stakeholders and target groups .................................................................................. 52
   6.4 Project partners ................................................................................................................ 53
List of figures

Figure 1: The ecological network model
Figure 2: Multifunctional landscape
Figure 3: National Ecological Network in the Netherlands
Figure 4: Territorial System of Ecological Stability (TSES) of the Czech Republic
Figure 5: Indicative map of the PEEN in Central and Eastern Europe
Figure 6: Sites designated under the Birds Directive (blue), sites designated under the Habitats Directive (orange) and sites designated under the Birds and Habitats Directives (Natura 2000 sites) (green) in the Netherlands
Figure 7: Indicative map of the PEEN in South-East European countries
Figure 8: National Emerald Network
Figure 9: National protected and planned areas
Figure 10: Map of Macedonian IBA sites – the first proposal in 1989
Figure 11: Map of Macedonian IBA sites – the new proposal of 2008. (Source: MES, 2008)
Figure 12: Map of IPA sites in Macedonia
Figure 13: Prime Butterfly Areas in Macedonia
Figure 14: European Green Belt
Figure 15: Green Belt in Macedonia

List of tables

Table 1: The climate-vegetation-soil zones of Macedonia
Table 2: Correspondence of Macedonian Protected Areas Management Categories to those of IUCN (1994)
Table 3: The first proposal of Macedonian IBA sites
Table 4: The new proposal for Macedonian IBA sites
Table 5: Identified priority areas in the framework of the Green Belt
Table 6: Implementation and enforcement actions required for Habitats and Birds Directives
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AEWA</td>
<td>Agreement on the Conservation of African-Eurasian Migratory Waterbirds</td>
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<td>ASCI</td>
<td>Area of Special Conservation Interest</td>
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<td>BSAP</td>
<td>Biodiversity Strategy and Action Plan</td>
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<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<td>CEMAT</td>
<td>Conference of Ministers Responsible for Regional Planning</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EN</td>
<td>Ecological Network</td>
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<td>ESDP</td>
<td>European Spatial Development Perspective</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>IBA</td>
<td>Important Bird Area</td>
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<td>IPA</td>
<td>Important Plant Area</td>
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<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
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<td>MOEPP</td>
<td>Ministry of Environment and Physical Planning</td>
</tr>
<tr>
<td>MAFWE</td>
<td>Ministry of Agriculture, Forestry and Water Economy, FYR Macedonia</td>
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<tr>
<td>MAK-NEN</td>
<td>National Ecological Network in FYR Macedonia</td>
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<tr>
<td>MOEPP</td>
<td>Ministry of Environment and Physical Planning, FYR Macedonia</td>
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<tr>
<td>NEAP</td>
<td>National Environmental Action Plan</td>
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<td>NEN</td>
<td>National Ecological Network</td>
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<td>NGO</td>
<td>Non-governmental organization</td>
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<td>NPAA</td>
<td>National Programme for Adoption of the Acquis Communautaire</td>
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<td>NSS</td>
<td>National Spatial Strategy</td>
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<td>PA</td>
<td>Protected Area</td>
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<tr>
<td>PBA</td>
<td>Prime Butterfly Area</td>
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<td>PEBLDS</td>
<td>Pan-European Biological and Landscape Diversity Strategy</td>
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<tr>
<td>PEEN</td>
<td>Pan-European Ecological Network</td>
</tr>
<tr>
<td>REN</td>
<td>Italian National Ecological Network</td>
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<tr>
<td>SAC</td>
<td>Special Area of Conservation</td>
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<tr>
<td>SAS</td>
<td>Sector Approximation Strategy</td>
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<tr>
<td>SEA</td>
<td>Strategic Environmental Assessment</td>
</tr>
<tr>
<td>SEE</td>
<td>South-East Europe</td>
</tr>
<tr>
<td>SPA</td>
<td>Special Protection Area</td>
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<tr>
<td>TSES</td>
<td>Territorial System of Ecological Stability</td>
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<tr>
<td>UNCED</td>
<td>United Nations Conference on Environment and Development</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VROM</td>
<td>Netherlands Ministry of Housing, Spatial Planning and the Environment</td>
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<td>WFD</td>
<td>Water Framework Directive</td>
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Summary

The main objective of this project is to develop a National Ecological Network (NEN) in FYR Macedonia. In doing so it will contribute to the development of the Pan-European Ecological Network (PEEN), the emphasis of which is now moving from the level of international policy and mapping to a focus on national, regional and local mapping and practical delivery. This project will also assist FYR Macedonia in fulfilling its obligations as a signatory country of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS).

Building up a coherent ecological network of core areas, corridors, buffer zones and nature development areas is seen as one of the most effective measures for the protection of species and habitats and the sustainable use of nature and biodiversity, as well as providing an effective tool for mitigating (and adapting to) the effects of climate change. The implementation of this project will therefore represent a significant contribution to the fulfilment of the main goal of the National Biodiversity Strategy and Action Plan.

It is anticipated that the definition of a National Ecological Network for Macedonia, in combination with the stakeholder involvement processes that will accompany it, will therefore have far-reaching effects. It could serve as a cornerstone in the process of implementing the European Union's standards in nature conservation, especially in the future process of establishing the Natura 2000 Network, which will be a requirement for FYR Macedonia on its way to joining the EU. In addition, the spatial nature of the ecological network approach, and the fact that it is based on the production of maps, provides an obvious and easily understandable platform for the involvement of other sectors (such as agriculture, planning, transport, energy, business and industry) in decisions about the use and management of land that can avoid impacts on biodiversity, ecosystem services and the wider environment.

Indeed, in order to ensure the success of the project the active involvement of all relevant stakeholders will be encouraged, there will be a nationwide awareness-raising campaign promoting the ideas of nature conservation, ecological networks and sustainable development. The project will be based on sound scientific principles and on the experiences from other countries, including examples of best practice.

The large carnivore issue (Brown bear, Lynx and Wolf) will be addressed through defining ecological corridors which are particularly important for them, and selecting them for further research and study. This approach will also include the consideration of socio-economic factors and will provide a further opportunity for promoting the project among stakeholders and for taking a cross-sectoral approach.

This report therefore begins with a consideration of the status of biodiversity in Macedonia, a consideration of the Brown bear in particular and a thorough introduction to the concept, history and legislative framework surrounding the development and implementation of ecological networks in Europe. There is also a detailed elaboration of the legislation surrounding protected areas designation in Europe, which was considered of specific relevance in the context of this study in relation to the future establishment of the Natura 2000 Network in FYR Macedonia, and the role that protected areas can play in providing a basis for the development of a wider ecological network. All of this is set within a summary of the national legal framework and strategic documents within the country, concluding with a review of current progress of the work on ecological networks that has taken place to date in FYR Macedonia. In the final section there is a brief summary of this project.

It is expected that the realization and implementation of MAK-NEN will provide a decisive instrument to achieve effective consideration of the extraordinary and rich biodiversity in Macedonia in key decisions about land management and land use, and preserve it as a vital resource for future generations to utilize and enjoy.
1. Introduction

The main objective of this project is to develop a National Ecological Network in the Former Yugoslav Republic of Macedonia (MAK-NEN) as part of the Pan-European Ecological Network (PEEN). This is an obligation of FYR Macedonia as a signatory country of the Pan-European Biological and Landscape Strategy (PEBLS) since 2 December 1997. Furthermore, building up a coherent ecological network of core areas, corridors, buffer zones and nature development areas is seen as one of the most effective measures for the protection of species and habitats and for the sustainable use of nature and biodiversity, as well as an effective tool for mitigation of the effects of climate change. The implementation of this project will represent a significant contribution to the fulfilment of the main goal of the National Biodiversity Strategy and Action Plan (BSAP).

The definition of a National Ecological Network for FYR Macedonia, in combination with the stakeholder involvement processes that will accompany it, will have far-reaching effects. It could serve as a cornerstone in the process of implementing the European Union (EU) standards in nature conservation, especially in the future process of establishing the Natura 2000 Network which awaits FYR Macedonia on its way to joining the EU. The project will be based on sound scientific principles, on experiences from other countries and best practice examples.

To make this process successful the project will encourage involvement of all the relevant stakeholders and include awareness raising through a nationwide campaign promoting the ideas of nature conservation, ecological networks and sustainable development.

The large carnivore issue (Brown bear, lynx and wolf) will be addressed through defining, and selecting for study, ecological corridors which are particularly important for them. Special focus will be given to the Brown bear. The ‘Bear Corridor Management Plan’ should therefore be agreed upon and used as a vehicle for better understanding of the bear’s ecological functions, connectivity of the habitats and ecological networks concept in general.

It is expected that realization and implementation of MAK-NEN will be a decisive instrument in achieving the effective conservation of the extraordinary and rich biodiversity of Macedonia.

1.1 Status of biodiversity in Macedonia

In spite of the relatively high degradation of nature (biodiversity) in Europe, FYR Macedonia still retains a wealth of wildlife and a variety of natural and semi-natural habitats in their pristine state.

According to the regional climate, distribution of soils and vegetation, there are eight climate-vegetation-soil zones in FYR Macedonia (Filipovski et al., 1996).

<table>
<thead>
<tr>
<th>Zone</th>
<th>Dominant associations/habits</th>
<th>Altitudinal distribution (m)</th>
<th>Area (ha)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submediterranean (modified</td>
<td>Coccifero carpinetum-orientalis (forests of Oriental hornbeam and Kermes oak)</td>
<td>50–500</td>
<td>897,000</td>
<td>34.9</td>
</tr>
<tr>
<td>Mediterranean) region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continental-submediterranean</td>
<td>Querco-Carpinetum orientalis (forests of Oriental hornbeam and White oak)</td>
<td>Up to 600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warm continental region</td>
<td>Quercetum frainetto-cerris (forests of Italian and Turkey oak)</td>
<td>600–900</td>
<td>740,000</td>
<td>27.4</td>
</tr>
<tr>
<td>Cold continental region</td>
<td>Orno-Quercetum petraeae (forests of Sessile oak)</td>
<td>900–1,100</td>
<td>342,000</td>
<td>13.3</td>
</tr>
<tr>
<td>Piedmont-continental-mountain</td>
<td>Festuco heterophyllae-Fagetum (submontane European beech forests)</td>
<td>1,100–1,300</td>
<td>250,000</td>
<td>9.7</td>
</tr>
<tr>
<td>region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mountain-continental region</td>
<td>Calamintho grandiflorae-Fagetum</td>
<td>1,300–1,500</td>
<td>269,000</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Table 1. The climate-vegetation-soil zones of Macedonia.
These zones represent the diversity of biomes in Macedonia: from the pseudomaquis in the lowest region to arctic tundra-like habitats on the highest parts of the mountains.

The total surface area of forests in FYR Macedonia is 947,653 ha or 36.85% of total land area (state-owned forests account for 90.14% and private forests for 9.86%).

![Subalpine beech forests on the Mountain Jablanica](image)

Although research on biodiversity is far from complete, the diversity of habitats, plant associations and species is impressive. FYR Macedonia is among the richest European countries in terms of its biological diversity. Vegetation is represented by 260 plant associations; there are more than 3,200 species of higher plants, with 114 Macedonian endemics; about 10,000 animal species are known so far, with almost 700 Macedonian endemics. Macedonian flora, fungi and fauna contain more than 100 species of global or European importance (MOEPP, 2003).

However, the global, regional and national processes that cause biodiversity losses do not exclude FYR Macedonia. Pressures on biodiversity are rising and the number of species which are threatened and in danger of extinction and the habitats suffering from some form of degradation are increasing every day. According to the Ministry of Environment and Physical Planning (MOEPP, 2003) there are 113 endangered vertebrate species and 392 endangered plant species (algae, fungi, lichens and vascular plants) in Macedonia.

The threats to biodiversity and nature in general can be defined as:
• Habitat loss, modification and fragmentation (conversion of natural habitats, especially wetlands, construction of reservoirs, inadequate planning for the expansion of human settlements, construction of roads and highways as well as power lines).
• Overuse of biological resources (overgrazing in some smaller areas, overhunting and overfishing, trade in wild plants, fungi and animals, severe water extraction and inadequately determined ecological minimum).
• Pollution, introduced and invasive species, natural pathogens, natural disasters, etc.
• Climate change (severe changes are expected).
• Knock-on effects (chain of extinction) and other factors (low implementation of national legislation, low public awareness, low institutional capacities, inadequate implementation of spatial planning documents, erosion, lack of knowledge about different aspects of biodiversity, inadequate or lack of monitoring systems).

The worst situation comes from a very low level of implementation of spatial planning documents (national and local), which are additionally inappropriate, at least in the sense of nature conservation. Planning and construction of the road infrastructure (construction of new and upgrading of existing roads) is performed without considering the needs of species movement and migrations. New concessions for exploitation of mineral resources or other types of uses are given without consulting the existing national or international documents for nature conservation. Thus, fragmentation of habitats is the greatest threat to maintaining the favourable status of biodiversity components. Large carnivores are the most threatened group due to their high needs with regard to habitat quality and area.

1.2 Brown bear in the MAK-NEN project

The Brown bear (Ursus arctos) lives in the forested mountainous areas since being pushed by humans from the lowland forests, floodplains and meadows. The individual territory of the Brown bear in the Balkans ranges from 60 to 300 km², with average daily movement of 1.6 km (10 km maximum). It is distributed in western and central Macedonia with occasional presence in eastern parts. The total population size in the country amounts to 200 individuals. However, there are no exact data for the population trend in the last decade, but it seems to be stable.
The great individual territory and mobility, feeding habits, low human–bear conflict rate, positive human attitude towards the bears and the connection of bears with human activities make this animal suitable for assessing the functionality of ecological networks. The MAK-NEN project puts great focus on the status of the Brown bear in the Republic of Macedonia in order to identify ecological corridors and to define the ecological network itself. It is used as a flagship species of the ecosystems and a model animal of the ecological network with the aim of presenting the need for unrestrained animal movement, the potential for solution of conflicts in nature and ways to integrate ecological networks into sectoral policies and programmes (spatial planning, traffic, energy, etc.).

The Brown bear is a strictly protected species in Macedonia under the Law on Hunting (2008).

### 1.3 Background document

This document presents the need and the grounds for the establishment of an ecological network(s). It is structured as follows:

- Chapter 2 deals with the basic scientific concept of ecological networks.
- Chapters 3 and 4 explain the international and national legal and policy instruments that regulate or impose the establishment of ecological networks on a global, European or national scale.
- Chapter 5 describes the current situation in FYR Macedonia, including current progress of the work on the Ecological Network (EN) in Macedonia (first attempts for the establishment of ecological network - indicative map of PEEN, Emerald Network, national protected areas, designated sites such as IBA, IPA, PBA) and work to be done for the establishment of Natura 2000.
- Chapter 6 presents an overview of the current project.
2. Ecological networks

2.1 About the concept

Ecosystems in Europe have been considerably fragmented by various forms of land use, including agriculture. Natural areas – whether protected or not – are very often made up of fragments representing isolated islands, of varying size, in the midst of intensive agriculture, built development or transport and energy infrastructure. The ecological network model has therefore been developed over the past 35 years with the goal of conserving biodiversity by maintaining and strengthening the integrity of ecological and environmental processes; and to counter the above effects by linking fragmented ecosystems with each other in order to promote exchange between populations of species and to enable the migration and spread of species. As a conservation approach, ecological networks are characterized by two generic objectives, namely (1) maintaining the functioning of ecosystems as a means of facilitating the conservation of species and habitats, and (2) promoting the sustainable use of natural resources in order to reduce the impacts of human activities on biodiversity and/or to increase the biodiversity value of man-managed landscapes (Bennett & Wit, 2001).

In applying this approach, ecological networks share five common features (Bennett & Mulongoy, 2006):

- a focus on conserving biodiversity at the landscape or ecosystem scale;
- an emphasis on maintaining or strengthening ecological coherence, primarily through providing for connectivity;
- ensuring that critical areas are buffered from the effects of potentially damaging external activities;
- restoring where appropriate degraded ecosystems;
- promoting the sustainable use of natural resources in areas of importance to biodiversity conservation.

All ecological networks share common conservation objectives and operational features, as well as a characteristic spatial architecture. This architecture is a derivation of spatial relationships and processes that are key to biodiversity conservation, particularly the distribution of local species populations, arrangement of habitats, geographical processes and human activities. Specific functions are allocated to different areas depending on their respective ecological value and natural-resource potential (Bennett, 2004). These functions are reflected in a coherent system of ecological network elements (Figure 1):

- **Core areas**, where the conservation of biodiversity takes primary importance, even if the area is not legally protected. The primary objective of core areas is to ensure the conservation of a representative array of characteristic habitats and species populations.

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1 Note: Parts of this section are drawn from or based on the reports by Bennett (2008a and 2008b). These are therefore not repeatedly referenced in the text; however, full references are given at the end of this document.
**Corridors**, which serve to conserve vital ecological or environmental interactions by maintaining connectivity between the core areas where necessary. These linkages may be of three broad kinds:

- *linear corridors* in the form of landscape elements such as hedges, shelterbelts, woods and rivers or infrastructure such as tunnels and ecoducts that allow species to traverse an obstacle;
- *'stepping stones’*, that is, an array of small patches of habitat that individuals use during movement for shelter, feeding, resting and other ecological functions;
- *landscape corridors* are various forms of interlinked landscape matrices, usually in the form of extensively managed landscapes, that retain sufficient natural elements to allow individuals to survive during movement between habitat patches (Figure 2).
• **Buffer zones**, which insulate areas where biodiversity conservation is the primary objective from potentially damaging external influences, and particularly those caused by inappropriate forms of land use. This function therefore permits in principle a range of sustainable human activities.

• **Restoration areas** are those where the degraded functions of an ecosystem can be restored, especially in cases where habitat fragmentation disables normal functioning of ecosystems or endangers the local populations. These areas are important because they can improve ecologic connectivity and functionality of the system. This concept includes development or redevelopment of biodiversity values.

• **Sustainable use areas**, which may surround the network and where opportunities are exploited within the landscape mosaic for the sustainable use of natural resources together with the maintenance of most ecosystem services.

The ecological network model can be applied at various scales. Many ecological networks encompass a geographical region, such as a watershed, a mountain range or a biome, e.g. temperate broad-leaf forest. On the other hand, if it is a part of government policy or planning, it can be national, regional (e.g. county or province), or even transboundary between neighbouring countries. Thus, at present it is possible to find examples of the ecological network model being used as a strategic approach to biodiversity conservation at the supra-continental scale, such as the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) for the pan-European level, all the way down to detailed conservation plans at the local (e.g. municipal) level.

Instead of aiming to conserve an entire ecosystem or community, some ecological networks give primary emphasis to the conservation of a single flagship species or a group of threatened species. Examples include the Italian National Ecological Network (REN) (Boitani et al., 2003) that focuses on vertebrate species, the various flyway programmes for migratory bird species (Boere & Rubec, 2002) and the Bonn Convention agreements and memoranda of understanding on the conservation of threatened migratory species such as European bats and the Slender-billed curlew (Bennett, 2003). However, it is still appropriate to class these
programmes as ecological networks since they apply the same basic conservation principles and aim to conserve the habitat, ecological communities and environmental conditions on which the respective species populations depend.

Most of the ecological network programmes in Europe are being developed and implemented primarily through government programmes, whether international, national or regional. Only a relatively small number are driven by non-governmental organizations (NGOs). In some other regions, particularly North and South America, by far the majority of the ecological network programmes are NGO initiatives. An important distinction between the two classes of programmes is the types of instrument that are applied to implement each kind of programme. Government programmes invariably rely to an important extent for their realization on policy instruments such as legislation, spatial planning and economic incentives (sometimes even including land purchase). Instruments such as stakeholder involvement, awareness raising and private action, while important in securing broader support for the programmes, often do not play the primary role in implementing ecological networks on the ground. NGOs, by contrast, cannot exercise the legislative and budgetary power that is available to governments and are therefore forced to rely primarily on citizen support, stakeholder processes and private action. However, most NGO-driven ecological network programmes aim to secure new government biodiversity-conservation policies.

2.2 History

Although ecological networks share a common architecture, their development has been characterized by a process analogous to convergent evolution. Two broad evolutionary paths can be distinguished. In Central and Eastern Europe, several national ecological network programmes were developed using the polarized-landscape theory of the Russian geographer Boris Rodoman (Rodoman, 1974). His ‘eco-stabilizing’ approach infers that the landscape should be zoned in such a way that intensively used areas are balanced by natural zones that function as a coherent, self-regulating whole. The resulting programmes not only developed the first ecological networks but also integrated biodiversity conservation into broad environmental management plans, approximating to what would now be described as national sustainable-development strategies.

The first initiative to establish what is now recognized as an ecological network was the Estonian Network of Ecologically Compensating Areas (Külvick, 2002). This programme originated as a concept in the mid-1970s and was elaborated into a national proposal in 1983. Following this initiative, several other countries in the region developed similar proposals, most notably Lithuania and former Czechoslovakia. All these programmes were characterized by an integrated approach to land-use zoning and environmental management within a national development-planning system.

In contrast to Central and Eastern Europe, the stimulus that led to the ecological network model in most other regions came primarily from developments in ecological theory, in particular MacArthur and Wilson’s equilibrium theory of island biogeography and meta-population theory (MacArthur & Wilson, 1967; Gilpin & Hanski, 1991). The most important insight that followed from these theories was that habitat fragmentation increases the vulnerability of species populations by reducing the area of habitat available to local populations and limiting the opportunities for dispersal, migration and genetic exchange.

The realization that island biogeography and the concept of meta-populations offered important lessons for biodiversity conservation was given practical form in the mid-1970s when Jared Diamond and others proposed general rules for the configuration of nature reserves (Diamond, 1975). In simple terms, these rules stated that nature reserves should be as large as possible, as round as possible (in order to reduce damaging edge effects), as close as possible to each other, and as far as possible connected with each other. The impact of these rules was increased when the principles were included in IUCN’s World Conservation Strategy (IUCN, 1980).
Following these developments, interest grew in Western Europe, North America, Latin America, Australia and Asia in developing conservation approaches that promoted ecological coherence at the landscape scale. In Western Europe the concept of wildlife corridors was introduced into regional planning in Denmark, and in 1990 the Dutch Government adopted a plan for a National Ecological Network (NEN). These programmes led in turn to the endorsement in 1995 by over 50 countries of the Pan-European Biological and Landscape Diversity Strategy, which included a commitment to establish the Pan-European Ecological Network (PEEN) (Bonnin et al., 2007).

So far, several countries in Europe have developed and implemented a NEN, and even though they share a common name and follow a similar general spatial structure, there are significant differences in their design as well as in the legal framework supporting it.

In the Netherlands the main policy concerning ecological networks is the National Spatial Strategy, NSS (VROM, 2004) and the corresponding Spatial Planning Act (VROM, 2008). Since this strategy has a legal status and its execution is compulsory, it can be considered a law rather than a policy. In the Czech Republic the main legal instrument for ecological network development and implementation (Territorial System of Ecological Stability – TSES) is the Act on the Protection of Nature and the Landscape (114/92 Gazette), while for spatial planning TSES is one of the legally binding components which should be taken into account during any spatial planning process.

In the Netherlands the NEN (Figure 3) is a spatially coherent network of existing and newly created nature areas that is being developed and is planned to be ready by 2018 (Hootsmans & Kampf, 2005). It should help to sustainably preserve, restore and develop ecosystems of national and international importance. It mainly addresses the ongoing process of fragmentation and loss of quality of nature. This is achieved by increasing the area of the NEN and of the individual natural areas, restoring their environmental quality and increasing the coherence of the network by creating connections. The NEN is composed of a coherent network of core areas, ecological development areas, management areas, connection zones and buffer zones.
In the Czech Republic, due to the conservation status of nature and landscape, the TSES covers mainly semi-natural habitats at various levels: local, regional and national (Figure 4). The concept also highlights habitat and ecosystem restoration and adaptive ecosystem management. Additionally, it includes habitats which are not extraordinary from a point of view of nature conservation (extraordinary nature conservation value), but would play a crucial role in supporting dispersal or migration of wildlife species or maintaining life-supporting ecosystem functions. Basically, the methodology consists of identification of the eco-stabilizing function of both natural and secondary landscape structures and their integration into the existing landscape elements from the ecological stability point of view (Löw et al., 1995).
2.3 Existing networks

In Europe, the ecological network model has been under development as a practical conservation tool since the 1980s (see previous section for details). Since that time, a range of programmes and proposals have been initiated, some of them have been implemented, and a valuable body of experience and knowledge has been accumulated.

In 1995, the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) was endorsed as a pan-European response to support the implementation of the Convention on Biological Diversity (CBD). At the same time, PEBLDS introduces a coordinating and unifying framework for strengthening and building on the wide range of existing initiatives related to the conservation of biological and landscape diversity. A key tool for implementation of the PEBLDS is the Pan-European Ecological Network (PEEN).

2.3.1 Pan-European Ecological Network (PEEN)

The PEEN is based on ecological principles, but at the same time allowing human influence and sustainable landscape use. The concept offers a dynamic framework for integrating the policies of several sectors (land-use planning, agriculture, forestry, rural development, transport, fisheries and tourism) into the nature conservation and management approach. It will build upon and benefit from existing agreements, programmes and initiatives in the field of nature conservation. The 'backbone' of the PEEN consists of Natura 2000 and Emerald Network sites, as well as sites designated through the policies and programmes of national and regional authorities.

Ideally, the core areas of the PEEN will contain important representative examples of the characteristic European natural and semi-natural habitat types across their natural range and
at different stages of ecological succession. Also, viable populations of species of European importance, together with natural environmental processes on which these habitats and species depend, as well as landscapes of European importance are included.

Thus, the goal of the PEEN is to ensure a favourable conservation status of the ecosystems, habitats, species and landscapes of European importance. Achieving this goal does not necessarily imply that all human activities must be excluded from the PEEN. Indeed, in some cases the continuation of certain forms of land use will contribute to the conservation of biological and landscape diversity, both within the PEEN and across the wider countryside. However, any activities that take place within the Network should be compatible with the conservation objectives of the area concerned.

At the Fifth Ministerial Conference 'Environment for Europe' (Kyiv, 2003) the 'Resolution on Biodiversity', which included the following goals, was accepted:

1. By 2006, the Pan-European Ecological Network (core areas, restoration areas, corridors and buffer zones, as appropriate) in all states of the pan-European region will be identified and reflected on coherent indicative European maps, as a European contribution towards a global ecological network.

2. By 2008, all core areas of the PEEN are conserved, and guidance is given to all involved sectors to implement PEEN principles.

The PEEN is an overarching framework for ecological networks in Europe. In recent years several indicative maps have been prepared that delineate the provisional spatial configuration of the PEEN (Bouwma et al., 2002; Biró et al., 2006; Jongman et al., 2006) (Figure 5).

Since the establishment of the PEEN is one of the promises made by FYR Macedonia as a member to the PEBLDS Council, the first steps for development of the PEEN in FYR Macedonia have already been taken through implementation of the project for development of the

2.3.2 Emerald Network

The Emerald Network represents a network of Areas of Special Conservation Interest (ASCI) designated with the purpose of preserving the network of natural habitats. It was implemented by the Standing Committee to the Bern Convention in 1996. The idea was to supplement the Natura 2000 Network in non-EU countries using the highest possible methodological synergy. Since the European Union (EU) is also a contracting party to the Bern Convention, Natura 2000 is considered to be the EU contribution to the Emerald Network.

Besides being an important tool for countries concerned to prepare for future work on Natura 2000 and compliance with the EU Habitats and Birds Directives, the Emerald Network also facilitates the establishment of national networks of protected areas. It makes an important contribution to the establishment of the PEEN by helping to identify and protect its core areas.

FYR Macedonia has already implemented several projects for the development of the National Emerald Network and designated Emerald sites, which could be the most solid ground for continuing the PEEN establishment processes.

2.3.3 Natura 2000 Network


There are several steps in fulfilling the objectives of the Natura 2000 Network. The first phase of implementation has focused on proposal and designation of sites for species and habitats of European interest by all the Member States. The next steps will aim at establishment of the operational character of the Network, to ensure that species and habitats of Community interest in the designated sites are maintained in ‘favourable conservation status’. Member States should establish the necessary conservation measures, including preparing management plans and adapting appropriate national statutory, administrative or contractual measures. However, it is clearly stated that conservation measures should ‘take account of economic, social, and cultural requirements and the regional and local characteristics of the area’ in order to maintain dynamic rural areas.

Natura 2000 is an example of an EU-wide ecological network-building process. Through involvement of all relevant stakeholders – landowners, land users, local, national and European authorities – across all sectors, it aims at ensuring biodiversity conservation beyond national boundaries.
Figure 6: Sites designated under the Birds Directive (blue), sites designated under the Habitats Directive (orange) and sites designated under the Birds and Habitats Directives (Natura 2000 sites) (green) in the Netherlands (Source: VROM, 2004).

National Park De Loonse en Drunense Duinen, the Netherlands.

Hautes Fagnes – Eifel Natural Park, Belgium.

The Natura 2000 Network makes a crucial contribution to protection of the core areas in the PEEN.

Establishment of the Natura 2000 network and transposition of the EU Birds and Habitats Directives into national legislation is one of the key goals Macedonia will have to reach in the process of joining the EU.
3. Legal framework for implementation of the PEEN

The implementation of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) is based on various international and European legal instruments for nature conservation, i.e. implementation of those agreements, programmes and initiatives can serve as a foundation on which the Pan-European Ecological Network (PEEN) can be built. In addition, national policies and instruments, such as protected areas network and other sectoral instruments (e.g. transport sector, management of forests and agricultural land, water management, etc.), are important for its implementation on a national and subnational level.

In general, the legal basis for development of the PEEN can be broadly divided into two conceptual categories:

- requirements that arise from the major international agreements on nature conservation (e.g. Convention on Biological Diversity, Ramsar Convention, Bonn Convention, Bern Convention, European Landscape Convention);
- legal basis that aims for sustainable spatial development.

3.1 Global legal instruments

3.1.1 Convention on Biological Diversity (CBD)


Biological diversity is a term that covers all diversity of life on Earth. It includes all genes, animal and plant species, ecological systems and landscapes (forests, grasslands, wetlands, freshwater, sea, soil, crops, domesticated animals, wild species and micro-organisms).

The three main goals of the CBD are: conservation of biodiversity, its sustainable use and equitable sharing of costs and benefits. Although the Convention text itself does not mention ecological networks, many of its provisions address the components of ecological connectivity.

Implementation of the PEEN within the context of the PEBLDS represents a regional application of CBD aims for Europe, providing a way to implement the ecosystem approach.

3.1.2 Ramsar Convention on Wetlands

The Convention on Wetlands of International Importance is the most important international agreement on the preservation of wetland habitats. It was signed in the (now) Iranian town of Ramsar in 1971. It is an intergovernmental agreement which creates a framework for international cooperation in protection and reasonable and sustainable use of wetland areas.

Special focus has been given to protection of water, which is a main ecological factor that conditions the formation and survival of wetlands. Parties are obliged to establish national protection programmes for preservation of wetlands and to include measures for their protection and reasonable use in their national physical and land-use plans. In addition, they have a duty to protect wetlands by establishing natural reserves, at least one of which, that complies with international criteria, has to be proposed for the Ramsar List.

The network of Ramsar sites aims to protect wetland ecosystems that are extremely rich in biodiversity, but at the same time under considerable threat worldwide. It plays a crucial role...
in protecting waterfowl migration routes and in proper management of the ecological processes and services provided by wetlands.

The Ramsar Convention has been a pioneer in promoting the ecosystem approach. Parties are encouraged to protect areas which can represent core areas of the PEEN.

### 3.1.3 Bonn Convention

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) was opened for signing in 1979 in Bonn, Germany.

The Bonn Convention has as its goal the protection of animal species that inhabit international waters or migrate over national borders. During their migrations, animals cross national and political borders and are dependent on the existence of different resting and feeding habitats. The Bonn Convention represents a frame within which participating parties take adequate measures for the protection of migratory species by:

- defining strict protection measures for migratory species that are at risk of extinction in whole or over a significant part of the area of their distribution;
- making agreements concerning the protection and management of migratory species that have unfavourable protection status or would benefit from international cooperation;
- carrying out joint research and monitoring.

Parties to the Bonn Convention are encouraged to make agreements that represent individual, internationally obliging instruments for states in the area of distribution of one, or commonly a group of migratory species. States do not have to be parties to the Convention to take part in agreements. The goal of each agreement is to renew specific migratory species or groups of species to the level where the favourable status of their protection is achieved or maintained. Some of the agreements made so far are the Agreement on the Conservation of Bats in Europe (Eurobats) and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).

The unique thing about this convention is that it aims at protecting migration as a process far beyond protection of species and areas. This convention was one of the important elements in starting the PEEN process.

### 3.2 European framework

#### 3.2.1 The Bern Convention

The Bern Convention on the Conservation of European Wildlife and Natural Habitats was drawn up and adopted in 1979 with the purpose of increasing inter-state cooperation on nature conservation.

The basic goals of this convention are:

- preservation of European wild flora and fauna and their natural habitats, especially through ensuring implementation of protection measures by all relevant sectors;
- promotion of international cooperation;
- ensuring minimal protection for the highest possible number of wild plant and animal species and ensuring special protection of specific threatened species listed in the Convention annexes.

Through its Recommendations and Resolutions the Convention encouraged its contracting parties to establish ecological networks. Finally, in 1996, following these Recommendations, the process for setting up the Emerald Network of Areas of Special Conservation Interest (ASCIs) started, with the possibility for ‘observer countries’ to participate as well.
3.2.2 European Landscape Convention

The European Landscape Convention (also known as the Florence Convention), promotes the protection, management and planning of European landscapes and organizes European cooperation on landscape issues. It was the first international treaty to be exclusively concerned with all dimensions of European landscape. The European Landscape Convention is part of the Council of Europe's work on natural and cultural heritage, spatial planning and the environment.
The main obligations of the parties to the European Landscape Convention are to recognize landscapes in law as an essential component of people’s surroundings and identity and cultural and natural diversity; to establish and implement landscape policies aimed at landscape protection, management and planning; to establish procedures for the participation of the general public, local and regional authorities, and other parties; and to integrate landscape into regional and town planning policies. Specific measures concern awareness raising, training and education, identification of ‘national’ landscapes, definition of landscape quality objectives and implementation instruments.

3.2.3 EU Birds and Habitats Directives

The Directive on the Conservation of Wild Birds (79/409/EEC) and Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), also known as the Birds and the Habitats Directives, are the legal basis for establishment of the Natura 2000 Network – the most important nature conservation instrument at European Community level.

When it was introduced in 1979, the Birds Directive provided legal protection not only for bird populations (including restrictions on hunting methods and trade) but also for their habitats. The Special Protection Areas (SPAs) designated under the Birds Directive have to be protected by national legislation by the date of submission of the list of SPAs to the European Commission.

The Habitats Directive (1992) continued to build on that principle and made a significant step forward in biodiversity conservation because it introduced a comprehensive and legal protection regime for all fauna and flora species of European importance and also valuable habitats. This regime requires the legal designation of protected areas (Special Areas of Conservation - SACs) that meet the criteria laid down in the Directive, a strict protection regime for designated species, the maintenance of the ‘favourable conservation status’ of habitats and species populations, the preparation of management plans, monitoring arrangements, and nature compensation where a project adversely affects a Natura 2000 site for reasons of ‘overriding public interest’. Moreover, the European Commission approves the various lists and management plans and takes enforcement action where necessary. Financial support is also available, mainly through the LIFE+ programme but also through other instruments, such as agro-environment measures.

According to Article 6, appropriate steps should be taken in the SACs to avoid deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated. Any plan or project not directly connected with or necessary to the management of the site, but likely to have a significant effect on it, either individually or in combination with other plans or projects, is subject to ‘appropriate assessment’ of its implications for the site in view of the site’s conservation objectives. If the assessment is negative and there are no alternative solutions, the project can be implemented only in the case of overriding public interest (of a social or economic nature). In that case, compensatory measures must be taken to ensure the overall coherence of Natura 2000.

The key concept of ‘favourable conservation status’, which is the basis of the Habitats Directive, suggests that the conservation of species and habitats must take account of species’ capacity for migration, dispersal and reproduction, along with the functional character of habitats. Direct reference to connectivity is made in Article 10. Nowadays the Natura 2000 Network is increasingly taking ecological fragmentation into account.

Monitoring of the favourable conservation status is another aspect prescribed in the Directive (Article 11), with obligation to report on it and conservation measures taken every six years (Article 17). In order to be able to do this, a country has to establish a systematic national biodiversity monitoring system.

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2 At present, the Republic of Macedonia is not eligible for funding of LIFE+ projects.
3.2.4 Water Framework Directive (WFD)

The Water Framework Directive (2000/60/EEC) is one of the most important documents for the protection, management and improvement of the water ecosystems. The purpose of the Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater.

Its main goal is achievement of at least good water status by defining and implementing the necessary measures within different integrated programmes. Good ecological status is defined as: ‘the values of the biological quality elements for the surface water body type show low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with the surface water body type under undisturbed conditions’. In such an approach the main determinants for quality status are biological elements. For each water body, the biological parameters chosen to be indicative of the status of each biological element, such as the phytoplankton, aquatic flora, macro-invertebrates and fish, must be monitored. For example, in the case of the aquatic flora, the parameters might be (i) presence or absence of indicator species, or (ii) the population structure. The WFD indicates that monitoring of the biological quality elements must be at an appropriate taxonomic level to achieve adequate confidence and precision in the classification of the quality elements.

The importance of the WFD with regard to ecological networks is twofold – it maintains the water habitats in a favourable status enabling water organisms to move and disperse and it protects riparian habitats which are suitable for terrestrial animal movement.

3.3 Other related programmes

In addition to the above-mentioned ecological network initiatives and programmes, there are several other protected areas within Europe being developed as networks. Developed at different levels, all of these programmes contribute to better conservation of nature throughout Europe, at the same time contributing to the development of the PEEN.

- **World Heritage Sites.** Designated under the 1972 World Heritage Convention (UNESCO) because of their outstanding natural or landscape value.

- **European Diploma of Protected Areas.** This aims to reward exemplary management of natural or semi-natural areas or landscapes of exceptional European interest for conservation of biological, geological and landscape diversity.

- **Biosphere Reserves.** These combine protection of resources with sustainable development. They have three clearly defined functions: conservation (to preserve biological and landscape diversity); development (to promote sustainable economic development); and logistical (to permit and encourage research, monitoring and education). For this purpose they are divided into three zones: core zone, buffer zone and transitional zone.

- **Important Bird Areas (IBAs).** IBAs aim to conserve sites that are particularly important for birds (see Section 5.4.1).

- **Important Plant Areas (IPAs).** IPAs conserve sites that are particularly important for plants (see Section 5.4.2.).

- **Prime Butterfly Areas (PBAs).** Selection of important butterfly areas in Europe (see Section 5.4.3.).

- **European Green Belt.** Aims to support the transboundary cooperation for nature conservation along the ‘Iron Curtain’ as a political barrier separating the countries of Europe for 40 years (see Section 5.4.4).

Cooperation between countries on nature conservation is a basis for the implementation of the PEEN. Operational ecological networks at a transboundary national or regional/local level would be a major contribution to the establishment of the PEEN. Several initiatives, such as the Alpine Network of Protected Areas, the Lower Danube green corridor, Econet for Central
Asia, the Caucasus Ecoregion, the Green Belt, etc., are showing that international cooperation is gradually developing.

### 3.4 Networks of protected areas at national level

Each of the European countries has set up a system of protected areas on its own, independently of European and international designations. These areas are usually divided into several categories defined by national laws (e.g. national parks, nature parks, nature reserves, nature monuments, etc.). The aims of designation for these areas vary greatly, ranging from strict protection to regulation of human activities (to varying extents). Over time, many of these areas have become part of the above-mentioned international designations.

Recently, more and more countries have introduced the concept of ecological networks into their legislation, proclaiming their 'National Ecological Networks'. Approaches vary between countries but usually they include formerly protected areas, as well as some additional areas designated with the purpose of achieving connectivity and sustainability of the network (either as core areas or as corridors).

The whole process contributes to the establishment of the PEEN.

### 3.5 Spatial planning and ecological networks

Spatial planning is a crucial sector in the planning of land use in space, and therefore has an important role to play in the implementation of ecological networks on the ground. It is a tool to balance social, economic and ecological demands on land use while at the same time taking into account the spatial characteristics of a certain geographical level (local, regional or national). Various social interests play a role, such as the need for housing, mobility, production areas, open space and nature. Different actors promote their interests and the spatial planning policy plays an integrating role with respect to the spatial placement of the various needs of modern society. It should prioritize the demands for land so that human activities occur where they are most suitable and where there are the fewest constraints. On the other hand, as a sector it should become international in focus and organization in response to the need to strengthen the management of transboundary processes.

Spatial planning is of vital importance for realizing the PEEN, because it could facilitate its establishment, including the conservation of core areas and the identification and maintenance of ecological corridors. It is possible to argue clearly the value of such areas, set against other land uses that also have social or economic priority. Furthermore, it is possible to state which land uses would irreparably damage the functional mode of the ecological network, that is, where the species’ life cycle or existence might be deleteriously compromised (migration, feeding grounds, reproduction and rest areas for fauna, sites of rare or threatened flora). If potential conflicts between the PEEN and other socially desired land uses are not resolved, spatial areas foreseen for the PEEN risk being eroded, abandoned or used for other purposes (Bruszik & Nieto, 2006).

Council of Europe activities in the field of spatial planning and landscape contribute to the promotion of ecological networks. In 1970 it hosted the first European Conference of Ministers responsible for Regional Planning (CEMAT). The *Guiding Principles for Sustainable Spatial Development of the European Continent*, adopted in 2002, aim to bring economic and social requirements to be met by the territory into harmony with its ecological and cultural functions and thereby to contribute to long-term, large-scale and balanced spatial development.

The European Spatial Development Perspective (ESDP) was a product of the growing interest in European-scale spatial planning in the 1980s and 1990s, because spatial planning was seen as a potential European policy arena and integrative tool in its own right. The ESDP reflected the high priority given to spatial development and included a range of proposals relating to spatial planning and biodiversity conservation. The most recent initiative in the field of EU territorial cohesion, that
is clearly based on the ESDP, is the so-called Territorial Agenda, adopted in May 2007 by the ministers responsible for spatial planning. One of the six priorities for the development of the EU is the strengthening of ecological structures and cultural resources that advocate the further development of a European ecological network.
4. National legal framework and strategic documents

4.1 National legal framework

The legal basis for nature protection is found in the Constitution of FYR Macedonia, the Law on Environment, the Law on Nature Protection, international agreements signed or ratified by the country and the laws regulating the use of certain natural resources.

Except for the Law on Nature Protection, where the requirement for establishment of ecological networks is clearly set out in several articles, the sectoral laws do not stipulate the establishment of the ecological networks, nor do they take into account the conservation or management of the landscape.

4.1.1 Law on Environment

(Official Gazette of FYR Macedonia, No. 53/05, 81/05, 24/07, 159/08)

The Law on Environment is the framework law which is the pillar of environmental and nature protection in FYR Macedonia. Specific environmental aspects tackled by the Law on Environment are regulated by several separate laws (Law on Nature Protection, Law on Ambient Air Quality, Law on Waters, etc.). Other aspects are covered by separate sectoral laws (see below).

In terms of development of ecological networks, it has only an indirect connection through the provisions of the Strategic Environmental Assessment (SEA). SEA is mandatory for planning documents prepared in the areas of agriculture, forestry, fisheries, energy, industry, mining industry, transport, regional development, telecommunications, waste management, water management, tourism, spatial and urban planning and land use, and for the National Environmental Action Plan (NEAP) and local environmental action plans. However, the references to landscapes and ecological networks in this law are vague.

4.1.2 Law on Nature Protection

(Official Gazette of FYR Macedonia, No. 67/04, 14/06, 84/07)

A great deal of the EU legislation has been transposed into this law, e.g. Birds Directive (79/409/EEC), Habitats Directive (92/43/EEC) and Endangered Species Regulation (EC/338/97), as well as the obligations arising from the relevant international agreements that have been ratified by FYR Macedonia. Complete transposition and implementation of the Law is to be attained after adoption of the by-laws (secondary legislation).

The Law regulates nature protection by means of protection of biological and landscape diversity and protection of natural heritage in and outside protected areas.

The Law stipulates the establishment of a coherent ecological network (Article 53) for the purpose of conservation, maintenance or restoration to a favourable conservation status of the environmentally important areas. The environmentally important areas (that contribute to the protection and conservation of biological diversity in FYR Macedonia), the system of ecological corridors as well as the international environmentally important areas (of significance for the conservation or attainment of improved conditions with regard to the conservation of the species and habitat types at an international level) are constituent parts of the ecological network.

The ecological network shall be taken into consideration when drawing up the planning documents for organization, structure, exploitation and protection of the space in FYR Macedonia.
The SEA, i.e. assessment of the impact on nature of certain strategic, planning and programme documents, as well as the Environmental Impact Assessment (EIA) of the influence on nature of certain public and private projects, are to be carried out in accordance with the provisions provided by the Law on Environment.

The Law provides a good framework for developing a protected areas system (harmonized with the IUCN categorization), which is being established for the purpose of biological diversity protection within the frame of their natural habitats, the processes occurring in nature as well as landscape diversity. The protected areas system shall represent part of the National Ecological Network.

4.1.3 Law on Forests
(Official Gazette of FYR Macedonia, No. 47/97, 7/00, 89/04, 54/07)

Although several amendments have been made to the basic Law on Forests (adopted in 1997) it was recognized that it does not satisfy the EU requirements, i.e. it is not approximated with the EU directives and a new law has been prepared, which is currently in the Parliamentary procedure. Because this law is very important for the process of establishment of the ecological network, it will be analysed after its adoption.

4.1.4 Law on Hunting
(Official Gazette of FYR Macedonia, No. 26/2009)

The new Law on Hunting determines breeding, protection, hunting and use of the game and parts of the animals.

The Law defines the species subject to hunting (game species). The list includes 110 bird and 23 mammal species. Most of these species (74 birds and 9 mammals) are under full protection (it is illegal to hunt them). For 26 birds and 7 mammals, hunting is regulated by seasonal protection, and 14 game species (7 birds and 7 mammals) are not protected. The Brown bear is among the fully protected species.

The Law is almost completely in accordance with the Birds and Habitats Directives, except for the few species from Annex I of the Birds Directive for which seasonal protection is proposed in the Law. Also, with the exception of the wolf, which is not protected, and the chamois, for which seasonal protection is proposed, the rest of the species are in accordance with Annex II of the Habitats Directive.

4.1.5 Law on Pastures
(Official Gazette of FYR Macedonia, No. 3/98, 101/2000, 89/08)

The basic Law was adopted in 1998, and is not yet approximated to the European legislation.

The Law defines a pasture as grassy agricultural land, the most rational exploitation of which is pasturing of cattle and grass mowing, and as land in the vicinity of a settlement used mostly for cattle driving, resting and partly for cattle pasturing. Pasture is also defined as a grassland larger than 3 ha within the borders of forests, if the forest is not a selective one or one where amelioration or regeneration measures are being carried out.

The Public Enterprise for Pasture Management manages the pastures and is obliged to draw up a ten-year programme for the management of pastures (to be approved by the Government) and annual programmes. The programmes should describe the natural conditions and the possibilities of the pasture, its regeneration, development, measures for growing, protection, improvement and enhancement, etc. No long-term programme or annual programme was available for analysis.

The Public Enterprise is allowed to grant use of the pastures to legal entities and persons under contracts for a maximum of 10 years. Contracts have to include a provision regarding pasture protection.
The Law prescribes a ban on ploughing the pasture, changing the crops, raising the annual crops and the perennial plantations, and raising solid construction projects. There are no provisions referring to protected areas or ecological networks in the Law.

4.1.6 Law on Agriculture and Rural Development
(Official Gazette of FYR Macedonia, No. 134/07)

The Law regulates the planning of agricultural and rural development, the goals and measures of agricultural policy and rural development policy, state subventions, etc. One of the goals of the agricultural policy and the rural development policy (Article 3) is the sustainable use of natural resources taking into account the principles of nature and environmental protection.

The measures of the rural development policy (Article 23) aim at preventing the process of depopulation of rural areas and conserving other values of the rural areas as part of the natural and cultural heritage of FYR Macedonia.

The Law provides designation of rural areas (Article 24) and areas with limited possibilities for agricultural activity (Article 25) according to certain criteria. Rural areas are designated according to specific socio-economic criteria related to a certain settlement and relatively small number of inhabitants.

For the purpose of implementation of the rural development policy, certain measures are stipulated, including environmentally friendly agricultural measures and rural areas improvement measures.

Although this a newly prepared law, approximated with the EU legislation, no provisions for the establishment of ecological networks can be found.

4.1.7 Law on Agricultural Land
(Official Gazette of FYR Macedonia, No. 135/07)

The Law regulates the exploitation, disposal, protection and land-use change of agricultural land. Agricultural land (in the sense of this law) means arable land, gardens, orchards, vineyards, olive plantations, other perennial plantations, meadows, pastures, marshes, pools, reedbeds, fishponds, other exploited or unexploited (fallow) land that can be enabled for agricultural production with certain agro-technical measures.

Chapter IV of the Law refers to the protection of agricultural land, but only with respect to pollution and contamination of the soil, water and air, for the purpose of the production of healthy/safe food, protection of human health, flora and fauna, and unhindered use and protection of the environment. For this purpose, the provisions of the Law on Environment and of the Law on Nature Protection are implemented. Measures for protection from erosion and fire protection are also provided.

State-owned agricultural land can also be leased to legal entities and natural persons for a certain period of time. A contract may be cancelled if the use of the land is contrary to the regulations for environmental protection; appropriate fines are also provided for this.

4.2 National strategic documents

4.2.1 Spatial Plan of FYR Macedonia (2002–2020)

The Spatial Plan of FYR Macedonia is an integral strategic development document defining the spatial organization of the State and the goals and concepts of the spatial development of certain areas, as well as the conditions for the implementation thereof. A Synthesis Concept for the organization, regulation and use of the space for the period 2002–2020 has been drawn up by the Public Enterprises for Spatial and Urban Planning (now Agency for Spatial
Planning) in coordination with the Ministry of Environment and Physical Planning, based on 12 expert studies as a professional and scientific basis. The Spatial Plan was adopted by the Parliament of FYR Macedonia in 2004.

The part of the Synthesis Concept describing the natural heritage deals only with the network of national protected areas (processed according to the former categorization) and the areas planned for protection. One of the goals of the protection of the natural heritage is ‘establishment of an ecological network of protected natural goods as areas with special purpose and green corridors from the aspect of protection of quality of the environment’.

However, the Study of Natural Heritage Protection, prepared in 1996, on the needs for drawing up the Spatial Plan, includes a special chapter ‘The elements and the criteria for Ecological Network according to the recommendations of the Pan-European Biological and Landscape Diversity Strategy’. It states that the Pan-European Ecological Network (PEEN), i.e. the national ecological network, provides a vision for the desired condition of the environment after several decades. The chapter defines the basic elements of the ecological network: core areas, corridors, areas (zones) for development or restoration and buffer zones, with criteria for their determination. It is nevertheless emphasized that the construction of the national ecological network assumes an expert approach and detailed elaboration of the criteria. It is mentioned in the text that an initial scheme of the network (scale 1:700,000) is provided for the needs of the Spatial Plan, and it has been drawn up according to the information on the natural values, refugial regions and degree of relevance of the ecosystems and landscapes. The scheme is intended to be used as a basis for establishment of future development policy, and a guideline for spatial distribution of activities with regard to the values of nature and the ecological integration of the landscape. However, the aforementioned scheme/map is not available.

4.2.2 National Biodiversity Strategy and Action Plan of FYR Macedonia

The overall aim of the BSAP is conservation of biological diversity and ensuring its sustainable use for the welfare of the people, taking into consideration Macedonia’s unique natural values and rich tradition.

The Strategy explains the goals, objectives and tasks for biodiversity conservation, i.e. it is a document with an integral approach based upon many strategic components: in-situ and ex-situ conservation, sustainable use of biodiversity, institutional improvement, investigation and monitoring, public awareness and education, impact assessment, incentive measures, legislation, financial resources, and coordination and implementation of the BSAP. The Action Plan for the conservation of biodiversity consists of specific tasks and detailed activities with a precisely defined time frame and budget for each strategic approach to achieving the main aim and the general guiding objectives.

To be more specific, the Strategy assigns high priority to the establishment of ecological networks for the purpose of conserving the exceptional natural values of Macedonia and meeting the obligations arising from the relevant international agreements ratified by FYR Macedonia. Thus, several actions/projects of the strategic approach of the Action Plan for in-situ conservation are directed towards the establishment of the ecological network, as follows:

- Action A.2.1 – Integration of data from all previous projects (CORINE, Emerald, IPA, IBA, etc.) aimed at the establishment of a protected areas network.
- Action A.2.3 – Establishment of a coherent eco-network of regions with specific natural values in accordance with European criteria.
- Action A.3.3 – Establishment of bio-corridors between the protected areas.
Also, a series of other actions for proclamation of new protected areas, revitalization and conservation of key ecosystems beyond the network of protected areas, improvement of methodologies for sustainable use of agro-biodiversity, sustainable use and restoration of forest resources, etc. contribute to the establishment of the ecological network.

4.2.3 Second National Environmental Action Plan (NEAP2)

The Second National Environmental Action Plan (NEAP2) is a strategic document providing general instructions and directions for FYR Macedonia in the field of the environment for the period 2006–2011. It defines the problems of the environment, establishes priorities and goals for different media and sectors that affect the environment, and provides special measures and actions for overcoming the problems. The obligation to draw up the NEAP arose from the Law on Environment.

The section entitled ‘Nature and Biodiversity’, which aims at the achievement of the main goal of establishing an integral system for nature protection and biodiversity preservation according to EU standards and international agreements, provides special actions for ‘establishment of national ecological network’ as well as the action ‘Preparing of documents and analysis for establishment of Natura 2000’. Implementation of these actions is to assist in overcoming the problems identified in this field, especially the lack of a national monitoring system, unsustainable use of forests, wild plant species and fungi, excessive hunting and fishing, the lack of information on managing the process of nature conservation, inappropriate use of the land and uncontrolled urbanization, etc., as well as the process of the approximation of FYR Macedonia to the EU. The above asserts that FYR Macedonia has accepted the concept of ecological networks for the purpose of effective conservation of biological diversity.

4.2.4 Agriculture and Rural Development Strategy

Agriculture and rural development are the key elements on which the Republic of Macedonia should put more attention in the pre-accession process to the European Union. As a basis for formulation of the agricultural policy, the Ministry of Agriculture, Forestry and Water Economy (MAFWE) has adopted the following strategic objective:

‘to strengthen the ability of Macedonian agriculture to compete in the integrated regional markets of the European Union and South-Eastern Europe through measures to increase the efficiency of agricultural production, processing and marketing, and to build appropriate, effective public and private institutions; to improve farm incomes; to ensure that consumers have access to safe, healthy food; to optimize the use of scarce land, forest and water resources, in an environmentally sustainable manner; and to build viable rural communities through sustainable rural development.’

The objective contributes to the achievement of the Strategic Objective stated in the National Economic Development Plan (2007–2009): ‘To increase international competitiveness of the country that is required for a sustained economic growth and higher employment.’

One of the six strategic policy focal issues that should be addressed in the period 2007–2013 in order to achieve the strategic objective outlined below is to achieve sustainable resource management, in order to comply with the EU Common Agricultural Policy and effective introduction of agro-ecological measures.

The main aspect covered by the agri-environmental policy in the Republic of Macedonia should be to protect and improve physical, chemical and biological soil conditions, to reduce the water-related environmental problems in agriculture, to preserve traditional low-input farming systems and traditional landscapes, to provide alternative use for areas with low potential, but also, to preserve valuable grassland habitats and arable land through extensive cultivation methods or landscape management on high nature value areas preserving and protecting biodiversity, sensitive/endangered habitat types and rare and threatened species. The need to ensure and provide effective tools for implementation of the Nitrate Directive, Water Framework Directive and the future Natura 2000 Network is particularly emphasized.
The planned activities for establishing the agri-environmental policy are mainly streamlined to approximation of the legislation (preparation of regulation for Good Agricultural Practice/Cross Compliance, that will serve as a baseline for agro-environmental payments), strengthening of agri-environmental capacities through establishment of an interdisciplinary working group composed of representatives from relevant organizations and institutions, development of an agri-environmental information system and preparation of a set of monitoring guidelines and standards.
5. Current progress of the work on ecological networks in Macedonia

5.1 Indicative map of the PEEN in South-East European countries

The first steps in the development of the Pan-European Ecological Network (PEEN) in FYR Macedonia started with the implementation of the project for development of the indicative map of the PEEN in South-East Europe (SEE), considered one of the biodiversity hot spots in Europe. The project was implemented in the period 2003–2006, and was coordinated by ECNC together with the national partners in the project countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Greece, FYR Macedonia, Serbia, Montenegro, Slovenia and Turkey).

The project resulted in an indicative map of the PEEN in SEE that identifies the core nature areas of European importance, existing corridors between these areas and where new corridors could and should be established to meet the connectivity requirements of key species. Buffer zones were not identified, because they are often site specific and depend on local socio-economic circumstances. Also, identification of buffer zones was difficult because of the broad scale of the map. Restoration or nature development areas were also not incorporated in the map, due to the lack of information on such areas.

![Indicative map of the Pan-European Ecological Network for Southeastern Europe](image)

Figure 7: Indicative map of the PEEN in South-East European countries (Source: Biró et al., 2006).

Because the map was prepared in a very broad scale (1:3,000,000), one of the project’s recommendations was that the countries continue development of the PEEN on a national level in a more detailed scale.
5.2 Development of the Emerald Network in FYR Macedonia

Activities for the development of the Emerald Network of Areas of Special Conservation Interest for Europe in FYR Macedonia started in 2002 by participation in the Pilot Projects programme, proposed and coordinated by the Council of Europe, i.e. the Secretariat of the Bern Convention. FYR Macedonia ratified the Bern Convention on the Conservation of European Wildlife and Natural Habitats in 1997 (Law on Ratification, Official Gazette of RM, No. 49/97) and this entered into force in April 1999.

Taking into consideration the provisions of the Convention and following Recommendation No. 16 (1989), identification of the habitat types and species of European importance present in FYR Macedonia was the first step in the process of development of the National Emerald Network before starting the identification and description of the Emerald sites in Macedonia. Of the total number of 187 endangered habitats requiring specific conservation measures listed in Resolution No. 4 (1996) of the Bern Convention, 32 endangered habitats have been identified in Macedonia. According to Resolution No. 6 (1998), which lists 927 European species requiring specific habitat conservation measures, 167 are present in Macedonia: 7 invertebrate, 13 fish, 3 amphibian, 7 reptile, 115 bird, 17 mammal and 5 plant species.

Within the four project activities for development of the National Emerald Network, realized in the period 2002–2008, a total of 35 sites were identified, described and submitted to the Secretariat of the Bern Convention. The proposed sites are fairly diverse in size: the smallest covers about 625 ha (Negorci marsh) and the largest site is Jakupica, which covers about 76,740 ha. The total area of the proposed sites is 752,223 ha, representing about 29% of the territory of the country.

From the total of 11 biogeographical regions that are present in the pan-European region, only two are found in FYR Macedonia: continental and alpine. Twenty of the identified Emerald sites are located in the alpine region (western part of Macedonia) and the other 15 sites are in the continental region (eastern part of Macedonia).
In order to provide compatibility of the Emerald Network with Natura 2000, the Emerald sites are categorized into three different types:

- **Type A**: Areas important for the protection of birds, which are in accordance with the Special Protection Areas (SPAs) of Natura 2000. Four sites in the National Emerald Network are categorized as type A.
- **Type B**: Areas important for other species and/or habitats, which are in accordance with the Special Areas for Conservation (SACs) of Natura 2000. Five sites in the National Emerald Network are categorized as type B.
- **Type C**: Areas important for birds, other species and/or habitats. This includes 26 sites, the largest number of National Emerald sites.

The activities undertaken for development of the National Emerald Network are considered to be important preparatory work towards the preparation of FYR Macedonia for EU membership with respect to the implementation of Natura 2000 and towards compliance with the Habitats and Birds Directives. It also represents a useful instrument for the conservation of areas of great ecological value and a framework for cooperation within a homogeneous network of areas covering the whole of Europe.

### 5.3 National protected areas system

The protected areas (PAs) system in Macedonia covers a variety of large and small sites representing different habitat types and various rare, endemic or relict species. Almost all of the PAs were proclaimed during the 1950s, 1960s and 1970s. At that time ecological networks were unknown and proclamation of PAs in Macedonia was carried out without any pattern. The threat status of habitats and species was hardly considered during their designation and proclamation. Some of the protected areas were designated for conservation of geodiversity or
fossils. It is important to note that there is a striking disparity in the distribution of PAs between east and west Macedonia, which could be a problem for the functioning of the ecological network (future MAK-NEN) on the national level in the near future.

The categories of protected areas in Macedonia and their corresponding management objectives are defined in Articles 66–90 of the Law on Nature Protection (Official Gazette of RM, No. 67/04). Other articles regulate other administrative procedures connected to protected areas (proclamation, register, cadastre, supervision, etc.).

The names of categories in the national Law were kept the same as those of the IUCN categorization, were slightly modified, or completely changed (for categories IV and VI the old names were taken since they correspond better to the language peculiarities or to keep already domesticated terms). However, they all more or less correspond to the respective IUCN categories (Table 2).

According to Ornat & Reinés (2007) protected areas in Macedonia are classified as level 2 in accordance with IUCN PAs Management Categories (Macedonia, Slovenia and Bosnia and Herzegovina). The protected areas categories are practically identical to those of the IUCN, but the IUCN is not specifically mentioned in the national Law.

The most comprehensive source of data for the time being can be found in the recently adopted Physical (Spatial) Plan of FYR Macedonia. Probably (but this is not certain) all protected areas are listed there. The data are confusing since areas that are recommended for protection are placed in the same table. According to the Spatial Plan, expansion of the total surface of designated areas is envisaged to rise from the current of about 7.5% to 11.6% of the national territory in the period 2000–2020.

Figure 9: National protected and planned areas (Source: MOEPP, 2004b).
There is an urgent need for deep and detailed analysis of existing protected areas and their assignment to some of the actual PA categories.

Table 2. Correspondence of Macedonian Protected Areas Management Categories to those of IUCN (1994).

<table>
<thead>
<tr>
<th>Macedonia 2004 (Law on Nature Protection)</th>
<th>Corresponding IUCN 1994 category</th>
<th>Macedonia - old categorization (Law on Protection of Natural Rarities)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Strict Natural Reserve. IUCN category I was not broken down into two subcategories in Macedonian legislation. However, the definition and management objectives fully correspond to both IUCN subcategories of category I. It was considered that there is not an undisturbed area large enough to be designated as Ib.</td>
<td>Ia. Strict Nature Reserve</td>
<td>Strict Nature Reserve Nature Reserve for Scientific Research</td>
</tr>
<tr>
<td></td>
<td>Ib. Wilderness Area</td>
<td></td>
</tr>
<tr>
<td>II. National Park. Corresponds completely with IUCN's category II.</td>
<td>II. National Park</td>
<td>National Park</td>
</tr>
<tr>
<td>III. Natural Monument. Corresponds completely with IUCN's category III.</td>
<td>III. Natural Monument</td>
<td>Natural Monument</td>
</tr>
<tr>
<td>IV. Nature Park. The definition of 'nature park' in the Law on Nature Protection corresponds with that of IUCN's category IV only with respect to species and communities. However, 'nature park' could include other physical features, which corresponds more with IUCN's category III.</td>
<td>IV. Habitat/Species Management Area</td>
<td>Special Nature Reserve. This category is very vague. It is not clear if it corresponds with current category IV, or is something different.</td>
</tr>
<tr>
<td></td>
<td>V. Protected Landscape</td>
<td>Landscape with Specific Natural Features Characteristic Landscape</td>
</tr>
<tr>
<td></td>
<td>V. Protected Landscape/ Seascape</td>
<td></td>
</tr>
<tr>
<td>V. Protected Landscape. Corresponds with IUCN's category V.</td>
<td>VI. Managed Resource Protected Area</td>
<td></td>
</tr>
<tr>
<td>VI. Multipurpose Area. According to the Law on Nature Protection this PA category is the same as IUCN's category VI, but in some cases it can also comprise a significant area modified by humans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VI. Managed Resource Protected Area</td>
<td></td>
</tr>
</tbody>
</table>

* The Law on Protection of Natural Rarities was replaced by the Law on Nature Protection. Other laws regulating some aspects of protected areas management were: the Law on Protection of National Parks and the Law on Protection of Ohrid, Prespa and Dojran Lakes.

Based on the analyses done in 2006, according to the old categorization (described in the old Law on Protection of Natural Rarities) the network of protected areas in Macedonia comprises 74 sites, covering a total surface area of 188,734 ha or 7.3% of the national territory (MOEPP, 2007b). The sites are arranged in the following categories:
• National Park: 3
• Strict Nature Reserves: 4
• Natural Monument: 50
• Site/Landscape with specific natural characteristics: 3
• Individual plant and animal species outside nature reserves: 14.

Although there has been a constant rise in the total number and area of different categories of protected areas, since 1948, when the first National Park Pelister was proclaimed, the network has been inefficient: the sites were proclaimed on a different level (national or local), their boundaries are not clearly defined, management authorities/bodies are not nominated (except for the three national parks), management objectives are not clear.

A specific problem for Macedonia is that the existing protected area system is not harmonized with the existing legislation (Table 2). The Law on Nature Protection stipulates that harmonization and reproclamation of all PAs have to be done in a six-year period (starting in 2004). Not much has been done so far. Additionally, for some categories it is not clear what the management objectives are (why were they designated?) and it is not easy to ascribe some of the categories in force to the existing PAs. The process is led by the Nature Sector established within the Administration of Environment in the Ministry of Environment and Physical Planning, but it is proceeding very slowly and has no priority plan. Only one site has already passed the complete procedure for reproclamation – Pelister National Park. Several more sites are in the process of revalorization and reproclamation (Ploche Litolelmi, Lokvi Golemo Konjare, Ezerani and Tikvesh as Strict Nature Reserves; Galicica National Park, Matka, Dojran Lake and Prespa Lake as Natural Monuments; Katlanovo Landscape and Ostrovo. Smolare Waterfall, Markovi Kuli and Kuklica were proclaimed as Natural Monuments after the adoption of the new Law. The valorization process of new sites (Monospitovo Swamp, Jablanica, Alsar, Osogovo) and preparation of proposals for their designation is ongoing.

Most of the existing PA categories will definitely serve as a backbone for the future Natura 2000 Network (Habitats Directive requirement). They will also serve as core areas in the future National Ecological Network (which is also a legal obligation).

### 5.4 Other initiatives

#### 5.4.1 Important Bird Areas (IBAs)

Identification of Important Bird Area (IBA) sites is an initiative implemented by BirdLife International on a global level, aiming to conserve sites that are particularly important for birds, such as sites for globally threatened species, species of European conservation concern, sites for migratory species that congregate in high numbers, sites for species unique to small regions and sites that support a species assemblage that is highly representative of a distinct biome (Heath & Evans, 2000).

Table 3: The first proposal of Macedonian IBA sites.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Surface (km²) (1989, 2000)</th>
<th>Surface (km²) (revised)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK001</td>
<td>Shara Mountain [parts of]</td>
<td>120</td>
<td>159.5</td>
</tr>
<tr>
<td>MK002</td>
<td>Korab Mountain and Radika Gorge</td>
<td>500</td>
<td>651.4</td>
</tr>
<tr>
<td>MK003</td>
<td>Babuna Gorge, Topolka Gorge and Crn Kamen</td>
<td>25</td>
<td>38.5</td>
</tr>
<tr>
<td>MK004</td>
<td>River Bregalnica</td>
<td>100</td>
<td>306.9</td>
</tr>
<tr>
<td>MK005</td>
<td>Lake Ohrid</td>
<td>251</td>
<td>246.1</td>
</tr>
<tr>
<td>MK006</td>
<td>Lake Prespa</td>
<td>189.2</td>
<td>196.3</td>
</tr>
<tr>
<td>MK007</td>
<td>River Crna Gorge</td>
<td>400</td>
<td>504.4</td>
</tr>
<tr>
<td>MK008</td>
<td>Demir Kapija Gorge</td>
<td>80</td>
<td>122.0</td>
</tr>
<tr>
<td>MK009</td>
<td>Kozhuf Mountain and Boshava River</td>
<td>200</td>
<td>460.3</td>
</tr>
<tr>
<td>MK010</td>
<td>Lake Dojran</td>
<td>42</td>
<td>23.8</td>
</tr>
</tbody>
</table>
The first IBA inventory that covered Europe was published in 1989 (Grimmett & Jones, 1989), when Macedonia was part of former Yugoslavia. Ten IBAs were proposed (Table 3, Figure 10), with total coverage of 2709 km² (ca 10% of the territory of Macedonia). This list was partially revised in 2002, and three new IBAs were proposed – one of them within the borders of already existing IBA, and another one without fulfilling the criteria.

With the change in the conservation status of some species in Macedonia – especially the upgrading of *Neophron percnopterus* (Egyptian vulture) and *Coracias garrulus* (Roller) to globally threatened species (IUCN, 2007) – and increased information on their distribution, as well as more accurate population estimates for other species (e.g. *Falco naumanni*, Lesser kestrel, *Aquila heliaca*, Imperial eagle), a new proposal was elaborated (Velevski et al., 2009) and submitted to BirdLife International. The new proposal lists 21 sites (Table 4, Figure 11), covering 6,538.05 km² or 25.43% of the territory of Macedonia.
Lesser kestrel (*Falco naumanni*).  
Imperial eagle (*Aquila heliaca*).  

Table 4: The new proposal for Macedonian IBA sites.

<table>
<thead>
<tr>
<th>IBA code</th>
<th>IBA Name</th>
<th>Surface (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK001</td>
<td>Šar Planina Mountain</td>
<td>413.17</td>
</tr>
<tr>
<td>MK002</td>
<td>River Radika catchment</td>
<td>663.84</td>
</tr>
<tr>
<td>MK003</td>
<td>Jakupica Mountain</td>
<td>196.01</td>
</tr>
<tr>
<td>MK004</td>
<td>Taor Gorge</td>
<td>25.38</td>
</tr>
<tr>
<td>MK005</td>
<td>River Topolka–River Babuna–River Bregalnica</td>
<td>297.62</td>
</tr>
<tr>
<td>MK006</td>
<td>River Pčinja–River Petrošnica–River Kriva Reka</td>
<td>698.23</td>
</tr>
<tr>
<td>MK007</td>
<td>Gradsko–Rosoman–Negotino</td>
<td>259.20</td>
</tr>
<tr>
<td>MK008</td>
<td>Demir Kapija Gorge</td>
<td>105.13</td>
</tr>
<tr>
<td>MK009</td>
<td>Tikveš Region</td>
<td>225.92</td>
</tr>
<tr>
<td>MK010</td>
<td>River Raec valley</td>
<td>138.75</td>
</tr>
<tr>
<td>MK011</td>
<td>Lake Tikveš</td>
<td>255.07</td>
</tr>
<tr>
<td>MK012</td>
<td>Bošavija</td>
<td>103.08</td>
</tr>
<tr>
<td>MK013</td>
<td>Mariovo</td>
<td>655.30</td>
</tr>
<tr>
<td>MK014</td>
<td>Pelagonia</td>
<td>1,371.89</td>
</tr>
<tr>
<td>MK015</td>
<td>Ovče Pole</td>
<td>413.66</td>
</tr>
<tr>
<td>MK016</td>
<td>Preod-Gjugjance</td>
<td>121.90</td>
</tr>
<tr>
<td>MK017</td>
<td>Osogovo Mountains</td>
<td>70.49</td>
</tr>
<tr>
<td>MK018</td>
<td>Lake Mantovo and River Lakavica</td>
<td>57.30</td>
</tr>
<tr>
<td>MK019</td>
<td>Lake Ohrid</td>
<td>246.07</td>
</tr>
<tr>
<td>MK020</td>
<td>Lake Prespa</td>
<td>196.29</td>
</tr>
<tr>
<td>MK021</td>
<td>Lake Dojran</td>
<td>23.77</td>
</tr>
<tr>
<td><strong>Total surface area</strong></td>
<td><strong>6,538.05</strong></td>
<td></td>
</tr>
</tbody>
</table>
Some of these localities are partly or entirely protected by national legislation (Prespa Lake, Tikves Lake, Demir Kapija and River Radika catchment), while others are partly or entirely included in the National Emerald Network (Osogovo Mountain, Jakupica Mountain, Shar Planina Mountain, Ovche Pole, Pelagonia and Mariovo).

Future work is needed to precisely identify the borders of the IBAs and to identify new IBAs, primarily for forest species.

5.4.2 Important Plant Areas (IPAs)

Important Plant Areas (IPAs) are the most important places in the world for wild plants (Radford & Odé, 2009). Identification and designation of IPAs in Europe is a Plantlife International initiative. Identification is carried out using three criteria (globally, nationally and on European scale endangered plant species, endangered habitats and species richness).

During two consecutive projects led by Plantlife in the South-East European region, a total of 42 IPAs were identified in Macedonia (Figure 12). The total area covered by IPAs in Macedonia is 459,425 ha, which is 17.9% of the country’s territory.
Forest (woodland) and grassland habitats are the most frequent on IPAs in Macedonia, occurring on 85% and 67% of IPAs, respectively. Where these habitats occur they are often the dominant vegetation types, especially on the 18 mountainous IPAs. The most common forests are broad-leaved deciduous woodland (on 34 IPAs) and broad-leaved evergreen woodland (23) and coniferous forests (9). Of the grassland habitats, dry grasslands are the most frequent (on 20 IPAs), followed by alpine and subalpine grassland (12). Sparsely or non-vegetated habitats are also common on Macedonian IPAs, occurring on 60% of IPAs. Although this includes some screes and rock associated with mountain IPAs (5), it largely reflects the importance of inland cliff and rock habitats for plants in Macedonia (25 IPAs), especially those associated with the eight IPAs within deep river gorges (Melovski et al., 2009).

All or part of 13 IPAs (31%) are within protected areas in Macedonia (three national parks, two strict nature reserves and seven natural monuments). Two of the national parks more or less overlap with corresponding IPAs and National Park ‘Mavrovo’ contains three IPAs. All or part of 31 IPA sites overlap with proposed Emerald sites in Macedonia, one overlaps with a Ramsar site, 18 with IBA sites and 10 with Prime Butterfly Areas (MOEPP, 2002, 2003, 2005, 2007c; Velevski et al., 2009).

IPAs in Macedonia cover various habitat types, and thus they provide a solid base for MAK-NEN core areas.

5.4.3 Prime Butterfly Areas (PBAs)
Prime Butterfly Areas (PBAs) are a selection of important butterfly areas in Europe, focusing on target species that are conservation priorities across this large and diverse region. The PBAs support the identification and management of biodiversity hot spots, core areas of ecological networks, and professionals involved with everyday management of core areas (Van Swaay & Warren, 2003). Identification of these areas is in full compliance with and supports
other initiatives, such as Natura 2000, the PEEN, the Pan-European Biological and Landscape Diversity Strategy (PEBLDS), the Emerald Network and the Bern Convention.

The site selection criteria are devised to identify the most important areas for the specified species in Europe, combined with a wide geographical coverage that includes both marginal and core populations. For each PBA, key data were collected on: location, butterfly species, habitat and land uses, threats, protection and conservation issues. Three main criteria were outlined when creating the PBAs: the global distribution of species is restricted to Europe, the species is listed in Appendix II of the Bern Convention and/or the Habitats Directive, and the species is threatened according to the recent Red Data Book of European butterflies. Selection of the species was done taking into account the compliance of the species with at least two of the three criteria given.

Europe contains 576 butterfly (Rhopalocera) species, one third of which are endemic to the continent. Of these 576 butterfly species, 71 species (12%) are considered threatened according to the new IUCN criteria. They comprise 19 globally threatened species and 52 species threatened at the European level. Using the above-mentioned criteria for the selection of target species that can be used in selecting PBAs, a total of 34 butterfly species were chosen. Taking these species into consideration, there are 431 PBAs in Europe covering more than 21 million ha, which is 1.8% of the land area in Europe (Van Swaay & Warren, 2003).

Data on the selection of PBAs in Macedonian have been compiled by Dr Redraw Jaksic. Five target butterflies can be found in Macedonia that are included in the list of species for selection of the PBAs. These species are *Euphydryas aurinia, Euphydryas maturna, Lycaena ottomana, Maculinea arion* and *Parnassius apollo*.

![Euphydryas aurinia - one of the target species for PBA.](image)

Considering the distribution of these species in the territory of Macedonia, eight areas were proclaimed as PBAs. These areas are: Shar Planina Mountain (I), Galichica Mountain (II), Radika Gorge (III), Struga (IV), Ograzhden Mountain (V), Kozhuf Mountain (VI), Baba Mountain (VII) and Babuna Gorge (VIII) (see Figure 13).
Three of the eight areas already have a certain level of protection on a national level: part of Baba Mountain, Galichica Mountain and Radika Gorge come within the framework of the National Parks.

The list of PBA identified so far is by no means comprehensive and there are many other sites and species in urgent need of conservation.

5.4.4 Balkan Green Belt

The Green Belt is a network that connects areas with intrinsic natural values preserved along the border of the former ‘Iron Curtain’. This Belt passes through 23 European countries, running from the Barents to the Black Sea, along some 12,500 km. The idea for establishing the European Green Belt is to create a backbone of an ecological network symbolizing the global efforts for cross-border cooperation in nature conservation and sustainable development along the former East-West border of the cold war era. In fact, the forbidden zone between East and West created wild landscapes with a number of rare and threatened species. A great number of birds and other flora and fauna species have found a place to live along the Green Belt.

The Green Belt is not to be seen as a consistent strip of protected area, because it connects areas with different categories of protection, areas identified for protection as well as non-protected areas. As an ecological network of protected areas it will contribute to the conservation of biodiversity, first of all by harmonizing management methods on both sides of the border. To see it on a large scale, the Green Belt habitat network consists of core areas and corridors, which can be landscape corridors, stepping stone corridors, linear corridors and buffer zones as well as sustainable use areas. This is of significant importance for the migrating species, such as wolf, bear, lynx or amphibians and birds.
The route of the Green Belt is divided into three regional sections: Fenno-Scandinavian, Central European and South-Eastern European, i.e. Balkan Green Belt including border sections of Serbia, Romania, Bulgaria, Turkey, Greece, Macedonia, Albania and Montenegro. Although the borders of the Balkan countries were not directly involved by the cold war, they were kept under strict control as well. These isolated areas/landscapes were not affected by human activities, thus creating different habitat types accompanying and connecting each other in a way that allows natural development and wild species movement.

IUCN is responsible for coordination of the activities in the framework of the Green Belt initiative. The IUCN Strategy for South-Eastern Europe identified 38 cross-border areas for which an appropriate level of protection should be proposed; 20 of these are part of the Balkan Green Belt.

The Green Belt in Macedonia covers three state borders with neighbouring countries Bulgaria, Greece and Albania. Three national parks (Mavrovo, Galicica and Pelister), three natural lakes and other protected areas with lower categories of protection or areas identified for protection are located along the Green Belt. All or parts of areas proclaimed under other initiatives such as Emerald sites, Ramsar sites, IPAs, IBAs, trilateral Prespa Park, etc. can also be found along the Green Belt.
Table 5: Identified priority areas in the framework of the Green Belt

<table>
<thead>
<tr>
<th>Code</th>
<th>Area Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK001</td>
<td>Core area – National Park Galichitsa, Natural monument Ohrid and Prespa Lakes and Strict Nature Reserve Ezerani</td>
</tr>
<tr>
<td>MK002</td>
<td>Core Area - NP Pelister</td>
</tr>
<tr>
<td>MK003</td>
<td>Core area - NP Mavrovo</td>
</tr>
<tr>
<td>MK004</td>
<td>Core area - Jacupica</td>
</tr>
<tr>
<td>MK005</td>
<td>Core area - Osogovo</td>
</tr>
<tr>
<td>MK006</td>
<td>Core area between Vinica and Delcevo, river Bregalnica valley and mountain massif Golak</td>
</tr>
<tr>
<td>MK007</td>
<td>Core area - Plackovica</td>
</tr>
<tr>
<td>MK008</td>
<td>Cluster of Kozuf and Kajmakcalan</td>
</tr>
<tr>
<td>MK009</td>
<td>Core area - Tikveš Lake</td>
</tr>
<tr>
<td>MK010</td>
<td>Core area - Sar Planina, Tetovo</td>
</tr>
<tr>
<td>AL004</td>
<td>Core area Shebenik, adjoining Jablanica Mountain on the Macedonian side, but it was not given a Macedonian code by IUCN.</td>
</tr>
</tbody>
</table>

So far, the following activities have been realized in the framework of the Green Belt initiative in Macedonia: valorization of the natural values of Jablanica Mountain has been carried out and it is in the phase of proclamation for protection in the category of national park; also valorization of the Osogovo Mountains is an ongoing process for preparation of a proposal for proclamation as a protected area. As for the other areas, priority is given to the areas where the initiative already exists on the other side of the border, like the southern part of Nidze and Kozuf and Belasica Mountain. Shara Mountain is a Macedonian priority for proclamation as a protected area.

The Green Belt activities contribute to the development of a national network of protected areas as well as to the establishment of a National Ecological Network.

5.5 Work ahead - national aspects of Natura 2000

FYR Macedonia was given a candidate status for membership of the EU by the European Council in December 2005, after submission of the application for membership in March 2004 and signing of the Stabilization and Association Agreement with the European Communities.
and their Member States (April 2001, in force from April 2004). A strong confirmation of the ability and dedication of all relevant institutions and civil services to respond to the requirements of the EU integration process is provided by the National Strategy for European Integration (adopted in September 2004) and the National Programme for Adoption of the Acquis Communautaire (NPAA) which is updated annually.

In 2007, a Sector Approximation Strategy (SAS) covering the nature and forestry sector was prepared as part of the CARDS 2006 project ‘Strengthening of Environmental Management in FYR Macedonia’ (implemented in the period 2006–2007), with the main aim of recommending the most appropriate and suitable approach to nature and forestry issues for the Government of FYR Macedonia towards the EU integration process.

In order to prepare the SAS for Nature and Forestry, in addition to the Habitats Directive (92/43/EEC) and the Wild Birds Directive (79/409/EEC), that are the legal basis for establishment of the Natura 2000 Network, the following main nature and forestry EU directives/regulations were analysed: Endangered Species Regulation (EC/338/97), Zoos Directive (1999/22/EC), Leghold Trap Regulation (EEC/3254/91) and Monitoring of Forests Regulation (EC/2152/2003). Several relevant international agreements are also covered in this Strategy. Based on the detailed legal and implementation gap analyses of the selected directives, the actions needed for full legal transposition and practical implementation of the EU requirements were defined with the identification of the main responsible governmental institutions, the time frame and the financial implications of implementation of the proposed actions. The prioritization plan for transposition, implementation and investment was very important because of the present institutional capacity and financial/economic limitations caused by the national economic situation.

The overall plan for achieving full compliance with the Habitats and Birds Directives, taking into account past and ongoing approximation projects, consists of:

- **Legal transposition**: proposing 17 actions needed to complete transposition of the directives. One of the actions proposed for the first year of transposition is preparation and adoption of the Decree on Establishing Ecological Network and Areas of International Importance (secondary legislation prescribed with the Law on Nature Protection).
- **Implementation including enforcement actions**: composed of 54 actions (summarized in Table 5). The first two activities constitute the preparatory phase and can be jointly implemented for both directives and the three subsequent activities are the implementation phase.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Habitats Directive</th>
<th>Birds Directive</th>
</tr>
</thead>
</table>
| 1. Institutional strengthening | - Establish a Competent Authority.  
- Evaluate administrative structures of MOEPP (evaluate present and draft future administrative structure).  
- Draft a by-law on revenue raised in National Parks.  
- Assess institutional needs.  
- Reform the Managerial Board overseeing National Parks.  
- Establish institutional arrangements for inspecting national parks and other possible SACs. | Establishment of Competent Authority |
| 2. Data collection, data handling and reporting | - Establish procedures for obtaining biodiversity data and for data input formats, and prepare manuals.  
- Establish a biodiversity information management system (specify and design a biodiversity information management system, enter data from Natura 2000 and international | Establishment of Protected Areas and Biodiversity Database |
A reasonable time frame for implementation of both directives, without regard to overall resource constraints, would be about 16 years from the time of commencement to the achievement of full compliance.

Increased attention is needed in order to implement Article 6 of the Habitats Directive, which refers to appropriate steps that have to be taken in the Special Areas of Conservation in order to avoid deterioration of natural habitats and the habitats of species for which the areas have been designated. Appropriate assessment should be applied for any plan or project not directly connected with or necessary to the management of the site, but likely to have a significant effect on it, either individually or in combination with other plans or projects.

This type of action is a matter of urgency, especially in economic sectors such as energy and transport. The Government of FYR Macedonia has been very active during last two years in improving energy production and distribution (concessions will be given on water resources for small hydroelectric power plants and wind turbines) and transport infrastructure (again with concessions). ‘Appropriate assessment’ is urgently needed in both sectors not only because of the requirements of Article 6 of the Habitats Directive, but also because of the national legal requirements (Strategic Environmental Assessment and Environmental Impact Assessments).

Furthermore, setting up MAK-NEN will improve the quality of future Natura 2000 functional characteristics (enabling the favourable conservation status of species and habitats) by providing connectivity to threatened species – unhindered movement of species and genetic exchange between subpopulations.
6. Development of National Ecological Network (MAK-NEN)

6.1 Goals

The main objective of this project is to boost the development of the National Ecological Network in Macedonia (MAK-NEN) as part of the Pan-European Ecological Network (PEEN). The outcomes of the MAK-NEN project are expected to boost the implementation of the National Ecological Network and awareness of the ecological network concept, thus contributing to the country’s efforts to halt the loss of biodiversity.

6.2 Activities

To achieve the project objectives, three main elements with different activities are foreseen:

- Element 1: Identification and mapping of the ecological corridors and restoration areas of national importance in Macedonia and their connection to the existing core areas and buffer zones to provide ecological connectivity.
- Element 2: Promotion of the PEEN and ecological networks in general through the development of a Management Plan for an ecological corridor for large carnivores, with special focus on the Brown bear (*Ursus arctos*).
- Element 3: Raising awareness about the newly prepared MAK-NEN among all stakeholders through a national campaign.

As part of Element 3, specific messages will be delivered on:

- the contribution and role of Macedonian biodiversity in relation to European and global biodiversity;
- ecological networks and their additional values (e.g. their role in climate change mitigation, social and economic benefits, etc.);
- the MAK-NEN map and its use;
- the integration of ecological networks into sectoral policies (e.g. pro-biodiversity businesses in core areas and buffer zones, forestry, urban biodiversity, spatial planning, agriculture, water management, construction and transport);
- the ‘Bear Corridor Management Plan’ as a vehicle for: a better understanding of the bear’s ecological functions; gaining better acceptance of its needs; and raising the awareness and willingness of key stakeholders to accept the implementation of the ‘Bear Corridor Management Plan’.

6.3 Key stakeholders and target groups

The key stakeholders and target groups are:

- relevant ministries of FYR Macedonia;
- national and local authorities in Macedonia;
- scientists, ecologists, national park managers;
- non-conservation stakeholder groups: forestry, agriculture, water management, landowners, spatial planners, construction and economic sectors;
- the general public.
6.4 Project partners

ECNC–European Centre for Nature Conservation
Website: www.ecnc.org

The Macedonian Ecological Society (MES), Macedonia
Website: www.mes.org.mk

Macedonian Ministry of Environment and Physical Planning
Website: www.moepp.gov.mk
References


IUCN, Gland, Switzerland and Cambridge, UK.