

**Shaping European Biodiversity Research
for a Sustainable Europe - Slovakia**

**Review based on information accessible to
authors**

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1. Introduction

The biodiversity assessment in Slovakia was conceptually came to anchor in National Biodiversity Strategy of Slovakia, which was approved by the Resolution of the Government of the SR No. 231 on April 1st 1997 and by the Slovak National Council on June 2nd 1997. The Strategy sets forth 24 goals and, within them 143 strategic directions for biodiversity protection in Slovakia. On the 1st of April, 1997, Government reflects the National Biodiversity Strategy of Slovakia in sectoral policies, strategies, concepts and programmes and in relevant legal instruments; and its implementing in accordance with provisions of the Convention on Biological Diversity to achieve conservation of biological diversity in Slovakia, sustainable use of its components and intensive protection of the environment. The research strategy of conservation of biological diversity has planned through general measures for conservation and sustainable use and main goal “Encourage research aimed at the conservation and sustainable use of biodiversity” and “Strengthen to the biological research related to National Strategy and international CBD implementation”.

The National Biodiversity Strategy of Slovakia offered several steps for providing of biodiversity research in Slovakia. To the most important belong undoubtedly increasing of financing of biodiversity related research, both basic and applied; development of integrated research programs focused on global environmental challenges.

Biodiversity research which directly contributes to the sustainable use of biodiversity in Europe should have based both in international conventions and good developed Europeans and national projects. In specified range is the mutual interconnection very desirable and necessary. The first group requires precisely targeted and complex research of the selected plants, animals and habitats with primary respect to endangered and rare species. The aims of projects can be various and more structured, joining several aspects of environment and nature.

Monitoring, particularly the long term ecological research offers ever-growing possibilities to provide early warning of environmental change. Conception of long-term socioecological research sites (LTSER) focuses on socioecological systems, i.e., complex, integrated systems that emerge through the continuous interaction of human societies with ecosystems (Redman et al., 2004). Selection criteria for publications and main topics followed the priority topics in proposal; main endeavour has been exerted for publications connected directly to projects. Reference to COM 216 suggests mainly for agricultural development, rural and forest policy; what we took into account by the selection of appropriate sources and documents as well.

The Pan-European Biological and Landscape Diversity Strategy was established to support implementation of the Convention on Biological Diversity. The Strategy introduces a coordinating and unifying framework for strengthening and building on existing initiatives. It does not aim to introduce new legislation or programmes, but to fill gaps where initiatives are not implemented to its full potential. Furthermore, the Strategy seeks to integrate ecological considerations into all relevant socio-economic sectors, and will increase public participation in and awareness and acceptance of conservation interests. The legal basis for implementing action under the Strategy is found in existing international agreements and treaties such as the Convention on Biological Diversity (CBD), the Bern, Bonn and Ramsar Conventions as well as the EU Habitats and Birds Directives. The Strategy is divided into five-year Action Plans, which identify the crucial actions towards achieving each set of five-year goals. The main objectives of

PEBLDS (protection of landscapes, different ecosystems and threatened species) require a comprehensive approach of biodiversity conservation, which is not entailed in other initiatives, but laid down in Action Themes 0 to 4. Action Theme 0 promotes to assist the introduction of National Biodiversity Strategies and Action Plans (NBSAP) in all countries of Europe by the year 2000. The NBSAPs should ensure the integration of ecological considerations into all sectors and to harmonise the national activities taken under different conventions and initiatives for the goods of preserving biodiversity.

2. Description of main findings of the selected studies

General statements regarding the state of biodiversity in Slovakia.

In Slovakia more than 12,000 plant species (including algae and fungi) and more than 28,000 animal species have been described so far. Of the total number 3,352 species of higher plants in Slovakia 29.6 % belongs to endangered species. Percentage of endangered species of invertebrates is from 3.2 % (butterflies) to 62.7 % (dragonflies). The most endangered species are lampreys, amphibians (100%) and reptiles (91.6%). These are followed by mammals (75.6%), fish (57%) and birds (55.3%). It can be said that most of critically endangered species of the Slovak fauna and flora comes from biotopes globally endangered in the whole Central Europe. A set of biodiversity indicators should provide the evaluation of overall situation and trends in biodiversity changes. The Ministry of Environment of the Slovak Republic prepared the set of indicators of the situation and biodiversity protection. The set of indicators is divided to the indicators of biodiversity situation, the indicators of pressures (processes, which endanger biodiversity) and the indicators of responses (the effectiveness of measures taken).

Discovery of new species or initiatives to protect endangered species

Carpathian Region initiative

The Carpathian ecoregion initiative represents a unique international cooperation; its goal is to protect nature in the globally important Carpathian mountain range.

The Carpathians are one of the last areas in Europe; this area is preserved in almost unchanged state. They are a unique refuge of wide mega fauna and unusually rich from the point of view of species diversity and presence of endemics. For these reasons the WWF included the Carpathians into important ecoregions in the framework of “Global 2000” network. More than 50 organisations from seven Carpathian countries –Romania, Ukraine, Slovakia, Poland, Hungary, the Czech Republic and Austria participated in the project.

Development and implementation of new policies that support conservation and sustainable use of biodiversity

The Slovak Biodiversity Platform, which was established on 14 April 2004, became in 2005 an advisory body of the Minister of Environment of the Slovak Republic for the area of biodiversity together with the Commission of the Convention on Biological Diversity. The Slovak Biodiversity Platform includes experts from 18 organisations working in the area of biodiversity, including non-governmental organisations.

National aspects of global issues such as biodiversity in freshwater, mountain and agricultural ecosystems, invasive alien species and the links between biodiversity and human health.

The most sensitive biotopes in the Slovak Republic are water ecosystems, which react to any change of water regime. In the last decades almost 10 % of the area was drained by meliorations

and water management procedures. Not only many organisms, but also special functions contributing to preservation of ecological equilibrium in the country, were lost. The areas richest in species are meadows and the most stable seem to be forest ecosystems, although in the last period the consequences of forest damages have shown off (air pollution, unsuitable composition, etc). The worst situation is in agricultural country, mostly in the southern Slovakia, where agricultural activities with all their negatives exclusively prevail. Current problems endangering biodiversity of vegetation in the last years have been caused by invading species spreading without a control and extruding domestic taxons. Mapping of invading species at the territory of Slovakia has been so far done in 317 protected areas and approximately 175 non-original plant species have been registered, of which about 20 species behave invasively. The connection between biodiversity situation and human health can be best seen in cultural and agricultural country. Agriculture contributes to intoxication of environment, not only by heavy metals, nitrates and phosphates. Remains of pesticides are also very toxic for human organism, of which polycyclic and aromatic hydrocarbons persist in soil for a longer time.

The National Strategy for the Conservation of Biodiversity

The basic document on biodiversity in Slovakia - The National Strategy for the Conservation of Biodiversity in Slovakia - identifies 24 goals.

1. Identify the status of biological diversity components.

In Slovakia, many inventories were and are being conducted with a focus on species, community, habitat and landscape levels. They include, inter alia, detailed mapping of forests types within single stands, Biotope Mapping Programme compatible with CORINE- biotopes, Wetlands Mapping Programme, etc. In contrast, some sciences, such as population biology, still need to be developed. In Slovakia, there is currently a shortage of taxonomists, biosystematists, population and community ecologists - specialists who identify and describe species, populations and communities. This shortage is related to the insufficient capacity of institutions to employ such specialist.

2. Build-up a comprehensive system for monitoring of changes in biodiversity on all levels.

There are several monitoring programmes in the Slovak Republic, both on the national and local levels as well. Monitoring of biota is being introduced as a part of the Environmental Monitoring System. Many agencies are collecting data for monitoring and information necessary for the conservation of biodiversity and the sustainable use of biological resources. These collected data and information are often unavailable because of the problems concerned with the exchange between management systems and irregular updating. Effective management systems are still lacking.

3. Encourage research aimed at the conservation and sustainable use of biodiversity.

Various research programmes and projects are being implemented on the national or local level. The Slovak Academy of Sciences and the universities play key roles in biodiversity research. Sectoral research institutions carry out specific problem-oriented applied research. However, no comprehensive biodiversity program covers the diverse issues relevant to the conservation and sustainable use of biodiversity.

The Action plan for implementation of the National Strategy for the Conservation of Biodiversity in Slovakia during years 2003 - 2010

The Action Plan for Implementation of the National Biodiversity Strategy (NBS) for years 1998-2010, as well as The National Environmental Action Programme II (NEAP II) of 1999 defined the following aims for the biodiversity protection:

- to create the conditions for natural animal migration (bioducts, aqueducts), to remove the migration barriers, to realise the monitoring and biotopes protection
- to update, in 10 year time intervals, the red lists of taxons and syntaxons of the endangered animal species
- to elaborate continuously the Action Plans for the Protection of the Particular Critically Endangered Species
- to provide the adequate protection of important bird areas and to improve nesting opportunities for endangered bird species
- to elaborate and to realise the Programme of the Amphibians Gene Pool Rescue by integrity revitalisation of their population in the country
- to realise the transfers, restitutions, reintroduction of selected animal species, to complete the construction of the breeding centres, emergency rescue facilities
- to limit the hunting of the big predators to the ecological necessity limit
- to build and complete technical and personal capacity of State Nature Conservation in order to ensure operative and qualified management and establishment of functional information system
- to strength capacity of botanical and zoological research
- to strength capacity for tasks of the European Platform for Biodiversity
- to create the Slovak Platform for Biodiversity

Priorities of the state interest:

1. Monitoring of the biodiversity state and analysis of initial level and with what related legislative regulations
2. Completing of databank of wild organisms and cultural stocks
3. Indication of the state of biodiversity development and biosensors
4. Programmes for sustainable conservation of biodiversity components
5. Programmes of revitalisation, restitution and keeping of biodiversity components
6. Programmes of education and training

Forms of tools for realisation of the particular concrete tasks are expressed in the three basic groups:

1. Research – package of particular tools outgoing from basic or applied research, which ensure completing of missing information database for realisation of Slovak national strategy of biodiversity
2. Programme – on the base of effective information and real state will be provided realisation of programme by evaluating of sectional conception, project or plan and that will be realised either at the position of the model (pilot) solution with crossing to system solution and/or will have an indicative character.
3. Activity – concrete activity or other activity, which outgoing from existing or running conceptions, plans or projects and/or from actual state assessment and evolution of biodiversity

and is unavoidable conservation of biodiversity components, or start-up of process, which will have long-term or sustained positive impact for state of biodiversity components.

Strategic direction: regular assessment of state of biological diversity assessment

- realisation of saprobiologic model of assessment in catchments of rivers Hron, Ipeľ, and Slaná – periodicity 5 years
- red lists of taxa and syntaxa update and publication
- study of butterfly (*Lepidoptera: Rhopalocera*) diversity in Slovakia, comparison with status 40 years ago, future trends definition
- establishment of regular inventory of old and regional cultivars of plants keeping

Strategic direction: support to finishing of currently running programs of biotopes and wetlands mapping and establishment of complex habitat database

- mapping of selected wetland and bog habitats
- finishing of mapping of biotopes

Strategic direction: extend knowledge of threatened species and ecosystems, poorly known taxonomic groups and taxonomic groups of economic importance

- study of biology and distribution of protected plants and animals, especially these included to annexes of Habitat and Bird Directives
- study of invertebrate diversity of bogs in Slovakia
- diversity and distribution of *Tardigrada* in Slovakia
- bionomy of relict species *Microtus oeconomus* subsp. *mehelyi* in Podunajská nížina lowland in perspective of its restitution
- research of beaver (*Castor fiber*) in Slovakia, study of biodiversity changes in newly colonised sites and damages caused by beaver
- establishment of biodiversity database of Biosphere Reserves

Strategic aim: Establishment of complex monitoring system for monitoring biodiversity changes in all levels

Strategic direction: To develop complex programme for biodiversity monitoring

- Enlarge of monitoring network in framework of Partial monitoring system Biota and to realise diversity monitoring in level of species and ecosystems for NATURA 2000 network
- Establishment of national network and strengthen of national node of Global Biodiversity Information Facility
- Recording and observation of forest status and development in Žiar basin in connection with technology change in aluminium factory
- Continue in building of information system of centre for Partial monitoring system Forests, to update database and database of methods

Strategic direction: To use new monitoring methods for better understanding of changes in ecosystems

- Realise monitoring in cave ecosystems
- Monitoring and modelling of pedological and climatic conditions in changing environment
- Monitoring of threatened species of bog habitats

- Monitoring of micro-flora of Danube river and its main tributaries in Slovakia

Strategic direction: Support to utilisation of biological indicators for monitoring

- Monitoring of wetland vegetation in alluvial ecosystems
- Utilisation of fish parasites for bio-indication of water pollution
- Mapping of lichens as indicator species

Strategic direction: Support to interconnection of monitoring systems

- Realisation of UN/ECE ISP Forest programme, continuation and enlarging of monitoring activities, strengthen of herb layer monitoring in forests
- Interconnects of databases of habitat mappings and ensure compatibility with other databases of different components of biodiversity

Environment Monitoring and Information System

The Concept of the Environmental Monitoring was adopted by the Government Order No.449/1992. On January 12, 2000, the Concept of the Integrated Environment Monitoring and Information System construction was approved by the Government Order No. 7. (hereafter referred to as Concept). Two of totally 10 parts of the Integrated Environment Monitoring and Information System are related to biodiversity monitoring: biota and forests.

Biota

The aim of partial monitoring system „Biota“ is to create the information system on plant species, animal species and habitats, threatened in European scale. Using bio-indication, this system should allow analysis and explanation of status and changes in populations of selected organisms and habitats. The objectives of Partial monitoring system “Biota” are:

- Knowledge of current status of biota
- Identification of population trends of monitored organisms
- Fulfil obligations of international conventions and agreements
- Provide necessary information for decision process in state administration
- Public information and supply of data on status of biota

Partial monitoring system Biota is primarily focused to monitoring of animal and plant of European importance and non-forest habitats. It is co-ordinated by the State nature conservancy of the Slovak Republic, Banská Bystrica. It includes 3 sub-systems: Animals, Plants, and Biotopes.

Following animal species and taxonomical groups are subject of the monitoring: white stork (*Ciconia ciconia*), chamois (*Rupicapra rupicapra tatrica*), turtle (*Emys orbicularis*), birds of prey (*Falconiformes: Aquila heliaca, Aquila chrysaetos, Falco peregrinus*), otter (*Lutra lutra*), European suslik (*Spermophilus citellus*), marmot (*Marmota marmota*), and bats (*Chiroptera: Rhinolophus ferrumequinum, Rhinolophus hipposideros, Rhinolophus euryale, Myotis mystacinus, Myotis brandti, Myotis emarginatus, Myotis nattereri, Myotis bechsteini, Myotis myotis, Myotis blythi, Myotis daubentoni, Myotis dasycneme, Vespertilio murinus, Eptesicus nilssoni, Eptesicus serotinus, Nyctalus leisleri, Nyctalus noctula, Nyctalus lasiopterus, Pipistrellus pipistrellus, Pipistrellus nathusii, Barbastella barbastellus, Plecotus auritus, Plecotus austriacus, Miniopterus schreibersi*). The standard methods for measuring of abundance and distribution of all monitored species in selected sites are used. The data are collected at least once per year.

In syb-system Plants following taxa are monitored: *Aconitum firmum* subsp. *moravicum*, *Alkanna tinctoria*, *Colchicum arenarium*, *Cyclamen fatrense*, *Daphne arbuscula*, *Dracocephalum austriacum*, *Echium russicum*, *Ferula sadleriana*, *Ligularia sibirica*, *Lilium bulbiferum*, *Liparis loeselii*, *Onosma tornensis*, *Ophrys holubyana*, *Pulsatilla slavica*, *Pulsatilla subslavica*, *Spiranthes spiralis*, *Thlaspi jankae*, *Tephrosieris longifolia* subsp. *moravica*, *Verbascum speciosum*. Methods used are based mainly on counting of flowering and sterile individuals of selected sites in sites, identified in advance. Measurements are performed once per year.

The subsystem “Habitats” was focused to non-forest habitats: wet meadows and tall wetland communities; sub-mountain and mountain grasslands; xero-thermophilous and rock communities. Currently a new methodology for monitoring of habitats of European importance is prepared.

Strategic targets: 1. Identification of the state of biological diversity components,

a) strengthening of institutional capacities, which deal with identification of biodiversity components

Strengthening of the capacities for zoological and botanical research, systematic biological research, strengthening of capacity for solving of tasks of European Platform for Biodiversity in Slovakia;

b) To enlarge a knowledge about the state of biological diversity components

Mapping of Slovak biotopes in compliance with NATURA 2000, Determination and state assessment of biodiversity of biotopes proposed for NATURA 2000, To establish documentary collective base of biotic and abiotic plant material, Slovak flora – vascular and non-vascular plants, mapping of the lichens state as indicatory species; Biodiversity of ecological and epidemiological important animals in landscape with various degree of anthropogenic pressure To make a proposal of areas for the system NATURA 2000 at forest soil fund.

c) To provide a regular assessments of the state of biodiversity components

Monitoring of state of microflora of the Danube River and its main tributaries in Slovak area, Realisation of saprobiological model of evaluation in Hron, Ipeľ and Slaná rivers catchment’s areas with periodicity approximately 5 years; To actualise (in 10 years intervals) and publish red lists of plant and animal endangered taxons, To establish the periodical inventory of the state of primarily wide-spread cultural species of plants on the up to the mark of old and regional varieties in Slovakia;

2. Control of processes negatively affected biological diversity – to identify processes impact threatening biodiversity and evaluate its impact, Invasive taxons of Slovak flora and its incorporation to vegetation – assessment of impacts to decreasing of biodiversity of native species, Analyse degrees of threatening of biodiversity by the pesticide protection of plants

3. Strengthening of the biodiversity conservation in-situ – to support realisation of programmes of the species rescue; anthropogenic structures of cultural landscape for conservation of biodiversity; Renaturation of floodplain ecosystems for purpose of the biodiversity restoration and ecological stability; stocktaking and theoretic bases of the animal biodiversity conservation in Slovakia

4. Strengthening of the genetic biodiversity conservation

To improve the inventory control aimed for determination of genetic diversity of domestic and non-domestic biological sources with the target to maximize conservation and economic utilisation of genetic sources. Analysis of extent and spatial distribution of genetic diversity of threatened species of coniferous species by means of molecular markers of chloroplastic and mitochondrial DNA.

5. Strengthening of the national capacities for conservation ex-situ

To establish collection of microbial cultures of microorganisms recorded in Slovakia together with genetic modified in laboratories. Establishment of the microorganisms collection, To finish the Collection of yeast cultures

6. Building of complex monitoring system for the biodiversity changes monitoring at all levels; Monitoring of impact of Slovak atomic power plants on biological diversity; Monitoring of the wetlands vegetation of inland ecosystems connected with water management modifications

7. Support of research oriented on biodiversity conservation and its sustainable utilization, Research of the microorganisms biodiversity state by means of molecular biology methods; Research of the soil microbial communities of non-disturbed ecosystems

8. Regulation of nationwide mechanism “clearing-house” related to biodiversity; National database of flora and vegetation of Slovakia.

The modern research and permanent training are very important tools for the conservation and enforcement of sustainable use of biodiversity components. Some scientific institutions reoriented research to this way and build basic level of information of the status and potential development of biodiversity. Main structure is Slovak Academy of Science and some independent organisations (non-state) for apply research. But the technical and scientific level and credibility depends from availability of financial recourses from state or non-state funding. Level of basic or apply research have reached very good standard in Slovakia acceptable also in abroad. We stress that limited finance create a barrier to follow all demands and requests linked to the implementation of NBS and CBD and the relevant decisions of COPs. Republic has been involved in the area of individual research and development of enviro-technologies and implemented enviro-technologies in industry are in great majority of cases imported. Science and research development in the field of biodiversity and application of the new knowledge into particular spheres of the society (especially to economy, social and natural sciences) becomes to be increasingly imperative. Positively can be evaluated the variety of regional or local activities that are initiated by municipality, universities, scientific and research institutes and interest groups (for example Sustainable Life Society, People and Water, Regional Environmental Centre). The ideas of SD or selected parts of local and regional AGENDA 21 have been successfully applied in tens of villages, towns, companies; they are gradually getting into the education at the universities, grammar and basic schools.

Gradually the contaminated sites issue is starting to be covered by legislation regulations, there were approved first methodical instructions aimed at synchronising of the procedures in the pollution research, realising of the risk analyses, or in the proposal of remediation proceedings.

FARMLANDS, RURAL AREAS

Europe's rich cultural and natural heritage is reflected in its traditional agricultural landscapes. A wide variety of natural conditions and farming traditions has created unique landscapes that are not only pleasing to the eye but provide the living conditions for many plants and animals. High nature value farmland comprises the hot spots of biological diversity in rural areas and also is characteristic by the extensive farming practices. Over the last few decades, however, biodiversity on farmland has declined seriously. Large scale rationalisation and intensification of agricultural production has taken its toll. Many marginal and extensively farmed areas were either improved or abandoned, resulting in considerably reduced habitat and species diversity. Semi-natural vegetation has declined rapidly and roughly two thirds of the currently endangered bird species depend on agricultural habitats. This has not gone unnoticed and the conservation of biodiversity on agricultural land is now high on the political agenda. Of the many relevant conservation efforts at European level, we would like to mention the pan-European Biological and Landscape Diversity Strategy (PEBLDS), the Bern Convention, the European Landscape Convention, and, at EU level, the habitats and birds directives and the biodiversity action plan for agriculture.

High Nature Value (HNV) farmland represents one of the most significant, but at the same time one of the most threatened, forms of ecologically sound entrepreneurship in Europe. HNV farmland is now a central focus of the European Union (EU) rural development policy. A detailed understanding of the concept of HNV farmland and of the complex needs of farming systems in HNV farmland areas is essential prerequisites for the formulation of effective policies in accordance with EU goals.

High Nature Value (HNV) farmland's importance in safeguarding Europe's biodiversity and landscape is now recognised at a continental level. This culminated in the agreement in Madrid in 2006, following on from the Kiev meeting of environment ministers, at which commitments were made to identifying and managing HNV farmland by 2006 and 2008 respectively.

At the same time, HNV farmland areas are rapidly changing - changes which are in danger of accelerating as economic prosperity gives farmers a wider range of options. Governments can address some of the problems, but given the fact that HNV farmland's profile has only recently been raised, the rapidly changing state of knowledge and awareness at all levels, and the amount of local variation in not only ecological relationships, but also social, economic and cultural factors, they need help in making the concept relevant at the local level.

HNV farmland will be central to EU policy in the 2007-2013 programme period. The Rural Development Strategy guidance issued by the Commission makes it clear that "to protect and enhance the EU's natural resources and landscapes in rural areas, the resources devoted to axis 2 (i.e. land management) should contribute to biodiversity and preservation of high nature value farming and forestry systems" as one of only 3 priorities for this theme of policy.

There is an opportunity to use national and EU funding to steer the development of HNV farmland areas in a way which maintains their natural value, addresses the aspirations of farmers and rural communities, and increases the degree to which the value placed on these sites internationally translates itself into direct reward for the ecologically sound entrepreneurs themselves.

The pressure to align policies to those of the EU for actual or prospective Accession States provides an opportunity to do much good, depending on the approach taken locally. The danger is that a rushed approach now will handicap policies for years to come.

Research related to the high-nature-value farmland and forest areas (including the Natura 2000 network) threatened with loss of biodiversity has been highly developed within the frame of the last 20 years in Slovakia.

The biodiversity value of farmland in Central and Eastern Europe

Large areas of farmland in Central and Eastern Europe (CEE) have retained a significant habitat value for many plant and animal species, despite intensive agricultural production methods and large land improvement schemes which frequently took place during the communist era. These valuable habitats are often concentrated in areas where traditional forms of land use have persisted. Overall, twice as many European species were found to have declined by more than 33 % of their population in Western Europe than in Eastern Europe. These data underline the importance of Central and Eastern Europe for nature conservation on the continent as a whole.

Implications of recent agricultural developments for biological diversity in CEE

Since 1990, the break-up of communist structures, the transition to a market economy, lack of consumption and the loss of important markets has led to a deep crisis for farming in CEE. Arable production declined by about a third during the last decade, while the number of livestock has fallen by almost 50 % for cattle and sheep, and 30-35 % for pigs and poultry. Fertilizer and pesticide use also decreased considerably, often by more than 50 %. The average farm size has become much smaller since collective farms have mostly been privatized and private farming is growing in importance. Many of the new private farms cover only one or two hectares, and are oriented towards providing subsistence or short marketing channels. The breakdown of communism has led to a collapse of farming in certain areas. This forced 'extensification' due to lack of access to credits, technology and because of the unclear property situation. Trends in farming have been towards production of arable crops and cereals which now account for nearly 60 per cent of the CEEC arable area. The trends in agricultural production outlined above have positive and negative effects on farmland habitats and the associated wildlife in Central and Eastern Europe. On the positive side, the general pollution load from farming on aquatic habitats, groundwater resources, etc. has strongly diminished.

The development of agri-environmental policy in Central and Eastern European

Land abandonment and the withdrawal of historic management have become a threat to farmland in CEE. An extrapolation of current trends in farming shows that, without intervention, a further concentration of agricultural production on the best soils and in the most productive herds is likely to occur, leading to an irreversible loss of high nature value farming systems. Experiences in the EU show that agri-environment programmes based on Regulation 1257/1999 can be a useful policy tool for maintaining extensive agricultural systems. The introduction of pilot agri-environment schemes under the pre-accession fund SAPARD provides an opportunity for the applicant countries to become familiar with this CAP policy instrument. However, the concept of support for countryside management is not totally new in Central and Eastern Europe. Several countries introduced aid schemes for marginal farming systems throughout the 1990s to provide support for poor farming communities and the maintenance of valued landscapes. These schemes are often similar to LFA and agri-environment measures in the EU (Petersen, 1999). However, the implementation of fullscale agri-environment programmes according to EU financial rules, administrative procedures and control systems remains a considerable challenge for all applicant countries. A number of technical assistance projects funded by the European Commission and EU governments support them in their efforts. All applicant countries have now taken up the

challenge of developing such agrienvironment programmes, mostly within the framework of the SAPARD programme.

Rurality in Slovakia

With respect to the nature of the territory and population density, Slovakia is a rural country. The average population density in the SR is 110 inhabitants per km². The Eurostat methodology defines a rural region as an administrative unit structured according to the level of rurality by the rate of number of people living in rural villages and the total number of inhabitants in the region. The criterion for classification as rural settlement and urban settlement is population density per km², with a boundary of 150 inhabitants per km². Significantly rural regions are regions where the share of the population of the region living in rural municipalities is greater than 50 %, prevalingly rural regions have a share of 15-50 % and prevalingly urbanised regions have a share of inhabitants less than 15 %.

With respect to regional level (NUTS III), single regions of the SR are classified as follows:

- Significantly rural regions:
 - Banská Bystrica region
 - Prešov region
- Prevalingly rural regions:
 - Trnava region
 - Nitra region
 - Trenčín region
 - Žilina region
 - Košice region
- Prevalingly urban districts:
 - Bratislava region

Conceptual policy for rural development

A document in the area of rural development politics at the national level with title of “Conceptual Policy for Rural Development in the Slovak Republic by the year 2005” was adopted in the year 1998. The basic objective of the document is to ensure an adequate standard of living and improvement of quality of life of the rural population, sufficient job opportunities and adequate incomes by means of economic activities in the areas of agriculture, forestry, water management, the processor industry, traditional crafts, services and tourism, creation of an appropriate social climate, protection and formation of a healthy environment. This document was the basis framework for the elaboration of strategy in the **SAPARD Programme**. 947 projects with a total amount of support from the SAPARD Programme amounting to SKK 4 622 804 thousand have been approved, which is 106.4 % of disposable public resources of the programme. Over-contracted projects are supported through the Rural Development Plan 2004-2006.

Rural development plan of the Slovak Republic

Rural development plan of the Slovak Republic 2004-2006 is submitted by the Ministry of Agriculture of SR designated as a responsible authority in the sense of Article 41 of Council regulation (EC) no.1257/1999 on support for rural development from the EAGGF. The plan is elaborated in the compliance with conditions set in the Article 43 of Council Regulation (EC) no.1257/1999 and in Annex II of the Commission Regulation (EC) no. 445/2002 laying down

detailed rules for the application of Council Regulation (EC) no.1257/1999 on support for rural development from the EAGGF. The plan allows also Commission Regulation (EC) No 963/2003 of 4 June 2003 amending Regulation (EC) No 445/2002 and Council Regulation (EC) No 1783/2003 amending Council Regulation (EC) No 1257/1999 as well a draft of Council Decision adjusted by Act of Accession.

Objective 1

The Objective 1 relates to regions of level NUTS II having its GDP per one resident measured by purchase power parity for the past three years lower than 75 % of the Community.

Objective 1 regions are: Western Slovakia (Region of Trnava (TT), Region of Nitra (NR), Region of Trenčín (TN), Central Slovakia (Region of Banská Bystrica (BB), Region of Žilina (ZA), Eastern Slovakia (Region of Košice (KE), Region of Prešov (PO))

- Renovation and development of villages and protection and conservation of rural heritage

Objective 2

- Investment in agricultural holdings
- Training
- Less favoured areas and areas with environmental restrictions
- Meeting standards
- Agri-environment and animal welfare
- Improving processing and marketing of agricultural products
- Forestry
- Afforestation
- Measures according to (Support adapting and rural development areas)
- Land consolidation (Reparcelling)
- Diversification of agricultural activities
- Measures according to (Specific measures for the new member states)
- Support for semi-subsistence farms undergoing restructuring
- Producer groups
- Technical assistance
- Complements to direct payments

Objective 2

Objective 2 refers to the territory of Bratislava region.

Slovak Republic has not included any transition regions of Objective 1 and 2 in its programming period 2004-2006 (phasing out 1 and 2 regions).

- Less favoured areas and areas with environmental restrictions
- Meeting standards
- Agri-environment and animal welfare
- Afforestation of agricultural land
- Measures according to (Specific measures for new member states)
- Support for semi-subsistence farms undergoing restructuring
- Producer groups
- Technical assistance
- Complements to direct payments

Plan structure

Rural development plan of the Slovak Republic 2004-2006 (Guarantee section of EAGGF) was elaborated in participation with the Sectoral operational programme Agriculture and rural

development of SR 2004-2006 (Guidance section of EAGGF). The plan describes the current situation in the relevant scope. It gives a view of the contemporary national policies in the respective areas with their priorities and measures. The existing pre-accession means (programme SAPARD) are evaluated in term of their impact as well as the utilization of existing capacities and institutions. The overall estimation of the current situation is showed in SWOT analysis and further ends in the description of programme strategy and proposal of objectives, priority and measures. The evaluation part shows an expected impact. The determination of consistence between the individual measures and financial tables indicate the share and financing method of individual measures in respective classification to means of guarantee section of EAGGF, national sources and the share of private sector. The summary covers a description of competent authorities and institutional framework for the programme realization.

FORESTS

Convention on Biological Diversity – National Strategy of Biodiversity Conservation

Synthetic information and strategies for forestry

The area of forests in Slovakia is 19,990 km² what equals 41 % of the total country's territory (49,036 km²). According to the functional categories, 71,01 % are commercial forests, 13,93% are protective forests and 15,06 % forests with special functions (watershed areas, nature conservation, recreation forests, forests damaged by air pollution). The average growing stock is 190 m³. It increased by 50 % during the past 50 years. The mean total annual growth has been 6,1 m³/ha. Contribution of forestry to the gross domestic product is 1,2 %. That of the wood industries is 4,5 % and more than 10 % if also furniture and pulp industries are included. The reprivatisation process in the forestry has progressed significantly and the target figure should correspond with the ownership structure in 1948. The state owned forests represent 45%, municipal, communal and church forests, and private forests 17 %. In the species composition, the broadleaves share 56,9 %, with dominating beech 29,6 % and oak species 13,71 %. Conifers represented by Norway spruce (27,5 %), European silver fir 4,6 %, Scots and black pine 7,73 %. Following the management criteria, geomorphology and ecological characteristics, 47 forest regions have been delineated in accordance with EU and OECD standards. Of the total forest area are semi-natural forests which originate from natural regeneration and in the species composition differs only little from the natural forests. This is typical of Slovakia in contrast to almost all countries of western and central Europe. More than seventy fragments of natural and virgin forests with total area 18,000-20,000 ha still exist in Slovakia (Korpel', 1990, 1993).

There is a link between the forest management and conservation

In the present, the local forestry is facing extensive imission damage of forests, effects of climatic extremes, and low environmental stability of forests where species composition was shifted in the past two centuries on behalf of coniferous species. These problems overlap with technical difficulties due to the mountainous topography of the country:

1. Accidental felling represents 65 % of the total annual cut.
2. Mountain forests in elevations over 700 m represent 33 % (641 000 ha) of the total forest area.
3. Fully 35 % of forests in Slovakia are on slopes steeper than 40 % (18°) what makes them unsuitable for conventional management and logging technologies.
4. The accidental felling and small size clear-cuts dominate over regular shelterwood regeneration in commercial forests.
5. As a consequence of all the above problems and limitations, the annual share of natural regeneration on the annually regenerated forest area has represented only 15-25 % in the Slovak forests in the long-term.

Develop national strategies, plans or programs, or adapt existing plans to address the provisions of the Convention.

Integrate biodiversity work into sectoral & cross-sectoral plans, programs and policies

The priorities and principles of the forestry policy in Slovakia have been declared in the “**Strategy and Conception of Development of Forest Management in Slovakia**” and the “**Principles of State Forestry Policy in Slovakia**”. The both documents have been discussed and approved by the National Council and the Government of the Slovak republic in 1993 (resolution of the Government No. 8 and 9/1993).

Resolution of the Government No. 731/1995 Conception of Forests Fund Protection in the Slovak republic, and the Resolution of the Government no. 549/1994 on Implementation Program to

Mitigate Anthropogenic and Especially Air Pollution damage in Forests should also be mentioned.

The officially declared principles of the forestry policy are (synopsis):

1. Forests in the territory of Slovakia are the national wealth. They represent a landscape-forming and ecologically stabilizing element of the country. The maintenance, protection and improvement of forests are a fundamental aim of Slovakia's forestry policy.
2. The principle of sustainable use of natural resources requires adoption of measures of gradual reduction and elimination of adverse impacts of air pollution from domestic and foreign sources of pollution, and other human activities having adverse impact on forests.
3. The public welfare functions of forests are irreplaceable and the maintenance of forests is in the interest of the state. Improvement of the production capacity of forests is in the interest of sustainable development of the wood processing industries and it represents a basic pre-condition for adequate economic yields and timber use in Slovakia.
4. The equality of ownership is guaranteed. All owners of forests are obliged continually, carefully, professionally, and timely tend forests, apply the forestry principles and principles of landscape protection. These goals can be met with the proper management systems.
5. Public use of forests is regarded as an important democratic principle which makes it possible for every citizen to enjoy a recreational and curative stay in the forests.
6. To ensure the reproduction and augmentation of forests in Slovakia, to secure their public welfare functions, including elimination of impacts of harmful factors on forests, the Government will allocate financial means through the State Forest Improvement Fund.
7. Taking into consideration the actual health status of forests as well as the fundamental changes in forest management and protection, the Government will guarantee pre-conditions for forest research focused on the most serious problems Slovak forestry, employing exact methods and efficient international cooperation.
8. To support the state forestry policy, the government will provide conditions for efficient state supervising over forests, which will secure permanent monitoring of forest conditions and forest management and protection, regardless of the ownership of the forests.
9. Relationships between the public and the forest owners (tenants) are of key importance for eliminating negative features of forest management and improving the biased attitude toward the forest use. The government will support activities of voluntary associations aimed at informing the public about situation in the forests and forest management in Slovakia, and will promote flow of information about forestry through the media.
10. It is necessary to create organizational and technical network for the protection of forests against fires, regardless the ownership. Fire protection needs allocation of financial means from the State Forest Improvement Fund, mainly for preventive aerial surveying, technical equipment and maintenance of the fire protection units.

Resolutions of the Ministerial Conferences on the Protection of Forests in Europe (Helsinki, June 16-17, 1994) reflect directly provisions of the Convention on Biological Diversity. Representatives of Slovakia signed all 4 Helsinki resolutions.

In the framework of the Helsinki follow-up process, the working group of experts appointed by the Ministry of Agriculture has been committed to set up **National Criteria and Indicators of Sustainable Forest Management** which official declaration by the Ministry of Agriculture is intended.

Legal Regulation System

The State Forestry Policy, the absolute priority of forest management has been maintenance, conservation and functional improvement of forest resources.

The forest management, use and conservation of forest resources are currently regulated by the acts. Forestry Regulations and Guidelines Relevant for Biodiversity Issues. Strategies, Legal Acts and Programmes to Address Provisions of the Convention.

Identification and monitoring

Animal Species Inventories on forest birds, small mammals and big mammals are available. Plant species inventory. Habitat and Ecosystem Inventories, inventory of genetic materials, Manage and monitor adverse impacts on biological diversity, Establish data management system for the above items. Indirect assessments of air pollution effect on forest ecosystems have been carried out in the framework of the international collaborative project ICP FOREST, in which the Forest Research Institute participates since 1988. The forest health (level 1) and ecosystem characteristics (level 2) have been periodically surveyed in 96 plots of a grid 16x16 km. However, only overall data are obtained at the national level by this system. 2. To obtain more information on the health and functional stability of forests for decision making and forestry planning, the ecological monitoring network 4x4 km comprising 1,289 plots was established by the Institute for Forest Management Planning in 1990

In situ conservation

Establish and manage a system of protected areas

Strict nature reserves on forest lands represent 69,560 ha in Slovakia, what equals to 3,5 % of total forest area (Vološčuk, 1994). In spite of their uneven vertical and horizontal distribution they are a basic frame for biodiversity conservation.

Manage biological resources outside protected areas

Protect ecosystems and natural habitats and maintain viable populations of species in natural surroundings.

1. Forest gene reserves

2. Forest Seed Zones, Wildlife Management Zones.

Approved seed collection Stands - The approved seed collection stands are used for procurement of the best available seed material for artificial regeneration of forests.

3. Protective forests Protective forests are mentioned here because of the absolute predominance of semi-natural forest stands with high conservation value in this category of forests. Priority of non-productive functions as well as generally low-intensity management is guaranteed by the special management plans in the protective forests. Their total area is 268,657 ha what equals to 13.93% of the total forest area.

Manage and develop sustainability in areas adjacent to protected areas

Rehabilitate and restore degraded ecosystem and promote recovery of threatened species

Prevent introduction of control eradicate those alien species which threaten ecosystems, habitats and species

Ex-situ conservation

Establish and strengthen ex situ capabilities, especially in the country of origin

Clonal Archives In forestry, attention is paid especially to ex situ conservation of endangered populations, ecotypes and most valuable genotypes of forest trees. Due to the fact that life expectancy of plus trees is rather limited, the clonal archives play an important role. The central clonal archive was established in 1986 in Ostrá Lúka on the area of 10.5 hectares. The

Seed Stands, Seed Orchards, Seed bank, Clonal Archives

Seed Bank Following the Guideline of the Ministry of Forests and Water Management on the Establishment and Maintaining the Forest Seed Bank in the Slovak Socialist Republic, the Forest Seed Bank was established with financial assistance of the Ministry in 1987.

Recover and reintroduce threatened species

Regulations on forest management planning require participation of the State Environmental Authority in the forest management planning as well as inspecting implementation of forest management plans.

The following conservation measures have been or will be undertaken in the forestry: Forest gene reserves with final area of 35,000 ha. Ex-situ conservation networks will be established for the black poplar, indigenous elms, and wild fruit species via regional clonal archives. The development program for forestry in the field of forest biodiversity was elaborated following the request of the Forestry Section of the Ministry of Agriculture in 1995.

Manage collecting procedures to avoid adverse impact on natural populations

Sustainable use of components of biological diversity

Integrate biodiversity considerations into national planning and decision making.

Sustainable use and conservation of biodiversity are recognized indirectly in the forestry related legislation and forestry policy in the terms of sustainable forest use, sustainable management, forest protection and forest conservation. "The Strategy and Conception of Development of Forest Management in Slovakia", and the "Principles of State Forestry Policy in Slovakia" approved by the Government and the National Council of Slovak Republic in 1993 (Government Decrees No. 8 and 9/ 1993). Central position of the principles of sustainable use of forests is accentuated and forests are declared a national wealth there: The term maintenance of forests is understood as the conservation and further enlargement of the forest area, and recognizing the role of forests in the system of landscape ecological stability. Protection of forests is understood as a goal-seeking activity aimed at restriction of the adverse impact of anthropogenic activities on forest resources in the both national and international levels and it includes also subsequent injurious impacts caused by biotic and abiotic elements. Augmentation of forests is understood as the realization of conceptual goals aiming better utilization of the functional potential of forests in Slovakia (KONOPKA, 1994).

Direct reference to the biodiversity and more nature oriented forestry practices is, necessary in both the legal system/forestry policy and operational forestry planning. The new Forest Act as well as currently prepared legal regulations and proposal of the Development Program for Forestry can be amended in this way.

Legal and Institutional Network for Decision Making and Forestry Planning

All forests in Slovakia are managed according to the forest management plans since 1950.

Principle of sustainable use of forest resources has been the officially declared, long-term priority in the commercial forests. A more detailed specification of criteria and indicators should be, however, necessary to avoid ambiguous situation in this field. Defining the "National Criteria and Indicators of Sustainable Forest Management" which started in the framework of the Helsinki follow-up process, should match this requirement. Overall indicators of progress in the field of "ecologization of forestry" should be: (i) the share of natural regeneration on annually regenerated area, (ii) area of forests managed by shelterwood and selection system, (iii) long term trends in the species composition. Several important features make the new regulation on forest management planning (Regulation no. 5/1995 Zb.) able to accommodate requirements concerning the protective, cultural and nature conservation functions of forests. Forest seed zones and wildlife breeding zones have been a part of regulation system on forest gene resources.

Forest gene reserves as large conservation units designed for in situ conservation of forest gene resources on ecosystem and a population basis, were established on the area of 22,110 ha.

Reform and manage biological resource uses to minimize adverse impacts on biodiversity

I. There are several legal acts and programmes under preparation, to where the provisions of the Convention on Biological Diversity can be addressed: The Forest Act which has been under preparation; A programme Development of Forestry in Slovakia, which has been under preparation and implementation of the Programme on Mitigating Anthropogenic and Especially Air Pollution Damage in Forests (Government Resolution no. 731/1994); The report Status of Forest Management in Slovakia (Green Reports), which are submitted to the Government every year. The report contains synthetic information on forestry in the previous year and intentions are declared there for the current and next years

II. System of ecological stability assessment, an interactive method for evaluating ecological stability of forests has been promoted in the forest management planning since 1992.

III. Education, training and research in this field has been carried out by the Faculty of Forestry, Technical University Zvolen, Institute for Training and Education of Workers in Forestry and Water Management, and the Forest Research Institute.

IV. In 1995, the Program for Forestry in the Field of Forest Biodiversity was elaborated in the framework of the research paid by the Forestry Section of the Ministry of Agriculture.

Impacts assessment and minimizing adverse impacts ensure that biodiversity considerations are taken into account in policies and programs of other sectors Survey of Activities.

System of ecological stability assessment, an interactive method for evaluating ecological stability of forests has been promoted in 1992.

Several monitoring systems have been operating to assess the effects of air pollution and other anthropogenic factors on forest ecosystems: Level 1 and 2 ICP FOREST 16x16 km, Ecological Monitoring 4x4 km of the Institute for Forest Management Planning, Ecological Monitoring 2x2 km in the Tatra National Park, Ecological Monitoring at the Danube Hydrocentral, and the Monitoring of Forest Damage by Air Pollution 1x1 km in Central Spiš. The Institute of Animal Production in Nitra has conducted monitoring of heavy metal contents and pesticides in small game.

Classification of ecological stability, an interactive method for evaluating current status and expected trends in the ecological stability of forests has been promoted in the forest management planning since 1992 V. Impact assessment of air pollution, climatic extremes and management measures, have been recognized in rehabilitation projects for forests damaged by air pollution.

Technical and scientific cooperation

Facilitate and Promote International and Scientific Cooperation in Conservation and Sustainable Use of Biodiversity

A. International Programmes:

I. European Forest Genetic Resources Programme (EUFORGEN) and collaborative programme of the International Plant Genetic Resources Institute (IPGRI) aimed at effective conservation and utilization of forest genetic resources in Europe.

II. Multi-Country Forestry Programme PHARE "Sustainable Forestry and Forest Biodiversity Conservation in Central-Eastern Europe".

III. National Ecological Network, a part of the ICTCN ECONET Programme

B. National Facilities I. The Seed and Reproduction Material Service in the Research Station Liptovský Hrádok of the Forest Research Institute.

II. Seed Bank and Genetic Resources Conservation Programme in the Tatra National Park, carried out by the Research Station of the Tatra National Park with assistance of the Global Environmental Facility (GEF) of the World Bank.

C. National Research Programmes - Human and Institutional Capacities

I. "Conservation and Integrated Protection of Forest Ecosystems' Biodiversity"

II. "Ecological Systems of Forest Management"

III. "Variability and Genetic Diversity of Forest Tree Species"

IV. "Breeding of Forest Tree Species for Deteriorated Sites".

V. Afforestation, Reconstruction and Management Technologies for Forest Stands on Former Agricultural Lands

VI Research in Forest Ecosystems",

VII Genetics and Breeding of Forest Tree Species

Joint Research Ventures

I. EU-UNEP International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forest) - monitoring, analysis and reporting in the field of forest health surveys. Research in the remote sensing applications, site and physiological surveys. Assessment of air pollution and climate impacts on forest health. Forest Research Institute has been taking part in the programme since 1988.

II. MARS Forest Ecosystem Mapping. A joint research venture of EU Institute for Remote Sensing Applications, Ispra, Italy. The ecosystem mapping sub-project is aimed at satellite based forest mapping and digital databases at a regional scale describing both the environmental conditions (forest type, health) and sectorial characteristics (tree species, timber volume, growth, age). Forest Research Institute and the Faculty of Forestry, Technical University Zvolen, have been taking part in the programme since 1994.

III. EU PECO Project Deposition of Ozone and Nitrogen Diogide to European Forests coordinated by the Institute for Environmental Protection Delft, Netherlands. Forests Research Institute has been taking part in it since 1994. Research on the effects of O₃ and NO_x in forest ecosystems.

IV. US Country Study Program on Climate Change: In Slovakia, the Forest Research Institute is responsible for a sub-project "Vulnerability and Adaptation Assessment for Forestry Due to Climate Change".

RURAL, LANDSCAPE AND FOREST ORIENTED RESEARCH – REVIEW OF PROJECTS

Very important and unique results of the scientific research related to landscape ecology, rurality, forests, and both biotic and abiotic components of ecosystems within the frame of Slovakia offered several scientific projects carried out by the Institute of landscape ecology during the last 10 years. Hundreds of published articles, numerous studies and practical recommendations related to sustainable use of biodiversity are the main outputs of this projects. As the second one, also important, we can consider the international cooperation a collaboration within the frame of European science and research community and planning of the new possible common activities.

Projects funded from European resources:

BIOPLATFORM – Establishment of the Slovak Biodiversity Platform, which consists from 5 institutes of the Slovak Academy of Sciences. Completing of the List of projects, necessary for the elaboration of the Action plan for biodiversity protection in SR. Active participation at Conferences on biodiversity in the EU Presidency countries. Participation at the discussions and preparation of the EPBRS materials.

European biodiversity forum implementing the ecosystem approach - NAS extension - BIOFORUM-NAS

The Regulation of the Ministry of Environment No. 55/2001 on landscape planning survey and documentation” defines principles used in preparation of landscape planning documentation and specify contents of individual hierarchical types of documents. Four hierarchical levels are distinguished:

1. Concept of the spatial development of Slovakia;
2. The landscape plan of region;
3. The landscape plans of municipality (cadastré);
4. The landscape plan of zone.

The concept of the spatial development of Slovakia (KURS) is based on the Regulation of the Slovak government No. 528/2002. KURS includes:

- Proposal of concept, protection and restoration of the cultural and natural heritage, concept of nature conservation and landscaping, inclusive of ecological stability of the Slovakia
- Evaluation of the quality of environment including requirements for evaluation of expected impact to environment

The obligatory part of KURS has 12 parts and “contains proposal of principles of spatial and functional utilization of territory that regulate the sectorial concepts and strategies in harmony with principle of sustainable development and with principles of protection of the environment”. The landscape plan of the municipality (cadastré) must include (among others): proposal of the functional land use; delineation of protected sites and buffer zones; proposal of nature protection and landscaping, including elements of the Territorial System of Ecological Stability and eco-stabilizing measures; concept of environment tending, eventually evaluation of predicted effects on environment; delineation of sites, requiring stricter protection; evaluation of proposed solution on the basis of environmental, economic, social and territorial effects; proposal of obligatory part. The obligatory part contains proposal of regulations of the territorial development with precisely formulated principles of spatial organization and functional utilization of the land. Thus includes obligatory rules for activities in the territory, conditions for land use and location of building activities. The landscape-ecological plan is an obligatory part of spatial planning documentation in each level:

“Landscape-ecological plan propose, on the basis of analysis of natural conditions of the territory, the most suitable form of utilization, ensuring careful use of nature, natural resources, maintenance of biodiversity and support of ecological stability of the landscape”. Reasons why landscape-ecological plan was included into land planning documentation:

- Tradition of landscape-ecological school in Slovakia
- The methodology of landscape-ecological planning (LANDEP) developed and used
- The concept of “Territorial system of ecological stability of landscape” (ÚSES) included into legislation: the Act on nature and landscape conservation No. 287/1994 Z.z. and 543/2002.

Economic and Technological Intelligence Project to Facilitate SMEs in Rural Areas to Participate in the Sixth Framework Programme Rural-ETINET

Rural-ETINET was a three-year ETI project (12. 2003 - 12. 2006) co-funded by European Commission, with the aim to set up and manage a network comprised of a series of thematic sub-networks of SMEs, with SME representatives and organisations that work with SME businesses in rural areas. There have been set up the network of 446 members, Slovak members have been 76. The network members were encouraged to participate in, and submit FP6 projects in rural issues, especially in the following sectors: Novel crops, On-farm processing, Forestry/wood chain, Waste management, Eco-systems. The methodology applied was much focused, utilising the knowledge and contacts of existing rural networks, organisations and associations from throughout Europe. SMEs will greatly benefit from theme-specific approach and assistance in networking as this raises their international competitiveness in larger consortia groups working with European Research programmes and particularly Framework Programme 6. The network members were encouraged and assisted to participate in the larger scale projects, in Thematic Priority 5 'Food Quality and Safety', 6 'Sustainable Development and Global Change' and 8 'Policy Orientated Research'. ILE SAS submitted project "Shaping Strategies of Management of Biodiversity Conflicts" (SHAPBIO), with participation of 9 European SMEs from the created network and organized 2 Info days concerning FP6 and FP7 for Slovak network members.

BIOSCENE – Scenarios for reconciling biodiversity conservation with declining agricultural use in the mountain of Europe

Aims of the project: The overall aim of BioScene is to investigate the implications of agricultural restructuring and decline for biodiversity conservation in Europe's mountain areas. The target is to provide practical outputs enhancing implementation of Natura 2000 and the European Biodiversity strategy through integration of agri-environmental, conservation and rural development policy. The project takes a case study approach to the analysis of the biodiversity processes and outcomes of different scenarios of agri-environmental change in six countries covering the major biogeographical regions of Europe.

Methods: Land cover maps in 3 different time layers were prepared through air photo interpretation. Maps of environmental variables were prepared from published or purchased sources and DEM. Data on vegetation, priority plant and animal species were collected using own data and data of the National Park Administration. Links between observed changes of landscape structure and environmental variables were studied using method CART analysis. Method ENFA (Ecological niche factor analysis) was used for modelling of habitat requirements of species.

BioHab – A Framework for the co-ordination of biodiversity and habitats

The key achievement of the BioHab project is the development of a standardised field recording system for Europe, involving about 100 habitat categories, that transcends the need for specialist knowledge. It will be able to provide valid, statistical estimates of habitats and link these with other habitat classifications and biodiversity. These results are important because it has now become feasible to produce consistent European figures for General Habitat Categories that could then be used for monitoring. This is possible because of the combination of efficient sampling and standardised procedures and represents a valuable product for a Concerted Action.

BIOPRESS – Linking Pan-European landcover change to pressures on biodiversity

Aims of the project: The project is aimed in identification and evaluation of land cover changes during last 50 years. It should to develop a standardised historical (1950 – 2000) land cover change product that will be extendable to the pan-European level. The land cover change matrices are analysed and then extrapolated to the pan-European level. The pan-European products will be used to link measures of land cover change to pressures on biodiversity

(intensification, abandonment, afforestation, and urbanisation) in combination with other biological, environmental and socio-economic data.

Methods: air photo interpretation using CORINE Land Cover (CLC) methodology and CLC level 3 level. Both back dating CORINE land cover 1990 (level 3) with aerial photos of the 1950's and interpretation and analysis of aerial photographs acquired in 1950, 1990 and 2000 was undertaken. Both statistical data and data on habitats of studied territory are used for linking of land cover changes to pressures on biodiversity and identification of socio-economic processes relevant to observed land use changes.

Joint EU/ICP monitoring programme – today 39 countries are participating in this joint EU/UNECE Forest Monitoring Programme. The legal basis for this Programme is formed by the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP) and until 2002 by the EU Regulation on the Protection of Forests from Air Pollution. Within the frame of Slovak research capacity, the Forest research institute has been actively participated.

GLORIA Europe – Global Observation Research Initiative in Alpine Environments is an ecological global change observing system that has a European component. It is focused on alpine ecosystems (elevation gradient from the natural treeline ecotone stepwise up to the limits of vascular plant life). The permanent plots were established and after 5-10 years the reinvestigation is planning. Results will offer base for the assessment of climatic changes within the frame of Europe.

EuroMAB network, founded in 1987, is a Man and the Biosphere (MAB) Programme's regional network of the MAB Programme, operating in the European and North American countries. It is a large network, with 30 countries with very different socio-economic conditions, varied cultural backgrounds and multiple languages. There are over 200 biosphere reserves in the region covered by EuroMAB.

European Topic Center for Nature Conservation and Biodiversity I

Reference list of species and habitats per country, including Malta and Cyprus, and per Biogeographic Region. Fact sheets for species proposed by accession countries and retained by the Commission for addition to Annex I. Of the Birds Directive and Annex II. of the Habitats Directive.

A Long-Term Biodiversity, Ecosystem and Awareness Research Network - ALTER-Net

This Network of Excellence (NoE) will develop the institutional structures, the capacity and the research necessary to provide co-ordinated approaches to research on the socio-economic drivers of biodiversity, the assessment of biodiversity and its change, the impact of the main drivers and pressures on biodiversity, the development of conservation options, public attitudes to conservation, and forecasting change in biodiversity, structure, functions and dynamics of ecosystems and their services.

Mobilising the European social research potential in support of biodiversity and ecosystem management – SoBio

The overall aim of SoBio is to stimulate relevant social research contributing to the management of biodiversity and ecosystems, and especially to the development of successful policies in this field. This will be achieved by providing an overview, assessing policy, identifying priority needs and stimulating new relevant research.

Sustainability impact assessment – tools for environmental, social and economic effects of multifunctional land-use in European regions – SENSOR

SENSOR will deliver novel solutions for integrated modelling, spatial and temporal scaling and aggregation of data, selection of indicators, database management, analysis and prediction of trends, education and implementation. SIAT will be made available to decision makers at the

European and regional level, providing user-friendly interfaces and scientifically sound procedures for the assessment of environmental and monetary responses of policy options. Cost-benefit and cost-effectiveness analysis of policy implementation will be an integral part of the SIAT's functions

EVALUWET – NAS – European valuation and assessment tools supporting wetland ecosystem legislation – inclusion of newly associated states.

The EVALUWET research project aims to synthesise and harmonise the various European policy approaches for the valuation and integrated management of wetlands, combining socio-economic and functional evaluation methodologies and tools at large river basin scales. As the final stage of a suite of more natural science oriented EU-funded research projects (FAEWE-1, FAEWE-2, PROTOWET) EVALUWET is more oriented towards socio-economic assessments and intends to contribute to an improved implementation of the forthcoming Water Framework Directive. This will be performed in close co-operation with all important stakeholders; taking into account the role ("value") of wetlands in the improvement of ground and surface water quality at catchment scale and the diverging interests of the stakeholders in this process.

CARBOMONT – Effects of land use changes on sources, sinks and fluxes of carbon in European mountains

Ecological Networks and Institutional Development in the Central Border region between Slovakia and Hungary;

Inventory of the Data on Species and Habitats for PHARE countries;

Evaluation of the project of the fifth framework programme - key action: City of tomorrow and cultural heritage;

Effects of Air Pollution on Forest Health and Biodiversity in Forests of the Carpathians Mountains.

Projects funded by the national grant agencies:

Ecological carrying capacity of the landscape;

Ecological evaluation of selected ecosystems of the Borská nížina Lowland;

Territorial relationships of landscape-ecological systems and their application in the landscape planning;

Biotores of semi-natural meadows and pastures of Slovakia - present state, endangerment, management;

Conditions and manners of floodplain forest ecosystems renaturation under purpose of regeneration of their natural species and structural diversity;

Vegetation map of eastern part of the Belianske Tatry Mountains - synecology of the fundamental communities of the area;

Ecological and hydrological optimization of the Paríž Creek watershed with emphasis on biodiversity conservation of Ramsar locality „National Nature Reserve Parížske močiare“;

Ecology and biodiversity of the water insects Exopterygota group (Hinton, 1963) in Slovakia;

Adaptation of microorganisms on environmental stress, stress proteins and their function;

National strategy of the sustainable development in the Slovak Republic, part II.;

Atlas of the Landscape of the Slovak Republic;

Regional Agenda 21 for Stredné Pohronie - part biota and nature protection; Preparation of tentative lists for nomination in to List of World Heritage;

Ecologization of the management in the Parna catchment;

Mapping of biotores of the alpine and subnival belt of the TANAP;

Successional changes of non-forest vegetation on abandoned areas in the Biosphere Reserve Eastern Carpathians and consequences on biodiversity and conservation value of the territory;
Increasing of ecological understanding of the Záhorská nížina lowland inhabitants;
Evaluation of ozone air pollution and its phytotoxic potential in the Carpathian forests;
Biological soil properties chronically loaded by foreign materials;
Changing Natural and Cultural Values in UNESCO Biosphere Reserves in Central and Eastern Europe;
Determination of landscape-ecological potential for optimum development of the territory;
The influence of nitrogen and phosphorus additions on an alpine grassland ecosystem;
The ecology, morphology, biodiversity and distribution of aquatic insects in Carpathian and Pannonian bioregions;
Methods of the evaluation cumulative effects in the landscape-ecological and environmental research;
Evaluation of the agricultural landscape in transitive economics;
The rural agricultural landscape and its biodiversity in transforming socio-economic environment;
Ecological evaluation of forest ecosystems in selected regions of the west Slovakia;
Biodiversity and ecology of selected insect groups of grassland and bush communities in the Borská nížina lowland;
Phytocoenological and ecological characteristic of the timberline forests of the Western Carpathians high mountains – Swiss stone pine - spruce forests;
Long – term ecological research in the Danube floodplain forests influenced by underground water level changes - Part 2;
Creation of environmental limits for sustainable development (on example of model territories);
Integrated Landscape Management;
Conservation and management of non-forest habitats in the agricultural landscape;
Landscape changes of the Biosphere Reserve Tatra in recent 200 years in relation to changing natural and socio-economical conditions;
Actualisation of the supraregional territorial system of ecological stability in accordance with NATURA 2000;
Wind parks (Birds monitoring for the prepared wind parks localities)

3. Conclusions

The biodiversity research in Slovakia is provided by the research institutions, which through the national and international projects bring the valuable and scientific results. This base created by scientific data is unavoidable for decision process and has been projected into the practical actions and recommendations.

The Action plan for implementation of the National Strategy for the Conservation of Biodiversity in Slovakia during years 2003 – 2010 and the National Biodiversity Strategy are undoubtedly the basic documents with exact and logical structure necessary for clear and successful implementation of biodiversity in Slovakia.

Main messages of the review are:

1. Sustainable use of biodiversity in Europe needs above all the powerful and qualitative legislation in the sphere of biodiversity.
2. Obtaining of valuable and useful scientific data needs successful international and national projects.
3. Superior international projects offer unique base for the establishing of cooperation within the frame of Europe and producing valuable scientific data, which allow a comparison of several biodiversity components among particular data and are the fundamental prerequisite of Pan-European fundamental documents and conventions.
This process contributes essentially to sustainable Europe.
Further research should be based on monitoring research programmes; as very progressive seems to be Long-term ecological research sites (LTER) and Long-term socio-ecological research sites (LTSER), which will allow quickly and reliable exchange of scientific data and will supply to the better assessment and forecast of biodiversity changes.

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