GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

MINISTRY OF ENVIRONMENT
AND PHYSICAL PLANNING
REPUBLIC OF MACEDONIA

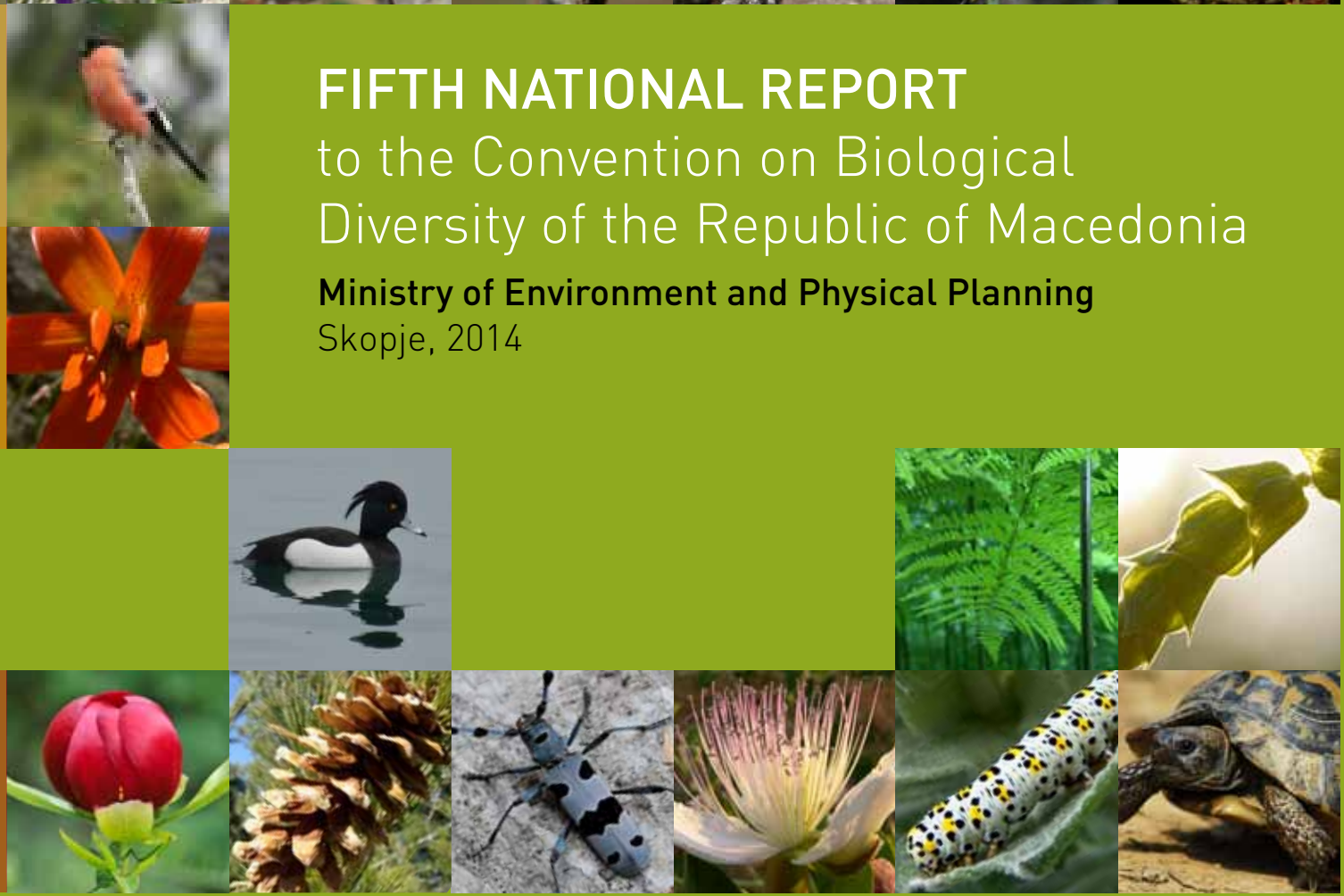
UNEP

FIFTH NATIONAL REPORT

to the Convention on Biological Diversity of the Republic of Macedonia

Ministry of Environment and Physical Planning

Skopje, 2014



FIFTH NATIONAL REPORT

to the Convention on Biological Diversity of the Republic of Macedonia

Ministry of Environment and Physical Planning
Skopje, 2014

INFORMATION CONCERNING THE REPORTING PARTY

Contracting Party	**REPUBLIC of MACEDONIA**
NATIONAL FOCAL POINT	
Full name of the institution	**Ministry of Environment and Physical Planning**
Name and title of contact officer	**Daniela Rendevska,** **Head of Unit for multilateral cooperatioon**
Mailing address	**Goce Delcev bb, MTV building, 1000 Skopje,** **Republic of Macedonia**
Telephone	**+389 2 3251 438**
Fax	**+389 2 3220 165**
E-mail	**d.rendevska@moepp.gov.mk**
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	**Administration of Environment,** **Department of Nature Protection**
Name and title of contact officer	**Vlatko Trpeski,** **Head of Department of Nature Protection**
Mailing address	**Goce Delcev bb, MTV building, 1000 Skopje,** **Republic of Macedonia**
Telephone	**+389 2 3251 462**
Fax	**+389 2 3220165**
E-mail	**v.trpeski@moepp.gov.mk**
SUBMISSION	
Signature of officer responsible for submitting national report	**Nurhan Izairi,** **Minister of Environment and Physical Planning**
Date of submission	**October 2014**

Fifth National Report to the Convention on Biological Diversity of the Republic of Macedonia is prepared in the framework of the project "Support to the Republic of Macedonia for revision of National Biodiversity Strategy and Action Plan (NBSAP) and preparation of the Fifth National Report to the Convention on Biological Diversity".

Project duration:	January 2013 – December 2014
Financed by:	Global Environment Facility (GEF)
GEF Implementation Agency:	United Nations Environment Programme (UNEP)
Beneficiary:	Ministry of Environment and Physical Planning

Expert support for preparation of the report:

Robertina Brajanoska, M.Sc., National Consultant for Project Coordination

Acad. Vlado Matevski, Team Leader

Avramoski Oliver, PhD

Velevski Metodija, PhD

Prof. Velkovski Nikolco, PhD

Prof. Ivanovska Sonja, PhD

Prof. Karadelev Mitko, PhD

Prof. Kostadinovski Mitko, PhD

Prof. Levkov Zlatko, PhD

Prof. Melovski Ljupco, PhD

Melovska Natalija, M. Sc.

Doc. Slavevska Stamenkovic Valentina, PhD

Stipcarov Boris

Prof. Hristovski Slavco, PhD

Prof. Dzabirski Vladimir, PhD

Acknowledgment to the Nature Department staff in MEPP for providing support and information for the preparation of the report.

Translation: Vera Mircevska Jovanovska

Photos: Ljubo Stefanov, except on p. 85 Despina Kitanova

CONTENTS

ABBREVIATIONS

CBD	Convention on Biological Diversity
CEPF	Critical Ecosystems Partnership Fund
CLC	Corine Land Cover
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
ECNC	European Centre for Nature Conservation
EEA	European Environmental Agency
EIA	Environmental Impact Assessment
EU	European Union
EUNIS	European Nature Information System
GEF	Global Environment Facility
GIZ	German Society for International Cooperation
GMO	genetically modified organisms
IBA	Important Bird Areas
IPA	Important Plant Areas
IUCN	International Union for Nature Conservation
MAFWE	Ministry of Agriculture, Forestry and Water Economy
MASA	Macedonian Academy of Science and Arts
MEPP	Ministry of Environment and Physical Planning
MES	Macedonian Ecological Society
NBSAP	National Biodiversity Strategy and Action Plan
NP	National Park
NUTS	Nomenclature of Territorial Units for Statistics
PI	Public Institution
REC	Regional Environmental Center
SDC	Swiss Agency for Development and Cooperation
SYB	Statistical Yearbook of the Republic of Macedonia
TDZ	Tourism development zone
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WWF	World Wild Fund

SUMMARY

The Fifth National Report was developed following the recommendations by the Secretariat of the Convention on Biological Diversity, and has the following structure:

- Part I - Overview of the status of biodiversity (trends and threats) and implications for human well-being (presented data primarily relate to the ten year period 2003-2013)

- Part II - Development and implementation of National Biodiversity Strategy and Action Plan, and the mainstreaming of biodiversity

- Part III - Progress towards achieving the Aichi Targets by 2020 and contribution to the relevant Millennium Development Goals by 2015

- Annexes –information on the process of preparation of the Report preparation, lists of implemented relevant projects and adopted bylaws based on the Law on Nature Protection, a review of multilateral agreements in the fields of environment and nature, and numerous publications, research papers, reports of completed relevant projects, and information obtained from the MEPP and other institutions and organizationsused to prepare the Report.

Part I

The Republic of Macedonia is situated at the center of the Balkan Peninsula and is part of the wider Mediterranean Region that has been identified as the third most important biodiversity hotspot in the world with respect to the number of endemic plant species (Myers et al. 2000). Accordingly, although relatively small in territory (25.713 km^2), the Republic of Macedonia holds an important position on the global map of biological diversity hotspots.

Most of the territory (44.1%) lies on altitude between 500-1000 m. Geomorphology and relief are characterized by domination of hilly terrains (almost 80% of the territory) and valleys are connected with deeply incurved canyons and gorges. Four watersheds exist in Macedonia of which river Vardar's is the largest one, covering about 80% of the national territory. In the southern lowland areas the climate is sub-Mediterranean, it is continental throughout the country and mountainous on altitudes above 1500 m a.s.l. Eight climatic-vegetation and soil regions have been defined, the largest being the warm sub-Mediterranean-continental zone of the pubescent oak. An average precipitation in mountainous areas is 1.000-1.500 mm/year, and 600-700 mm/year in the valleys, Ovche Pole plain being the driest area with only 490 mm/year.

According to the last Census in 2002, there are 2 022 547 inhabitants in Macedonia with average density of 78.7 inhabitants/km^2. About 57 % of the population lives in urban centers (half of which concentrated in the capital Skopje) and the rest 43 % live in rural areas.In administrative terms, the country is divided into 80 municipalities and the City of Skopje (as capital city) composed of 10 municipalities. Eight statistical planning regions (NUTS) were established on the territory of the Republic of Macedonia in 2007, namely: Vardar, Eastern, Southwestern, Southeastern, Pelagonia, Polog, Northeastern and Skopje regions.

About biodiversity

During 2013, 28 most important (key) ecosystem types/groups (some of them with anthropogenic origin but with some importance for biodiversity) have been identified, which equals to 177 habitat types of level 3 (according to EUNIS classification, with necessary modifications), indicating high diversity of ecosystems in Macedonia.

Forest ecosystems cover about 38.5 % (988835 ha) of the country's land surface and 44% is agricultural land (1120000 ha). About 90 % of the forests are state-owned. Regarding the forest types dominant are deciduous forests (22.3%), followed by the mixed forests (11.6) while the coniferous (2.8%) are least present. Balkan endemic species Macedonian Pine or Molika(Pinus peuce) forms large forest stands (app. 1.800 ha)in Pelister National Park.

The structure of agricultural land is composed of cultivated land (or 44.2%) mainly concentrated in valleys (arable land and gardens, meadows, vineyards and orchards) and pastures (or 55.6%) located mainly in the highlands. Pastures of high quality are located in almost all high mountain areas, especially in the western part of the country. Grassland ecosystems occupy a large part of the country, occurring often as secondary habitats primarily caused by the permanent degradation of forest phytocenoses and re-colonization of abandoned farmland by grassland species.

There are three larger lakes of tectonic origin (Ohrid, Prespa and Doyran) and 43 small glacial lakes, approximately half of which are found on Shar Planina Mt.

Wetland vegetation, which used to develop over large areas of swamps and marshes in the country's entire central valley, underwent great changes due to the implementation of previous drainage measures which resulted in most of these ecosystems being converted into arable land. The relict wetland communities that are present exist in a fragmentary state (7 smaller marshes still exist) and their flora and fauna species are the most endangered.

The various ecosystems and habitat types in the country host about 1700 algal species, 3200 vascular plants, over 2000 fungi, 450 lichenes, 13000 invertebrates 85 fish species nd cyclostomata, 15 amphibians, 32 reptiles, 333 birds and 84 mammal species. The endemism among these groups is large, with at least 150 endemic algae, 120 vascular plants, over 700 invertebrate species and 27 endemic fishes. The existing figures on biodiversity are incomplete due to the fact that the data on some taxonomic groups are scarce or lacking altogether.

The 3.5 million years old Lake Ohrid is the center of the endemism (with 212 endemic species), being one of the global centers for endemism as well. Another example of ecosystem of global importance is the Lake of Prespa (transboundary ecosystem), where the largest nesting colony of Dalmatian Pelican in the world is sustained. A small population of the Eurasian Lynx, which has been isolated from the rest of species' population for a long time (some authors consider it as a distinct subspecies – the Balkan Lynx) populates the territory of the western part of Macedonia and eastern part of Albania (conservation estimates 20 - 44 adult individuals). Besides Ohrid and Prespa lakes, about 9671 km^2 or 38% of the country territory fulfill the criteria for Key Biodiversity Areas.

Status and trends of biodiversity

The volume of knowledge of biological diversity has enhanced the ten year period 2003-2013: around 250 taxa new to science have been described (6 higher plants, more than 170 taxa of diatomeous algae and 48 invertebrate species) and hundreds of previously unregistered species have been registered for the first time (23 higher plants, 237 fungi species, etc.). Quantitative assessments of the populations of certain priority species (e.g. Balkan lynx, several bird species) have been made, and trends in the populations of certain bird species (Griffon Vulture, Egyptian Vulture, Lesser Kestrel, Imperial Eagle) have been documented. Significant progress has been noted in the knowledge of algal diversity (primarily diversity of silicate algae - diatoms) and fungal diversity; Intensive floral investigations under the project "Flora of the Republic of Macedonia" have proceeded; synthesis overview of the Macedonia brioflora was published for the first time; numerous data and maps of distribution of 32 reptile species in Macedonia was published in 2014; investigations of herpetofauna, birds, mammals; and more than 300 scientific works dealing with biological diversity of invertebrates in Macedonia have been published. The first report aimed at comprehensive presentation of the status of biological diversity in Macedonia is Analysis and valorization of Biological Diversity and Catalogue of species, developed in 2009. Intensive vegetation surveys focusing on different vegetation types that are considered less explored continued - attention was paid to phytocenological research on hilly pastures developing on silicate and, above all the limestone surface, early spring ephemeral grassland vegetation, the vegetation of the high grassland plants that grow beside mountain streams, some hazmophytic communities, as well as the forest and mountain vegetation on Galicica mountain.

Due to intensified threats in the last ten year period, negative trends in the populations of certain species have been recorded:

- full extinction of Lammergeier and Black Vultures from Macedonia and drastic decline in the number of Griffon (see Figure 5) and Egyptian Vultures (see Figure 4), primarily as a result of easily accessible chemical preparations used for carnivorous animals and dogs poisoning;

- decline in the population of Lesser Kestrel (*Falco naumanni*) by at least 70%; decline in the chamois population size has been observed in NP Mavrovo (in Korab area, mainly due to poaching) and Multi-purpose Area Jasen (currently unknown reasons)

- Extinction of certain plant species (*Acorus calamus, Sagitaria sagitifolia, Lysimachia thyrsiflora* and *Aldrovanda vesiculosa*) that have been recorded earlier remained.

- Inappropriate, and sometimes illegal, collection of some plant species (ex. *Gentiana lutea, Gentiana punctata, Arctostaphyllos uva ursi, Sideritis scardica* (Bistra Mt.), *Sideritis raeseri*, etc) have resulted in depletion of their population and degradation of habitats.

The only positive finding relates to the species *Ranunculus lingua* (only few specimens) in the swamp near the village of Bansko and a small population of *Gentiana pneumonanthe* was detected in the shore area of Mavrovo Lake.

Main pressures - drivers of change to biodiversity (direct and indirect):

A total of 17 threats of very high priorityhave been identified (Table 5) based on completed analysis of threats carried out in accordance with the current EU classification of threats used by Member States to report under Article 9 of the Habitat Directive and using 5 different criteria for prioritization. The following threats or sectors have led to decrease of populations in many species, and reduction of coverage of priority habitats:

- Agriculture - succession of habitats due to depopulation of rural areas as a result of economical changes on one hand, and intensification of agricultural production on the other threatens many habitats

- Use of mineral resources - intensified economic growth has often been based on unsustainable use of the natural resources, particularly water and minerals, leading to habitat destruction and alteration

- Urbanization - continued and discontinued urbanization threatens some of the remaining lowland priority habitats, especially marsh habitats.

- Forest fires are one of the root causes for modification of habitats – a total of 92223 ha were destroyed by forest fires in the period 2003-2013, particularly thermophilous oak forests and shrublands that are characterized with high diversity and/or presence of species characteristic for Mediterraneancoastal forests and maquis biome.

- Surface water intake for energy production and irrigation - almost all rivers are under great direct and indirect anthropogenic pressures (e.g. reservoirs that have been built on some rivers).

- Other contributing drivers include unsustainable hunting and fishing practices, unsustainable/ uncontrolled collection of wild plants and fungi species, illegal logging, decline in pray availability, pollution of groundwater, etc.

- Climate change - total of 18 habitats and 58 vulnerable plant species have been identified as potentially affected by climate change on the basis of conducted modeling of habitats and species, as well as expert estimates in the process of elaboration of the Third National Communication on Climate Change (MEPP 2014).

Root causes leading to biological diversity loss in Macedonia are typical for developing countries

that face transition from one system of political ruling and governance to another and cope with poverty. The country stands on a cross-road between more intensive economic development (intensive exploitation of natural resources, enlargement of agricultural land under the management of a small number of economically strong companies, etc.) and ever growing devastation of natural values. Lack of capacity to specify efficient measures for protection and poor coordination among sectoral strategies is another classical underlying cause.

Benefits from biodiversity and ecosystem services

The difficult economic transition over the last decade has negatively affected the country's biodiversity. The economic benefits arising from the use of biological resources have often outweighed investment in protection measures. Although utilized on daily basis, in form of timber, erosion prevention, fish stocks and for recreation, the economical benefits from the biodiversity are not widely recognized or valued.

The Convention on Biological Diversity highlights the importance of biological diversity for evolution and for maintaining ecosystems of the biosphere. The ecosystem functions in turn have instrumental value in meeting human needs of specific services that contribute to human well-being. This idea is captured by the increasingly popular concept of ecosystem services. The acceptance of the concept in Macedonia has been limited, however, both among scientists and practitioners. Study on valuation of natural values of Shar Planina and estimation of their market value, prepared in 2007, pioneered the application of the ecosystem services concept and the related concept of environmental economic valuation. More recently, in 2013, a study on the economic values of ecosystem services in Ezerani Nature Park made direct use of the concept of ecosystem services to assess the economic benefits arising from this protected area.

The ongoing process for updating Macedonia's National Biodiversity Strategy and Action Plan provided an opportunity to integrate expertise and knowledge from all sectors in the country and identify links between biodiversity and ecosystem services. A preliminary mapping of the potential to provide ecosystem services at the national level has been conducted during this process. Recognizing that land-cover change is one of the most important drivers of change in ecosystems and their services CORINE data sets were used to map the overall (theoretical) potential of all land cover classes in Macedonia to provide one or more of 29 ecosystem services. This preliminary study has demonstrated that mapping of ecosystem services is a valuable approach in the application of the concept of ecosystem services in science as well as in practice. The approach adopted in the study helped establish the scientific link between ecosystem services and human well-being by focusing on the ecosystems from which services are derived and the people who depend on them. It also showed that the data to develop indicators for regulating ecosystem services at the national level are practically non-existent. Appropriate research projects, monitoring schemes, capacity building and further national ecosystem service assessments are therefore needed in the future to develop suitable indicators for these and other types of ecosystem services.

The provision of ecosystem services is directly related to ecosystem integrity that is in turn affected by human activities and decisions, such as change in land use patterns and technological progress. Land cover changes are therefore the result of such impacts which in turn affect the capacity of ecosystems for providing services to humans. This was evident from the comparison of the CORINE land cover data sets from 2000 and 2006. By combining CORINE land cover data of 2000 and 2006 and the estimates for the (theoretical) potential of land cover classes in Macedonia to provide one or more of 29 ecosystem services, it was possible to assess the change in the potential to provide services by the ecosystems in the country for the period 2000-2006. A more detailed analysis of the observed land cover changes helped estimate the difference in the potential to provide each of the provisioning, regulatory and cultural services by the ecosystems in the country. For instance, the observed sharp decrease in the potential to provide the ecosystem service "Pollination" is the result of the conversion of the land cover class "Fruit trees and berry plantations" into several other classes which lack the potential to provide this particular service.

Part II

Development of NBSAP and its implementation

The first National Strategy and Action Plan for Protection of Biological Diversity was adopted in 2004.The results of the completed analysisof the first Biodiversity Action Plan show that only 64 actions (29%) have been implemented, 57 actions (26%) have been implemented partially, and 96 actions (around 44%)have not been implemented of the total number (217) of defined actions (Table7).Obstacles to NBSAP implementation that have been identified include, among others, insufficient financial resources, lack of capacities, education and public awareness, and insufficient mainstreaming of biodiversity into different sectors.

The First NBSAP is currently under revision;during this process19 new national targets (in line with Aichi targets) have been drafted and grouped into four strategic goals and biodiversity action plan is under development.

National Biodiversity Policy

Some progress has been made in relation to developing legislative and institutional frameworks for nature protection and improving the system for protecting natural values.

General principles and measures for biodiversity conservation are described in the Law on Nature Protection (adopted in 2004) with more amendments, mainly due to the ongoing process of transposition of EU Acqui into national legislation. Additionally, legal framework includes a number of legal acts relevant for biodiversity conservation and the sustainable use of natural resources (e.g. legislation on water management, forestry, hunting, agriculture and rural development, fishing, etc.). Most of the multilateral environmental agreements (relevant to the field of nature protection) have been ratified by Macedonia. The country also participated in developing a Pan-European Biological and Landscape Diversity Strategy that expanded the scope of the Convention on Biodiversity to landscapes using the Pan-European Ecological Network as a main tool for its implementation, based on which the National ecological network (MAK-NEN) was developed (Figure 17).

Nature protection division with 4 units, including GMO Unit (Figure 13) has been established as part of the Administration of Environment within the Ministry of Environment and Physical Planning to be responsible for the execution of the expert works in the field of nature protection. Other departments within MEPP as well as many other stakeholders have significant role in the conservation of biological diversity in the country. Many national committees, councils and inter-sectoral groups have been established as mechanisms for cooperation at national and international level, however most of them with insufficient activity.

Biodiversity conservation activities

Biological diversity protection on national level is carried out through protection of species and their populations, conservation of natural habitats and designation of protection areas.

The lists of strictly protected (a total of 194 species) and protected (820) wild species were adopted in 2011 without prior categorization of species based on their threat status.Red list of fungi was developed in 2012 by scientific experts, but it has not been adopted yet. Protection of some species nominated as game (110 bird and 23 mammal species) is provided by the Law on hunting.Most of these species (74 birds and 9 mammals) are under full protection. Collection and trade of threatened and protected wild species of plants, fungi and animals and their parts is conducted only upon prior acquisition of license for collection and license or CITES certificate for trade, as prescribed by the Law on Nature Protection.

In the period 2004-2011, numerous activities were carried out towards conservation of plant genetic resources used for food and agriculture Collection of 2666 specimens of 89 different species (Table 12) is maintained in the Gene Bank at the Institute of Agriculture in Skopje. With regard to genetic resources in livestock in Macedonia, there is modestly precise data. Two

breeds of indigenous domestic animals have been given the status of an endangered population.

Conservation actions have been identified for the following species: Prespa trout (*Salmo peristericus Karaman*), Macedonian ground squirrel (*Spermophyllus citellus karamani*), and bats in Prespa region, mountain tea (*Sideritis raeseri*) on Galicica Mt., Greek juniper forest and reed belt in transboundary Prespa region. Also, measures for conservation of several flora species (*Drosera rotundifolia, Salvia officinalis, Verbascum lesnovoensis*) have been undertaken by the local population.

Currently, the network of protected areas in Macedonia comprises 86 areas, covering about 9% of the country's territory (Table 13). The Law on Nature Protection provides solid legal basis for establishment of representative and efficient system of protected areas and encourages also international cross-border connection with protected areas of neighboring countries. Protected areas network is not a coherent system, it is in transitional phase i.e. obligation for re-proclamation of all protected areas proclaimed before 2004 (deriving from the Law on Nature Protection) implies revalorization and preparation of new acts for proclamation under the new categorization of protected areas (harmonized with IUCN). Proposal of the representative network of protected areas was developedin 2011 (Figure 15) comprising 99 areas covering about 20% of the country territory.

International important areas have been identified (24 important bird areas, 42 important plant areas, 8 prime butterfly areas, key biodiversity areas). Two sites (Prespa and Dojran Lakes) are designated as wetlands of international importance (Ramsar sites) and Ohrid region is proclaimed as world natural and cultural heritage. Prespa Park was established by the three neighboring countries (Macedonia, Albania and Greece).

National Emerald network (Figure 16) was designated including 35 Areas of Special Conservation Interest (ASCI), being an important tool for countries concerned to prepare for future work on Natura 2000 and compliance with the EU Habitats and Birds Directives.

A number of areas of relevance for the protection of biological diversity in Macedonia (mountain and forest ecosystems, aquatic ecosystems) are situated in border regions. Therefore, the Republic of Macedonia has established cooperation with neighboring countries (on expert and institutional level) and takes part in different initiatives/ activities for protection: Prespa Park, bilateral protection of Lake Ohrid, Drin river basin management plan, transboundary biosphere reserve Ohrid-Prespa, revitalization and protection of lake Dojran, establishment of Balkan Green Belt, activities for conservation of Osogovo Mountains as transboundary priority area along the Green Belt, initiative for designation of Shara Mt., Jablanica mountain identified as potential national park, participation of Macedonian 3 national parks in Dinaric Arc Parks initiative, etc.

For implementation of programmes for work under the Convention on Biological Diversity,in the last few years, activities were focused mainly regarding protected areas, plants conservation, communication, education and public awareness (CEPA), implementation of the Cartagena Protocol on Biosafety, as well as preparatory activities for Nagoya Protocol.

The following strategic/planning documents: National Spatial Plan, spatial plans of the planning regions, local biodiversity action plans and second National Environmental Action Plan are relevant for biodiversity conservation in the country. However, biodiversity is still not considered an important issue outside of nature conservation and environment sectors. Sectoral policies have been weak in covering the need for protecting biodiversity by placing its importance secondary to other issues and often on a formal basis. Tools used for integration of the issues of biodiversity protection and sustainable use into spatial planning and different economic sectors, are mechanisms for environmental impact assessment (EIA) and strategic environmental assessment (SEA).

Part III

Newly developed national biodiversity targets in the process of revision of NBSAP are harmonized with the 2020 Aichi Biodiversity targets. Indicators to monitor the progress towards

the implementation of the national as well as Aichi Targets will be set. Their development requires overcoming the problem of regular collection of adequate data. Also, coordination of activities with the State Statistical Office is of great importance.

Macedonia's efforts to achieve the biological diversity targets are also relevant for the achievement of the Millennium Development Goals due to their linkage.The most relevant and most important goal from biological diversity protection point of view is goal no.7. Activities related to conservation of forests, conservation of threatened species, monitor the trend of biological diversity loss, increase the network of protected areas, and are contributing towards the achievement of these goals.

Republic of Macedonia recognizes that a change in attitude towards biodiversity, within society at large and among officials with decision-making responsibilities, is key to implementing the Convention. Environmental and nature awareness-raising, building capacities of responsible institutions and other relevant organizations, establishing expert institution for nature protectionon a national level, adoption of relevant secondary legislation, establishing national biodiversity monitoring system and better access to biodiversity data, as well as providing financial resources for nature conservation are high priorities among country development needs.

Pelister National Park

PART I: AN OVERVIEW ON BIODIVERSITY STATUS, TRENDS AND THREATS AND IMPLICATIONS FOR HUMANWELL-BEING

1.1 THE IMPORTANCE OF BIODIVERSITY IN MACEDONIA

1.1.1. ABOUT THE COUNTRY

The Republic of Macedonia is situated at the center of the Balkan Peninsula and is part of the wider Mediterranean Region that has been identified as the third most important biodiversity hotspot in the world with respect to the number of endemic plant species (Myers et al. 2000). Accordingly, although relatively small in territory (25.713 km^2), the Republic of Macedonia holds an important position on the global map of biological diversity hotspots.

Major part of the country's territory (44.1%) lies on an altitude between 500 and 1000 m and nearly 80% of the territory has hilly and mountainous nature, i.e. there are a number of valleys connected with deep gorges and canyons. Out of the four river basins in the country, Vardar River Basin occupies the largest area (80%). The southern, lowland areas of the country are characterized by sub-Mediterranean climate, while the mountainous regions at 1500 altitude and above have alpine climate; the remaining part of the country is dominated by continental climate. Eight climatic-vegetational and soil regions can be distinguished in the country, with the sub-Mediterranean-continental zone of the pubescent oak occupying the largest area. The volume of precipitation on annual basis varies between 1.000 and 1500 mm on mountains and from 600 to 700 mm in valleys, while volume of precipitations in the area of Ovche Pole is significantly lower – around 490 mm.

The total number of population in Macedonia is 2.022.547 inhabitants with an average density of 78.7 inhabitants per km^2 (according to the last Census of 2002). In administrative terms, the Republic of Macedonia is divided into 80 municipalities and the City of Skopje composed of 10 municipalities. Out of the total population, 57% live in urban settlements (with around 30% concentrated in Macedonia's capitol – Skopje), while the rest 43% are rural population. Based on the Nomenclature of Territorial Units for Statistics (NUTS) adopted in 2007, eight statistical (planning) regions have been established on the territory of the Republic of Macedonia, namely: Vardar, Eastern, Southwestern, Southeastern, Pelagonia, Polog, Northeastern and Skopje regions. There are 1767 settlements in Macedonia, 34 of which are urban. Migration of the population from rural to urban settlements is generally present, and especially from smaller towns to the City of Skopje. Overseas migration is in constant increase, too. In 2012, predominant sectors of population occupation were Manufacturing industry (20%), Agriculture, hunting, forestry and fishery (17%) and Trade and motor vehicles servicing (14%). Unemployment rate has been reducing gradually to reach 29% in 2013.

1.1.2. ABOUT BIODIVERSITY

By way of interaction of natural conditions and human interference on the territory of the Republic of Macedonia, around 120 habitat types of the third level of EUNIS classification have been identified, belonging to 28 ecosystem types. Among those, there are some that have exceptional importance not only on national, but on global level as well. Thus, for example, Ohrid Lake as the oldest lake in Europe is considered as one of the most important hotspots of endemic biological diversity in the world (Wilke et al. 2008). According to Albrecht & Wilke (2008), Ohrid Lake with its 212 endemic species and area of 358 km^2 is distinguished in the world as lake with greatest diversity per area unit. According to these authors, the Lake accommodates more than 1200 autochthonous species, 586 of which are animal species and 182 endemic, with a note that individual taxonomic groups have not been sufficiently studied or have not been explored at all. Consequently, the rate of endemism is 36% for all taxa and 34% for Animalia. On the other side, if we consider the latest researches of diatomaceous flora in the Lake (Levkov & Williams 2012), the overall rate of endemism is even higher. More specifically, Levkov & Williams (2012) indicated the presence of 789 taxa in total, 117 (14%) of which were endemic. Despite of the fact that 80 taxa have not been identified in full (or marked as "cf", "aff" or "sp."), and around 20 species are not certain, the incorporation of this data would augment the overall rate of endemism significantly compared to previous estimates (including around 500 diatomaceous species with no information on the number of endemic species).

Transboundary Prespa lakes support the largest nesting colony of Dalmatian Pelican

Another example of ecosystem of global importance is the Lake of Prespa, where the largest nesting colony of Dalmatian Pelican in the world is sustained. Though explorations of biological diversity in Prespa Lake have been modest compared to those related to Ohrid Lake, data on diversity and endemism rate within individual groups (Albrecht & Wilke 2008, Albrecht et al. 2012, Levkov & Williams 2012) indicates that it is one of the most important lakes in Europe. On the other side, the Transboundary ecosystem of the Prespa Lake, i.e. Greater and Lesser Prespa Lakes supports the largest nesting population of Dalmatian Pelican. Global population of this species has been estimated at 4.350 to 4.800 breeding pairs (Birdlife International 2014), out of which more than 1100 (20%) nest in the Greek part of Prespa (SPP 2014). According to IUCN (2013) data, this species is considered as globally threatened and has been categorized as "vulnerable" (VU).

Forest ecosystems which cover around 38.5 % (988.835 ha) of the country's territory (Statistical Yearbook of the Republic of Macedonia 2013) also support rich and important biological diversity. Thus, for example, the Macedonian Pine or Molika (*Pinus peuce*), a species endemic to the Balkan, in Pelister National Park forms large forest stands (app. 1.800 ha) that are typical and the most representative examples of this habitat type.

Balkan lynx fulfills the IUCN criteria to the category .critically endangered species' and requires actions towards improved conservation status

The extensive forest and mountain ecosystems in the western part of the country support a small population of the Eurasian Lynx that has been isolated from the rest of species' population for a long time. Some authors consider it a population of a distinct subspecies of the Eurasian Lynx – the Balkan Lynx (Bureš 1941, Mirić 1978), but its taxonomic status has not been generally accepted by the scientific community. Nonetheless, it represents a distinct, autonomous metapopulation of great importance for nature conservation. While the debate on its taxonomic status continues the recent drastic decline of its population tells of significant deterioration of its conservation status. Following the latest research (Melovski et al. 2013); the population of the Balkan Lynx is likely under 100 adult individuals while conservation estimates suggest 20 to 44 adult individuals populating the territory of the western part of the Republic of Macedonia and eastern part of the Republic of Albania. Consequently, the Balkan lynx population fulfills the IUCN criteria for allocation to the category of "Critically Endangered Species" (CR (C2a (i, ii) D), and calls for immediate action towards improved conservation status (Melovski et al. 2012).

Large part of the national territory has been categorized as agricultural land (44% or 1.120.000 ha) and includes plowed fields, gardens, orchards, vineyards, meadows and pastures, covering 54% of the overall agricultural land, while the rest consists of alpine natural or semi-natural grass habitats which also support rich and important biological diversity.

In summary, around 1700 species of algae, 3.200 vascular plants, more than 2.000 fungi and 450 lichens, 13.000 invertebrates, 85 fish and cyclostomata, 15 amphibian, 32 reptile, 333 bird and 84 mammalian species have been registered under different ecosystems and habitat types in the country so far. These include high number of endemic species, namely: at least 150 endemic, 120 endemic vascular plants, more than 700 invertebrate and 27 endemic fish species. Given the fact that knowledge of certain taxonomic groups is modest or missing, the real picture of the rich biological diversity of the country is still incomplete.

The above presented data reveals the fact that the Republic of Macedonia is distinguished by its rich biological diversity which is important not only for the country but wider for the European region and globally. The widely accepted method distinguishing between the instrumental and the intrinsic value of biodiversity may be applied to assess the importance and the value of biodiversity in Macedonia. The intrinsic value of an object, e.g. a component of biodiversity, is the value contained in the object itself, for its own sake, regardless of its usefulness or its relation to something else. Instrumental value, on the other side, expresses the usefulness of a species, ecosystem or other biodiversity component in meeting human needs for certain services thus contributing to her/his well-being. This methodology has been accepted by the Convention on Biological Diversity. The Convention also highlights the importance of biological diversity for evolution and for maintaining life sustaining systems of the biosphere.

1.1.3. ABOUT ECOSYSTEM SERVICES

The idea that ecosystem functions have instrumental value for the people is reflected in the increasingly popular concept of ecosystem services. In simple terms, ecosystem services are defined as "the instrumental value of ecosystems as means for achievement of purposes related to human well-being" (Costanaza 2008). Due to their integrative and problem-focused character, ecosystem services have high potential for application in resource and environmental management.

The acceptance of the concept in Macedonia has been limited, however, both among scientists and practitioners. The study "Valuation of natural values of Shar Planina and estimation of their market value", published in 2007 (Melovski & Hristovski 2008) and financed by the Ministry of Environment and Physical Planning, through the Program for Environmental Investments, is the first instance of application of the ecosystem services concept and the related concept of environmental economic valuation. Using the survey based method of "contingent valuation",

targeting respondents from Tetovo, Gostivar and the adjacent settlements, the "economic value" of natural resources on Shar Planina has been estimated at €3.200.689 – a sum that the residents in the cities and villages around the mountain are willing to pay annually for the protection and improvement of the state of the environment of Shar Planina.

A recent study on the economic values of ecosystem services in Ezerani Nature Park (Ceroni 2013), financed by a GEF/UNDP/MEPP project for the protection of the Prespa basin ecosystem, makes a direct use of the concept of ecosystem services to assess the economic benefits from a specific area. The study shows that the annual sum of all tangible benefits from Nature Park Ezerani amounts to about €225,000. This sum includes the value of fishing within the borders of the Park (€22,200), sand collection (€182,000), and hay for feeding sheep (€9,200), educational visits (€7,000), research (€2,400), and wildlife viewing (€1,800). The economic benefit related to role of the area in the natural re-stocking of the Prespa Lake needs to be added to the sums above. More specifically, based on expert opinion, artificial restocking could at the most cover one fifth of one single species in the lake at a cost of €32.993 annually.

The ongoing process for updating Macedonia's National Biodiversity Strategy and Action Plan (NBSAP), having the goal to mainstream biodiversity values across government and society, provided an opportunity to integrate expertise and knowledge from all sectors in the country and identify links between biodiversity and ecosystem services. A preliminary mapping of the potential to provide ecosystem services at the national level has been conducted during this process. Recognizing that land-cover change is one of the most important drivers of change in ecosystems and their services (Burkhard et al. 2009), the mapping was based on data on level 3 Corine land cover classes (CLC) identified in Macedonia (Table 1). The matrix developed by Burkhard et al. (2009) provided a rather easy tool to assess ecosystem services at the national level (see Table 2 below). The resulting map (see Figure 1) gives an overview of the overall (theoretical) potential of all land cover classes in Macedonia to provide one or more of the 29 ecosystem services (Table 3).

The matrix developed by Burkhardet al.(2009) helps identify the areas (CLC) which are most important in terms of ecosystem structure and functions needed to sustain the provision of ecosystem services (see Table 2). This information may be used to highlight and map areas or ecosystems of exceptional biodiversity in the country. Following this matrix, mixed forests and natural grasslands have very high potential to support biodiversity, as indicated by the presence of selected species, functional groups of species or species composition. Other CLC, such as Broad-leaved forest, Coniferous forest, Moors and heathland, Sclerophyllous vegetation, Transitional woodland-shrub, Water courses and water bodies, have high potential and thus may be regarded as important for the conservation of biodiversity (see Figure 2).

Figure 1. The overall potential for provision of ecosystem services in the Republic of Macedonia

highest potential (102)

lowest potential (0))

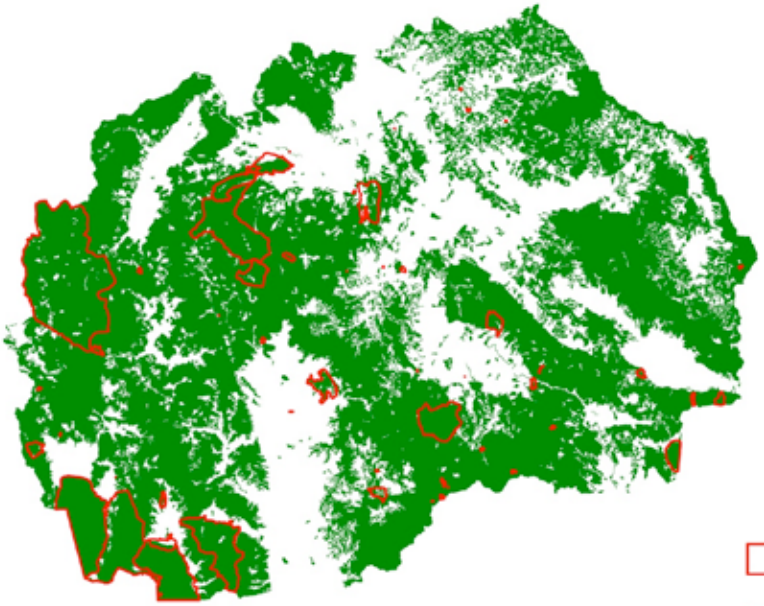


Figure 2. Areas of high or very high potential to support biodiversity in the Republic of Macedonia

existing protected areas,

areas with high or very high potential to support biodiversity)

Figure 3. The potential for provision of the ecosystem service "woodfuel" by ecosystems in the Republic of Macedonia

very high relevant capacity
high relevant capacity
edium relevant capacity
relevant capacity
low relevant capacity
no relevant capacity

The mapping of ecosystem services is considered an important contribution towards the applications of the concept of ecosystem services in science as well as in practice. In our case, this approach assisted in establishing the scientific link between ecosystem services and human well-being and in considering both the ecosystems from which services are derived, and the people who depend on them. These maps may also be used in conjunction with other information to communicate values to decision-makers, and evaluate scientifically-informed alternatives for policies and actions.

The applications of such maps in the evaluation of ecosystem services are limited by the lack of appropriate data for the quantification of the individual services' supply and demand. The supply of ecosystem services is strongly linked to natural conditions, e. g. land cover (vegetation), hydrology, soil conditions, fauna, elevation, slope and climate. All this information should be as detailed as possible, in a relevant resolution and at an appropriate scale when defining the actual capacity of different ecosystems to supply services.

The State Statistical Office regularly collects data which can be used to develop indicators for the specific ecosystem services at the national level and publishes it in the Statistical Yearbook of the Republic of Macedonia. This data is not readily applicable, however. For example, following the 2006 CLC data, the area covered by forests (codes 311, 312 and 313) amounts to approximately 828.862 ha (see Table 4). Following the Statistical Yearbook of the Republic of Macedonia 2007 (SYB 2007), the area covered by forests in 2006 was estimated at 959.259 ha.The differing estimates may be linked to the methodology used to produce the data sets. For instance, according to the SYB 2007, 'forest is an area over 5 acres covered with forest trees in the form of stands having a protective function and is used for production of forest assortments or has a special purpose'. On the other hand, the CLC2006 technical guidelines (EEA 2007) define forests as 'areas occupied by forests and woodlands with a vegetation pattern composed of native or exotic coniferous and/or deciduous trees and which can be used for the production of timber or other forest products' and'the forest trees are under normal climatic conditions higher than 5 m with a canopy closure of 30 % at least'.Therefore, according to CORINE,areas where clear cuttings are performed and that are at an earlier stage of natural recovery are not recorded as forest though, few years after the cutting is performed, the area is naturally recovered and again transformed into forest. Due to the above mentioned disparity, the estimated potential for provision of the ecosystem service "woodfuel" based on 2006 CLC data (see Figure 3) is to be considered as provisional. Similar disparity between 2006 CLC and the SYB data is observed for other CLC classes, as shown in the table below (Table 4). However, it should be noted that this disparity may arise from the discrepancy between the actual service provision and the underlying ecosystem potential to provide a specific service. The problem gets further complicated because the actual production of ecosystem services depends not only on the natural potential, but also on the dynamic climatic changes and meteorological conditions, as well as on technological innovations in land use.

Code	Description (Level 3)
111	Continuous urban fabric
112	Discontinuous urban fabric
121	Industrial or commercial units
122	Road and rail networks and associated land
124	Airports
131	Mineral extraction sites
132	Dump sites
133	Construction sites
141	Green urban areas
142	Sport and leisure facilities
211	Non-irrigated arable land
212	Permanently irrigated land
213	Rice fields
221	Vineyards
222	Fruit trees and berry plantations
231	Pastures
242	Complex cultivation patterns
243	Agriculture&Natural vegetation
311	Broad-leaved forest
312	Coniferous forest
313	Mixed forest
321	Natural grasslands
322	Moors and heathland
323	Sclerophyllous vegetation
324	Transitional woodland-shrub
331	Beaches, dunes, sands
332	Bare rocks
333	Sparsely vegetated areas
411	Inland marshes
511	Water courses
512	Water bodies

Table 1. List of Corine land cover classes (Level 3) represented in Macedonia

Study on the economic values of ecosystem services in Ezerani Nature Park was prepared in 2013

CODE (LABEL 3)	CORINE LANDCOVER CLASS (LABEL3)	Abiotic heterogeneity	Biodiversity	Biotic waterflows	Metabolic efficiency	Exergy capture	Reduction of nutrient loss	Storage capacity	Ecosystem integrity
111	Continuous urban fabric	0	0	0	0	0	0	0	0
112	Discontinuous urban fabric	1	1	1	1	1	1	1	7
121	Industrial or commercial units	1	1	0	0	0	0	0	2
122	Road and rail networks and associated land	2	2	0	0	0	0	0	4
124	Airports	1	1	1	1	1	2	0	7
131	Mineral extraction sites	2	2	0	0	0	0	0	4
132	Dump sites	2	1	0	0	0	0	5	8
133	Construction sites	2	1	0	0	0	0	0	3
141	Green urban areas	3	3	2	1	4	3	2	18
142	Sport and leisure facilities	2	2	2	1	4	3	2	16
211	Non-irrigated arable land	3	3	2	1	4	3	2	22
212	Permanently irrigated land	3	2	5	2	5	1	3	21
213	Rice fields	3	2	5	1	5	1	3	20
221	Vineyards	3	2	3	1	3	0	2	14
222	Fruit trees and berry plantations	4	3	4	2	3	2	3	21
231	Pastures	2	2	4	5	5	2	4	24
242	Complex cultivation patterns	4	3	3	2	4	1	3	20
243	Agriculture&Natural vegetation	3	3	3	2	3	2	3	19
311	Broad-leaved forest	3	4	5	4	5	5	5	31
312	Coniferous forest	3	4	4	4	5	5	5	30
313	Mixed forest	3	5	5	4	5	5	5	32
321	Natural grasslands	3	5	4	4	4	5	5	30
322	Moors and heathland	3	4	4	5	4	5	5	30
323	Sclerophyllous vegetation	3	4	2	3	3	4	2	21
324	Transitional woodland-shrub	3	4	2	3	3	4	2	21
331	Beaches, dunes, sands	3	3	1	1	1	0	1	10
332	Bare rocks	3	3	0	0	0	0	0	6
333	Sparsely vegetated areas	2	3	1	0	1	1	1	9
411	Inland marshes	3	2	4	4	4	3	5	25
511	Water courses	4	4	0	3	3	3	1	18
512	Water bodies	4	4	0	4	4	3	4	23

Table 2. The potential of different CLC to support ecosystem structures and functions needed to sustain the provision of ecosystem services in the country (based on Burkhard et al. 2009)

ECOSYSTEM SERVICES	POTENTIAL INDICATORS
ECOSYSTEM INTEGRITY	
Abiotic heterogeneity	Habitat diversity indices; Heterogeneity indices, e.g. humus contents in the soil; Number/area of habitats
Biodiversity	Indicator species representative for a certain phenomenon or sensitive to distinct changes
Energy Capture	Transpiration / total evapotranspiration
Metabolic efficiency	Respiration / biomass metabolic quotient)
Biotic waterflows	Net primary production; Leaf area index LAI
Reduction of Nutrient loss	Leaching of nutrients e.g. N, P
Storage capacity	Solved organic matter; N, Corg in the soil; N, C in biomass
REGULATING SERVICES	
Local climate regulation	Temperature, albedo, precipitation, wind; Temperature amplitudes; Evapotranspiration
Global climate regulation	Source-sink of water vapor, methane, CO_2
Flood protection	Number of floods causing damages
Groundwater recharge	Groundwater recharge rates
Water purification	Water quality and quantity
Erosion Regulation	Loss of soil particles by wind or water; Vegetation cover
Nutrient regulation	N, P or other nutrient turnover rates
Air Quality Regulation	Leaf area index; Air quality amplitudes
Pollination	Amount of plant products distribution of plants; Availability of pollinators
PROVISIONING SERVICES	
Crops	Plants / ha; kJ / ha
Livestock	Animals / ha; kJ / ha
Fodder	Fodder plants / ha; kJ / ha
Capture Fisheries	Fishes available for catch / ha; kJ / ha
Acquaculture	Number of animals / ha; kJ / ha
Wild Foods	Plant biomass / ha; Animals available / ha; kJ / ha
Timber	Wood / ha; kJ / ha
Wood Fuel	Wood or plant biomass / ha; kJ / ha
Energy	Wood or plant biomass / ha; kJ / ha
Biochemicals/Medicine	Amount or number of products; kg / ha
Freshwater	l or m^3 / ha
CULTURAL SERVICES	
Recreation and Aesthetic Values	Number of visitors or facilities; Questionnaires on personal; Preferences
Intrinsic Value of Biodiversity	Number of endangered, protected or Rare species or habitats

Table 3. List of ecosystem services with definitions and potential indicators (based on Müller & Burkhard 2007, de Groot 2006, MA 2005 and Costanza et al. 1997)

Land use type	CLC 2006	SYB 2007
Arable Land	931.278 (code: 2)	1.226.000
Vineyards	27.748 (code: 221)	25.000
Orchards	2.217 (code: 222)	13.000
Pastures	192.856 (code: 231)	688.000

Table 4. Differing data concerning the area related to some land cover classes following CORINE (2006) and the Statistical Yearbook (2006) of the State Statistical Office of the Republic of Macedonia

At the same time, the data to develop indicators for regulating ecosystem services at the national level is practically non-existant. Appropriate research projects, monitoring schemes, capacity building and further national ecosystem service assessments are therefore needed in the future to develop suitable indicators for all types of ecosystem services using existing data or by developing new protocols for data collection. At the same time, it is necessary to develop corresponding national programs for monitoring (collection of data), human capacity for implementing ecdosystem service assessments, and education.

1.2 STATUS AND TRENDS OF BIOLOGICAL DIVERSITY IN MACEDONIA

The analysis of the status and the trends of biological diversity comprised the ten year period 2003-2013. Namely, the first Country Study for Biological Diversity of the Republic of Macedonia was developed in 2003, and the process of revision of the National Biodiversity Strategy and Action Plan started in 2013.

Progress in research and knowledge about biodiversity in Macedonia

In the course of this period, the volume of knowledge of biological diversity has enhanced, especially in some of its components. Thus, for example, around 250 taxa new to science have been described (6 higher plants, more than 170 taxa of diatomeous algae and 48 invertebrate species). Hundreds of previously unregistered species have been registered for the first time (23 higher plants, 237 fungi species, while the estimate of the number of invertebrates has risen from around 10000 to more than 13000 species). Quantitative assessments of the populations of certain priority species (e.g. Balkan lynx, several bird species) have been made, and trends in the populations of certain bird species (Griffon Vulture, Egyptian Vulture, Lesser Kestrel, Imperial Eagle) have been documented.

Significant progress during the last years has been noted in the knowledge of algal diversity, primarily diversity of silicate algae (diatoms). In 2007, Monograph of Ohrid and Prespa Lakes Diatoms (Levkov et al. 2007) was published, where 75 new species for science were described. Later, detailed taxonomic research was conducted with regard to individual genres, such as Amphora (Levkov 2009), Luticola (Levkov et al. 2013), Eunotia (Pavlov & Levkov 2013), Hippodonta (Pavlov et al. 2013) Diploneis (Jovanovska et al. 2013), including taxa from geologically old lakes (Ohrid, Prespa and Dojran), sub-alpine and river habitats, as well as extreme habitats (thermal springs, aerophyts and epizoics). In the frames of these additional studies, around 60 species new for the science have been described and high number of species has been registered for Macedonia. The results acquired so far indicate that more than 900 diatomaceous taxa (Levkov & Williams 2012), have been registered in Ohrid and Prespa lakes solely, and the number of diatom species known for the territory of Macedonia is around 1600.

During the past period, continuous research work has been carried out with regard to fungal diversity in Macedonia, especially for macromycetes, resulting in 2000 taxa identified and enrolling the country among one of the best explored regions in Europe. Furthermore, several papers elaborating numerous new and rare species of Fungi in Macedonia have been published (Karadelev et al. 2007a, 2007b, 2008b, 2009; Karadelev &Murati 2008a, Dogan & Karadelev 2009). Detailed taxonomic researches were conducted for the genres Phellinus (Karadelev& Spasikova 2006),Tulostoma (Karadelev& Rusevska2009c), Phallus и Scleroderma (Karadelev et al. 2009b), while specific publications elaborated underground (Chavdarova et al. 2011), medicinal (Bauer-Petrovska et al. 2006, 2008a,b,c)and poisonous fungi in Macedonia (Karadelev & Spasikova 2006,

2009a). New species of the type Ascomycota were also published, by which the number of taxa of this lesser known groups reached 260 (Karadelev et al.2009g, Kajevska et al. 2013). Furthermore, systematic researches were conducted of the micro diversity of certain regions in the country, including the mountains of Ograzhden, Jakupica, Korab and Dobra Voda (Karadelev et al. 2009d,e,f). As of recently, intensive work has been done to conserve fungi and establish the basic Red List of fungi in Macedonia (Karadelev & Rusevska 2012), in which 213 fungal species were categorized according to IUCN criteria. The List was presented and discussed at the Third World Congress on fungi conservation held in Turkey, in November 2013.

Intensive floral researches have proceeded during the past period on the whole territory of the Republic of Macedonia. For the first time, synthesis overview of the brioflora of the Republic of Macedonia (Cekova, 2005) was published; covering 397 taxa and this paper contains all literature data listed by a number of authors for the bryoflora of Macedonia until that date. Later on, Martinčić (2009) listed 75 taxa new for the bryoflora of Macedonia, while according to data of Papp & Erzberger (2012), the number of new taxa of Macedonia's bryoflora raised by 43 new taxa. Based on all the above data, we may conclude that the bryoflora of the Republic of Macedonia consists of slightly above 500 taxa, more than 400 of which account for genuine mosses (Musci), while approximately 100 taxa concern representatives of the class Hepaticae. Further investigations of taxonomy and horology of taxa in this group in the Republic of Macedonia are necessary to complete the knowledge of the real number of taxa on its territory.

Continuous investigations under the Project "Flora of the Republic of Macedonia" implemented by the Macedonian Academy of Sciences and Arts resulted in publication of the 6th and the last book of the volume I of the edition "Flora of the Republic of Macedonia" (Micevski & Matevski, 2005), finalizing the work on the families of the group Sympetalae. Certain number of flora data was also obtained through implementation of different projects (vegetation investigations, studies of (re)valorization of certain protected areas, etc.). Significant flora data is mentioned in the two monographic studies of Macedonian steppe (Matevskiet al.2008) and forest vegetation of mountainous massif of Galichica (Matevski et al. 2011). From among flora related works published in the past period, it is worth to mention the work of Teofilovski (2011), which contains significant floristic data on Suva Gora mountain, but also on other parts of the territory of the Republic of Macedonia, as well as monographs on the natural values of Monospitovo Swamp (Melovski et al. 2008) and Shar Planina Mt. (Melovski et al. 2010).

Intensive vegetation surveys on the bigger part of the territory of the Republic of Macedonia continued in the past, focusing on the different vegetation types that are considered less explored or were not covered by previous research. Special attention was paid to phytocenological research on hilly pastures developing on silicate and, above all the limestone surface, early spring ephemeral grassland vegetation, the vegetation of the high grassland plants that grow beside mountain streams, some hazmophytic communities, as well as the forest and mountain vegetation on Galicica Mountain. More than 20 articles about vegetation have been published and 2 monographs – Flora and Vegetation of Macedonian Steppe (Matevski et al., 2008) and forest vegetation of Galicica mountain massif in Macedonia (Matevski et al. 2011) in which more than 15 associations new for the science, 3 new alliances and sub alliances have been described, and revision of syntaxonomy and nomenclature of more than 15 plant communities in accordance with the provisions of the International codex of phytocenological nomenclature was conducted.

The first report aimed at comprehensive presentation of the status of biological diversity in the Republic of Macedonia is the report Analysis and valorization of Biological Diversity, developed in 2009 (Petkovski, 2009) in the frames of GEF/UNDP/MEPP Project on protected areas, enclosing Catalogue (check list) of species in digital form as well.

Quantitative investigations of herpetofauna on the Island of Golem Grad in Prespa Lake were conducted, with an accent on Hermann's Tortoise, Dice Snake and Nose-horned Viper, and results have been published only partially (Sterijovski et al. 2011; Ajtić et al. 2013).

Work of particular importance with regard to reptile distribution in Macedonia is the work of Sterijovski et al (2014), which presents numerous data and maps of distribution for all 32 species of this class found in Macedonia.

Apart from Catalogue of Petkovski (2009), there is no synthesis list of bird fauna in Macedonia. Yet, it is known that ornitofauna of Macedonia counts 333 bird species (Velevski et al. 2013) and the numbers and trend of population is known only for limited number of them. For the 24 identified Important Bird Areas (IBA) in Macedonia, there are more pieces of information of the size of populations and trends of priority bird species, though data on the numbers of common species and particularly species related to forest habitats is missing (Velevski et al. 2010).

List and Catalogue of mammals in Macedonia with comments on distribution and overview of endemism are provided by Krystufec & Petkovski (2003, 2006), according to which 83 mammalian species are listed for the Republic of Macedonia.

Algyroides nigropunctatus - a species under strict protection regime according to EU Habitat Directive. In Macedonia, found only in Ohrid-Prespa region.

In the course of the last 10 years, more than 300 scientific works dealing with biological diversity of invertebrates in Macedonia have been published. Minor part of these scientific publications is monographic works. It is worth to mention the attempt of Petkovski (2009) towards cataloging the fauna of Macedonia, lists of snail species (Stankovic et al. 2006), orthopterans (Chobanov & Mihajlova 2010) and ants (Karaman 2009). During the recent period, 50 invertebrate species and subspecies from Macedonia, including 7 snails (1 fossil), 3 crayfish, 2 opiliones, 4 pseudoscorpions, 1 tick, 3 centipedes and 30 insects (most of which beetles Coleoptera - 21) have been described. Prominent publications dealing with invertebrates in Macedonia include editions on Orthoptera (Micevski et al. 2003) and daily butterflies (Micevski, N. & Micevski, B. 2005) in the national Park of Mavrovo and daily butterflies in the National Park of Galichica (Krpac et al., 2011).

There are eight designated Prime Butterfly Areas in Macedonia (Van Swaay & Warren 2003): Shar Planina Mt., Galichica, Gorge on Radika River, Struga, Ograzhden, Kozhuf, Baba and Gorge on Babuna River, based on 5 target species: Euphydryas aurinia, Euphydryas maturna, Lycaena ottomana, Maculinea arion and Parnassius apollo. Krpač & Darcemont (2012) proposed Red List of daily butterflies of Macedonia. This List includes 69 species, of which 1 is assessed as endangered (EN), 15 are assessed as vulnerable (VU), 24 as nearly threatened (NT), while the remaining 27 have not been determined by status under IUCN, but are considered as important for conservation owing to endemism or small area of distribution.

Trends in biological diversity in Macedonia

Due to intensified threats against biological diversity in the period 2003-2013, negative trends in the populations of certain species have been recorded. Major part of known trends in species populations the monitoring of which has commenced in the past period are negative. During this period, we have observed full extinction of Lammergeier and Black Vultures from Macedonia and drastic decline in the number of Griffon (see Figure 5) and Egyptian Vultures (see Figure 4), primarily as a result of easily accessible chemical preparations used for carnivorous animals and dogs poisoning.

Maculinea arion - one of the target species for designation of Prime Butterfly Areas in Macedonia

At the same time, decline in the population of Lesser Kestrel (*Falco naumanni*) by at least 70% has been observed (Velevski et al. 2013).

Decline in the chamois population size has been observed in NP Mavrovo (area of Korab), mainly due to poaching (Maletikj 2010). Although there is no precise data, it has been estimated that chamois population in Multi-purpose Area of Jasen has declined by around half

during the last 20-30 years, and reasons are at the moment unknown (Research society 'Ursus speleos' 2011).

According to investigations conducted in areas where extinction of certain plant species has been recorded earlier, conclusions that the species *Acorus calamus* - Struga area, *Sagitaria sagitifolia* - village of Novaci, *Lysimachia thyrsiflora* - Mavrovo Pole and *Aldrovanda vesiculosa* - Prespa, Ezerani, are extinct from the territory of the Republic of Macedonia, remain. Only a small population of the species *Gentiana pneumonanthe* was detected in the shore area of Mavrovo Lake, at the site of Bunec, which used to be considered extinct. Populations of *Nymphaea alba* from the shore area of Dojran Lake, near the village of Nikolikj, which was endangered upon water discharge from the Lake in 1988, remained to be considered extinct. We might also probably talk of the extinction (or pre-extinction) of the species *Senecio paludosus* and *Ranunculus lingua*, which have not been registered for years in the sites of Studenchishte and Struga Swamp. The only positive finding relates to the species *Ranunculus lingua* (only few specimens) in the swamp near the village of Bansko (Strumica area) (Matevski, 2005).

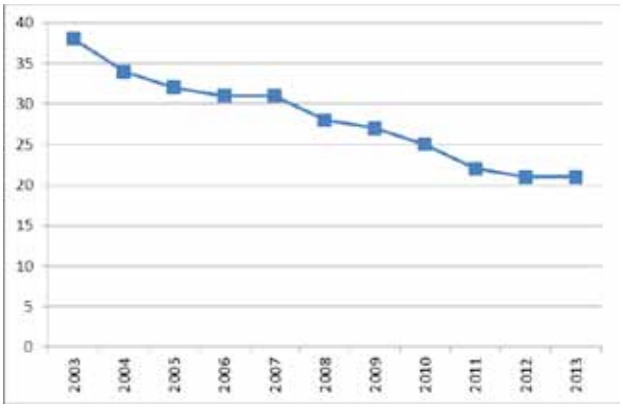


Figure 4. Trend in population of Egyptian vulture *Neophron percnopterus* (Velevski 2013, with amendments for 2013)

Positive example of preventive measures undertaking for the purpose of endangered species conservation is the species *Menyanthes trifoliata* (Deshat-Lokuf), which used to be endangered species due to eutrophication of the swamp caused by the shipfold present in its proximity and now dislocated.

Population of the floating plant *Salvina natans* in the shore area of Dojran Lake, between Star Dojran and Nov Dojran, which was endangered by water discharge from the Lake in 1988, has gradually recovered and thus biologically vital population of this species has been registered in the site of its earlier growth.

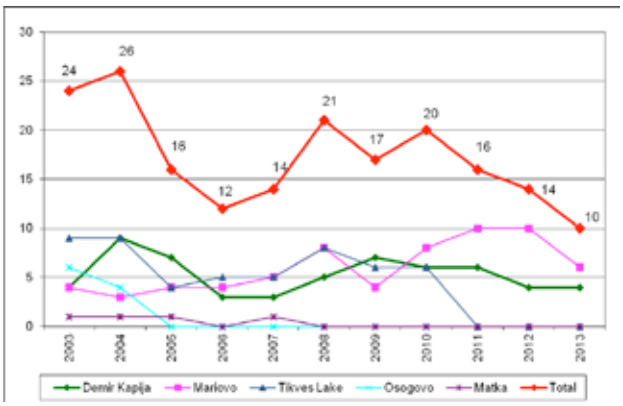


Figure 5. Trend in population of Griffon vulture *Gyps fulvus* (Velevski et al. 2013, with amendments for 2013)

Despite the prohibition by MEPP for collection of the species *Gentiana lutea* and *Gentiana punctata* issued in 2006 for a period of 5 years, inappropriate (and illegal) collection of Gentiana continued within and outside protected areas, resulting in threat to this species population and degradation of its habitats. To overcome this condition, it is necessary to extend the period of prohibition for these species collection.

Populations of the species *Common Bearberry (Arctostaphyllos uva ursi)* have been endangered by massive and inappropriate collection of this plant in the areas of the villages Patishka Reka, Elovo, Drazhilovo and Crn Vrv (Karadzica Mt.) despite of the recommendation made by scientific experts concerning temporary termination of this plant collection, in line with the developed study on this plant population status on the territory of Macedonia (Matevski 2003), at the request of MEPP. Furthermore, there has been apparent depletion of the populations of the species *Sideritis scardica* (Bistra Mt.), as well as *Sideritis raeseri* on Galichica Mt., due to traditionally massive and inappropriate collection of this plant.

Order prohibiting collection for use and trade in native wild growing fungi – morels of the genus *Morchella, Verpa* and *Pitchoverpa* (Official Gazette of the Republic of Macedonia no. 161/08) for a 5 year period was issued to protect their natural habitats and conserve deciduous plantations from deliberate foreign fires. Prohibition for collection refers to burnt or degraded

areas and applies during summer period (from 1 June to 30 August) (Amendments nos. 56/2009 and 53/2010). Amendments in the period of morel collection were introduced in 2012 (Amendment of Order no. 108/2012), by which prohibition covered the period from 1 June to 30 September.

Measures and actions for protection of endangered species

For the purpose of protecting the Prespa trout (*Salmo peristericus* Karaman 1938), the necessary actions have been identified and need to be undertaken to document the current ecological status of Prespa trout populations and their health condition, assess density and size, estimate threats and propose measures to improve the state and promote sustainable use and conservation of the species (Crivelli et al. 2008).

With regard to the critically endangered species of Macedonian souslik (*Spermophilus citellus karamani*) from Jakupica Mt., series of conservation activities have been proposed (Petkovski 2008), including inter alia protection and management of natural habitats and public awareness promotion.

As far as bat fauna in the Republic of Macedonia is concerned, no scientific work has been published during the last 10 years, except individual reports from field investigations under specific project activities. In 2012, the Report "Investigation of the Status and Action Plan for Conservation of Bats and Caves in Prespa" was developed in the frames of GEF/UNDP/MEPP Project for Prespa Basin Management. It presents data on the status and distribution of bats in all three countries incorporated in Prespa region, as well as list of priorities for research and protection in order to achieve favourable conservation status of bats in Prespa.

Illustrations of care by the local population for floristic rarities conservation:

- *Drosera rotundifolia* – Pehchevo, measures undertaken by the Municipality and part of the local population in order to improve the habitat in the vicinity of the site of Judovi Livadi (meadows) as the only area in Macedonia where this plant grows.
- *Salvia officinalis* (village of Lukovo) – educated police officers in the local police station take care of the conservation of this floristic rarity in the site near the village of Lukovo.
- *Verbascum lesnovoensis* (village of Lesnovo, Zletovo)– initiative for this local endemic plant to be placed on the Coat of Arms of Probishtip Municipality

Preliminary investigations of swampy terrains in the area of Debarca were carried out during 2007 by the Macedonian Limnological Society (under the Programme for Environmental Investments for 2007), as a result of which map was produced of the swampy part covered by woody flora (occasionally flooded part) of the site of Belchishte Swamp, floral material was collected (presence of 55 plant species was recorded) and recommendation was made to designate Belchishta Swamp for protected area under special management regime (Talevski 2007).

Other swampy habitats (Struga Swamp, Monospitovo Swamp, Studenchishta Swamp, Belchishte Swamp and Katlanovo Swamp, etc.) are under continuous pressure. Case of destruction of swamp vegetation and formation of arable areas was observed in Studenchishta Swamp.

Spotted Gentian (*Gentiana punctata*) Nationally endangered species due to illegal overexploiting

Mountain Tea (*Sideritis scardica*), A(iv) IPA species or Balkan endemic. Classified as 'near threatened' according to IUCN.

Prespa trout - endemic variety of trout found in Lake Prespa watershed

Macedonian souslik, assesed as 'Vulnerable' according to IUCN. Critically endangered species on a national level

Drosera rotundifolia - an insectivorous plant that inhabits the bogs in the vicinity of Pehchevo

Furthermore, illegal dumpsites of demolishing and industrial waste, construction of asphalted path and other infrastructure structures were also registered, while in the shore belt (at the Swamp contact with Ohrid Lake) beaches were developed with platforms and parking places. In 2011, part of Monospitovo Swamp suffered fire and the same occurred in 2014 in part of the swamp in the Nature Park of Ezerani. The Swamp near the village Negorci has entered the final stage of destruction due to altered hydrological regime and construction of touristic complex. Population of the species Cladium mariscus within the site of Negorci Spas, which was maintained thanks to the constant supply of hot mineral water from the old spa of the habitat of only around hundred square meters where this plant grows, is approaching destruction.

Owing to important flora heritage of endemic and rare plants such as the plant species: Mariana's tulip (*Tulipa mariannae* Lindt.), Macedonian hedysarrum (*Hedysarum macedonicum* Bornm.), Jurisicic's sage (*Salvia jurisicii* Kos.), *Convolvulus holosericeus* M.B., Cuper bush/Sicili cuper (*Capparis sicula* Duh.), *Morina persica* L. and *Astragalus parnassi* Boiss. in 2002, the Municipality of Negotino adopt a Decision to designate floristic site "Orlovo Brdo" (Eagle's Hill) as Monument of Nature.

Areas under halophytic vegetation in the area of Ovche Pole remain exposed to degradation (communities with *Suaeda maritima, Camphorosma monspeliaca, Camphorosma annua, Crypsis aculeata*, etc.). They are plowed over and gradually converted into areas on which agricultural crops are cultivated or are regarded as areas with undesired vegetation through which agricultural mechanization passes to reach adjacent areas under agricultural crops. In this way, even the small areas under specific halophytic vegetation are irreversibly lost without any opportunity to be revitalized.

The assessment of the status of biological diversity of Dojran Lake as transboundary area was made in 2004 (Katsavouni & Petkovski 2004) in the frames of transboundary project with neighbouring Greece. The example of Dojran Lake water status improvement is especially successful, though still not sustainable and it also resulted in recovery of the local economy which is to a great extent dependent on tourism.

Mariana's Tulip (*Tulipa marianae*), A(iii) IPA species and national endemic.

Comprehensive programme has been implemented for the purpose of Prespa Lake protection as of 2004 (GEF/UNDP/MEPP Project for Prespa Basin Management), aimed at improving the ecological status of aquatic and other related ecosystems and preserving globally important biological diversity. At transboundary level, the key plans, programmes and strategies have been developed, providing basis for implementation of specific measures for biological diversity protection. At national level, activities were aimed at improving the active protection and management of the Park of Nature "Ezerani" and Monument of Nature "Prespa Lake", delegated for management to the Municipality of Resen.

The process of elaboration of Prespa Lake Basin Management Plan (MEPP 2012) made use, for the first time, of the methodology of the EU Water Framework Directive. It is a technical plan for establishment of the most cost-effective programme and measures for the entire Prespa Basin. Besides this, activities have been completed to reduce negative impact of agriculture, industry, wastewater and solid waste management, as well as erosive processes,

which have had indisputably positive effects on the whole Prespa ecosystem (SDC/UNDP Project for Prespa Lake revitalization).

Study and medium term programme of measures for revitalization of the old Molika forest in NP Pelister was developed in 2008 (Faculty of Forestry, Skopje 2008), which was aimed at establishing conditions for efficient recovery of development phases of the forest thus providing conditions for sustainable Molika development. In this way, diverse structure of old Molika forest as important ecosystem of great landscape and aesthetic value will be achieved.

The programme of measures for control, restriction of use of the douglas fir (*Pseudotsuga menziensii*) in NP Pelister (Faculty of Forestry, Skopje 2008) was developed on the basis of scientific and expert analysis for the purpose of measures undertaking to restrict the spread of invasive alien woody species, as well as analysis of the possibilities for recovery of the original autochtonous vegetation within the boundaries of NP Pelister.

Documentation of the biological diversity values in Prilep part of Mariovo was elaborated; socio-economic analysis was made and cultural values were defined, potentials for livestock production (especially sheep breading) were determined, and possibilities for sustainable development through identification of priority economic activities that do not endanger the environment were defined (Prima 2008).

Monitoring activities on Lake Prespa

Preliminary valorization of biological diversity (with proposed categories of protection) for all protected areas, as well as areas proposed for protection incorporated in the Study on Natural Heritage Protection (1999) prepared for the purposes of the Spatial Plan of the Republic of Macedonia (2004-2020), was made during 2010 within the process of identification of the representative network of protected areas, elaborated in the frames of the GEF/UNDP/MEPP Project on protected areas (MES 2011). The process of protected areas designation is complex and thus carried out at slow pace. While defining the external boundaries and zones within the area, besides natural values, views of different stakeholders are considered as well and these are most frequently different and/or opposed. Coordination with all stakeholders as well as nomination of adequate entity for management of the protected area, to possess the required financial resources and human capacities are challenges that often prolong the process of designation. Thus, during the past period, two new protected areas were designated and nine areas were re-designated; management entities were nominated for 13 areas (most of them handle with deficiency of human, technical and financial resources), and only 3 management plans were adopted (see Chapter 2.3.1.3 Protected areas).

The site of Majdan and its wider area is recognized as Important Plant Area at national level because of the presence of two local endemic species *Viola alschariensis* and *Viola arsenica*. These species were designated as Monuments of Nature by way of specific Decision in 2003 under the 1973 Law on Natural Rarities Protection, currently out of force. In 2009, The Law on Designation of the Site "Alshar" for Monument of Nature was adopted. In order to enable continuation of geological investigations for the purpose of establishing economically significant quantities of ores of antimony, thallium and gold and finalize the activities implementing the scientific project (Lorex, Lorandite Experiment), as well as provide conditions for detailed geological investigations related to antimony, arsenic, thallium and gold on the site of Alshar, the Law terminating the application of the Law designating the site of Alshar for Monument of Nature was adopted in 2011, which was at the same time the first instance of abolition of a protected area.

Furthermore, the category of protection of "Ezerani" area was downgraded from first to fourth category, partially due to failure of earlier measures to secure protection and continuous loss of values of the area and necessity for its active management based on valorization conducted during 2011 in the frames of the GEF/UNDP/MEPP Project for Prespa Basin Management.

National Ecological Network (MAK-NEN), which includes core areas, corridors for large carnivores, protection belts and revitalization areas, was developed in 2011 (in the frames of the

MES/ECNC/MEPP Project). The measures for protection and management of identified corridors are incorporated in the Brown Bear Corridors Management Plan, developed in 2011 (Brajanoska et al. 2011).

Despite the established degree of protection (and zoning in a number of protected areas), there are apparent negative impacts within protected areas due to insufficient quality of the measures for negative effects mitigation, insufficient application of proposed measures, non-existence or inefficiency of management entities and inefficiency of inspection authorities. Such and similar pressures definitely result in negative trend and loss (regional extinction) of individual species and habitats. Among the most visible examples, we should mention the building of the access road to the dam "Sveta Petka" in the Canyon of Matka (Monument of Nature) and increasing number of structures erected on the shores of "Matka" water accumulation, hundreds of structures built on the shores of Tikvesh Lake within the boundaries of the Strict Nature Reserve "Tikvesh", strong pressure towards establishment of tourism development zones within the boundaries of protected areas, construction of energy infrastructure, etc. In the course of the construction of Kozjak hydro accumulation, in the lower course of the River of Ocha, parts of the populations of the plant *Thymus oehmianus* were destroyed. Part of the populations of the endemic species *Viola kosaniniie* was devastated and fragmented during the construction of the access road between the village Nova Breznica and the dam of Kozjak. The same case occurred with part of the population of *Phyllitis scolopendrium* (rare species of fern), which was devastated in the gorge of Treska River on the occasion of taking infrastructure civil works to build the access road and the dam for the hydro accumulation of Sveta Petka.

Two local endemic species *Viola alschariensis* and *Viola arsenica* are found on the locality of Alshar

The Study on Environmental and Socio-Economic Assessment of Crna River basin (Spirkovski et al. 2007) was developed for the purposes of the energy sector and it provides summary information of its physical, chemical, ecological and socio-economic parameters.

For the purposes of nature preservation and local development of Bregalnica River region, activities were initiated in 2013 in the frames of SDC/MEPP Programme for Nature Protection, as an umbrella programme integrating all activities implemented in Bregalnica region towards nature preservation and sustainable local development. In the course of 2014, the analysis of gaps in environmental data and development of map of ecological sensitivity of the area of Bregalnica River basin will start, to enable identification and valorization of biological diversity in the region and offer guidelines and recommendations for its preservation (including establishment of protected areas system) and sustainable use. The obtained results will be used as basis for development of an elaborate for natural values as part of the Draft Spatial Plan for the Eastern Planning Region.

Parts of the populations of the plant *Thymus oehmianus* were destroyed during construction of Kozjak hydro accumulation.

In parallel with the above, Bregalnica River Basin Management Plan is under development (SECO/MEPP Project), by which the implementation of the Law on Waters will be assisted and protection and sustainable management of water resources, rational use of waters, as well as improved quality of water and sanitary services will be achieved. The project implementation involves 14 municipalities along the course of Bregalnica River. For the purposes of the basin management, Management Board for Bregalnica River Basin was established to serve as an example for other river basins in the country.

In accordance with the criteria of the PlantLife International, 42 Important Plant Areas (IPA) (Melovski et al. 2010), 24 Important Bird Areas (Velevski et al. 2010) based on the criteria developed by Bird Life International have been identified. Also, 35 areas of special conservation interest have been incorporated in the National Emerald Network (MEPP 2008), however, there is a need for its review based on revised criteria of the Bern Convention (supplemented resolutions of species and habitats for the purposes of their harmonization with the Lists under the EU Directives on habitats and birds). Major part of these areas significant for biological diversity has remained unprotected – only 19 percent of identified core areas for biological diversity are protected (Melovski et al. 2012), with this percentage being 21 % for Important Bird Areas (Velevski et al. 2010), and only 13 IPAs (25 %) are protected on national level. From among identified Emerald areas, around 27 % (2027 km2) are protected on national level.

Activities for preservation of nature and sustainable local development in Bregalnica river basin were initiated in 2013

Pressures on these identified important areas are especially strong and include detailed geological investigations and opening of concession based fields for utilization of mineral resources (queries), replacement of electric columns with new that apply construction model unsafe for birds, poaching and use of poison traps, change in land use, clear cuts, intensive agricultural production, surface waters intake for the purposes of agriculture or electricity production, roads building, fires, extraction of sand and gravel from riverbeds, etc.

In absence of intensive changes in existing forestry and agriculture practices towards enhanced care for priority habitats and species and without improved planning of infrastructure and production facilities and utilization of mineral resources to avoid protected and sensitive areas, as well as without intensified supervision during the implementation of protection measures proposed within the conducted impact assessment procedure (EIA or SEA) during the implementation of a high number of other projects, it is to expect that negative trends in the populations of wild species will prevail in future as well, and areas of natural habitats (including priority ones) will keep to reduce. This will also result in reduction in the benefits coming from ecosystem services for the local communities and possibilities for development of alternative forms of tourism, organic production and utilization of other forest products.

Forest fires have devastated 115.240 ha in Macedonia in the period 2003-2013

1.3 MAIN THREATS TO BIOLOGICAL DIVERSITY IN MACEDONIA

1.3.1 DIRECT CAUSES FOR BIOLOGICAL DIVERSITY LOSS

Detailed analysis of threats was carried out in the course of the revision of the National Biodiversity Strategy and Action Plan. In this process, for clear presentation purposes, but primarily for the purpose of compatibility of data with the data on international level, the analysis was made in accordance with the current EU classification of threats used by Member States to report under Article 9 of the Habitat Directive. Threats were analyzed according to the following criteria: (1) scope (geographical distribution) of threat, (2) area coverage (severity), (3) intensity of the threat, (4) time frame of the threat occurrence (urgency) and (5) reversibility of threat. Following these analyses, threats were grouped into four categories according to the level of priority.Based on the completed analysis of threats in Macedonia, we were able to identify 17 threats of very high priority, 68 threats of high priority, 115 threats of medium priority and the rest of 49 threats have low priority (Figure 6).

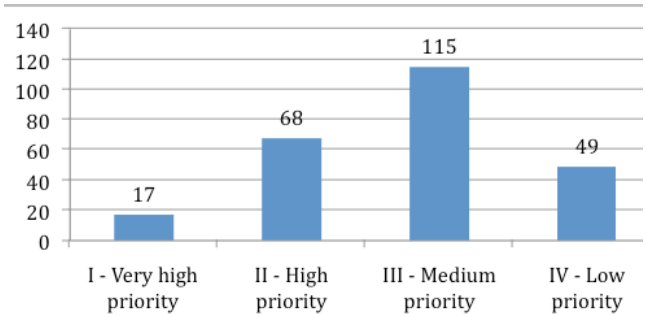


Figure 6. Identified threats in the Republic of Macedonia (number and priority)

The seventeen threats of very high priority to biodiversity in Macedonia are given in Table 5. Threats of very high and high priority (85 in total) are considered as biological diversity conservation priority and they will be addressed accordingly in the National Action Plan for Biodiversity.

No.	Threat
1	Abandonment / lack of mowing
2	Abandonment of pastoral systems, lack of grazing
3	Open cast mining
4	Continuous urbanisation
5	Disposal of household / recreational facility waste
6	Disposal of industrial waste
7	Trapping, poisoning, poaching
8	Missing or wrongly directed conservation measures
9	Groundwater pollution by leakages from waste disposal sites (WFD)
10	Diffuse groundwater pollution due to agricultural and forestry activities (WFD)
11	Burning down existing vegetation
12	Reservoirs
13	Surface water abstractions for agriculture (WFD, e.g. irrigation)
14	Surface water abstractions by hydro-energy (WFD, not for cooling)
15	Reduction of prey availability (including carcasses)
16	Temperature changes
17	Droughts and less precipitations

Table 5. List of identified threats of very high priority to biodiversity in Macedonia

Agriculture

From among priority threats, two are related to agricultural sector, i.e. they derive from abandoned traditional modes of meadows and pastures utilization through mowing and grazing, respectively. The root causes lie in depopulation of rural cores and low economic profitability of these activities in absence of subsidies. Namely, extensive migration from villages to urban settlements resulted in considerable reduction of livestock reserves which in turn diminished commercial value of meadows. Former areas under meadows are no longer mowed and their places are taken over by plant species from adjacent vegetation types, and thus gradual natural succession towards montane pastures can be observed. Different plant communities from plane meadows are the most affected, especially the communities of *Hordeeto-Caricetum distantis*, *Cynosureto-Caricetum hirtae* and *Trifolietum resupinatibalansae*. In many areas of the rural parts of the Republic of Macedonia, those have sustained only in fragmented condition. This is apparent in many parts of the Republic of Macedonia, especially the area of Mariovo, eastern and northeastern parts of Macedonia, etc. Threats lead to landscape modifications through successions and changes in the composition of biological diversity. Although no specific indicators have been developed in Macedonia (i.e. no monitoring of biological diversity priority components is performed with regard to meadows and pastures), these threats are widely spread in Europe, they are driving forces of the decline of the populations of higher number of species on continental level and their impact on the most specific groups is well documented (Bernáldez 1991; Stampfli & Zeiter 1999; Baur et al. 2006; Marini et al. 2009; Brotons et al. 2005; Nikolov 2010, 2011).

Use of mineral resources

One of the priority threats originates from the sector of mineral and non-mineral resources exploitation (mining and queries), and it causes permanent loss of habitats of higher number of specific species associated with marbleized limestone, especially among plants ("marble flora" within the meaning of Soška, 1933) and invertebrates. Both groups include numerous endemic species (or, their permanent extinction would assume extinction of the species on global level). Particular concern in this regard is raised by the situation in the wider surrounding of Prilep, where considerable number of areas has been awarded under concession for marble exploitation (Pletvar, Sivec, Belovodica, Kozjak, etc.). This part of the territory of the Republic of Macedonia is well known by its endemism and so several endemic plant species have been described from this area, such as: *Stachys iva* (Trojaci), *Seseli vandasii* (Kozjak), *Armeria vandasii* (Kozjak), *Centaurea kozjakensis* (Kozjak), *Silene prilepensis* (Kozjak), *Allium bornmulleri* (Drenovo), *Potentilla pletvarensis* (Pletvar), *Centaurea marmorea* (Sivec), *Centaurea grbavacensis* (Kozjak, Pletvar, Sivec), *Astragalus sericophyllus* (Kozjak), *Helianthemum marmoreum* (Pletvar, Kozjak), etc. Populations of the mentioned endemic species have been registered in the vicinity of all old marble mines, as well as newly established mines operating under concession. Expansion of exploitation surface area and disposal of waste unused resources poses serious problem to the conservation of this endemic plant geostock. Similar conditions occur in the site of Alshar, where several local endemic species grow, such as *Viola arsenica, Viola allchariensis, Thymus alsarensis, Centaurea leucomala, Onobrychis degenii, Knautia caroli-rechingeri* and several more, which are under constant danger from undertaking of future mining activities in this area.

Urbanization

Three of the identified threats are associated with urbanization growth and lead to direct uptake of habitats and disturbance of species caused by uncontrolled discontinuous urbanization and discharges of untreated urban wastewater into water bodies. Several plant communities are affected (especially swampy) and representatives of flora (for example, *Carex elata, Nuphar lutea*), and entire endemic fauna in Ohrid Lake. To a lesser extent, the problem is also relevant for Prespa and Dojran Lakes, as well as Vardar River basin (which is also characterized by several endemic fish species).

Examples:

Yellow Water-lily (*Nuphar lutea*), species related to one of the attempts for re-introduction after it's population was threatened by infrastructural activities

Carex elata – population of this relict species within the site of the swamp remains near Studenchishte in the shoreline area of Ohrid Lake, is in worrisome condition. Small populations of this species are still present, but with declined biological vitality, in the Swamp of Studenchishte and they can still constitute genetic potential for preservation of this species in this locality which is the only one in Macedonia where this species exists

Nuphar lutea (Struga, village of Kalishta), due to infrastructural development of Ohrid Lake shoreline area in the part of the village of Kalishte, population of this species has been fragmented and thereby its biological vitality has declined. An attempt was made to re-introduce this plant in the Lake of Ohrid, near the locality of Mazija where this species used to grow earlier.

Due to the wide range, intensity and irreversibility of the threat, this group also includes disposal of solid municipal waste and demolition waste.

Hunting

One of the priority threats is associated with the hunting sector and concerns poaching, which is the cause of the reduction in the populations of several species of concern (roe deer, chamois), and directly (through killing) or indirectly (through reduction in the number of natural pray) of Balkan lynx as well. Hunting with live snares and traps results in regular cases of bears catch (three reported cases for the last four years). On the other side, illegal use of poisonous baits, led to extinction of Lammergeier and Black Vulture and to drastic reduction in the populations of Egyptian and Griffon Vultures. Given the fact that all mentioned species contribute significantly to the circle of biomass and energy of ecosystem, consequences from their extinction (or reduction in number) will undoubtedly reflect on the functioning of whole ecosystems they are related to.

Tourism development activities near Lake Dojran

Tourism

One of the threats is associated with tourist activities (recreation or targeted observation of nature) or with economic activities that are not regulated in the management plans for protected areas, or there are no sufficient resources for successful coping with these threats, or the specified measures are not implemented to a sufficient extent. In many cases, protected areas do not have management plans and designated entities for their management at all, while in still other cases where managing entities have been appointed and management plans have been adopted, there is lack of appropriate supervision over their implementation, no indicators have been developed to measure the efficiency of management, no measures have been defined that could be undertaken against managing entities if populations and areas of critical species and habitats are of negative trend.

Pollution of the groundwater

Due to the wide spread use of chemical protection products in agriculture, as well as lack of sanitary landfills with water impermeable layer, entry of such waste and agricultural waters into ground aquifers is a wide spread and irreversible problem, especially with regard to endogene fauna; furthermore, the use of these waters (e.g. for irrigation) or because of their linkage with lake basins (e.g. Prespa Lake) transfers the risk to a great number of aquatic organisms.

Groundwater pollution due to agricultural activities is one of the identified threats of very high priority

Modification of natural habitats

Most of the threats (as many as five) from the priority group concern modification of natural ecosystems. This group includes forest fires, which in the period 2003-2013 have devastated 115.240 ha under forest (MAFWE 2014). Thermophilic oak forests and shrubberies, characterized with high diversity and/or presence of species specific for Mediterranean biome of marine forests and maquis, as well as coniferous forests, are particularly affected. These fires often pose real risk to protected areas. Such was the example of the locality of Cham Chiflik near Strumica, protected for the specific stand of black pine of great age, which suffered fire in 2012. Fires were also registered in the three National Parks – "Mavrovo", "Galichica" and "Pelister", as well as Multipurpose Area "Jasen".

- In "Galichica" National Park, in 2007, two big fires were recorded, affecting around 7.000 hectares or almost 30% of the total Park territory. Most of the burnt area was in the Zone for active management, while the area affected in Zone for strict protection on Stara Galichica amounted around 750 hectares. Burnt areas covered mostly secondary grasslands in the zone of beech ecosystem in the Park, which used to be used for livestock grazing in the past. This is to the largest extent the habitat "Pelagonia closed calcareous pastures with fescue (EUNIS E4.41724, or habitat 6170 under Habitat Directive). From among forest habitats, the most severe damages occurred for endemic Greek juniper forests along the stretch between Sirhansko Kale and Tomoros, determined as priority habitat type (*9560), under the Habitat Directive; EUNIS G3.933). Significant damages were also caused in sub-alpine beech ecosystem, especially the habitat "Ilirian beech forests with Acer obtusatum" (EUNIS G1.6C323), i.e. habitat 91K0, under Habitat Directive. During the last 50 years, accelerated succession of biocenoses has been going on in these habitats where the community of common juniper prevailed, and spread of beech forest was noted as well. As a consequence of the fire, this process was halted completely.

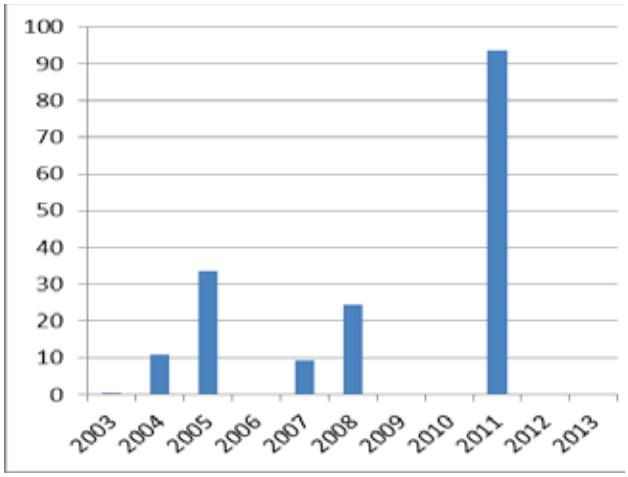


Figure 7. Burnt area (ha) in "Pelister" NP in the period 2003-2013

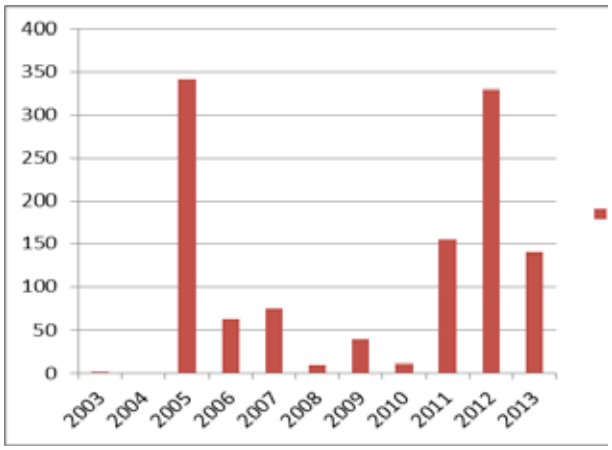


Figure 8. Burnt area (ha) in "Mavrovo" NP for the period 2003-2013

- In "Pelister" National Park, total of 21 fires were registered during the past ten year period, which burnt an area of 194.3 ha (Figure7).The largest area (93.5 ha) was burnt in 2011, and the resulting damage from the fire was around 6.150.000.00 MKD. One of the main characteristics of these fires is that all of them started outside of the Park boundaries and then spread inside. The most frequent causes of these fires are negligence, burning of stubble fields and junipers by livestock breeders.

Surface water intakes for energy production and irrigation

Another severe threat, primarily due to its irreversibility, is the construction of artificial water accumulations. As by rule, river gorges are the most suitable places for their construction and they are often refugial areas rich in rare (relict), endangered or endemic flora and fauna. Accumulations along the courses of the rivers Treska and Crn Drim are of this kind. In certain cases, small hydro power plants are constratcted within the boundaries of protected areas, mainly in mountainous areas. Studies on artificial lakes Matka (Smiljkov 1996), Strezhevo (Miljanović et al. 2004) and Mantovo (Slavevska-Stamenkovic et al. 2010) indicated prevalence of a small number of species resistant to pollution (i.e. severe disturbance of the fauna of macrozoobenthos). Surface water intakes for irrigation, through construction of water accumulations, lead to the same problem, and in some cases (e.g. Dojran Lake, and especially Prespa Lake) there is direct pumping of water for the purposes of agriculture, which contributes directly to the reduction of water quantity in the Lakes and severe problems with the vegetation and fauna (Matzinger et al. 2006; Popovska & Bonacci 2008).

Decline in pray availability

Small populations or negative trend in large herbivores (deer, roe deer, chamois) and reduction in livestock combined lead to decline in the number of predators (especially Balkan lynx) and necrophagous species (especially obligatory necrophagous species, like vultures, but also facultative ones including several species of eagles). Populations of some of these species are approaching full extinction, which is certainly due to synergetic effect of this factor with a number of other factors.

Climate change

The last priority threat is related to climate change and concerns the expected raise in temperature and decrease in the volume of precipitations, to result in extinction or reduced area range of several sub-alpine and/or alpine species and habitats, as well as expansion of arid areas, increased risk of fires and increased erosion. On the basis of conducted modeling of habitats and species, as well as expert estimates in the process of elaboration of the Third National Communication on Climate Change (MEPP 2014), total of 18 habitats have been identified as potentially affected by climate change and 58 vulnerable plant species.

1.3.2 ROOT CAUSES OF BIOLOGICAL DIVERSITY LOSS

All the above mentioned direct causes of biological diversity loss can be identified easily, but those are result of the influence of underlying, hidden, so called 'root causes' of biological diversity loss that are often not easy to identify and it is even harder to undertake activities for their overcoming.

Root causes leading to biological diversity loss in Macedonia are typical for developing countries that face transition from one system of political ruling and governance to another and cope with poverty (Wood et al. 2000). These authors point out that socio-economic cause of biological diversity loss are bifold – intensive exploitation of natural resources to respond to domestic and foreign (economic) pressures and general approval of development model promoting the use of these resources. Although Wood et al. (2000) stated that such policies are often due to centralized authorities, this model in Macedonia is only partially applicable, because major part of the responsibilities concerning utilization of mineral and non-mineral resources, as well as development of energy sector (plants with designed capacity below 2 MW) fall under the competence of local authorities. Awarding of concessions for utilization of mineral and non-mineral resources and small scale energy facilities, which may sometimes have severe consequences on the local, often endemic component of biological diversity, is carried out through expedited procedure, mostly in absence of the relevant study or elaborate on the project environmental impact. On central level, the procedure for concluding an agreement for concession awarding through public tender precedes the procedure for environmental impact assessment for the specific projects, which puts the environmental executive authorities in subordinate position with regard to the accomplishment of their obligations. This situation is further burdened by the weak staff capacity (insufficient number and insufficient expertise) in the departments of local and central authorities responsible for the affairs of environment and nature. This is another classical root cause, where developing countries, striving to achieve economic growth, lack capacity or lack will to specify efficient measures for protection (tolerating, on the way, the activities fostered by poverty, but also activities intended towards gaining significant illegal economic benefit) and even to implement the adopted measures for nature conservation (Wood et al. 2000).

The latest trend is the growing inequality among different social levels, change in lifestyles of economically more powerful individuals and enlargement of agricultural land under the management of a small number of economically strong companies (which, if implemented without consideration of the dependence of wild species on the availability of ecological corridors and uncultivated areas) will result in declining trends for many now widely spread species. As in other countries, the causes for biological diversity loss in Macedonia are intertwined and one cannot expect that elimination of one of the threats would alter the negative trends (for example, priority species of birds of prey depend on the application of measures, at least regulations on agriculture, plant protection, hunting, nature, etc., and even consistent implementation of some of these laws will not be sufficient to ensure their survival). There is poor coordination among sectoral strategies (e.g., tourism, forestry, energy) and goals of sustainable development and nature protection (=Strategy for Biological Diversity Protection).

At present, the Republic of Macedonia stands on a cross-road between more intensive economic development and ever growing devastation of natural values. The focus of nature conservation has to be searched for in the integration of the principles of sustainable development into other sectoral policies, identifying mechanisms and alternatives that will not slow down the projected economic growth drastically, contribute to the ultimate objective of poverty reduction and improvement of the quality of living, and enable at the same time a long term survival of the most significant (both nationally and internationally) components of biological diversity.

1.4 IMPACTS OF THE CHANGES IN BIODIVERSITY

Land-cover change is recognized as the most profound effect of human activities on the environment. The provision of ecosystem services is directly related to ecosystem integrity that is in turn affected by human activities and decisions, such as change in land use patterns and technological progress. Land cover changes are therefore the result of such impacts which in turn affect the capacity of ecosystems to provide services to humans. This is evident from the comparison of the CORINE land cover data sets from 2000 and 2006.

The analysis shows that the areas where land cover change has taken place cover 35.604 ha in total, which represents 1.4% of the total area covered by the 2006 CORINE project (2.540.278 ha: the area of the country within the actual borders is 2.571.300). Interestingly, on 49% (17.462 ha) of the total area affected there is a change from "Broad-leaved forest" (code 311) to "Transitional woodland-shrub" (code 324). This observation leads to the conclusion that most of the changes are related to the combined effects of forest management practices, clear-cutting in particular, forest fires and illegal felling. According to Nikolov (2014), for instance, each year there have been in average 272.7 forest fires, for the period 1989-200, affecting an area of 6.994.0 ha. Each year there have been In average 90.2 forest fires, for the period 2001-2005, each

Figure 9. The overall potential and areas with changes in the potential to provide ecosystem services in the Republic of Macedonia for the period 2000-2006

changes in the class 311 to 324;
changes in other classes

year affecting in average 372.6 ha or 10,779.53 ha in total. The areas of broad-leaved forest account for some 13% (1.448.47 ha) of all affected forest in that period. Acceding to Nikolov (2014), the total economic loss for the period 1999-2005 amounts to €28.298.245.10 or €4.042.606.44 annually. This figure takes into account the economic value of a few services provided by forest ecosystems however (e.g. the services "Wood fuel" and "Timber"), and the actual loss (monetary and non-monetary) is likely significantly higher.

By combining CORINE land cover data of 2000 and 2006 and the estimates for the (theoretical) potential of land cover classes in Macedonia to provide one or more of the 29 ecosystem services (following the matrix produced by Burkhard et al. 2009), it is possible to assess the change in the potential to provide services by the ecosystems in the Republic of Macedonia for the period 2000-2006 (Figure 9).

A more detailed analysis of the observed land cover changes helps estimate the difference in the potential to provide each of the provisioning, regulatory and cultural services by the ecosystems in the country (see Table 6). There is a decrease in the potential of 15 out of 22 ecosystem services in the period 2000-2006, as shown in the table. The potential to provide the services "Capture fisheries", "Aquaculture", and "Groundwater recharge" remains unaltered, whereas the potential to provide the services "Fodder", "Freshwater", and "Flood protection" has slightly increased in the same period. The highest increase in the potential is observed for the service "Freshwater". The sharpest decrease is observed for the ecosystem services "Timber", "Wood fuel" and "Pollination". The further analysis of the 2000 and 2006 CLC data sets reveals that the change in the potential to provide the ecosystem service "Pollination" is the result of the conversion of 6.094 ha of the CLC class "Fruit trees and berry plantations" (code 222) into the following classes: "Non-irrigated arable land" (code 211), "Pastures" (code 231) and "Complex cultivation patterns" (242). According to the matrix developed by Burkhard et al. (2009), the CLC class 222 has the highest potential to provide the ecosystem service "Pollination", whereas the classes 211, 231, and 242 do not possess such potential. Similar analysis may be carried out for other changes and how they affect the provision of ecosystem services which can provide important information for future decision-making in land management in the Republic of Macedonia.

Ecosystem services	2000 (ha)	2006 (ha)	Промена (%)
Provisioning services			
Crops	543.881,06	542.526,31	-0,25
Livestock	480.617,97	480.583,9	-0,01
Fodder	456.532,24	456.577,58	0,01
Capture Fisheries	0	0	0,00
Acquaculture	0	0	0,00
Wild Foods	892.519,36	882.784,59	-1,09
Timber	842.793,93	831.079,64	-1,39
Wood Fuel	842.793,93	831.079,64	-1,39
Energy	290.539,28	290.671,43	0,05
Biochemicals/Medicine	839.978	828.862,34	-1,32
Freshwater	52.541,36	53.922,25	2,63
Regulating services			
Local climate regulation	853.326,9	842.200,71	-1,30
Global climate regulation	839.978	828.826,34	-1,33
Flood protection	2.393,96	2.413,1	0,80
Groundwater recharge	0	0	0,00
Water purification	839.978	828.862,34	-1,32
Erosion Regulation	1.237.058,59	1.224.969,59	-0,98
Nutrient regulation	1.035.519,11	1.023.626,01	-1,15
Air Quality Regulation	1.046.979,9	1.035.057,12	-1,14
Pollination	842.793,93	831.079,64	-1,39
Cultural services			
Recreation and Aesthetic Values	938.931,31	927.448,25	-1,22
Intrinsic Value of Biodiversity	933.719,69	923.974,96	-1,04

Table 5. Changes in the potential to provide ecosystem services by the ecosystems in the Republic of Macedonia for the period 2000-2006

1.5 POSSIBLE FUTURE CHANGES FOR BIODIVERSITY AND THEIR IMPLICATIONS FOR HUMAN WELL-BEING

1.5.1 CLIMATE CHANGE IMPACT

The impact of climate change on biological diversity was subject of assessment in the three national communications to the United Nations Framework Convention on Climate Change (MEPP 2003, 2008, 2014).

The First and the Second National Communications (MEPP 2003, 2008) identified refugia and refugial areas predisposed to climate change impacts and vulnerable to various extents, that required specific adaptation approaches. Another significant threat to biological diversity in the country in relation to climate warming and broadcasted reduction in precipitations is the danger of certain species extinction from refugial areas and alpine belts (MEPP 2008). These refugia are very important for the biological diversity of the Republic of Macedonia because of the incredible richness in species, especially endemic and relict species that have found shelter in response to climate change from earlier epochs (Figure 10).

The assessment of biological diversity for the Third National Communication (MEPP 2014) was based on the identification of vulnerable habitats and species and expert judgment of their vulnerability, analysis of possible invasive species, assessment of the adequacy of the national system of protected areas in relation to climate change, assessment of the functionality of bio-corridors in Macedonia, as well as modeling of selected habitats and species.

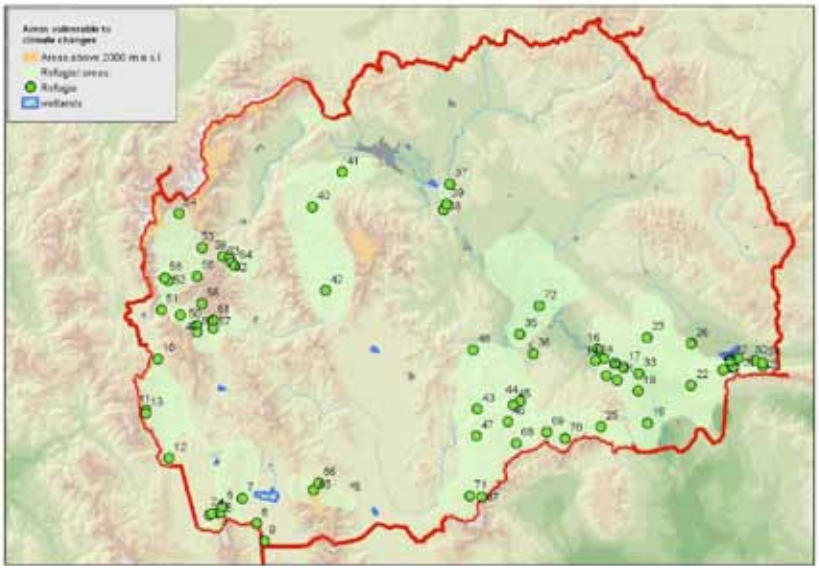


Figure 10. Map of the areas in the Republic of Macedonia that are sensitive to climate change (Source: GEF/UNDP/MEPP Project on protected areas, Report – second part, 2010)

Through assessment of vulnerability, total of 18 vulnerable habitats, 58 plant and 224 animal species were identified. Expert judgments were made for all habitats and species, according to which we may expect changes in distribution (vertical and horizontal resettlement, changes in phenology, especially with certain bird species), and even extinction of some habitats (lowland swamps) and species (plant and animal species bound to sub-alpine, swampy and riparian habitats).

Under the Third National Communication (MEPP 2014), by application of the modeling software MaxEnt, possible changes in the distribution of two habitats, two plant species and one endogene insect were predicted under the scenario A1B (IPCC 2000) representing market oriented world with relatively fast economic growth per capita and maximum raise in global population by 2050. Modeling of species and community of mountain pine (dwarf pine - *Pinus mugo*) (Figure 11) confirmed the expert judgment that the forthcoming 50 years will bring unsuitable

climate conditions for the analyzed plant and animal species (*Pedicularis ferdinandi, Crocus cvijicii, Trechus goebli*) and their vertical movement (upwards in altitude) can be expected. However, the model for the community of Kermes oak (pseudomaquis) showed unexpected results according to which this community will move to the mountains in the eastern part of Macedonia, opposite to expert judgment which anticipated its movement from Southern Vardar area towards north, along the valley of Vardar River (Figure 12).

Action Plans for adaptation to climate change are integral parts of the three national communications (MEPP 2003, 2008, 2014). The Third National Communication (MEPP 2014), however, has concluded that these activities are implemented only in part.

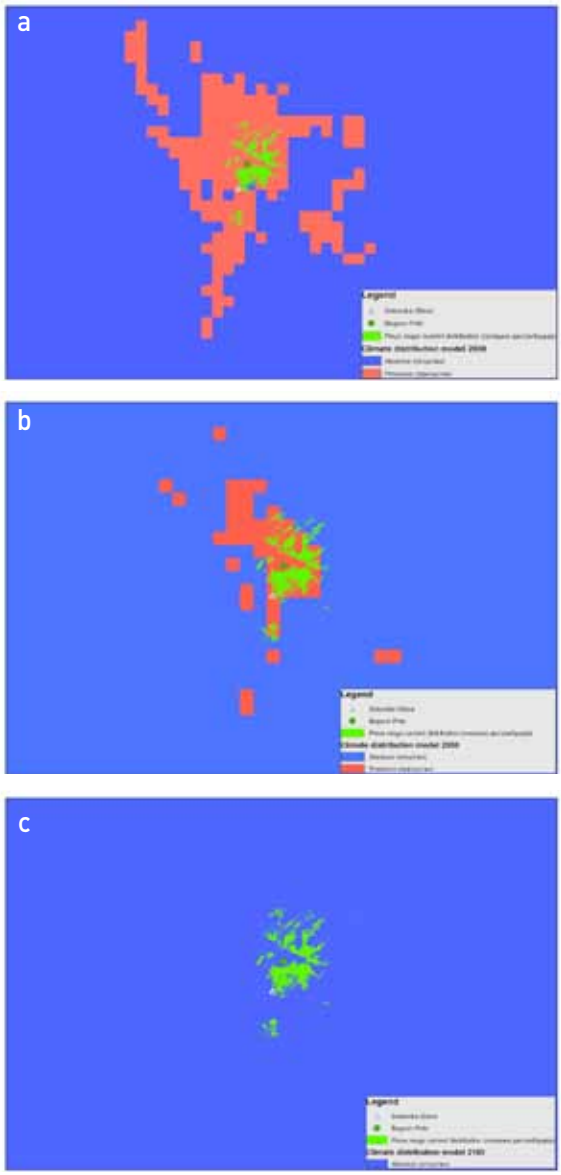


Figure 11. Community of mountain pine (Pinus mugo) on the mountain of Mokra (Jakupica), a – current distribution, b – predicted distribution in 2050 based on modeling and c – predicted distribution in 2100 based on modeling (Source: Report on the analysis of vulnerability and climate change in the sector of biological diversity, 2013, GEF/UNDP/MEPP Project on climate change)

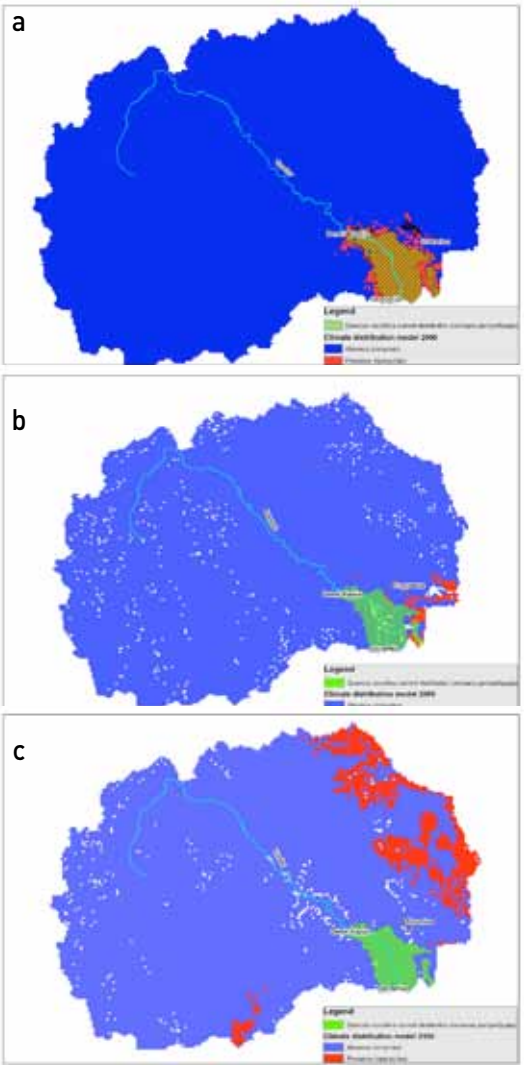


Figure 12. Community of Kermes oak (Quercus coccifera) - pseudomaquis, a – current distribution, b – predicted distribution in 2050 based on modeling and c – predicted distribution in 2100 based on modeling (Source: Report on the analysis of vulnerability and climate change in the sector of biological diversity, 2013, GEF/UNDP/MEPP Project on climate change)

1.5.2 INFRASTRUCTURE PROJECTS IMPACT

The planned development of energy and tourism development zones is expected to have negative impact on certain important species and habitats within and outside the protected areas, owing to changes in land use, spread of continuous and discontinuous urbanization and changes in watercourses.

In the period 2003-2013, the implementation of a number of infrastructure development projects has started or has been announced, and some of them have potential to cause local negative changes in biological diversity components, while for some there is also a risk of significant impact on biological diversity. From among initiated or planned activities, we should hereunder mention the following ones, because of their implementation in regions that possess important biological diversity components
:

- **Highway "Demir Kapija – Smokvica"** – part of the highway is to be built through the pass of Demir Kapija Gorge (Canyons on Vardar and Chelevechka Rivers), an Emerald area, Important Bird Area and Important Plant Area. According to the Environmental Impact Assessment (EIA) Study (Institute of Civil Engineering of Macedonia, 2008), several types of habitats/localities have been identified as "very sensitive areas" along certain sections of the route.
- **Highway "Miladinovci – Sveti Nikole - Shtip"** – parts of the route pass through Important Bird Areas and Important Plant Areas. The EIA Study (DIK Chakar Partners, Skopje 2012) states wrongly that no globally endangered species have been registered along the route of the planned highway, although at least couples of the globally endangered Imperial Eagle are present (Velevski et al., 2010).
- **Highway "Shtip – Strumica"** – part of the route passes through Important Bird Areas, although the EIA Study (Balkan Consulting DOO Skopje, 2011), failing to quote the source, concludes that the route does not pass through "core area" of the respective IPA, despite the fact that such part has not been defined in the description of the area of IPA Mantovo Lake and the river Kriva Lakavica.
- **Highway "Kichevo – Trebenishta"** – according to EIA Study (GEING Krebs und Kifer International et al. DOO, 2013), the highway does not pass through area of importance for biological diversity, and it will affect only three habitat types considered to be priority under the Habitat Directive. Nevertheless, the highway does have a potential to cause break of the corridors Treska (Podvis) and Ilinsaka Planina Mt. – Stogovo from the National Ecological Network MAK-NEN (Brajanoska et al. 2011), which is the reason to envisage measures for mitigation of the effects of the planned highway – construction of several underground passages and construction of two green bridges at minimum. The EIA Study explicitly states that no impact on the mentioned bio-corridors is expected (pp. 166) and therefore no impact mitigation measures are recommended (pp.270).
- **Motorway "Bridge on the river Raec – Gradsko"** – part of the road route passes through Emerald area, Important Bird Area and Important Plant Area. The EIA Study (Lasoy DOO, 2013) stressed the greatest risk to biological diversity components along the section passing through Drenovo Gorge.
- **Express road A3 "Ohrid – border with the Republic of Albania – Sveti Naum"** – planned to pass through "Galichica" National Park (designated as World Natural and Cultural Heritage of Ohrid Region - UNESCO, Transboundary Biosphere Reserve "Ohrid

- Prespa", Emerald site, Important Plant Area and Prime Butterfly Area). According to the project documentation of the road (Chakar &Partners 2013), the overall area to be occupied by the road body and protection belt on its both sides amounts around 308 hectares, of which around 50 hectares belong to the zone for active management. For the purpose of this road implementation, amendments to the Management Plan of NP "Galichica" have been initiated (Bioeco and PI NP "Galicica" 2013).

- **Motorway "Kula – Makedonski Brod"** – passes through Multi-Purpose Area "Jasen".
- **Railway "Kumanovo – Republic of Bulgaria"** - passes through Emerald site and Important Bird Area and cuts two ecological corridors. The EIA Study states that wild species mortality is expected (mammals, amphibians and reptiles on rails, birds on accompanying electric installations) locally with medium to great impact (Eptisa 2012).
- **Railway "Kichevo – Kjafasan"** – According to the EIA Study, the railway does not imply particular threat to environment and nature (Dekons-Ema 2010).
- **Railway "Drachevo – Veles"** – passes through (mainly) peripheral parts of severa designated/protected areas: Important Bird Area, Important Plant Area, Emerald site and several nationally protected areas. The EIA Study anticipates negative impacts on biological diversity components with mostly medium intensity (ILF et al. 2013).
- **Gas pipeline "Klechovec – TEC Negotino"**- EIA Study was prepared in 2011 (Tehno Lab DOO Skopje, 2011).
- **Regional road "Nova Breznica – Kula Kolomot"** – passes through the Multi-Purpose Area "Jasen"; EIA Study was prepared in 2012 (Prima Ingenering DOO Skopje, 2012)

1.5.3 TOURISM DEVELOPMENT ZONES

Tourism development zone (TDZ) is defined in the Law on Tourism Development Zones (Official Gazette of the Republic of Macedonia no. 141/12) as specifically bounded and marked area representing functional whole, established for the purposes of tourism development by introduction of standards in the segment of services, as well as efficient utilization of resources by application of the highest environmental standards, where activities are performed under conditions prescribed by law.

The Law will initially cover eight sites ranging from 13 to 50 hectares in the areas of Struga, Prespa, Dojran and Ohrid. From among announced sites, three are situated within NP "Galichica" (TDZ "Ljubanishta", TDZ "Stenje", and TDZ "Oteshevo").

In the past period, the Government of the Republic of Macedonia has issued consent for permanent conversion of agricultural into construction land for elaboration of Urban Plan outside populated places, for the purposes of developing Tourism development zone in Cadastre Sheet Kalishta, Municipality of Struga (Official Gazette of the Republic of Macedonia no. 135/2013) and Cadaster Sheet Nov Dojran, Municipality of Dojran (Official Gazette of the Republic of Macedonia no. 127/2013).

PART II: DEVELOPMENT OF NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN, ITS IMPLEMENTATION, AND THE MAINSTREAMING OF BIODIVERSITY

2.1 NATIONAL BIOLOGICAL DIVERSITY TARGETS

The new vision and the national targets for biological diversity protection in the Republic of Macedonia have been identified during 2013/2014 as part of the activities under the GEF/UNDP/MEPP Project for revision of the National Biodiversity Strategy and Action Plan.

The Vision of the Republic of Macedoniaby 2050 reads as follows: "Biological diversity, exceptional natural resources and traditional relationships of people with nature in the Republic of Macedonia are conserved, adequately valued and promoted, thus providing ecosystem services that support the human's welfare in the country".

For the purpose of defining national targets, process of consultation with the relevant stakeholders was undertaken, through which the goals of the first NBSAP, the status and the trends of biological diversity in the country, identified threats to biological diversity, as well as the guidelines for implementation of the globally set Aichi targets (CBD/UNEP 2013) were reviewed.

As a result, 19 national targets were drafted (Table 6) and grouped into four strategic goals:

1) reduction of pressure on/loss of biological diversity through integration of biological diversity into other sectors,

(2) reduction of direct and indirect pressures on biological diversity,

(3) improvement of biological diversity status through conservation of ecosystems, species and genetic diversity for the purpose of enhancing the benefits of biological diversity and ecosystem services, and

(4) improvement of biodiversity knowledge and accessibility of all relevant information related to biological diversity.

Table 6 presents the draft strategic goals and national targets, as well as their relation to Aichi targets. The Table indicates that all targets are related to one or more Aichi targets, except target 13 (which is certainly related indirectly, taking into account the Convention recommendation for common commitment by all Parties for full and efficient implementation of the Global Strategic Plan for Biological Diversity).

Finalization of national targets and definition of measures and actions to achieve them, as planned, will be done during 2014 through elaboration of the National Strategy for Biological Diversity with Action Plan.

Strategic goals / targets	Relation to Aichi Targets
A. To take action to reduce pressure on/loss of ecosystems and biodiversity through mainstreaming of biodiversity into relevant sectors	
1. Raised public awareness on biological diversity and its values, the services provided by ecosystems and the steps to be taken for the protection and sustainable use of biological diversity	1
2. The values of biodiversity to be gradually incorporated into economic development policies on national and local level (poverty reduction, accounting systems, national and local development plans, etc.)	2
3. To identify and eliminate incentives, including subsidies harmful to biodiversity and to introduce positive incentives for conservation and sustainable use of biological diversity assigned with the Convention and EU obligations	3
B. Reduce direct and indirect pressures on ecosystems and biodiversity	
4. To establish management practices in forestry and agriculture that contribute to conservation of biodiversity and maintenance of ecosystem services	7, 14
5. Pollution, including waste and excess nutrients, to be reduced to levels that are not harmful to biodiversity, ecosystems and the provision of ecosystem services	8
6. To develop and implement plans for sustainable production and consumption for use of natural resources within safe ecological limits	4
7. To create and establish appropriate policies for the evidence, control and protection from invasive alien species	9
8. To integrate measures for adaptation and mitigation of climate change and combating desertification	15
C. To improve the status of biodiversity through conservation of ecosystems, species and genetic diversity aiming to increase the benefits of biodiversity and ecosystem services	
9. To prevent the loss, degradation and fragmentation of natural habitats of national and European importance	5
10. To increase the surface of protected areas to 15% including their functional connectivity (ecological network) and establish effective management of protected areas in collaboration with local communities.	11
11. To determine the extent of threat of wild species in order to prevent the extinction of endangered species, and to improve and maintain conservation status, particularly of the species in decline	12
12. To improve in situ and ex situ protection of genetic resources of native species cultivated plants and domestic animals	13
13. To establish monitoring of biodiversity and natural processes	19, 12, 11, 9, 13
14. To promote the protection of species and ecosystems on transboundary level through implementation of joint actions/measures	
15. To improve the status of important ecosystems in terms of providing essential ecosystem services	14
16. To integrate requirements of Nagoya Protocol into national legislation to 2018	16
D. To improve biodiversity knowledge and availability of all relevant information related to biodiversity	
17. To encourage and financially support the research of all components of biodiversity, to establish and update the database on national level to better use and sharing of information on biodiversity	19
18. To preserve and promote traditional knowledge, innovations and practices in benefit of conservation and sustainable use of natural resources	18
19. To increase the level of investmentsand financing sources for biodiversity conservation from the central and local budget and other sources	20

Table 6. Draft national biological diversity targets

2.2 NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN – PROCESS OF REVISION AND INCORPORATION OF AICHI TARGETS

The First Biodiversity Strategy with Action Plan was adopted in 2004, with Action Plan validity by 2008. In the course of 2009, a report was prepared on the implementation of the first Action Plan for biological diversity for the period July 2004 – June 2009 and considered by the Government of the Republic of Macedonia as information material. In the course of 2012, information was prepared on the need to elaborate the Second Action Plan for biological diversity protection and it was considered by the Government of the Republic of Macedonia as information material.

The process of revision of the National Biodiversity Strategy with Action Plan started in January 2013, in the frames of the Project "Support to the Republic of Macedonia for revision of the National Biodiversity Strategy with Action Plan and development of the Fifth National Report to the Convention on Biological Diversity", financed by GEF and implemented by MEPP and UNEP Office in Vienna.

This project enables gathering of huge amount of information and analyses of biological diversity in the Republic of Macedonia to be used in the revision of NBSAP and development of the Fifth National Report, including:

- analysis of the status of biological diversity (species, habitats, ecosystems) in the Republic of Macedonia for the period 2003 – 2013;
- analysis of the main threats to biological diversity, according to the classification of the European Union (reporting format under the Habitat Directive), while valuation of the threats was done on the basis of five parameters, and then they were categorized into four categories (see Chapter 1.3);
- specific overview was made of the sectors (forestry, hunting, transport, energy, water management, pollution, etc.) that have or could have impact on biological diversity;
- analysis of legal and institutional setup for biological diversity protection, list of relevant strategic and planning documents, the state of the monitoring, research, education on biological diversity, etc

2.2.1 ANALYSIS OF THE IMPLEMENTATION OF THE FIRST ACTION PLAN FOR BIOLOGICAL DIVERSITY

As the first step in the process of revision of the National Biodiversity Strategy with Action Plan adopted in 2004, analysis of the implementation of the first Action Plan was made together with the assessment of biological diversity status in the Republic of Macedonia.

Guidelines under the Convention on Biological Diversity contained in Decision (CBD/COP/DEC VIII/8) and experiences from other countries were used in the evaluation of the NBSAP implementation. For that purpose, the expert team used the recommended Table under the CBD with minor supplement, while the status of implementation was reviewed for each action (fully/partially implemented or not implemented), brief explanation, the main obstacles to its (non)implementation and additional comment on the specific action.

The process of development of the analysis of the Action Plan for biological diversity was carried out in the period from June to December 2013 through broad process of consultations with all stakeholders. Most of the required information was collected by the expert team during the two day workshop regarding the action plan analysis. For further information, the employees of the Nature Department within MEPP were consulted. Then, the analysis was presented at the first meeting of the Steering Committee, and their comments were incorporated in the table for actions analysis. For actions lacking data, it was necessary to contact representatives of other departments of the MEPP and other competent ministries. Finally, the analysis was presented and discussed at the second workshop for the stakeholders (held in October 2013), where comments and information given by the participants assisted to finalize the analysis.

The results of the completed analysis show that, out of the total of 217 actions defined to achieve the main goal and the objectives of the first NBSAP, only 64 actions (29%) have been implemented, 57 (26%) have been implemented partially, and 96 actions have not been implemented which is around 44% of the total number of defined actions (Table7).

The main obstacles to the implementation of the First Action Plan for biological diversity identified in the process of the analysis include:

- Lack of financial resources
- Conservation of biological diversity is not priority
- Lack of capacity in MEPP and other institutions, insufficient coordination/cooperation between departments
- Insufficient inter-sectoral cooperation
- Unadjusted legal solutions, non-compliance with the legislation (poaching, illegal fishing, illegal wood cutting, etc.)
- Slow procedures for designation and non-adopted developed documents

Strategic approach	Implemented actions	Not implemented actions	Partially implemented actions	Total
A. In-situ conservation	13	26	15	54
B. Ex-situ conservation	-	10	4	14
C. Sustainable use of biodiversity	2	6	9	17
D.Institutional strenghtening	1	10	6	17
E. Investigation and monitoring	6	7	8	21
F. Public awareness and education	6	3	4	13
G. Impact assessment	1	3		4
H. Incentive measures	-	6	2	8
I. Legislation	31	9	5	45
J. Financial resources for implementation of NBSAP	1	3	4	8
K. Coordination and implementation of NBSAP	3	13	-	16
Total	64	96	57	217

Table 7. Analysis of the implementation of the First Action Plan for Biological Diversity (2004)

Dianthus myrtinervius - endemic species on Pelister Mountain

2.2.2 PROCESS OF NBSAP REVISION

The process of NBSAP development/revision (as well as its implementation) is led by one responsible authority on national level – the Ministry of Environment and Physical Planning, but with involvement of high number of relevant stakeholders. Although the process of public participation consumes a lot of time and resources, it will have multifold benefits – through stakeholders' involvement, the processes of planning and implementation are linked; access to high number of information and a lot of knowledge is enabled; public awareness is raised; consensus is built and policy on issues related to biological diversity conservation is adjusted to the maximum.

The process of identification and consultation with the relevant stakeholders started at the very beginning of the Strategy revision, at the point of which the relevant stakeholders and their responsibilities were identified. CBD defines five main groups of stakeholders: state institutions (different ministries and agencies), scientific community, non-governmental organizations, private sector and local communities. The identification of the stakeholders in the process of NBSAP considered all those:

- that have direct legal or administrative responsibility for biological diversity conservation (Ministry of Environment and Physical Planning, Ministry of Agriculture, Forestry and Water Economy, local self-governments, entities managing protected areas, etc.)
- that have influence on biological diversity (public enterprises for forests, waters, pastures, transport, agencies for space planning, energy, etc.)
- that possess knowledge, experience and expertise and can contribute to the revision and implementation of the NBSAP (scientific institutions, non-governmental organizations, consulting companies, etc.)
- that may be affected by the measures in the adopted strategic document (ministries and agencies responsible for the development of energy, transport, urbanization, use of natural resources, etc.)
- that can be concerned by the status and the trend of biological diversity

On the basis of the above analyses and identified national targets for biological diversity by 2020 (which are to a great extent harmonized with Aichi targets), the process of definition of the actions necessary to achieve the set national targets is underway. They will contribute to the achievement of the Global Strategic Plan for biological diversity by 2020.

In parallel with the process of the Strategy revision, Strategic Environmental Assessment is developed, in which, inter alia, socio-economic aspects and the impact of the Strategy for Biological Diversity thereon are considered. The report will give recommendations for incorporation of issues related to the protection and sustainable use of biological diversity in other relevant national policies (laws, strategies, plans, programmes, etc.).

2.3 IMPLEMENTATION OF THE CONVENTION ON BIOLOGICAL DIVERSITY ON NATIONAL LEVEL

2.3.1 POLICY FOR BIODIVERSITY PROTECTION

2.3.1.1 Legal framework

In the Republic of Macedonia, national resources, flora and fauna are defined as goods of general interest and enjoy special protection under the Constitution of the Republic of Macedonia. The Law on Environment (Official Gazette of the Republic of Macedonia no. 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 13/13, 163/13, 41/14) regulates the rights and the responsibilities of the Republic of Macedonia in providing conditions for environment protection and improvement, for the purpose of exercising of the citizens' right to a healthy environment.

The basic law regulating the protection of the nature through protection of biological and landscape diversity and protection of natural heritage within and outside protected areas, is the Law on Nature Protection adopted in 2004.

The above Law has integrated and updated former laws concerning species and ecosystems protection, namely: The Law on Natural Rarities Protection (Official Gazette of the Socialist Republic of Macedonia no. 41/1973), Law on the Protection of National Parks (Official Gazette of the Socialist Republic of Macedonia no. 33/80) and the law on the Protection of Ohrid, Prespa and Dojran Lakes (1977), new global trends in biological diversity protection, categorization of protected areas specified by the International Union for Conservation of Nature (IUCN), the principles of sustainable development and obligations deriving from the relevant multilateral agreements ratified by the Republic of Macedonia (Annex IV). Of course, the initiated process of the Republic of Macedonia accession to the European Union has played great role in the law creation, in which transposition of the EU legislation was the first step, including the two most important directives on nature protection – Bird Directive (2009/147/EC ex. 79/409/EEC) and Habitat Directive (92/43/EEC).

Since its adoption, the Law has been amended on several occasions (Official Gazette of the Republic of Macedonia nos. 67/04, 14/06, 84/07, 35/10, 47/11, 148/11, 59/12, 13/2013, 163/13, 41/14) in order to be adjusted further with the EU legislation, enable better functioning of the system of protected areas, records keeping on nature protection, etc. Full implementation of the Law will be accomplished upon the adoption of the relevant bylaws – around 50 bylaws are prescribed, of which 17 have been adopted (Annex III). Half of the bylaws were developed under the GEF/UNDP/MEPP Project on protected areas, thus providing for more efficient implementation of the law and further transposition of the provisions of the EU Bird and Habitat Directives into the national legislation. This has contributed to the implementation of part of the activities planned under the National Programme for Adoption of EU Acquis in the area of nature protection, carried by the MEPP in the process of approximation/adjustment with the EU law. Drafting and adoption of certain bylaws requires significant efforts and prior scientific/expert analysis, as are, for example, bylaws concerning identification of habitat types, including the type and the extent of the threats against them and their significance, the manner of elaboration, maintenance and mapping, manner of performing assessment of the status of and threat to habitat types, etc.

The main goals of the Law on Nature Protection are defined in Article 4 and these are:

1. Determination and monitoring of the state of nature;
2. Conservation and restoration of the existing biological and landscape diversity in a state of natural balance;
3. Establishment of a network of protected areas for the purpose of sustainable protection of the features on the basis of which they have acquired the status of natural heritage;
4. Providing for sustainable use of natural wealth in the interest of the present and future development, without significant damage of parts of the nature and with the least possible disturbance of natural balance;
5. Prevention of harmful activities of individuals and legal entities and disturbance in nature as a result of technological development and performance of activities, i.e. providing for the best possible conditions for protection and development of the nature;
6. Providing for the citizen to fulfill their right to healthy environment.

The principle of integration is one of the eight principles for nature protection, according to which measures and activities for nature protection should be integrated into all development strategic, planning and programming documents, plans for space development and use, as well as plans for natural heritage management and use.

Preservation of agro-biological diversity is subject of regulation in several laws (see Table 8), the implementation of which is under the responsibility of the Ministry of Agriculture, Forestry and Water Economy.

With regard to the utilization of natural resources for economic purposes and space development and use (land use), besides the provision of the Law on Nature Protection, provisions of special laws apply as well, the most significant among which are listed in Table 8.

For the purpose of implementing the Cartagena Protocol for Biosafety and regulating the issues related to genetically modified organisms (GMO), the Law on Genetically Modified Organisms was adopted in 2008 (Official Gazette of the Republic of Macedonia no. 35/2008), and bylaws were prepared in the course of 2013, in order to finalize the regulatory regime for biosafety.

The Criminal Code (adopted in 1996 and amended on several occasions), in its Chapter 22, includes several articles (218-234) referring to "Crimes against environment and nature".

Topic	Law
Agrobiodiversity	**Law on Agriculture and Rural Development** (Official Gazette of the Republic of Macedonia no. 49/2010; 53/2011, 126/2012, 15/2013 and 69/2013) which prescribes the manner of monitoring and analyzing the conditions and measures for conservation of autochtonous varieties of crops and breeds of domestic animals based on their extent of threat and prohibition of their extinction.
	Law on Seed and Seeding Material (Official Gazette of the Republic of Macedonia no. 55/11) that regulates operation of the Gene Bank of plants.
	Law on Animal Husbandry (Official Gazette of the Republic of Macedonia no. 7/2008, 116/2010 and 23/2013) defines 11 autochtonous breeds and/or linesof domestic animals. It gives a legal basis for preparation of Programme for conservation of biodiversity in domestic animals (prepared for the period 2013-2017).
Use of natural resources	**Law on Hunting** (Official Gazette of the Republic of Macedonia no. 26/09, 32/09, 136/11, 01/12, 69/13, 164/13and 187/13)
	Law on Forests (Official Gazette of the Republic of Macedonia no. 64/09, 24/11, 53/11, 25/13, 79/13, 147/13 and 43/13)
	Law on Fishery and Aquaculture (Official Gazette of the Republic of Macedonia no. (7/08, 67/10, 47/11, 53/11 and 95/12)
	Law on Agriculture and Rural Development (Official Gazette of the Republic of Macedonia no. 49/10)
	Law on Organic Agricultural Production (Official Gazette of the Republic of Macedonia no. 146/2009)
	Law on Waters (Official Gazette of the Republic of Macedonia no. 87/08, 06/09, 161/09, 83/10 and 51/11)
	Law on Pastures Management (Official Gazette of the Republic of Macedonia no. 3/98, 101/2000, 89/2008, 105/2009, 42/10 and 164/2013)
Land use	**Law on Spatial and Urban Planning** (Official Gazette of the Republic of Macedonia no. 51/2005, 137/07,91/09, 124/10,18/11,53/11,144/12 and 55/13)
	Law on Construction (Official Gazette of the Republic of Macedonia no. 130/09, 124/10, 18/11, 36/11, 13/12, 144/12, 25/13)
	Law on Construction Land (Official Gazette of the Republic of Macedonia no. 17/11, 53/11, 144/12, 25/13)
	Law on Agricultural Land (Official Gazette of the Republic of Macedonia no. 135/07, 18/11, 42/11. 148/11 and 95/12)
	Law on Concessions and other Public Private Partnership (Official Gazette of the Republic of Macedonia no. 7/2008, 139/2008, 64/2009 and 52/2010)
	Law on Mineral Resources (Official Gazette of the Republic of Macedonia no. 136/2012, 25/2013, 93/2013, 132/2013 and 44/2014)
	Law on Auto Bearings (Official Gazette of the Republic of Macedonia no. 13/2013)
	Law on Tourism Development Zones (Official Gazette of the Republic of Macedonia no.141/12)
GMO	**Law on Genetically Modified Organisms** (Official Gazette of the Republic of Macedonia no.35/2008)
Food safety and animal protection	**Law on Veterinary Medicine** (Official Gazette of the Republic of Macedonia no. 113/2007, 23/2011 and 156/2011)
	Law on Animal Protection and Welfare (Official Gazette of the Republic of Macedonia no. 113/2007 and 136/2011)
	Law on Food Safety (Official Gazette of the Republic of Macedonia no. 157/10)

Table 8. Relevant laws for biodiversity protection in Macedonia

2.3.1.2. INSTITUTIONAL FRAMEWORK

The competent state authority in the areas of nature and biological diversity protection is the Ministry of Environment and Physical Planning.

The Administration of Environment, as a body responsible for the performance of expert activities in the area of environment and nature protection, was established in 2007 and its main goal is to establish efficient and integrated system of environment and nature protection, thus improving the quality of the environment in the Republic of Macedonia. Five Departments were established within the Administration, as follows: Department of Environment, Department of Waste Management, Department of Waters, Department of Industrial Pollution and Risk Management and Department of Nature (Figure 13).

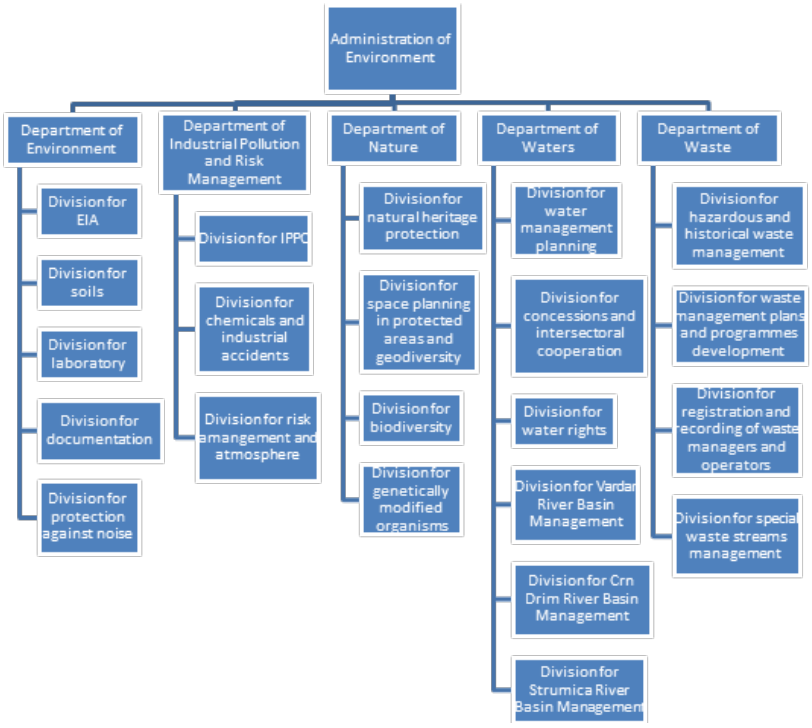


Figure 13. Organizational Chart of the Administration of Environment

Department of Nature is the only organizational unit within MEPP (and at national level at all) performing expert activities in the area of nature protection. The Department carries out activities for nature protection through protection of biological and landscape diversity and protection of natural heritage. The Department has 13 employees distributed in the following four divisions: Division for biological diversity; Division for natural heritage protection; Division for space planning in protected areas and geodiversity; and Division for genetically modified organisms.

Nature Department is responsible for the implementation of the national legislation and multilateral agreements in the area of nature protection; it takes part in the approximation

of the national legislation with the one of the European Union; coordinates the development, adoption and implementation of strategies, programmes, action plans and measures for nature protection; it accomplishes inter-institutional cooperation in the process of preparation and adoption of other laws and strategic documents related to nature protection; it initiates and manages procedures before the Government and the Assembly of the Republic of Macedonia for designation of protected areas; it performs supervision over the work of entities obliged with protected areas management and implementation of management plans for protected areas; it takes care of the establishment and implementation of system of measures for natural heritage protection; it accomplishes inter-sectoral cooperation in order to ensure sustainable use of natural resources; it accomplishes inter-sectoral cooperation for space planning and development within protected areas; it cooperates with international organizations in relation to issues of nature protection; it accomplishes cooperation with the bodies of the state administration with regard to the implementation of strategic development documents on nature protection; it takes part in the implementation of multilateral agreements on nature protection; it keeps technical records of natural heritage (register of natural heritage and cadastre of protected areas); it performs monitoring over the status of biological diversity and geo-heritage and takes measures for protection and conservation; it encourages scientific and research work in the area of nature protection; it takes part in activities for natural heritage promotion and public awareness raising of nature protection; it carries out measures for GMO treatment and protection against deliberate release of GMO in nature; it performs activities related to clearing house for bio-safety, as well as other activities in accordance with the provisions of the legislation on GMO.

In accordance with the Law on Nature, the Department of Nature manages administrative procedure for issuance of: permit for keeping wild animals in captivity; expert opinion on fulfilled conditions for keeping and breeding wild animals in captivity; CITES permit/certificate regulating international trade in endangered wild species of plants, fungi, animals and derivatives thereof; permit for scientific research in nature; consent on management plan for protected area (PA); consent on annual programmes for nature protection in PA; consent on urban planning documentation; expert opinions for the issuance of permits for collection of threatened and protected wild species of plants, fungi and animals; expert opinions for the issuance of permits D4 (through EXIM system) for export or import of wild species of plants, fungi, animals and derivatives thereof; expert opinions determining the legal status of illegally built structures; expert opinions on detailed geological investigations and exploitation of mineral resources.

Apart from the Department of Nature, other Departments of the Administration of Environment play a role in nature protection, especially:

- **Department of Waters** which is responsible for the performance of expert activities related to waters protection in accordance with the regulations on waters which incorporate the principle of integrated management of river basins. In organizational terms, the Department is organized in divisions by river basins (Vardar, Strumica, Crn Drim and Juzhna Morava River Basins). It takes part in and observes the development of the Water Management Master Plan, prepares the Programme for water management and monitors its implementation; participates in the procedure for water rights issuance and awarding of concessions for use of water, discharging of water and excavation of sand, gravel and stone, as well as issuance of water management consent; it participates in the procedure for development of water bodies management plans and in the work of the bodies managing waters through relevant divisions; keeps records of the protection zones, etc.
- **Department of Environment** which, inter alia, is responsible for the performance of environmental impact assessment procedure.

There are other departments within MEPP which also have significant role in the conservation of biological diversity, such as: Department of Spatial Planning, Department of Sustainable Development and Investments, Department of EU, Department of Public Relations, Macedonian Environmental Information Centre, as well as Spatial Information System Office and State Inspectorate of Environment and Nature.

2.3.1.3. MECHANISMS FOR COOPERATION

National level

In order to implement the Convention on Biological Diversity on national level, the Republic of Macedonia has nominated National Focal Point. **The National Committee for Biological Diversity** (composed of around twenty scientists and experts) was established in 1999 and was especially active during the elaboration of the Country Study on Biological Diversity (first national report, 2003) and the first National Strategy for Biological Diversity and Action Plan (2004). However, upon the adoption of these documents, its activity has lessened and presently it is not active. A number of members from the original composition have passed away, and the Committee, despite numerous requests, has not obtained its office for work within the MEPP, where its seat is to be. In the process of revision of the National Biodiversity Strategy, activities will be undertaken to revise the composition of the National Committee for Biological Diversity in line with the obligations and new demands for implementation of the Convention on Biological Diversity. Besides the Committee for Biological Diversity, other national committees have been established in Macedonia in accordance with the instructions of other multilateral agreements (Ramsar, Bonn Convention, etc.) or councils (for nature, sustainable development) in line with the obligations deriving from national legislation. More details on these committees/councils are given in Table 9.

For the purpose of harmonization with other international agreements in the area of nature protection and due to the insufficient activity of established committees, it is necessary to consider the possibility to establish a single committee to observe the implementation of all conventions, or to introduce changes in the composition of the members of the National Council for Nature Protection and supplement its responsibilities (which would cause adoption of amendments to the Law on Nature Protection), by which this Council would become operational.

Table 9. National committees/councils established in Macedonia

Name of the committee/council	Establishment and activities
National Committee for Biological Diversity	• Established in 1997, in line with the obligations under the Convention on Biological Diversity • Composed of around twenty scientists and experts • Especially active in the elaboration of the First National Report, 2003) and the first NBSAP (2004)
National Committee for Migratory Wild Species Protection	• Established in 2001, in line with the obligations under the Bonn Convention • Composed of 13 members from relevant institutions • Not active
National Ramsar Committee	• Established in 1994, in line with the obligations under the Ramsar Convention • Composed of 7 members, representatives of competent ministries, scientific institutions and non-governmental sector • So far, it has had more than 50 sessions

National Council for Nature Protection	• Established inaccordance with the Law on Nature Protection (Article 145, paragraph 1) • Minister's Advisory body • It comprises eight members in total from the relevant institutions appointed for a period of four years (2009-2013) • It is inactive in practice
National Coordinative Committee for Biosafety	• Established in September 2012 for the implementation of the GEF/UNEP Project "Support to the implementation of the biosafety framework of the Republic of Macedonia" • It comprises 18 members from the relevant ministries and scientific institutionsand non-governmental organizations
National Council for Sustainable Development	• Established in 2010 by the Government of the Republic of Macedonia • It comprises 16 members from the relevant state and scientific institutions, chaired by the Vice President of the Government of the Republic of Macedonia responsible for economic affairs • Advisory body to the Government of the Republic of Macedonia • It holds regular sessions, reviews issues and gives opinions on the policies for sustainable development in the country, observes the implementation of the Strategy for Sustainable Development, issues opinions on documents in the area of economy, social development, environment protection, agriculture and other relevant documents, cooperates with relevant institutions in the country and abroad on issues related to sustainable development, etc.

Besides national committees, other councils or commissions with similar goals and activities have been established in Macedonia during the last years.

Thus, in 2013, **expert inter-sectoral group** was established, concerning valorization of advantages and deficiencies for designation of new protected areas. It was established by Decision issued by the Minister of Environment and Physical Planning, based on the obligation delegated by the Government of the Republic of Macedonia of 2011. The working group consists of nine members from all relevant state institutions. The working group is given the task to fill in the List for valorization of advantages and deficiencies arising from designation of new protected areas and Methodological aspects of definition of the parameters required for areas valorization and factors with instructions on the achievement of real results in factors valorization. The Lists and Methodological aspects were developed by the Office of the Vice President of the Government of the Republic of Macedonia responsible for economic affairs.

Another mechanism for cooperation with stakeholders towards efficient management of protected areas was introduced in 2010 with the Amendments to the Law on Nature Protection (Article 135a). Namely, the entity appointed to manage the area has the obligation to establish **Council of Stakeholders** and **Scientific Council** as entity's consultative body. In the course of 2013, the Public Institution National Park "Mavrovo" established the first Council of Stakeholders.

The concept of integrated management of river basins is the niche through which the new Law on Waters is applied. For the purpose of appropriate management of basins, the respective divisions for the four river basins in Macedonia have been established within the MEPP's Water Department, namely: Vardar, Crn Drim, Strumica and Juzhna Morava River Basins. In order to prepare and implement river basin management plans, **Councils for River Basin Management** were established for the rivers Vardar (together with Juzhna Morava), Strumica and Crn Drim. For the purposes of existing projects implementation, Council for Prespa Lake Sub-basin (SDC/UNDP project) and Council for Bregalnica River Sub-basin (SECOproject) were established as well.

Declaration on the establishment of Prespa Park and protection of the environment and sustainable development of Prespa Lakes region was signed in 2000

Transboundary cooperation

For the purpose of the transboundary cooperation for nature protection and establishment of transboundary protected areas, different committees and bodies have been established in Macedonia, at different levels – institutional, academic, etc. The more prominent committees, the purpose of their establishment and their activites are presented in Table 10.

Table 10. National committees for transboundary cooperation established in Macedonia

Name of the committee	Establishment and activities
National committee for UNESCO 'Man and Biosphere' programme of Convention on protection of cultural and natural heritage	• Established in August 2013 by the Government of the Republic of Macedonia • Goal – implementation of the MAB Programme and establishing cooperation with other countries and UNESCO Secretariat • Composed of president and 12 members • Rules of procedures are adopted; MEPP is responsible body for administrative technical issues • Nomination form for proclamation of transboundary biosphere reserve Ohrid-Prespa was prepared in 2013 and submitted to the UNESCO world center
Committee for Management of Lake Ohrid watershed	• Established in 2004 based on the signed Agreement between the Government of the Republic of Macedonia and council of ministers of the Republic of Albania • Goal – protection and sustainable development of Lake Ohrid and its watershed • Activities – implementation of several bilateral projects for protection of Lake Ohrid, involved in preparation of nomination form for the transboundary biosphere reserve Ohrid-Prespa.
Prespa Park management commitee	• Established on the basis of the Agreement for protection and sustainable development of Prespa Park • Ratified by the Parliament of the Republic of Macedonia in 2013 and by the Republic of Albania • Not active, because the Agreement has not been ratified by the Republic of Greece yet

Project based cooperation between Macedonian Academy of Science and Arts (MASA) and Bulgarian Academy of Sciences (BAS) was initiated in 2013, followed by implementation of project for flora and taxonomic researches concerning certain genres of the families *Lamiaceae* and *Asteraceae* in cross-border areas of Macedonia and Bulgaria. Further on, MASA has established cooperation with Serbian Academy of Science and Arts under the project "Endemic flora on the Balkan Peninsula in Serbia and Macedonia – distribution, diversity, ecology and phytogeographical position". Cooperation has been also accomplished with the Albanian Academy of Science, in relation to the protection of Ohrid and Prespa Lakes, resulting in organization of regional international conference 'The System "Prespa Lakes – Ohrid Lake":The Actual State - Problems and Perspective', held in Struga and Pogradec (2013).

Sveti Naum springs

2.3.1.4. FUNDING

According to the Law on Nature Protection, the funds for nature protection are provided from the Budget of the Republic of Macedonia and from other sources (Article 161 of the Law on Nature Protection): budgets of the units of local self-government on the territory of which the protected area is situated, compensations for entrance, visit, parking, collection of wild species of plants, fungi and animals and parts thereof, sustainable use of natural resources, compensation for stay, navigation, ecosystem services, performance of activities in protected areas and other sources (donations, grants, credits, etc.). The funds from these sources are used for achievement of the goals of nature protection.

For the purpose of efficient implementation of the Law on Nature Protection in the segment of financial resources provision from the collection of compensations in the National Parks, Public Institutions National Parks of "Pelister", "Galichica" and "Mavrovo", in 2013, took decisions determining the level of compensations in the national parks, but their application has not become operational yet.

The National Strategy for Environmental Investments (2009-2013) was developed in 2009 by the Ministry of Environment and Physical Planning in cooperation with Regional Environmental Center (REC) Country Office in Macedonia, with the financial support from the Austrian Development Agency. In its chapter on nature protection, investments (implementation of projects) are envisaged towards implementation of the EU legislation in the area of nature protection (Bird and Habitat Directives, Regulation on endangered species and Directive concerning wild animals keeping in captivity), as well as implementation of international conventions (Convention on Biological Diversity, Bern Convention, Bonn Convention on biodiversity and CITES. The value envisaged for allocation is 7.67 million EUR from different sources: central budget, EU pre-accesion funds (IPA funds), and other donors. The identified 185 projects (incorporated in the existing strategies in the Republic of Macedonia) and high number of local initiatives (grouped into 9 clusters) has been ranked on the basis of 15 criteria. Three major projects have been identified for funding, namely: establishment of National Park "Jablanica", establishment of National Park "Jakupica", and project for nature conservation and sustainable development of Osogovo.

Starting in 2007, the Government of the Republic of Macedonia (on the basis of Article 172 of the Law on Environment) adopts Programme for Environmental Investments every year (except in 2009 and 2012), under which funds are awarded to fund programmes, projects and other activities in the area of environment. The funds for the implementation of this Programme are provided from compensations paid by legal and natural persons causing pollution of the environment, using natural resources, producing or importing products and goods that are harmful for environment and nature, etc., or from the Budget of the Republic of Macedonia, international cooperation, national and foreign legal and natural persons, foundations, etc. (specified in Article 162 of the Law on Environment). Allocation of funds is carried out on the basis of public competition published by the Ministry of Environment and Physical Planning. Beneficiaries of these funds are: municipalities or associations of municipalities, legal and natural persons, non-for-profit and non-governmental organizations (including universities and other scientific institutions), non-governmental organizations established for the purposes of environment protection that implement programmes, projects and other activities for

environment and nature protection and improvement. In the past period, total of 36.000.000.00 MKD was allocated under the item for implementation of projects aimed at biological diversity and nature protection (see Table 11). The Investment Programme includes, inter alia, items for financial support for scientific research work and public awareness increase and education, through which projects in the area of nature and biological diversity protection are supported, too. The most important projects for nature and biological diversity protection implemented under this Programme are presented in AnnexII.

Table 11. Planned and allocated financial resources for biological diversityand nature protection under the Programme for Environmental Protection, by year

Year	Allocated funds (MKD)	Allocated funds(EUR)
2007	4.000.000,00	65.040,00
2008	4.000.000,00	65.040,00
2009	Unpublished competition	-
2010	9.000.000,00	146.342,00
2011	8.000.000,00	130.081,00
2012	Unpublished competition	-
2013	6.000.000,00	97.561,00
2014	5.000.000,00	81.301,00
Total:	36.000.000,00	585.365,00

Activities for nature protection in the Republic of Macedonia are to the greatest extent financed by foreign funds, such as: Global Environmental Facility, EU Funds, and donations/ grants from other countries, among which Switzerland, Germany, Netherlands, Austria, Italy and other countries have provided the most significant support. Annex II gives a list of significant implemented or ongoing projects for biological diversity protection in the past period.

As part of the cross-border cooperation programme between Macedonia and neighbouring countries Albania, Bulgaria and Greece, financed by the EU Instument for pre-accesion (IPA) in the period 2007-2013 different projects regarding conservation of nature and biological diversity were financed.

2.3.2. ACTIVITIES FOR LEGAL PROTECTION OF BIODIVERSITY

Biological diversity protection on national level is carried out through species protection and designation of protection areas. Conservation of certain ecosystems and habitats (especially habitats and ecosystems of pastures, hedges habitats, alpine habitats, etc.), although stipulated in the Law on Nature Protection, is insufficiently accomplished, primarily due to non-adopted bylaws regarding national list of habitat types, including assessment of the their threat status and their significance, development of map of habitats (Article 49) and measures for preservation of habitat types in a favourable conservation status (Article 50). Besides this, it is necessary to adjust provisions of laws that are of relevance for different ecosystems preservation (e.g. Law on Pastures, etc.)

2.3.2.1. SPECIES PROTECTION

The Law on Nature Protection (Article 21) specifies general measures for species protection, with regard to: extermination of indigenous wild species; reduction of the populations of wild species, destruction of their habitats, or modification of their living conditions to an extent that would cause a state of danger; deliberate disturbance of wild animals, especially during mating, breeding or wintering, as well as capturing, hunting or shooting of wild animals; deliberate removal of wild plants and fungi from their habitats, reduction of their population, or destruction in any way; deliberate damaging or destruction of habitats of wild species; using the non-selective means for wild species collection and hunting.

Red list of fungi was developed in 2012 by scientific experts (Karadelev&Rusevska), but it has not been adopted yet. With reference to endangered plant and animal species, no national red lists have been developed yet.

In 2011, the Lists identifying strictly protected and protected wild species of plants, fungi and animals were adopted, prepared on the basis of comparative review of species in the country enrolled in international lists of protected species (under GEF/UNDP/MEPP Project for protected areas). Total of 194 species has been designated as strictly protected, of which 9 fungi, 51 plant and 134 animal species.Destruction, collection, cutting or uprooting of strictly protected plants and fungi are prohibited, while with regard to strictly protected animals – deliberate capture, keeping and shooting; deliberate damaging or destruction of their developmental forms, nests, roosts, and their habitats; deliberate disturbing; deliberate destruction or taking of eggs from the nature; hiding, keeping, raising, selling, buying and transferring or any other form of acquiring and stuffing, are prohibited. Total of 820 species has been designated as protected, of which 75 fungi, 151 plants and 594 animals,yet no appropriate measures and activities for the conservation and extent of use have been prescribed.

Protection of species identified as game (110 bird species and 23 mammalian species, of which only 14 species are regarded game without protection) is regulated by the Law on Hunting.

Collection of and trade in endangered and protected wild species of plants, fungi and animals and their parts are regulated by the Law on Nature Protection and can be performed only upon prior obtained permit for collection or permit/certificate for trade issued by the Minister of Environment and Physical Planning. Through one-window stop system for import, export and transit of goods (EXIM), established in 2009, the Ministry of Environment and

Physical Planning is connected to Customs Administration, companies and other competent institutions and agencies, enabling electronic application for permit for import, export and transit by business community, as well as electronic issuance of permits by the competent institutions. With reference to trade in species enrolled in the Appendices to CITES Convention, CITES certificate is issued, while endangered and protected wild species of national significance (enrolled in the Appendices to the Decision on distributing the goods to export and import forms) are subject of issuance of D4 permit.

Case Study "Pelister" National Park

As a positive example of established system for collection and purchase of wild species, we should mention NP "Pelister" where around 15 species and other forest products are collected regularly, including: bilberry (*Vaccinium myrtillus*), as economically most important species, several species of fungi, common juniper (*Juniperus communis*), seeds and pine cone of Molika pine (*Pinus peuce*),etc., which provide extra income to local population (sometimes reaching even 20 % of the total income). The system for sustainable collection of bilberry in accordance with the principles of organic production has been implemented as of 2007 when the Public Institution NP "Pelister" established quotas (around 130 t of bilberries are collected at an average per year), training of collectors on the manner and period of collection, registration of collectors and issuance of identity card by the Public Institution (around 400 collectors are registered per year at an average, 20% of which are new collectors), as well as purchase agreement. The rangers of the Public Institution NP "Pelister" and additionally engaged collectors (more than 20 in a season) control the enforcement of the specified rules in cooperation with Forest police and Inspectorate of Environment.

Also, the Public Institution NP "Mavrovo", in cooperation with USAID Office in Macedonia, initiated preparatory activities for sustainable use of wild species within the boundaries of the Park, in cooperation with the local population. The goal of these activities is the establishment of system for sustainable use of natural resources through organization of trainings for the local population about the manner of collection (in the course of 2013) and issuance of permits for wild species collection. During 2014, total of 61 permits for collection of wild species of plants and fungi were issued, for a period of three months.

In the period 2004-2011, numerous activities were carried out towards conservation of **plant genetic resources** used for food and agriculture, in terms of collecting specimens through collection missions, their characterization and evaluation, establishment of database to keep documentation data, as well as in terms of upgrading infrastructure and equipment in the Gene Bank at the Institute of Agriculture in Skopje, which functions as national gene bank. Republic of Macedonia is part of the SEEDNet network (including 12 members countries), which represents a development network of Southeastern Europe for conservation and sustainable use of plant genetic resources.

In 2013, collection of 2666 specimens of 89 different species (Table 12) was maintained in the Gene Bank. Fruit crops, including grapevine have the biggest share in this collection, with a total of 1042 specimens the collection of which is maintained as field collection. In the seed collection, the biggest share belongs to wheat crops (29%). According to the status of the material, autochtonous or local populations/varieties (1187) are the most numerous. In the field collection, there are also local populations, but many of them have origin in other countries. However, considering that this collection was found many years ago, they are adapted to local conditions having specific characteristics.

Table12. Number of specimens in the collection at the Gene Bank in Skopje

Species/crops	Number of species	Material for selection	Local populations	Advanced lines/ varieties	Wild	Unknown	Total
Cereals	8	242	351	85		95	773
Leguminous plants	5	18	78		2	34	132
Industrial plants	3	21	11				32
Vegetables	28	28	368			5	401
Forage crops	21		22	9	209	1	241
Grapevines		46	234	158		1	439
Fruitcrops	13	35	123	431		14	603
Medicinal and aromatic plants	11				45		45
Total specimens	89	390	1187	683	256	150	2666

With regard to **genetic resources in livestock** in the Republic of Macedonia, there is modestly precise data, though expert community has confirmed the presence of several domestic breeds or strains in cattle species (Busha), sheep (Karakachanska, Ovchepole and Sharplania), goats (Balkan goat), pigs (local primitive pig), bees (*Apis mellifera macedonica*), buffalos (domestic buffalo), dog (shepherd's dog Sharplaninec), horse (domestic horse), donkey (domestic donkey), and poultry (domestic hen) and those are defined as indigenous breeds and/or lines, protected under the Law on Livestock Breeding (Article 54). The system of characterization, monitoring and recording (inventory) of local breeds and monitoring of the trends and the risks in the domain of extent of threat to local breeds is under development.

Ex-situ protection of 10 indigenous species: sheep Pramenka, Macedonian bee, cow Busha, water buffalo, yellow water lily, local species of apple (Tziganka) and pear (Sulija), bats and almost extinct Macedonian river fish species Trout and Vretenarwas conducted in the period 2005-2014 by several civil associations through GEF Small Grants Programme, with biodiversity as focus area.

Keeping and breeding of wild animals in captivity (in accordance with Article 33 of the Law on Nature Protection) by natural or legal persons, for the purposes of public exhbition, enrichment of rural space and education purposes, may be performed only upon prior license issued by MEPP. Total of 13 licenses were issued in the period 2010-2013. Draft version of the Decree prescribing conditions for wild animal species keeping in captivity has been prepared, and it specifies the conditions that should be met by Zoos and similar facilities or premises for wild animals keeping, conditions of keeping, manner of wild animals in captivity marking and recording, on the basis of which the said license will be issued.

2.3.2.2. PROTECTED AREAS

Designation of protected areas in the Republic of Macedonia started in 1948 when the first National Park Pelister was proclaimed. Most of the protected areas were proclaimed during 1960s, 1970s and 1980s and included different bigger and smaller size areas covering different types of habitats, but also different rare, endemic and relict species (status of threat to habitats and species was not considered seriously), and some of the protected areas were proclaimed for the purpose geodiversity or fossils preservation. Although there has been continuous growth in the overall number and area of protected areas, the network of protected areas is still insufficient. The trend of protected areas is shown in Figure 14, where areas proclaimed under the old categorization are presented (stipulated by the 1973 Law on Natural Rarities Protection) and current categorization stipulated in the Law on Nature Protection (adopted in 2004).

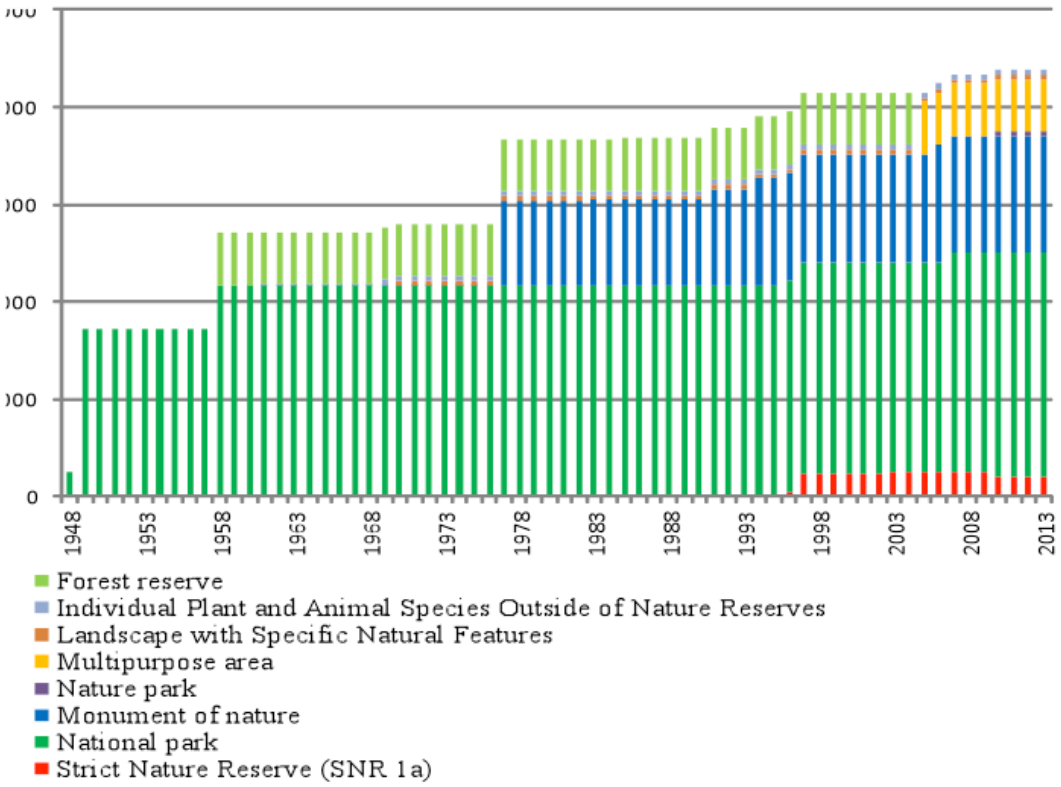


Figure 14. Trend in national protected areas

The Law on Nature Protection (Article 65) provides solid legal basis for establishment of representative and efficient system of protected areas, and its purpose is the protection of the biological diversity within the frames of the natural habitats, the processes occurring in the nature, as well as the abiotic features and the landscape diversity. The Law also encourages international cross-border connection with protected areas on the territories of neghbouring

countries (Article 67). The following categories of protected areas and their respective goals of management are specified in Articles 66 – 90 of the Law on Nature Protection:

1. 1) Category I - (Ia) Strict Nature Reserve, and (Ib) WildernessArea;
2. 2) Category II - National Park;
3. 3) Category III - Natural Monument;
4. 4) Category IV - Nature Park;
5. 5) Category V - Protected Landscape; and
6. 6) Category VI - Multipurpose Area.

New form of placing parts of nature under protection – natural rarity, was introduced in 2010, under the amendments of the Law on Nature Protection. Parts of nature that can be proclaimed as natural rarities include rare, endangered and endemic plant and animal species and their parts and communities, as well as relief forms, geological profiles, paleontological and speleological objects, provided that their area is below 100 ha), which for their scientific, aesthetic, health and other significance, cultural, training and educational and touristic and recreational function, are placed under special protection by the state.

Network of protected areas in Macedonia

At present, the network of protected areas in Macedonia comprises 86 areas (MEPP, CDDA 2014) and it is not a coherent system, i.e. it is transitional and covers areas proclaimed in different periods, according to different categorizations and with different goals (areas proclaimed under the old categorization, areas proclaimed under the new categorization, re-proclaimed areas, areas in a process of re-proclamation, areas in a process of proclamation). The current status of number of protected areas distributed in different categories and the overall area they cover are presented in Table13.

Table 13. Protected areas (number, category and area) in the Republic of Macedonia (Source: MEPP, CDDA 2014)

Category of protection according to IUCN	Number of sites	Coverage (ha)	% of the country territory
Ia. Strict Nature Reserve	2	7787	0.3
Ib. Wilderness Area	-		-
II. National Park	3	114870	4.48
III. Natural Monument	67	78967,5	3.0
IV. Nature Park	12	3045	0.12
V. Protected landscape	1	108	0.004
VI. Multipurpose Area	1	25305	0.98
Total	86	230083	8,9

The obligation for re-proclamation of all protected areas proclaimed before 2004 derives from the Law on Nature Protection, which assumed performance of protected areas revalorization and preparation of new acts for proclamation under the new categorization of protected areas (harmonized with IUCN). Studies for revalorization of natural values in protected areas are carried out with content prescribed in the bylaw adopted in 2012 (see Annex III, item 11).To this end, studies for revalorization have been prepared for the protected areas Mavrovo, Ezerani and Prespa Lake. In the period from 2004 to 2014, procedure for revalorization has been carried out for the following protected areas:NP"Markovi Kuli" (49/2006), NP "Pelister" (150/2007), NP "Galichica" (171/2010), SNR "Ploche Litotelmi" (145/2010), NM "Lokvi-Golemo

Konjari" (124/2010), NM "Slatino Springs" (23/2011), NM "Prespa Lake" (51/2011), NM "Dojran Lake" (51/2011), NM "Vevchani Springs" (39/2012), NP "Ezerani" (24/2012).During the same period, two new protected areas were proclaimed under the category of Natural Monument – "Smolare Waterfall" (2006) and "Kuklica" (2008). In 2013, procedure was initiated for reproclamation of Mavrovo for protected area in the category of National Park. Studies for valorization/revalorization and draft management plans were prepared for four areas with important natural values (Strict Nature Reserve "Tikvesh", Natural Monument "Matka Canyon", Multipurpose Area "Jasen" and Mountain of Belasica), in the frames of the GEF/UNDP/MEPP project for protected areas), but the procedure for re-proclamation has not been completed for these areas yet.

The process of protected areas proclamation is carried out slowly due to insufficient financial resources required for development of studies for (re)valorization, i.e. assessment of the status of natural values/biological diversity in protected areas and outside of them, as well as provision of adequate management entity, but also as a result of failure to establish balance between environmental and economic processes in the country.

Representative protected areas network

In the course of 2010, detailed analysis of the existing network of protected areas and areas proposed for protection was made in line with the Spatial Plan of the Republic of Macedonia and other documents. As a result of this, proposal of the representative network of protected areas was developed (MES, 2011), comprising 99 areas in total, of which: 34 existing protected areas, 42 areas proposed for protection, and 23 newly identified areas for protection (Figure 15). Additionally, 91 more localities were proposed for proclamation as natural rarities.

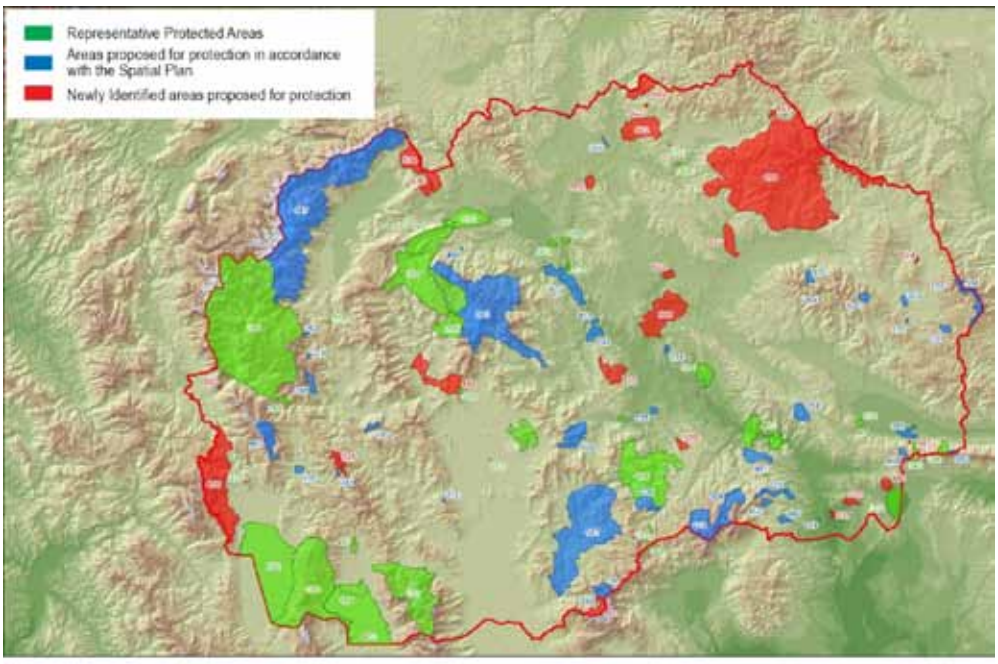


Figure 15. Map of proposed representative protected areas network

Information on the status of the natural heritage in the Republic of Macedonia and the need for establishment of a system of protected areas with representative national network of protected areas was submitted to the Government of the Republic of Macedonia in 2013 and it was considered as information material.

Protected areas management authorities

The act for proclamation of protected area defines the boundaries of the area, different zones and permissible activities in the area – zone of strict protection, zone of active management, zone of sustainable use and protection belt, as well as the entity to manage that area.

National Parks are managed by public institutions established by the Government of the Republic of Macedonia by Decision taken in 2006.

For the purpose of performing the activities of national park management and protection, the Government of the Republic of Macedonia founded Public Institution – National Park, by means of act on foundation regulating the manner of performing the activity of public interest, mutual rights and obligations of the Government of the Republic of Macedonia and the Public Institution, the rights of the Public Institution, conditions for activity performance, etc. Decision on the foundation of the Public Institution National Park (PINP) "Pelister", PINP "Galichica"and PINP "Mavrovo" was taken in January 2006 by the Government of the Republic of Macedonia on the basis of the provisions of the Law on Nature Protection and Law on Institutions.

Municipalities mandated as managing authorities of the protected areas (e.g. Municipality of Vevchani for the management of the Natural Monument "Vevchani Springs", Municipality of Novo Selo for the management of the Natural Monument "Smolare Waterfall", Municipality of Dojran for the management of the Natural Monument "Dojran Lake") have not established the respective management bodies (within the Municipality) and cope with real problems with regard to the enforcement of the legislation on nature protection. A positive example is the Municipality of Resen as a manager of the Natural Monument "Prespa Lake" and Nature Park "Ezerani", in the establishment of specific unit for management and implementation of the programmes for monitoring and protected measures as defined in the management plans for these protected areas. Support for capacity strengthening was provided under SDC/UNDP Project for Prespa Lake revitalization. Another example of efficient application of the management of the protected areas is the Municipality of Makedonski Brod as entity mandated to manage the Natural Monument "Slatino Springs", which due to lack of adequate capacity for this protected area management delegated it to Speleological Society "Ursus Speleos" based on mutual agreement. Municipality of Kratovo is a similar example, which transferred the management rights for the Natural Monument "Kuklica" to the non-governmental organization "Izvor" – Kratovo. Decision on the establishment of Public Enterprise to manage and protect the Multi-purpose Area "Jasen" was taken in 2005 by the Government of the Republic of Macedonia.

Management Plans

Management plans and annual programmes for nature protection are developed in accordance with the content prescribed in the bylaw adopted in 2012 (see AnnexIII item 12), and they are adopted by the entity for protected area management upon prior consent issued by the body of the state administration responsible for the performance of activities in the area of nature protection (MEPP). So far, three management plans were adopted for the protected areas NP "Pelister", NP "Galichica" and Nature Park "Ezerani", prepared mainly with support by foreign donors. The Management Plan for NP "Pelister" was prepared in the frames of the Swiss Project for NP "Pelister" protection and adopted in 2005, but it is not in compliance with the content prescribed in the Rulebook. Development of the management plan for NP "Galichica" was supported by KfW Project "Transboundary Biosphere Reserve Prespa Park – support to National Park "Galichica"" and it was adopted in 2012. Upon obligation delegated by the Government of the Republic of Macedonia, amendment of the management plan was initiated with reference to the Park zoning to support the implementation of five projects, namely: Tourism Development Zone (TDZ) Oteshevo, TDZ Stenje, TDZ Ljubanishte, project for construction of ski centre and project for construction of express road A3 Kosel – Ohrid. Preparation of Strategic Environmental Assessment of the proposed amendments to the management plan for NP "Galichica" is underway. Support to the development of the management plan for Nature Park "Ezerani" was provided under the GEF/UNDP/MEPP project for Prespa Basin protection and it was adopted by the Municipality of Resen which was given the competence for the area management in 2012, upon consent being issued by MEPP.

In addition to the above, draft management plans have been prepared for the following protected areas: Matka Canyon, Tikvesh, Smolare and Koleshino Waterfalls and Jasen (in the frames of the GEF/UNDP/MEPP project for protected areas), Mavrovo (UCODEP/MEPP project for NP "Mavrovo" protection) and Prespa Lake (SDC/UNDP Project for Prespa Lake revitalization), and will be adopted after completion of proclamation or re-proclamation procedure of the protected area.

2.3.2.3. ECOLOGICAL NETWORKS

Establishment of a coherent national ecological network is prescribed by the Law on Nature Protection (article 53) for the purposes of conservation, maintenance or restoration to a favourable conservation status of the ecologically important areas. Apart from the ecologically important areas, the network includes the system of ecological corridors, protected areas and areas proposed for protection as well as ecologically important areas for the EU – Natura 2000. The need for establishment of the ecological network has been identified in several strategic documents: Spatial Plan of the Republic of Macedonia, Second National Environmental Action Plan, as well as the first NBSAP. Through its establishment functional protection of biodiversity in and outside of protected areas will be provided. In this regard, in the last period in Macedonia activities for identification of the Emerald Network and the National Ecological Network (MAK-NEN) were undertaken, while activities for the establishment of the Natura 2000 network has not yet started. Also, Balkan Green Belt stretching along the national borders with Bulgaria, Greece and Albania, represents a kind of ecological network in Macedonia (see subchapter 2.3.4.4.).

Emerald Network

Establishment of Emerald Network developed on the territory of the countries Party to the Conservation of European Wildlife and Natural Habitats (Bern Convention), aims at conservation of species and habiatats of European importance.

In the period from 2002-2008 35 Areas of Special Conservation Interest (ASCI) were identified and designated as National Emerald Network (Figure 16) covering an area of 752.223 ha that represents about 29% of the country territory (MEPP 2008). Twelve Emerald sites are completely and two others partially protected on a national level in different categories i.e. only 27% of Emerald Network sites are protected on a national level, while the rest are outside of protected areas 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 network of protected areas.

Figure 16. Map of National Emerald network (Source: MEPP 2008)

National Ecological Network (MAK-NEN)

National Ecological Network (MAK-NEN) was developed in 2011 and Brown bear (*Ursus arctos*) was taken as a model species (umbrella and flagship species for identification of core areas, corridors, buffer zones and restoration areas.

In the process of development of ecological network a number of digital carotgrafic layers were used: national and international protected/designated areas, distribution of key habitat types according to Corine land cover and Brown bear distribution in Macedonia. Also modelling of suitability of habitats was conducted. As a result of the project MAK-NEN map was prepared (Figure 17) that comprised 13 core areas (key for maintencae of stable bear population), corridors (12 linear, 11 landcape and 3 stepping stones), buffer zones and restoration areas were also identified. Guidelines for protection and management of identified corridors are given in the Brown Bear Corridors Mangement Plan (Brajanoska et al. 2011). Information for establishment of MAK-NEN was submitted to the Government of the Republic of Macedonia in 2013 and it was considered as information material.

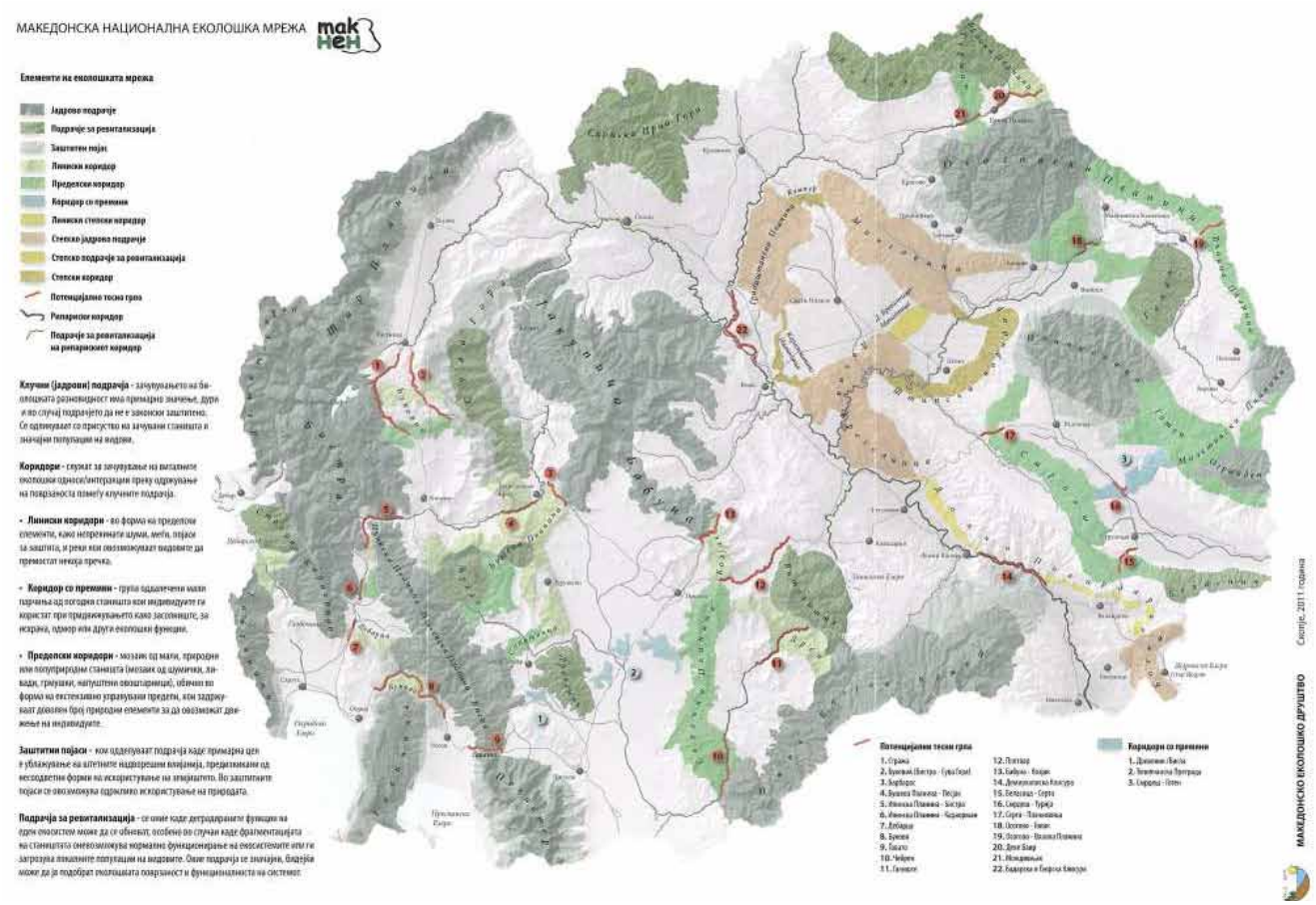


Figure 17. Map of National Ecological Network (MAK-NEN)

2.3.3. BIOLOGICAL DIVERSITY MONITORING AND DATABASES

Monitoring

Monitoring of the status of nature is carried out through measurement, observation, assessment and control of the status of species, their habitats, habitat types, ecologically important areas, ecosystems and landscape types; monitoring of the status of natural heritage and geological heritage, as specified in the Law on Nature Protection (Article 154). Nature Department of the Ministry of Environment and Physical Planning is responsible for the organization of the monitoring of the nature status, and undertaking of appropriate measures for protection and preservation. Besides MEPP, monitoring should also include other institutions and organizations, protected areas, scientific institutions, non-governmental organizations, etc. Monitoring of the status of nature can be also performed by accredited legal persons that fulfill the relevant conditions (Article 148), but those are not specified. Furthermore, methodology for nature status monitoring has not been prescribed yet.

In practice, real monitoring activities for biological diversity components are carried out under different projects (often without continuity), implemented by different organizations. Thus, for example, continuous monitoring has been carried out for vultures in Macedonia (as of 2003) and Balkan lynx monitoring (continuously from 2006 by the method of camera traps), implemented by the Macedonian Ecological Society.

Monitoring data is public (in accordance with Article 154 of the Law on Nature Protection), but this is not gathered in a single integrated database.

National Biodiversity Information System

CIn order to provide congregation of the existing knowledge on biological diversityin a single central database, the first National BiodiversityInformation System (NBIS) was developed with a web access for clients, in the frames of GEF/UNDP/MEPP project for protected areas. Software application of the central database was prepared, installed and tested and trainings were organized in its use and maintenance. The database contains the following groups of data, but is not limited thereon: taxonomy and species; protected areasand sites of special importance for biological diversity; data from field works (scientific and research, regular and extraordinary monitoring, etc.); geographical (spatial) data on species and sites; reference to different aspects of biological diversity and its protection (protected areas, etc; contacts and institutions of relevance in the segment of biological diversity; general directories (code books) of biological diversity, as national source of information to enable standardization of data and information recording. During the project, data on around 10.000 taxa, geographical and administrative data on around 250 areas and around 30.000 entries on species distribution in these areas was entered in the database.

Three groups of users have been defined in the Decree for establishing NBIS (see Figure 18): decision makers, professionals in the area of biological diversity and public in general, but it has not been adopted yet.

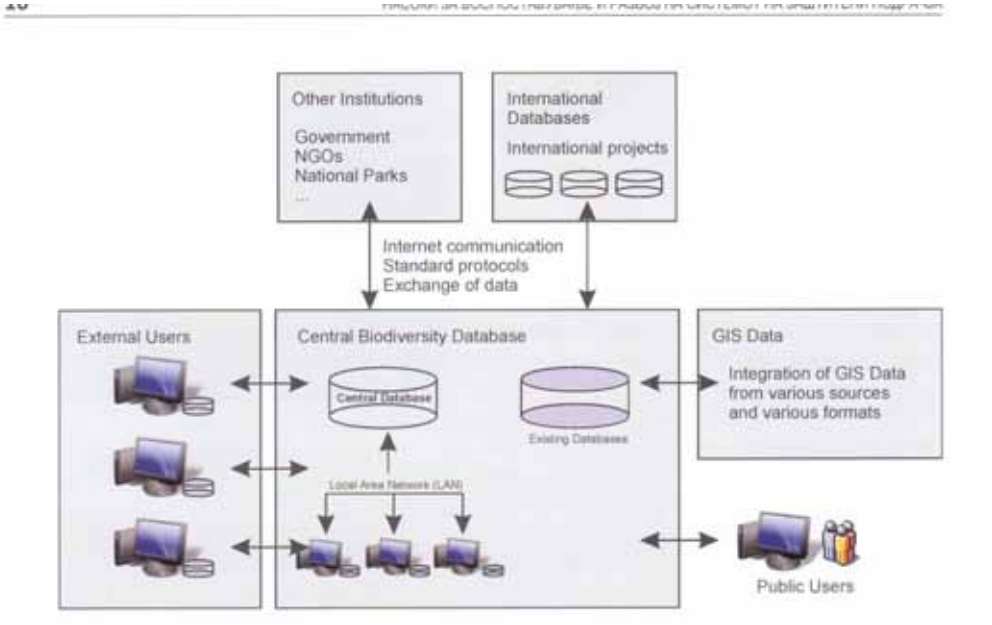


Figure 18. NBIS architecture

At the moment, the system is in need for hardware and software upgrading, adoption of the required bylaws and training of the relevant staff for its management.

2.3.4. INTERNATIONAL AND/OR CROSS-BORDER COOPERATION FOR BIOLOGICAL DIVERSITY PROTECTION

A number of areas of relevance for the protection of biological diversity in Macedonia (mountain and forest ecosystems, aquatic ecosystems) are situated in border regions. Therefore, the Republic of Macedoniahas established cooperation with neighbouring countries (on expert and institutional level) and takes part in different initiatives and undertakes different activities for protection.

2.3.4.1. PRESPA PARK

Lake Prespa is situated in the southwestern part of the Republic of Macedonia – its biggest part belongs to Macedonia, while minor parts belong to Albania and Greece, respectively. The commitment of the three countries to protect this important ecosystem was demonstrated through signing of the Declaration on the establishment of Prespa Park and protection of the environment and sustainable development of Prespa Lakes and their surrounding, signed in 2000 by the Prime Ministers of the three countries. Strategic Action Plan for Prespa Park Sustainable Development was developed in 2002 by four non-governmental organizations active in the Region (SPP et al. 2005). For the purpose of further cooperation on cross-border level and implementation of common activities aimed at protecting the outstanding natural and cultural values in the region, on 2 February 2010, the Agreement for Prespa Park protection and sustainable development was signed by the Ministers of environment of Macedonia, Greece and Albania, respectively and EU Commissioner for Environment. On the basis of this Agreement, **the Committee for Prespa Park Management** was established. However, it is not active because the Republic of Greece has not ratified it yet.

During the past period, with the support of the transboundary GEF/UNDEP/MEPP Project "Integrated management of ecosystems in Prespa Basin", the key plans, programmes and strategies were developed to provide basis for implementation of specific measures for biological diversity protection. Thus, for example, System for transboundary monitoring of Prespa Park was developed with identified priority species and action plans for the conservation of key species (Brown bear and mountain tea) and habitats (reeds, caves, foya forests) of transboundary importance. Furthermore, Strategy Action Programme for Prespa Lake Basin by 2020 was developed, containing the priority goals and actions for improved trilateral management of Prespa Lake Basin. This is important international example of cooperation between the three countries for sustainable development of the Region. The goal of the project was to introduce the targets and the priorities of environmental management in the policies and practices of production sector within the Basin, including land-use, space planning, waters management, agriculture, forestry and fishery and management of protected areas.

Prespa Lake Basin Management Plan was developed in 2012 in line with the requirements of the EU Water Framework Directive. It contains: site description, delineation and typology of water bodies, monitoring, pressures and impacts on water bodies, ecological status of water bodies and economic analysis of the river basin. Prespa Lake Basin has been designated as pilot basin and therefore it incorporates a wide spectrum of different types of aquatic and terrestrial habitats, but also major sources of ecological pressures, such as the town of Resen and intensive agricultural production.

On the basis of the recommendations in the Prespa Lake Basin Management, activities towards improvement of Prespa Lake state, strengthening of its adaptation capacity and provision of long-term plan for control of eutrophication processes are underway. Measures are aimed at reducing the pressures from agriculture, forestry, rivers' pollution, wastewater and solid waste (SDC/UNDP Project for Prespa Lake revitalization). The Project is expected to have positive effects on environment and socio-economic conditions, as well as significant raise in resistance of the overall Prespa ecosystem with regard to climate change pressure.

2.3.4.2. PROTECTION OF LAKE OHRID

Lake Ohrid is one of the oldest lakes in Europe and one of the most important hotspots of endemic biodiversity; it has been proclaimed as protected area in the category Monument of Nature since 1977, and in 1980 it was included on the UNESCO World Cultural and Natural HeritageList. The need for its protection was identified more than 20 years ago by Macedonia and neighboring Albania who share the lake. Feasibility study to identify priority environmental issues was prepared in 1995. Memorandum of Cooperation between the Ministers in charge of the affairs of Environment of Macedonia and Albania was signed in 1996, which was the basis for starting a bilateral project for conservation of Lake Ohrid (funded by GEF/World Bank). The purpose of this project was to develop effective cooperation between Macedonia and Albania for the joint

management of the Lake and its basin. The completed state of environment report on the Lake Ohrid (Watzin et al. 2002) gave a picture of environmental conditions, pressures and hot spots of the Lake, and represents a good basis for future research and actions in the basin of the Lake. In order to raise the awareness of local people about the importance of the Lake and the need for its protection June 21 is set as the Lake Ohrid Day.

Agreement for the protection and sustainable development of the Lake Ohrid and its basin was signed in 2004 between the Government of the Republic of Macedonia and the Council of Ministers of the Republic of Albania and ratified in 2005. This Agreement provides legal basis for long-term cooperation and joint protection and sustainable management of the Ohrid Lake basin. Bilateral Secretariat (which has representatives from both countries) for management of the Ohrid Lake watershed was established within the MEPP and based in Ohrid, and it has implemented a number of national and cross-border projects and activities. The Secretariat was involved in the initiative for protection of Drin river watershed (see sub-chapter 2.3.4.3) and establishment of transboundary biosphere reserve Ohrid-Prespa (see sub-chapter 2.3.4.4).

2.3.4.3. DRIN RIVER BASIN PROTECTION

The basic concept for improving the cooperation between the countries that share the Drin River basin was discussed in 2006. The initiation of dialogue between all stakeholders for Drin River Basin management (known as "Drin Dialogue") was formally launched in 2009 in order to build a common vision and improve cross-border cooperation and sustainable management of Drin River basin. This initiative is within the UNECE Water Convention, and will also enable the implementation of the EU Water Framework Directive, implementation of the requirements of the Ramsar Convention, and will help in achieving the Millennium Development Goals.

Memorandum of Understanding "Drin: a common strategic vision" was signed in 2011 by the environment ministers of the five countries aiming to take joint actions for coordinated management of water resources of the Drin basin to preserve and restore the ecosystem and services it provides, as well as mitigation of climate change. This Memorandum serves as a basis for starting a cross-border project for cooperation and integrated management of water resources in the Drin River basin, funded by GEF.

Trilateral project for protection and sustainable use of Ohrid, Prespa and Skadar Lakes (which are part of Drim River Basin) has been carried out in the period 2012-2014 and it has accomplished cooperation between the Ministry of Environment and Physical Planning of the Republic of Macedonia, Ministry of Environment, Forests and Waters of the Republic of Albania and Ministry of Sustainable Development and Tourism of Montenegro for the purpose of taking common activities for biological diversity monitoring and conservation in Drin River Basin. The project is supported by the German Ministry of Foreign Affairs and implemented by GiZ. Project activities have been aimed at fauna and flora monitoring in accordance with the EU Habitat Directive (the key habitat types and key species of flora and fauna for monitoring have been identified), sustainable fishing through definition of quotas, protection and revitalization of aquatic/swampy habitats, definition of the obligations based on EU Water Framework Directive. Project activities for adaptation to climate change of Drin River basin (2013-2016) are on-going, financed by the German Federal Ministry of Economic Cooperation and Development.

2.3.4.4. ESTABLISHMENT OF TRANSBOUNDARY BIOSPHERE RESERVE OHRID – PRESPA

Significant steps in transboundary context have been made in Ohrid-Prespa region through the initiative for establishment of Ohrid-Prespa Transboundary Biosphere Reserve. This initiative is based on the existing trilateral agreement on Prespa Park and bilateral agreement signed between the Governments of the Republic of Macedonia and Republic of Albania, respectively, in 2004. Bilateral Secretariat was established (with representatives of the two countries) for Ohrid Lake Basin management in the frames of the MEPP, with its seat in Ohrid. So far, it has implemented high number of transboundary and national projects and activities. Both agreements provide solid legal and institutional framework for the establishment of transboundary biosphere reserve.

The process of development of the required documentation for nomination of the biosphere reserve was carried out between 2012 and 2013 through participation of all relevant structures from both sides, supported by the Project "Transboundary Prespa Biosphere Reserve – Support to Prespa National Park in Albania", financially supported by the German Ministry of Economic Cooperation and Development through German Bank of Reconstruction (KfW). In October 2012, Declaration on the Commitment towards establishment of Transboundary Ohrid - Prespa Biosphere Reserve was signed, under UNESCO Programme "Man and biosphere", by the Ministry of Environment, Forestry and Water Management of the Republic of Albania and Ministry of Environment and Physical Planningof the Republic of Macedonia, as well as the Mayors of Municipalities in the Basin, Directors of protected areas and departments of forestry on the territory of the proposed transboundary biosphere reserve. The important role of the Greek partner was identified in the document, with clear note of their expected further involvement in the transboundary biosphere reserve. Secretariat for Ohrid Lake Basin Management (as the most appropriate transboundary body) was mandated with the implementation of the formal process for transboundary biosphere reserve designation. Nominating documentation was prepared in accordance with the prescribed form of UNESCO, which requires: adjusted boundaries, zones, description of area values, and fulfillment of the three basic functions of biosphere reserves: protection, logistics-development and education, as well as mechanisms for management and coordination between participating parties. The boundary and the zones of the future biosphere reserve have been commented on several occasions and adjusted to the needs for development and protection of the values in the region. The document of nomination was reviewed and confirmed by the national MAB Committee, and then forwarded to the National UNESCO Commission in the Republic of Macedonia. In September 2013, the National UNESCO Commission submitted the application officially to UNESCO MAB Secretariat (Department of ecology and natural science), with its Headquarters in Paris. This process was carried out in parallel and coordinated manner on the Albanian side as well, and thus the nomination process was successfully completed both on national and transboundary level.

Nomination of Ohrid-Prespa for transboundary biosphere reserve was officially considered on the Meeting of MAB Committee of UNESCO in June 2014 and Ohrid-Prespa region was designated for transboundary biosphere, by the unanimous Committee Decision.

2.3.4.5. LAKE DOJRAN REVITALIZATION AND PROTECTION

Lake Dojran is the smallest tectonic lake situated in Dojran Valley in the southeastern part of Macedonia and part of the Lake belongs to neighbouring Greece. Starting in 1988, the water level in the Lake began to decline rapidly (caused by unfavourable climate conditions and human factor), by which Dojran Lake was subject of hydrological agony.

The Project for revitalization of Lake Dojran started in 2002, with replenishment of water from the alluvial aquifer Gjavato, Bogdanci. This hydro system enabled improvement of the water status in Lake Dojran. For 2014, activities have been planned towards upgrading of the project for well water supply to the Lake of Dojran, by reclamation of 5 submersible pumps which will enable part of the water to be used for irrigation of agricultural areas in Bogdanci, Stojakovo and Paljurci.

The assessment of the status of biological diversity of Lake Dojran as transboundary area was made in 2004 (Katsavouni&Petkovski 2004) in the frames of a transboundary project with neighbouring Greece. In 2008, Dojran Lake was designated for Ramsar site. Elaborate for Dojran

Lake nomination to the World Ramsar List of the most important wetlands on the Planet was prepared by the Society for Study and Research of Birds in Macedonia in 2007, funded by MEPP, under the Programme for Environmental Investments.

Lake Dojran was proclaimed as protected area under category III Natural Monument in 1977, and the procedure for its re-proclamation has not been completed yet. Municipality of Dojran, appointed as managing entity in 2011, copes with insufficient capacity.

Capacity building activities on local level were initiated in 2013, supported by the Critical Ecosystem Partnership Fund (CEPF).

Activities for local capacity strengthening (through organization of environmental training camps), for the purpose of creating a local group for biological diversity conservation in Dojran Lake were carried out in the course of 2013-2014 (in the frames of the MES/CEPF Project "Education and capacity strengthening for protection of Dojran Lake, a priority area for biological diversity"). Activities aimed at strengthening the capacity of the local self-government and other relevant stakeholders with regard to integrated management of waters and natural resources are underway (in the frames of REC/CEPF Project for capacity building for Dojran Lake sustainability). This will contribute to capacity strengthening and knowledge promotion for the future management of this ecosystem.

2.3.4.6. BALKAN GREEN BELT

Establishment of Green Belt along the border of the former "iron curtain" in order to establish the basic ecological network to serve as global model for transboundary cooperation for nature protection and sustainable development was initiated in 2002 by BUND and BfN, and the first conferences on the European Green Belt were organized together with IUCN in 2003 and 2004. Its vision is the common natural heritage along the former iron curtain to be preserved and restored as ecological network connecting major natural values and cultural landscapes, while taking into account economic, social and cultural needs of local communities. This belt passes through 24 European countries, starting from Barents Sea up to Black Sea in a length of 12.500 km. The Green Belt is divided into three parts: Fennoscandian, Central European and Balkan Green Belt.

Apart from the Republic of Macedonia, Balkan Green Belt includes: Romania, Serbia, Montenegro, Bulgaria, Greece, Albania and Turkey, which though not directly affected by the cold war, were also kept under strict control and so border areas were isolated landscapes with naturally preserved habitats with no anthropogenic activities.

The Green Belt in Macedonia runs along the three national borders with Bulgaria, Greece and Albania, with varying width (it encroaches most deeply at Prespa border region with around 42 km) and covers an area of 5125 km2 (around 20% of the country's territory). It incorporates 11 protected areas (the three National Parks, the three natural lakes and other lower category protected areas) and a number of areas proposed for protection, among which the mountains of Shar Planina, Jablanica, Nidze, Kozhuf, Belasica, Osogovo Mountains, Monospitovo

Swamp, Tikvesh Lake, etc. Beside protected and proposed areas for protecteion, important dry grasslands, wetlands, rivers and other important habtats are included in the Balkan Green Belt.

In the past period, in the frames of this initiative, Macedonian Ecological Society implemented several project activities related to valorization and elaboration of proposal for protection of two areas that are part of the Balkan Green Belt – Osogovo Mountains and Jablanica Mt.

In May 2013, MEPP signed the Joint Declaration of Intent for the European Green Belt, thus sharing joint view of the importance of the transboundary cooperation for the preservation, restoration and sustainable development of the European Green Belt.

2.3.4.7. OSOGOVO MOUNTAINS IN THE BALKAN GREEN BELT

With regard to the transboundary region, Bilateral Agreement was signed with the Republic of Bulgaria, in 2000 in Sofia, between the Ministry of Environment and Waters of the Republic of Bulgaria and the Ministry of Environment and Physical Planning of the Republic of Macedonia. Obligations of this Agreement should lead to improvement of the state of the environment, provision of conditions for sustainable use of natural resources through establishment of network of protected areas in this region and strengthening of cross-border cooperation aimed at sustainable economic development and provision of conditions for improved social welfare. Osogovo Mountains are priority area for conservation along the border between these two countries and form part of the European Green Belt or, more precisely, Balkan Green Belt.

Activities for collection of data on natural values and socio-economic potentials in the region started in 2005 (MES/EuroNatur Project). Analysis of data and preparation of proposal for protected areas followed in the second phase. Besides establishing the potentials for proclamation as protected area, continuous work was also done on the involvement of all stakeholders and their active participation in the development of the Study on valorization of natural values of Osogovo Mountains and proposals for their protection. Through trainings, presentations and meetings, work was also done on the preparation and involvement of the local population in this process. As a result of the analyses, while considering local interests, it was concluded that Category V – Protected Landscape reflects the specific interaction between people and nature in Osogovo region in the best way.

The possibility for establishment of biosphere reserve of Osogovo as a form of nature protection and support to and nourishment of human activities in the region under the "umbrella" of UNESCO was suggested as realistic opportunity, as Osogovo meets the basic criteria for biosphere reserves. The possibility for designating Osogovo region as biosphere reserve is of exceptional importance in transboundary context, especially owing to the fact that this type of natural and cultural values preservation leads unavoidably to improved social and economic development in the region. To this end, vision for a transboundary biosphere reserve has been proposed not only towards natural resources protection, but also towards strengthened cooperation between local authorities and institutions in the two countries.

2.3.4.8. SHAR PLANINA

Shar Planina Mt. possesses immense natural wealth and exceptionally rich biological diversity, which is important not only at national, but also on international level. Certain parts of Shar Planina Mt. have been identified in the frames of several international initiatives – as Important Bird Area in Europe, Important Plant Area in Europe and Important Butterfly Area in Europe. Major part of Shar Planina is included in the National Emerald network.

The initiative to designate Shar Planina for protected area under Category of National Park by means of law proposal dates back in 1997, when the Draft Law on the Designation of Part of Shar Planina for a National park with law proposal was prepared, but it was not adopted by the Assembly of the Republic of Macedonia. The interest of the state institutions in its designation as protected area was also demonstrated in the Spatial Plan of the Republic of Macedonia, where Shar Planina was proposed area for protection, and as priority area for protection under the Category of National Park, it was included in the National Biological Diversity Strategy with Action Plan (2004).

For the purpose of assessing the values of Shar Planina for its proclamation for protected area, significant activities were carried out in the period 2006-2010 by the German Foundation EuroNatur in cooperation with the Macedonian Ecological Society, in the frames of which the publication "Natural Values of Shar Planina" (Melovski et al. 2010) was developed. Furthermore, the results of the Study assessing economic value of non-market natural wealth of Shar Planina indicate that the residents from towns and villages which gravitate to the mountain would allocate total of 3.2 million EUR per year for its protection and status improvement (Melovski&Hristovski 2008).

In 2006, Shar Planina was identified as priority mountain on the agenda of the United Nations Environmental Programmein the frames of the initiative for Balkan mountains (Environment and Security Initiative - ENVSEC). According to UNEP's Feasibility Study of 2010, financially supported by the Austrian Development and Cooperation Agency, Canadian International Development Agency and Ministry of Foreign Affairs of Finland, the proposed transboundary protected area "Shar Planina – Korab – Deshat" could become the largest protected area in the Region of Southeastern Europe and one of the largest in Europe (UNEP Vienna 2010).

Information on the need to designate part of Shar Planinafor protected area in the Category of National Park was prepared in 2010 and delivered to the relevant state authorities for opinion, upon which the Government of the Republic of Macedonia took conclusion to establish inter-ministerial working group to consider and harmonize all current and planned projects and concessions in the area of Shar Planina and accomplish adjustment of the proposed external boundaries of the future protected area among competent ministries as stakeholders.

At the same time, for the purpose of promotion of the idea for establishment of transboundary protected area Shar Planina-Korab-Deshat, two big trilateral conferences were organized on Popova Shapka – the first one in November 2011, and the second one in November 2013, by the Macedonian Ministry of Environment and Physical Planning, with the support of the UNEP Vienna Office, Foundation EuroNatur from Germany and Macedonian Ecological Society. At the Second Trilateral Ministerial Conference, Ministers of Environment of the three countries Macedonia, Albania and Kosovo, signed the commonly prepared document "Vision for the transboundary protected area Shar Planina – Korab", and several ambassadors and other representatives of local communities, protected areas, universities, local, national and international organizations. The Vision was developed as part of the Project "Development of prospects for a transboundary protected area Sharr/Šar Planina-Korab", that involved,as partners, one non-governmental organization from each of the three countries sharing the concerned area – Macedonia, Albania and Kosovo and EuroNatur from Germany. This meeting was also a good possibility for establishment and promotion of local partnerships, facilitate cross-border contacts and consultations and identify common priorities in the areas of nature protection and local development.

2.3.4.9. JABLANICA

The need to protect natural and cultural values of the Mountain of Jablanica has been recognized long time ago and it was identified as potential National Park in the Strategy for Biological Diversity Protection with Action Plan of the Republic of Macedoniain 2004.

Valorization of natural values of the Mountain of Jablanica – Shebenik was carried out in the course of 2006 as part of the Project "Balkan Green Belt as Corridor for Bear, Wolf and Lynx", implemented by the Macedonian Ecological Society, BIOECO, Society for Environment Protection and Conservation in Albania (PPNEA) and German organization EuroNatur in order to develop document to assist the competent Ministries in Macedonia and Albania to undertake measures for this transboundary area protection. Socio-economic investigation was carried out in 2008 to take into account all aspects of man and their impacts on biological diversity in the process of definition of boundaries of the proposed National Park Jablanica, as well as the boundaries of the zones within the area. At the same time, for better promotion of natural and cultural values of the Mountain of Jablanica, as well as capacity building among local population, MES in cooperation with EuroNatur supported the implementation of 14 pilot projects.

The Study valorizing natural values of the Mountain of Jablanica with a proposal for its designation as National Park with delineated boundaries and zoning of the area was developed by MES with the support of the Municipalities of Vevchani and Struga, which was submitted to the Ministry of Environment and Physical Planningin 2009 in order to initiate the procedure for legal protection of the area. This Study was elaborated before the adoption of the Rulebook on the content of the Study on (re)valorization and therefore it is necessary to supplement it.

Considering the importance of the local population in decision making process and the need to strengthen the public awareness, implementation of the transboundary project "Improvement of transboundary cooperation and development of the mountain massif Jablanica-Shebenik through active participation of local population" (2013-2014), was financed by EU IPA programme for cross-border cooperation between Macedonia and Albania. The goal of the project is to contribute to the promotion of positive practices for sustainable utilization of natural resources in several municipalities along the mountain massif.

According to investigations undertaken so far, the main threats to aquatic ecosystems on the Mountain of Jablanica (4 glacial lakes, 2 swamps identified as rare habitats in Macedonia) originate, mostly, from eutrophication, water capturing and presence of waste. Activities for quantification of threats and the need for protection of glacial lakes, swamps and springs as priority habitats under the Habitat Directive and their appropriate protection in accordance

with the Water Framework Directive, as well as specification of measures for sustainable management of forests in river basins (in the frames of the project "Water for lakes, swamps, springs and people on Jablanica Mountain", carried out by MES).

2.3.4.10. DINARIC ARC PARKS

In the beginning of 2012, the World Wild Fund for Flora and Fauna (WWF) initiated activities in the frames of the Project "Dinaric Arc Parks" for the purpose of establishing alliance of Nature Parks and National Parks in the region of Albania, Bosnia and Herzegovina, Montenegro, Croatia, Kosovo, Macedonia, Slovenia and Serbia. The three National Parks of Macedonia "Mavrovo", "Galichica" and "Pelister" participate in the project. The project duration is three years, and it is supported by the Norwegian Ministry of Foreign Affairs and Foundation for Nature Conservation from Switzerland (MAVA). The main goal of the project is to establish network of protected areas through networking of all parks in the area of Dinaric Arc. Important segment of this project concerns development of management capacity, for the purpose of which several trainings have been completed.

As part of this project, the three National Parks will be included in the process aimed at obtaining certificate for sustainable tourism, issued by Europark Charter for Sustainable Tourism, as well as active participation in creation of recognizable brand.

2.3.4.11. TRANSBOUNDARY WATER MANAGEMENT

In the domain of regional cooperation, the Republic of Macedonia hosted the Ministerial Conference on Waters, on 18 April 2011 in Ohrid, resulting in adoption of the Joint Declaration for Integrated River Basin Management. In parallel with this, the Ministers representing the participating countries of Drim Dialogue, adopted the Declaration on the management of the extended Drin Basin.

2.4. IMPLEMENTATION OF THE THEMATIC PROGRAMMES OF WORK UNDER THE CONVENTION ON BIOLOGICAL DIVERSITY RELATED TO CROSS-CUTTING ISSUES

In the past period, the activities in the Republic of Macedonia were focused mainly on the implementation of programmes for work under the Convention on Biological Diversity regarding protected areas, protection of plants and communication, education and public awareness. Furthermore, activities are undertaken towards implementation of the Cartagena Protocol on Biosafety, as well as preparatory activities for Nagoya Protocol.

2.4.1. PROGRAMME OF WORK FOR PROTECTED AREAS

The Action Plan for implementation of the Programme of work under CBD for protected areas in the Republic of Macedonia was prepared in 2012 by the MEPP, for a period of five years. The first Part of the Plan elaborates the status of protected areas in Macedonia. More details of the status are presented in Chapter 2.3.1.3. Protected areas.On the basis of the developed Studies for (re)valorization, using the tool of the World Bank and WWF to monitor the efficiency of the management, analysis of the main threats/sectors having impact on the integrity of protected areas was made, stressing the following sectors: energy, transport, urbanization, mass tourism, forestry, fishery, agriculture and climate change.

The Action Plan sets 9 national targets for protected areas, intended, mainly towards (1) strengthening the capacity on central and local levels for protected areas management, (2) establishment of strategic approach to protected areas funding, (3) improvement of the legislation, (4) increased participation of local communities in protected areas management, (5) extension of the network and establishment of representative network of protected areas, (6) incorporation of climate change aspects in protected areas, and (7) promotion of communication, education and increasing the public awareness of protected areas.

For the purpose of implementing the programmes of work for protected areas, three priority activities have been identified, namely:

- Integration of protected areas in wider landscape and sectors in order to maintain their ecological structure and functioning
- Strengthening the effectiveness of protected areas management
- Promotion of the system of protected areas in order to mitigate negative impacts of climate change.

2.4.2. GLOBAL STRATEGY FOR PLANTS CONSERVATION (2011-2020)

Continuous research of the flora of the Republic of Macedonia and steady progress in the knowledge of the values and significance of flora and vegetation diversity on its territory, constituted the basis for the implementation of the project for identification of Important Plant Areas in Macedonia, initiated by Plantlife International, and coordinated by the Regional Environmental Centre from Budapest in the course of 2002-2003. This activity was implemented in several Balkan countries to result in identification of 42 smaller and larger Important Plant Areas on the territory of the Republic of Macedonia (Figure 19), with preliminary assessment of the threats jeopardizing the survival of plant species and habitats in these areas. Furthermore, in the period 2007-2009, on the basis of the adopted methodology, important species and habitats were identified for each of the prior identified 42 Important Plant Areas (MES/Plantlife project in IPAs identification).

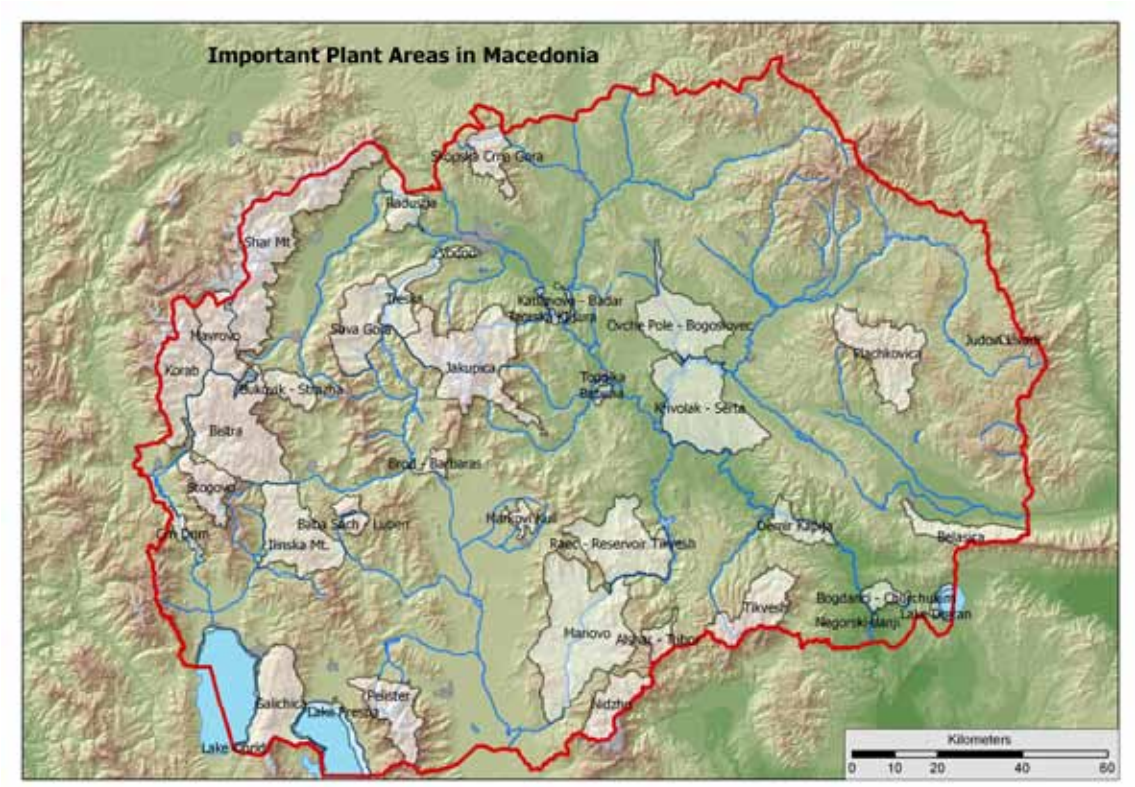


Figure 19. Map of Important Plant Areas in Macedonia (Source: MES 2010)

Data produced by this project established important grounds for planning of the flora and vegetation diversity in these areas (Melovski et al. 2010). As a result of the researches conducted during the past ten year period, significant progress was achieved in the study of the flora of higher plants in the Republic of Macedonia. Activities for IPAs protection and promotion were carried out in several pilot areas, such as the mountains of Shar Planina, Pelister, Ilinska and Plakenska, Judovi Livadi (meadows)-Pehchevo and Osogovo Mt. Activities focused mainly on the promotion of the importance of these IPAs on international level, as they constitute at the same time potential Nature 2000 sites.

The main goal of the programme for IPAs is to identify and protect priority areas for plants throughout Europe, using appropriate criteria developed by Planta Europa. The programme for IPAs protection is a good tool in terms of the implementation of the Global Strategy for Plant Protection.

2.4.3. EDUCATION AND PUBLIC AWARENESS RISING OF THE IMPORTANCE OF BIOLOGICAL DIVERSITY

Capacity building and public awareness rising are the key factors in the achievement of the goals for biological diversity protection. Article 13 of the Convention on Biological Diversity, concerning the understanding of the importance of biological diversity and raising of public awareness and education towards achievement of the three goals of the Convention, was for the first time discussed in 1998, at the Fourth Conference of the Parties to CBD. Later, in 2002, Decision VIII/6 was adopted regarding the Programme for communication, education and public awareness with information of this global initiative. In order to implement this thematic programme of work, Parties are obliged to prepare plan for its implementation on national level, however such plan has not been prepared yet.

During the last decade, the number of activities in the Republic of Macedonia aimed at public awareness rising and educational programmes has increased, but it is still deemed that these are insufficient, especially for the fact that many of them are implemented on short-term basis, within certain projects, and the results achieved are in most cases not measured.

Capacity strengthening

Strengthening of the capacity for application of biological diversity on institutional level was conducted through several projects implemented by MEPP, units of the local self-government, administrations of national parks, public enterprises and other institutions and NGOs responsible for or with great interest in protected areas, in the frames of the GEF/UNDEP/MEPP project for protected areas, designed on the basis of prior performed poll in 30 relevant institutions/organizations. During 2011, five trainings were organized on the following priority topics: (1) legislation, norms and institutional aspects of protected areas, (2) basis of research on biological diversity, monitoring and management of protected areas, (3) communication, public awareness rising and public relations, (4) funding, donations and effects on local economic development with an accent on tourism, and (5) basic training in GIS.

Training of nature inspectors in terms of environmental crime in protected areas (illegal wood cutting, transport, misdemeanor and penalty provisions) was carried out under RENA project.

Regional trainings on priority topics in the areas of nature protection and climate change for the employees of the ministries and other relevant institutions are planned in the frames of ECRAN project (implementation started in 2013), as follow up to the successfully completed RENA project and identified need for capacity strengthening, strengthening of the regional cooperation and exchange of information between relevant institutions of the countries in the Region in the process of approximation with the EU.

Trainings aimed at capacity strengthening for National parks management were carried out in the frames of the WWF project on Dinaric Arc Parks.

Activities for enhancement of the local knowledge of the possibilities for sustainable economic development through the benefits from the care for biological diversity, ecosystem services, and for increasing the capacity with regard to the process of action based planning for biological diversity conservation on local level were carried out in the frames of the ECNC/REC project for biological diversity protection and ecosystem services in Western Balkan countries.

Different types of trainings in monitoring, research and conservation of biological diversity are carried out for different target groups in the frames of several projects implemented by non-governmental organizations and scientific institutions. Thus, for example, with reference to birds protection, Macedonian Ecological Society has carried out trainings for the competent institutions (environmental inspectorate, inspectorate of forestry and hunting, veterinary inspectorate, Ministry of Interior, agriculture inspectorate), regarding application of the procedure in case of vultures poisoning (transfer of experiences from Spain) and training in pathoanatomic analysis (autopsy) and basics of toxicology (in cooperation with the Faculties of Veterinary Medicine in Sofia and Skopje). A number of trainings were organized for volunteers

given the task to carry out monitoring of common bird species, international census (counting and determination) of water birds, monitoring of Lesser Kestrel, Imperial Eagle and Egyptian Vulture, monitoring of bird migration, education of students in protection of rare bird species, etc. Another good example is the established network for Balkan lynx monitoring and protection, which involves scientists, mountaineers, hunters, rangers, game wardens, students, farmers and border police.

Education activities of children on Osogovo Mountain

Education

Education of the young population is particularly important, because they are inclined to easy absorbing of ecological knowledge, skills and routines which can later on grow into environmental life style with appropriate level of environmental awareness. Of course, this does not mean that other groups should be neglected, but on the contrary their education should be taken care of in parallel. The subject matter of biological diversity in educational system (primary and secondary school levels) is included in curricula, though not adequately elaborated during classes. At higher education level, this matter is dealt with only for vocational education profiles, though not in social and humanistic or electric and mechanical engineering professions.

In the course of 2013, under the support of the SDC/MEPP programme for nature conservation, implementation of activities was initiated towards improvement of the educational system and introduction of biological diversity conservation at the Faculty of Forestry in Skopje, by way of establishment of cooperation between the Faculty of Forestry from Skopje and University of Applied Science from Bern, for the purpose of exchange of experience and knowledge between the two institutions in the segment of forest management, biological diversity conservation and sustainable development.

High number of educational activities on biological diversity is performed by non-governmental organizations (informal education).

The Green Package for students education was developed by the Regional Environmental Centre in cooperation with the Ministry of Environment and Physical Planning and Ministry of Education and Science, and financed by the Austrian Agency for Development and Cooperation in order to contribute to improved quality of environment in Macedonia through fostering personal responsibility among citizens by improving their own attitudes and care for the environment. Both green packages that contain well designed active methods and tools

for educationof the students in primary school level, their teachers and parents. They were distributed to all schools in Macedonia.

The Programme "We have no spare Planet" was implemented in several primary schools in 1999 by the non-governmental organization OHO, as first Macedonian original project which produced didactical materials for public awareness rising of the importance of environment. The Programme grew into interactive, complex educational programme covering all kinder gardens, primary and secondary schools and students' homes in the Republic of Macedoniaand offering education and comprehensive methodology for environmental management of those institutions. The same programme gave rise to television programme 5+ broadcasted in Macedonian and Albanian.

Rising public awareness

Activities for celebration of International day of biological diversity in the Republic of Macedonia have been organized every year on a different level in cooperation with different institutions, agencies and NGOs.

In 2009, the NGO Makmontana organized the first "Pan-European Picnic on Biological Diversity", in collaboration with the Ministry of Environment and Physical Planning and CEE web. The event was organized on 11 June, near Skopje, with participation of about 35 representatives from relevant ministries, research institutions, international organizations (UNDP, SDC, REC), NGOs and business sector. The theme for celebration of biodiversity day for 2009 was "invasive species" as one of the greatest threats to biodiversity from environmental point of view, but also for the economic welfare of society.

In the year of 2010, declared as the international year of biodiversity, more promotional activities were organized by the MEPP with support from GEF / UNDP / MEPP project for protected areas and the Macedonian Ecological Society (MES) with financial support from CEE web. From the completed competition for best biodiversity photo in Macedonia the exhibition of 30 photographs was set in the Natural History Museum of Macedonia. The celebration of the Day of Biological Diversity (May 22) was moved on June 5, marking the World Environment Day at the same time. Workshop on "Biodiversity in Macedonia and its obligations in the process of EU accession" and "Pan-European Picnic on Biological Diversity" (picnic and a short trip to the slopes of Popova Shapka) were organized on Shar Planina Mountain. More than 100 participants, senior representatives of the Government, representatives of the EU and UNDP in Macedonia, other institutions and organizations, non-governmental organizations and local population attended the event. The working part of the event, at the global, European and national level policies for the protection of biodiversity were presented, biodiversity values and the current state of the network of protected areas in Macedonia, biodiversity values of the Shar Mountain were promoted and the necessity for its proclamation as National Park. Two books "The natural values of Shar Planina" and "Important Plant Areas in Macedonia", published by the MES were promoted.

International Day for Biological Diversity in Macedonia in 2013 was marked nearthe Lake of Prespa, under the motto "Think regionally, act regionally", which was equivalent to the celebration theme - "The water and biodiversity." The initiator of the event was the German Society for International Cooperation (GIZ) through the project "Conservation and sustainable use of biodiversity of Prespa, Ohrid and Skadar Lakes", under the auspices of the MEPP and organized by the MES. As part of the celebration of the Day of Biodiversity which was primarily intended for locals, a number of educational activities on the theme biodiversity were organized, exhibition of children's drawings and handicrafts, screenings of documentaries on biodiversity in Macedonia, the fair of local food products, numerous presentations and walks in nature, which further contributed to raising public awareness of biodiversity conservation.

In 2014, International Biodiversity Day (dedicated to "island biodiversity") was celebrated on 22 May in Delčevo, where emphasis was put on the so-called "ecological islands" and the value of biodiversity in the Bregalnica region. Support in organization of activities associated with marking the International Day of Biological Diversity was provided by the two on-going biodiversity projects GEF / UNEP / MEPP project to revise the National biodiversity

Strategy and Action plan and Programme of nature conservation in Macedonia, funded by SDC and coordinated by Helvetas Swiss Intercooperation and Pharmahem, with the help of the Macedonian Ecological Society. Numerous activities were realized for education and raising public awareness through an exhibition of biodiversity photos in Bregalnica region, displaying different messages and data on the existing flora and fauna in the Bregalnica region, new national targets for biodiversity conservation and their relation with the Aichi Targets, dissemination of promotional materials for ongoing projects at national and local level regarding the protection of nature, drawings of biodiversity, environmental games etc. In the working part of the event, in addition to information about the activities of the two current projects (the event organizers) two lectures on biodiversity values in Bregalnica region and island biogegraphy theory and importance of ecological islands were organized, attended by about 90 participants.

Apart for the International Biodiversity Day, different activities for celebration of important international days and campaigns have been undertaken on a national or local level, of which most important are the following:

- World Migratory Day – celebration events have been organized in the last 8 years by Macedonian Ecological Society;
- World Wetlands Day – it is marked regularly with different activities implemented by different institutions/organizations
- 'Spring Alive' campaign – non-governmental sector and pupils from different schools in Macedonia have been actively involved in this campaign during the last 4 years.
- International Bats Day -marked with distribution of promotion materials regarding conservation of bats, etc

In recent years in Macedonia, popular films (short, documentary, videos, etc.), mainly related to the promotion of natural heritage and primarily for tourism development, have been produced are broadcast on national television. Also, several shows for medicinal plants were realized. Two documentaries, made by German Production MDR, were made during 2010. The first documentary is dedicated to the natural values of the National Park "Mavrovo", "At the heart of the Balkans - in search of the Lynx", recorded in collaboration with MES, Euronatur Foundation, Germany and PI NP "Mavrovo". The documentary "At the heart of the Balkans: Pelicans of Prespa" is dedicated to the Prespa Basin, with emphasis on Galichica National Park and Island Golem Grad. This documentary was produced in collaboration with UNDP and the international team of experts to study the reptiles. The first showing of two documentary films was organized in December 2011 and aired on European television ARTE, while the promotion of the film in Skopje was organized on 5 April, 2012.

Organized scientific gatherings, congreses, conferences

- **III Congress of ecologists of Macedonia with international participation**, Struga, 06-09.10.2007 - attended by some 280 guests, and 185 papers in the area of ecology presented. Of these, 50% were research results mainly from neighboring countries scientists: Bulgaria, Serbia, Montenegro, Albania, Turkey, and Switzerland, Germany, Slovakia and Croatia. Parts of the presented papers are published in the Proceedings.
- **Regional Ministerial Conference "Conservation of Biodiversity in the Balkan region according to the principles of sustainable development and in the climate change conditions"** was held on 28 June 2010 in Mavrovo with the participation of senior officials from relevant ministries in the Region, representatives of the Italian Embassy, UN/UNDP, Euronatur and ECNC. The conference Declaration (known as Mavrovo Declaration) was signed to take joint actions for protection of biodiversity in the Balkan region, establishing coherent ecological network, raising awareness of the importance of biodiversity among all stakeholders and promotion of inter-sectoral approach to biodiversity conservation.

- **Sixth Pan-European Conference on Green Belt** - was organized in June 2012 in Mavrovo by the Macedonian Ecological Society in cooperation with the German NGO Euronatur and Bund - Friends of the Earth Federation, and financialy supported by the Federal Agency for Nature Conservation of Germany. More than 120 participants discussed the various issues and developments in the countries involved in this initiative, and set guidelines for future action of the members of the Green Belt.
- **IV Congress of ecologists of Macedonia with international participation**, 12 to 15 October 2012, Ohrid - more than 300 scientists and guests from the country and from Turkey, Norway, Switzerland, Germany, Italy, Greece, Albania, Bulgaria, Slovenia, Croatia , Bosnia, Serbia, Montenegro, Kosovo, presented their research papers in the field of ecology and environmental protection. As part of the Congress, Symposium of Research Society of Biology students from Skopje was organized,as well as exhibition and contest of children's drawings, photographs, collection materials, promotional materials entitled 'Forests - guardians of nature' from the primary schools students in Macedonia.
- **Regional International conference "System Prespa Lakes –Ohrid Lake"** was held on 27-29 October 2013 in Struga, organized by MASA and the Academy of Sciences of Albania. The purpose of the conference was to analyze the problems in the region and target future joint research for the defined priorities.

2.4.4. IMPLEMENTATION OF CARTAGENA PROTOCOL ON BIOSAFETY

Activities for Cartagena Protocol on Biosafety implementation in the Republic of Macedonia started back in 2004. Activities are ongoing to strengthen the capacity for the Protocol implementation with financial support from GEF (GEF/UNEP/MEPP project). Through the project, support will be provided for the purpose of fulfilling the obligations specified in Cartagena Protocol on Biosafety, with particular focus on the requirements of Articles 1 and 2 of the Protocol. In the frames of these activities, the Republic of Macedonia should revise the National Biosafety Framework (developed in 2005) and set appropriate administrative, regulatory system for assessment of the possible negative impact of genetically modified organisms (GMO) on environment and human health.

Project cycle consists of five components:

- Analysis of the status of biosafety in the Republic of Macedonia
- Legal framework – support in the adoption and implementation of the bylaws under the Law on GMO (Official Gazette of the Republic of Macedonia no.35 /08)
- Handling of applications for GMO authorization, including administrative processing for risk assessment and informed decision making
- Monitoring mechanisms (monitoring of GMO impact on the environment and strengthening control and inspection)
- Public Participation.

2.4.5. NAGOYA PROTOCOL

The Republic of Macedonia has not signed and ratified the Nagoya Protocol yet. In the course of 2013, in the frames of the project for revision of the National Biodiversity Strategy with Action Plan, initial activities were carried out, in the frames of which translation into Macedonian was made of the the Nagoya Protocol on the Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization and Bonn Guidelines on Access to Genetic Resources and Sharing of the Benefits Arising out of their Utilization. Furthermore, brief analysis of the Protocol and Bonn Guidelines was made and presented on the second workshop of stakeholders concerning revision of the NBSAP (held in October 2013, in Berovo). Financial support is expected under the GEF 6th programme for development of assessment of the national capacity for Nagoya Protocol signing and ratification.

2.5. INTEGRATION OF BIODIVERSITY INTO RELEVANT SECTORAL STRATEGIES, PLANS AND PROGRAMMES

Apart from the NBSAP, the Ministry of Environment and Physical Planning is required to develop a National Strategy for Nature Protection, in accordance with the Law on Nature Protection. This Strategy is developed for a ten years period, adopted in a procedure that provides public participation in decision-making and includes long-term fundamentals of the policy of nature protection. The Strategy is adopted by the Government of the Republic of Macedonia, upon proposal of the Minister of Environment and Physical Planning. The preparation of the National Strategy for Nature Protection is planned to start in 2014 in the framework of the SDC/MEPP Program for nature conservation. The Strategy will set goals and guidelines for the preservation of nature, the ways of its implementation in accordance with the overall economic, social and cultural development of the Republic of Macedonia.

Three local biodiversity action plans for the municipalities of Gostivar, Mavrovo and Rostuse, and Debar were developed in the period 2009 - 2013, under the ECNC/REC/MEPP project for biodiversity conservation in local sustainable development in the Western Balkan countries. The legal basis for the development of these action plans stems on the Law on Nature Protection and Law on Environmental, as well as legislation for the new system of local government (which has been in operation since July 2005) by which the local governments are faced with growing number of jurisdictions, particularly in the area of the environment (which includes the protection of biodiversity), such as: planning and spatial management at the local level, establishing limits on the use of natural resources, identification of problems of environmental pollution and undertaking protection measures, issuing B ecological permits, communal activities, conducting inspections and monitoring, management of Natura 2000 sites, developing local environmental action plans and, of course, providing local development according to the principles of sustainable use of resources.

2.5.1. RELEVANT STRATEGIC AND PLANNING DOCUMENTS

The **Spatial Plan of the Republic of Macedonia** is an integral strategic development document defining the spatial development of the State, giving directions for the use, protection, organization, regulation and management of the space in the country (in accordance with the Law on Spatial and Urban Planning, Article 8). The Spatial Plan of the Republic of Macedonia is elaborated through spatial plans of the planning regions and spatial plans for areas of special interest of the country. Further more, spatial plans have been elaborated through urban plans. The Law on implementation of the Spatial Plan of the Republic of Macedonia for the period 2002–2020 (Official Gazettee of the Republic of Macedonia no. 39/04) was adopted by the Macedonian Parliament in 2004. The Spatial Plan has been drawn up by the Public Enterprise 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. Other planning documents regulating the landscaping and use of space shall be harmonized with the Spatial Plan of the Republic of Macedonia, also adopted by the Macedonian Parliament.

In the sectoral Study of Natural Heritage Protection (prepared in 1999), as the most comprehensive source of information regarding protected areas, all protected and proposed areas for protection (265 in total) have been elaborated, and analyses have been done on the basis of the old categorization.

The following goals pertaining to biodiversity conservation are set regarding natural heritage in the National Spatial Plan: preservation of protected areas of exceptional and unique values; preservation, protection and promotion of all specific representatives of individual ecosystems and outstanding biogeographical areas; priority to be given to the protection and promotion of those that are used with higher intensity; for the purpose of preserving ambient, aesthetic and recreational resources of the space, focus should be placed on protection, promotion and adequate use of major natural entireties; full protection of flora and fauna through protection of major spatial units and guided use of natural resources in accordance with environmental conditions; provision of natural landscapes protection, ambient and areas surrounding cultural and historical monuments; establishment of eco-network of protected natural goods and green corridors; interconnection of areas and zones with the same or similar purpose and protection regime with those in the neighboring areas of the country. Also increasing the network of protected areas up to around 12% of the country territory) and nomination of management bodies has been planned.

Spatial plan of the planning region is the second most important strategic document after the Spatial Plan of the Republic of Macedonia. So far, the following plans were adopted: Spatial Plan of the accumulation Kozjak region (2000-2020) (Official Gazette of the Republic of Macedonia no.49/1999), Spatial Plan of the region of the source protection zones Rasche (Official Gazetteof the Republic of Macedonia no. 98/2002), Spatial plan of the region of river Treska watershed for the period 2005 to 2020 (Official Gazette of the Republic of Macedonia no. 25/2007) and the Spatial plan of the Ohrid-Prespa region was adopted in 2010 (Official Gazette of the Republic of Macedonia no. 2210) for the period 2005 to 2020. Draft Spatial Plan of the Skopje region (2005-2020) was prepared and not adopted yet. Draft spatial plan of the Eastern Planning Region is under preparation (supported by SDC/MEPP Program for Conservation of Nature) to give directions for biodiversity conservation through proper future use, regulation and management of space in the region.

The development of spatial plans for landscaping and use of space in protected areas is an obligation under the Law on Nature Protection (Article 103). For the category National Parks, preparation and adoption of spatial plan is a legal obligation, while for other categories of protected areas as needed. The first spatial plans for NP "Galichica", NP "Pelister" and NP "Mavrovo" were adopted in 1988 and valid until new spatial plans are adopted. In 2011, a draft Spatial Plan for the National Park Galichica for the period 2009-2020 was developed, but it had not yet been adopted. Also, during 2013-2014 draft Spatial Plan for the NP Mavrovo (2012-2030) was prepared, and its adoption shall follow the procedure for re-proclamation of the NP "Mavrovo" as protected area (obligation arising under the Law on Nature Protection).

The **Second National Environmental Action Plan (NEAP2)** is a strategic document providing general instructions and directions for the Republic of 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 for preparation of this document arises 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 conservation according to EU standards and international agreements, the measure "Implementation of effective mechanisms for further implementation of the National Biodiversity Strategy and National Capacity Self-Assessment, the Law on Nature Protection and providing adequate conditions for the establishment of the Natura 2000 network' is foreseen with several actions.

Strategy for Regional Development of the Republic of Macedonia (2009-2019) adopted in 2009, following the adoption of the Law on Balanced Regional Development which defines eight planning regions in the country: Vardar, East, Southwest, Southeast, Pelagonia, Polog, Northeast and Skopje regions. The Strategy defined the following vision for the development of regions "balanced and sustainable development in the territory of the Republic of Macedonia, which is characterized by high economic growth and competitive planning regions and small differences between them, the optimal use of natural, human and energy resources, high degree of economic and social cohesion and where the population enjoys a good standard of living".

2.5.2. RELEVANT SECTORAL STRATEGIES

A number of strategic documents (adopted in different sectors) are relevant to the issues of integrating biodiversity conservation; the most important have been elaborated in the text below. Relevant policy documents will be further elaborated in the Strategic Environmental Impact Assessment of the NBSAP, which is under development and will give recommendations for incorporating issues related to conservation and sustainable use of biodiversity in other relevant national policies.

1. AGRICULTURE

National Strategy for Agriculture and Rural Development (2007-2013) 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 objectives of the national agricultural policy of the Republic of Macedonia, among others, aimed at: ensuring sustainable development of rural areas and optimal use of natural resources while respecting the principles of the protection of nature and environment. Currently this Strategy is under review.

The Strategy is realized through the implementation of multi-year programs. Within the **National programme for development of agriculture and rural development,** adopted for the period 2013-2017, special attention was directed towards the sustainable management of natural resources, environmental protection and biodiversity conservation, as a new set of measures to be introduced in the upcoming period.

Certain contribution to biodiversity conservation and sustainable use of natural resources has the **National Strategy and Action Plan for Organic Production**. The first Strategy was adopted for the period 2008-2011. Revised Strategy for the period 2013-2020 is an instrument which provides the basis for further development of organic farming in the country, the strategic objective of which is to increase the competitiveness of organic production for successful marketing in domestic and overseas markets. The Strategy envisages concrete targets for wild spacies collection.

The general aim of safeguarding the biodiversity of domestic animals in the Republic of Macedonia, and consequently the **Program for protection of agrobiodiversity in livestock** (2011-2017) is to set national guidelines (priorities) in this area in accordance with internationally accepted four priority areas, established in the framework of the Global Action Plan, adopted at the First International Technical Conference on animal genetic resources (held in Switzerland, 2007) and the Law on Livestock. Priorities related to protection and utilization of genetic resources in livestock are directed towards establishing a system for characterization and inventory of all species and all breeds/lines of domestic animals individually, monitoring, conservation system and gene bank, sustainable use and development of genetic resources in livestock production, a system of measures to support the protection, institutional strengthening and raising public awareness.

2. FORESTRY

The overall goal of the **Strategy for Sustainable Development of Forestry in the Republic of Macedonia** (adopted in 2006 for the 20 years period) is to increase the contribution of the forestry sector to the national economy and rural development through sustainable forest management, ensuring renewable resources and protection of local and global environment, and providing products and services for improving the quality of life of all citizens.

The Strategy is mainly focused on the economic aspects of forests: increasing forest area, improving the composition and quality of forests, protection of forests against fires and diseases, forest management measures, promoting the use of timber and wood products from sustainably managed forests, etc.

One of the goals defined in the strategic goal "forestry and environment" refers to the conservation and revitalization of the components of biological and landscape diversity of forests in Macedonia through the integration of conservation objectives into forestry practices.

The action plan prepared for the period 2007-2009 does not address forest biodiversity properly. However, it calls upon forest certification based on standard international criteria which take biodiversity into account to a great extent.

3. WATERS

The **National Strategy for Water of the Republic of Macedonia** (2012-2042) is one of the most important documents that deal with the management of waters in the country which summarizes data on the legal and institutional framework in the field of protection and management of water resources, review the condition of surface and ground water, the way of use of water and analyzed the potential impacts of human activities on the status of surface waters. The objectives of this Strategy are inter alia directed towards protection of water from pollution and pollution control, designation of areas for special protection of waters, areas for preservation of human health and the conservation of water dependent ecosystems in the framework of integrated water management.

4. ENERGY SECTOR

Strategy for Energy Development in the Republic of Macedonia by 2030 prepared for the period 2010-2020, with a vision to 2030 defines the best long-term development of the energy sector in the country, aiming to provide reliable and quality supply to consumers. Maximum use of renewable energy sources is a priority activity in the energy sector, as defined in the Energy Development Strategy. The following renewable energy sources are used in Macedonia: hydropower (for electricity production), biomass (mostly timber for heating in households), geothermal energy (mostly for heating greenhouses) and the solar energy (moderate for hot water in households). Additionally, in 2010, **Strategy for renewable energy sources in the country** to 2020 was adopted, with the main objective to collect and present all relevant information concerning the potential and opportunities for using renewable energy sources in Macedonia.

5. TOURISM

National Strategy for Tourism Development (2009-2013) provides a framework which defines the main directions of development, based on the natural and cultural heritage, uniqueness, quality products, our distinctive warmth and hospitality. The Strategy sets the following vision "Republic of Macedonia until 2013 shall build an image of recognizable European destination for tourism based on the cultural and natural heritage and to be recognized for environmentally friendly products and services and sustainable high quality, on the level of international best practices."

Additionally, in 2009, **National Strategy for Rural Tourism** (2009-2013) was developed, as the first document of its kind in the country, prepared in accordance with domestic and

international policy documents, especially EU documents and standards of rural development and rural tourism. The main goal of this strategy is inter alia to set up a framework to encourage the development of rural (village) tourism, as part of the overall tourist offer of the Republic of Macedonia.

6. CLIMATE CHANGE

In the **Third National Communication on Climate Change**, adopted by the MEPP in 2014, major limitations and weaknesses were identified associated with assessing and mitigating the impact of climate change on biodiversity including: (1) lack of data on the impacts of climate change on biological diversity, especially in mountain ecosystems; (2) lack of a system of protected areas that takes into account the impact of climate change; and (3) lack of ex-situ conservation actions. The new Action Plan for potential mitigation measures presented in this document contains 30 actions relating to biodiversity, directly or in conjunction with other sectors: agriculture, forestry, water resources and health.

7. POVERTY ERADICATION

The rate of poor people in the Republic of Macedonia in 2010 was 27.3%, measured by social transfers, as an important indicator for measuring poverty. Analyzed by sex, the rate was higher in men, 27.9%. Young people up to 18 years have a higher risk of poverty (31.4%), while the least susceptible were those aged over 65 years who mainly live on pensions and social transfers. The most vulnerable and the most affected are those who live in rural areas. Their existence is in direct connection with nature and biodiversity. The main strategic goal of the **National Strategy for Poverty Reduction and Social Exclusion in the Republic of Macedonia** (2010-2020) is "reduction of poverty and social exclusion through better use of available human and material resources, improved living conditions, work and social conditions for all citizens, systemic and institutional collaboration aimed at faster growth, and higher living standards ", but the terms biodiversity, nature or natural resources were not mentioned at all.

2.6. TOOLS USED IN BIOLOGICAL DIVERSITY INTEGRATION

To integrate the issues of biological diversity protection and sustainable use into spatial planning and different economic sectors, mechanisms for environmental impact assessment (EIA) and strategic environmental assessment (SEA) are used. The procedure for their application is stipulated in the Law on Environment and further regulated in several bylaws determining the strategies, the plans and the programmes, as well as projects that are subject to these procedures, the content of the report, public participation, the manner of carrying out transboundary consultations, etc.

Environmental Impact Assessment Studies have been carried out for highway sections (Demir Kapija-Smokvica), Miladinovci-Shtip, Shtip-Strumica, etc.), national roads (bridge on the river Raec – Gradsko, Kula – Makedonski Brod), railway sections (Kumanovo – Republic of Bulgaria, Kichevo – Kjafasan, Drachevo – Veles), as well as prior to the construction of large hydro power plants (e.g. EIA for Boshkov Most with a year biodiversity monitoring). Details of these studies are presented in Chapter 1.5.2.

The Law on Nature Protection stipulates the obligation for application of environmental impact assessment of measures and activities envisaged in different development strategic, programme and planning documents that could have impact on nature (Article 15) and activities planned in nature which during their implementation might independently, or in joint action with other activities disturb the natural balance (Article 18) in order to avoid or minimize the degradation of the nature. These activities are carried out in accordance with the provisions of the Law on Environment. The procedures are especially important to prevent fragmentation of habitats while implementing projects for construction of roads, dams, airports, etc. Depending on the anticipated or caused degradation of nature, as well as on the possibility for compensation thereof, compensatory measures shall are prescribed (Article 19), i.e. activities by which nature degradation is compensated for or mitigated.

Within protected areas, planning and use of space is carried out in accordance with the Spatial Plan of the Republic of Macedonia, spatial and urban plans stipulated by law, regime of protection specified in the act for proclamation of the protected area and the national ecological network, as well as the management plan of the protected area (in accordance with Article 17 of the Law on Nature Protection). The management plans of protected areas undergo a nature impact assessment procedure in accordance with the Law on Environment. The documents in the domain of spatial development and use shall, when being adopted, undergo a nature impact assessment procedure and include measures and conditions for nature protection prescribed by Article 16 of the Law on Nature Protection.

Upon the completed proclamation of the site of "Ezerani" for protected area in the category of Nature Park, strategic environmental assessment was developed on the occasion of adoption of the management plan for the area during 2012

.

2.7. SYNERGIES WITH OTHER RELEVANT CONVENTIONS

Besides the Convention on Biological Diversity, the Republic of Macedonia has ratified a number of multilateral environmental agreements. Overview of the relevant multilateral agreements of importance for biological diversity protection in the country and details of their ratification are presented in Annex IV.

For the purpose of the implementation of multilateral agreements in the area of nature protection, national focal points have been appointed in MEPP, mainly in the Department of Nature and Department of International Cooperation, and national committees have been established for certain conventions (see Chapter 2.3.1.3.).Obligations deriving from these multilateral agreements are to a great extent incorporated in the existing national legislation. The first National Biological Diversity Strategy with Action Plan included actions related to the application of the provisions contained in these conventions. The level of implementation differs with different multilateral agreements – significant activities have been undertaken for some of them, while activities for others are in initial phase of implementation. Reports on activities completed towards fulfillment of the obligations under conventions are prepared on regular basis and delivered to the secretariats of the conventions. Brief overview of the implementation of the most relevant multilateral agreements is presented in Table14.

Table 14. Multilateral agreements of relevance for biological diversity in Macedonia

Multilateral agreements	Implementation
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	• National Report on the Implementation of the Ramsar Convention for the period 2009-2011 was submitted in June 2012 (the 11th Conference of Parties • Two areas from Macedonia (Prespa and Dojran Lakes) are included on the Ramsar list, both protected at national level, whereas, in the past few years, a number of activities were implemented for protection the Lake Prespa
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	• National Report for implementation of the Convention for the period 2009-2011 was submitted in 2011
Agreement on the Conservation of Bats in Europe (EUROBATS)	• National Report for implementation of the Agreement for the period 2007-2010 was submitted in 2010
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)	• National Report for implementation of the Agreement for the period 2009-2012 was submitted in 2012
Convention for the Protection of the World Cultural and Natural Heritage (UNESCO)	• Ohrid region is included on the UNESCO world natural and cultural heritage list • Two areas (Markovi Kuli and Slatinski Izvor) are included on the tentative list • The transboundary biosphere reserve Ohrid-Prespa was declared in 2014 (see chapter 2.3.4.3.)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	• Annual reports are regularly submitted to the Secretariat of the Convention with detailed data on issued CITES certificates for import, export and re-export of species included in Appendices of the Convention
Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)	• Areas of National Emerald network have been identified • Report on implementation of the Convention for the period 2009-2012 was submitted in 2013
United Nations Framework Convention on Climate Change (UNFCCC)	• Third National Communication on climate change was adopted in 2014 (see sub chapters 1.5.1. and 2.4.1.)
Convention on Access to Information, Public Participation in Decision-making and Access to Justice on Issues related to Environment	• Strategy for implementation of the Aarhus Convention in the Republic of Macedonia was adopted in 2005 • National reports on implementation of the Convention were submitted in 2005 and 2008
United Nations Convention to Combat Desertification (UNCCD) in Countries Experiencing Serious Drought or Desertification, particularly in Africa	• Biennial national reports on implementation of the Convention are submitted on a regular basis • Activities for the preparation of a National Action Plan for implementation of the Convention are on-going

PART III: PROGRESS TOWARDS IMPLEMENTATION OF AICHI TARGETS TO 2020 AND CONTRIBUTION TO RELEVANT MILLENIUM DEVELOPMENT GOALS BY 2015

3.1. PROGRESS TOWARDS THE IMPLEMENTATION OF THE GLOBAL STRATEGIC PLAN FOR BIOLOGICAL DIVERSITY FOR 2011-2020 AND AICHI TARGETS

Strategic Plan for Biological Diversity for 2011 – 2020, titled "Living in harmony with nature" was adopted in 2010, in Nagoya, Japan. It is ten year leading international framework for action by all countries and entities in order to save biological diversity and enhance the benefits therefrom for people.It includes common vision, mission, 5 strategic goals and 20 ambitious though attainable targets, known as Aichi targets. It calls to establishment of specific national targets, involvement of all stakeholders and integration of the aspects of biological diversity into all sectors of the environment. Full and effective implementation of this Strategic Plan is possible only by joint commitment of all countries that are Parties to CBD throughout the decade.

In the process of the NBSAP revision, brief analysis was made of Aichi targets with regard to whether the target was covered by the first NBSAP, current conditions in the country related to each specific target, as well as its relevance for integration into the new national biological diversity targets, in the frames of the second stakeholders' workshop held in October 2013. Thus, out of all 20 Aichi targets, the first NBSAP covered 6 targets and 4 were covered partially, 8 were not mentioned at all and 2 were not relevant for the country. This analysis, together with the analysis of the status of biological diversity and identified threats served as basis for definition of the new national targets (see Chapter 2.1.).

It is not possible to make analysis of the progress in the achievement of the goals of the global strategic biological diversity plan for 2011-2020 through indicators in the frames of this Report, because the development of biological diversity indicators in Macedonia is on essential level.

The national set of environmental indicators in the Republic of Macedonia was developed and adopted in 2008 by the Macedonian Environmental Information Centre of the MEPP, which is responsible to collect and process data on the state of the environment in the country. Environmental monitoring and reporting is an obligation prescribed by the national

legislation (Article 45 of the Law on Environment), European legislation (driven by the desire to get closer to the practices of the European Union in this area), obligation to submit annual reports to the European Environmental Agency (EEA), and these processes are certainly helpful for the reporting based on the requirements of other multilateral agreements (MEPP 2010). Forty national environmental indicators were adopted by the Government of the Republic of Macedonia in 2008, of which only three are biological diversity indicators: (1) threatened and protected species, (2) protected areas, and (3) species diversity. Of course, a number of indicators in other areas (e.g. waters, agriculture, soils, climate change, fishery, energy) are linked to biological diversity directly or indirectly. Lack of data (especially lack of relevant data to serve the indicator based reporting purposes, the quality or the format of data, discontinuous collection of data by the relevant institutions, are the main problems faced by experts in the preparation of environmental indicators, including indicators of biological diversity.

New indicators to monitor the progress in targets achievement will be set for the new national biological diversity targets set in the process of revision of the first NBSAP and harmonized with the Aichi targets, while taking into account the CBD recommendations (global headline indicators included in Decision VIII/15), as well as biological diversity indicators developed by the European Environmental Agency. Their development requires overcoming the problem of regular collection of adequate data. Also, coordination of activities with the State Statistical Office is of great importance. Starting in 2007 and every second year afterwards, this Office prepares Environmental Statistics (State Statistical Office 2007, 2009, 2011, 2013).

3.2. CONTRIBUTION OF ACTIONS FOR CBD IMPLEMENTATION TOWARDS RELEVANT MILLENNIUM DEVELOPMENT GOALS

The Millennium Development Goals were adopted by 189 United Nations Member States and at least 23 international organizations in September 2000 (at the onset of the 21st century). They represent an important momentum for cooperation on global level in order to foster development through improvement of social and economic conditions in the poorest countries of the world. According to the Millennium Declaration of the United Nations, every individual has the right to dignity, freedom, equality, basic living standard, which includes freeing from hunger and violence and a healthy environment, and it promotes tolerance and solidarity. The eight set goals on which world leaders agreed to achieve by 2015, include:

- Eradication of extreme poverty and hunger,
- Achievement of universal primary education,
- Promotion of gender equality and empower women,
- Reduction of Child Mortality Rate,
- Improvement of maternal health,
- Combating fatal diseases like HIV/AIDS, malaria, and other diseases,
- Ensuring environmental sustainability, and
- Developing a global partnership for development.

In fact, Millennium Development Goals address three main areas of mankind development: strengthening the human capital, improvement of infrastructure and enhancement of social, economic and political rights where the focus is placed mainly on the increase of basic living standards. Millennium Development Goals also stress the role of developed countries in helping developing countries, as stated under the eighth goal.

With reference to the focus on infrastructure, the goals include: infrastructure improvement through increased access to safe drinking water, energy and technology for modern information and communication; expansion of agricultural production through sustainable practices; improvement of transport infrastructure; as well as protection of the environment.

The most relevant and most important goal from biological diversity protection point of view is goal no.7 and it relates to: integration of the principles of sustainable development

into country policies and programmes and prevention of the loss of environmental resources, halving the portion of population lacking sustainable access to safe drinking water and basic sanitation and significant improvement of the quality of life.

High number of indicators have been defined to measure the progress towards the achievement of these goals, such as proportion of land area covered by forest and species threatened with extinction; area covered by protected areas to monitor the trend of biological diversity loss (i.e. whether biological diversity loss declines).

The Republic of Macedonia developed two national reports on the progress towards Millennium Development Goals achievement in 2005 and 2009, respectively. Achievement of the Millennium Development Goals that will at the same time secure achievement of sustainable development of the Republic of Macedonia and fulfillment of the criteria for EU membership is a long-term and intensive process which requires huge financial resources (UNDP 2009).

The Republic of Macedonia is committed to the efforts for realization of the vision of the Strategic Plan for Biological Diversity (2011-2020) and the 20 Aichi targets, which in the process of NBSAP revision have been integrated in the new national biological diversity targets. Macedonia's efforts to achieve the biological diversity targets are also relevant for the achievement of the Millennium Development Goals due to their linkage. Thus, for example, the Millennium Goal no.7 is linked with Aichi targets nos. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 18 and 19. The targets set with regards to enlargement of protected areas, preservation of ecosystems and ecosystem services, protection of traditional knowledge will certainly contribute to the achievement of Millennium Development Goals as well..

3.3. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

On the basis of the conducted analysis of the status of biological diversity in Macedonia for the period 2003-2013 and information presented in the previous chapters, we may conclude the following:

- certain progress has been achieved in the domain of research of biological diversity, the amount of knowledge has been augmented, legislation for its protection has been improved, considerable number of project and published results and scientific papers have been implemented, congresses/conferences have been organized, all indicating that there are solid scientific capacities and potentials to implement the Convention on Biological Diversity in the Republic of Macedonia.
- on the other side, biological diversity protection in Macedonia, both on national and local levels, faces series of challenges related mainly to the lack of financial, human and technical resources.

The main challenges identified in the implementation of the Convention on Biological Diversity on national level are as follows:

1. Lack of capacity of the Nature Department of the MEPP – Institutional capacity for biological diversity conservation to achieve the desired intensity. Despite the establishment of the Nature Department within the MEPP's Administration of Environment, it copes with insufficient capacity and financial resources to implement the annual programmes for nature protection. Restructuring and capacity strengthening of the Department is necessary.
2. Nonexistence of specific expert institution on national level for nature protection.
3. Insufficient capacity on local level (especially municipalities nominated as entities for protected areas management) to implement activities for nature protection.
4. Insufficient or inappropriate human capacity with entities mandated with protected areas management to carry out protection measures and activities.

5. Lack of financial resources to implement annual programmes of the Nature Department.
6. Lack of implementation of the system of collection of fees in protected areas as source of funding.
7. Incomplete legislation – significant number of bylaws prescribedby the Law on Nature Protection has not been prepared.
8. Insufficient inter-institutional cooperation with regard to natural resources use.
9. Overlapping of the responsibilities with regard to inspection supervision between relevant ministries.
10. Shortage of data on the status of biological diversity – system for biological diversity monitoring has not been established.
11. Poor accessibility of data on biological diversity - the prepared national information system of biological diversityis not operational.
12. Slow procedures of the process of re-proclamation of the existing protected areas and proclamation of new protected areas.
13. Documents/plans developed in the frames of realized projects have not been adopted.

Lessons learned and recommendations from the implementation of the Convention on Biological Diversity up to date, in terms of its more efficient implementation and achievement of the set national targets and thus contribution to the global biological diversity conservation targets, are as follows:

- Owing to the pressures deriving from economic development of Macedonia (as country in transition), it is necessary that the process of decision making includes established model that will attribute greater priority to the conservation and sustainable use of biological diversity. To that end, strengthening of the cooperation between relevant state institutions, scientific institutions and civil organizations is of particular importance, both on national and local levels (establishment of cooperation with the local population is particularly important).
- It is necessary to undertake activities for establishment of efficient coordination structure (national committee), strengthen the capacity on national and local levels and provide adequate financial resources to implement the planned measures and activities.
- For the purpose of harmonizing the obligations under the high number of ratified multilateral agreements and the necessary harmonization of activities with other sectors that have or may have impact on biological diversity, it is necessary to establish comprehensive monitoring and exchange of data on the status of nature in the country.

ANNEXES

ANNEX I – INFORMATION REGARDING THE PROCESS OF PREPARATION OF THE FIFTH NATIONAL REPORT

The fifth national report was prepared in the framework of the project "Support to the Republic of Macedonia for revision of the National Biodiversity Strategy and Action Plan and preparation of the fifth national report to the Convention on Biological Diversity", which was implemented in the period 2013-2014, by the Ministry of Environment and Physical Planning and the United Nations Environment Programme (UNEP) Office in Vienna, in cooperation with national organizations and experts, and with financial support from the Global Environment Facility (GEF).

The requirement for preparation of the Report arises from Article 26 of the Convention on Biological Diversity. Recommendations of the Convention given in Decision X/10 and developed guidelines for the content and process of preparation of the report prepared by the Secretariat of the Convention on Biological Diversity were used for its drafting. The purpose of preparation of this Report is to review the progress towards implementation of the Convention at the national level in the period after the submission of the fourth national report (submitted in 2010), however, the first chapter on the status and trends of biodiversity in Macedonia covers a ten-year period from 2003 to 2013.

The report was developed through a consultative process, in which despite expert team representatives from the Ministry of Environment and Physical Planning were involved. The draft report was presented and commented on stakeholders workshops and their comments incorporated into the Report.

Following the recommendations of the structure / content of the report presented by the Secretariat of the Convention, the Fifth National Report has the following structure:

- Part I - Overview of the status of biodiversity (trends and threats) and implications for human well-being
- Part II - Development and implementation of National Biodiversity Strategy and Action Plan, and the mainstreaming of biodiversity
- Part III - Progress towards achieving the Aichi Targets by 2020 and contribution to the relevant Millennium Development Goals by 2015
- Annexes - information on the process of preparation of the Report, the list of projects, a list of adopted bylaws based on the Law on nature protection, a review of multilateral agreements in the field of environment and nature, and sources of information used.

For the preparation of the Fifth National Report numerous publications, research papers, reports of completed projects in the field of nature protection, and information obtained from the Ministry of Environment and Physical Planning, national parks management authorities and other institutions and organizations were used. Literature used is given in Annex V.

ANNEX II - LIST OF PROJECTS

1. SIGNIFICANT PROJECTS FOR NATURE PROTECTION AND BIODIVERSITY REALIZED THROUGH THE PROGRAMME OF INVESTMENT IN THE ENVIRONMENT:

- Elaborate for nomination of Lake Dojran on the World Ramsar List of the most important wetlands on the planet (2007);
- Developing recommendations for ex-situ protection of endemic viola species (2007);
- Education of officials and preparation of educational material for recognizing of fungi and higher plants included in the Customs Tariff of the Republic of Macedonia (2007);

- Research of wetlands in Debarca region and proposing measures for their protection as nature part of special interest (2007);
- Effective protection of biodiversity of Prilep's part of Mariovo by making recommendations for the sustainable development of the region (2008);
- Protection of endemic species of leech in the lake Ohrid (2008);
- Valorisation of natural values of Shar Planina and assessment of their market value (2008);
- Geological- petrographic, mineralogical and geomorphological features of micro locality Kokino (2008);
- Global warming and the impact of fires on forest ecosystems (2008);
- Expert study for natural values of the site Begovo Pole with an action plan for the protection of Macedonian ground squirrel (Spermophilus citellus karamani) (2008);
- Revitalization and protection of the chestnut in the range of the natural monument Smolare Waterfall (2010);
- Activities for protection of the environment and nature of the site Raven (2010);
- Let's protect Lake Dojran (2010);
- Increase of public awareness of environmental protection through support of the formal education system through implementation of the outdoor program in nature (2011);
- 2011 – a year of biological diversity (2011);
- The natural resource potential for development of tourism in the Shara Mountains (2011);
- Study on the valorisation of the natural values of the monument of nature Slatinski Izvor (2013);
- Study on the microbiological diversity in some traditional dairy products in Macedonia (2013).

2. REALIZED PROJECTS FINANCED BY FOREIGN FUNDS:

1. GEF / UNDP / MEPP project "Strengthening the environmental, institutional and financial sustainability of the system of protected areas in Macedonia (2008-2011), funded by GEF
2. GEF / UNDP / MEPP project "Integrated Ecosystem Management in the Prespa Basin" (2006-2012), funded by GEF
3. The GEF Small Grants Programme (implemented by UNDP) is supporting the associations (NGOs) to implement activities related to global concerns / challenges in the area of environment through local approaches. Starting from May 2005 in Macedonia nine call for project concepts / proposals were published (December 2005, March 2006, April 2007, October 2007, October 2008, August 2009, October 2010, July 2012 and July 2013). During that period, 97 projects were funded (84 proposals and 13 planning grants) awarded a total sum $ 1,934,682.
4. MES / ECNC / MEPP project "Development of a national ecological network MAK-NEN" (2008-2011) - funded by the Dutch Ministry of Agriculture, Nature and Food Safety (BBI Matra Fund)
5. UCODEP / MEPP project "Environmental protection, economic development and promotion of sustainable eco-tourism in NP Mavrovo" (2009-2012) - funded by the Ministry of Foreign Affairs of the Republic Italy
6. Project "Cross-border Biosphere Reserve Prespa Park - Support to the Galicica National Park" (2009-2011), financed by KfW, realized on the basis of the project agreement between KfW, the Government represented by the Ministry of Finance and PI NP "Galichica"

7. RENA Project - Regional Environmental Network for countries joining the EU, implemented in 2011-2012, funded by the European Commission
8. ECNC / REC / MEPP project "Biodiversity and ecosystem services in local sustainable development in the Western Balkans" (first phase 2009-2011, second phase 2012-2013), funded by the Ministry for Foreign Affairs of Finland

3. CURRENT PROJECTS FOR BIODIVERSITY CONSERVATION:

1. SDC / MEPP project "Programme for Conservation of Nature in Macedonia" (2013-2018), funded by the Swiss Agency for Development and Cooperation (SDC), and coordinated by a consortium of Swiss and Macedonian partners (Helvetas Swiss Intercooperation and Farmahem)
2. SDC / UNDP / MEPP project "Revitalization of Prespa Lake ecosystems" (2010-2015), funded by SDC
3. Euronatur / MES / BBF project "Osogovski Mountains in the Balkan Green Belt" (2007-2014), funded by the Frankfurt Zoological Society (Germany) and ProNatura (Switzerland)
4. MES / Euronatur project "Balkan Lynx Recovery Programme " (first phase 2006-2009, second phase from 2010 to 2012, the third phase from 2013 to 2015), funded by MAVA Foundation;
5. GIZ project "Conservation and sustainable use of biodiversity of Prespa, Ohrid and Skadar Lake" (2012-2014), funded by the German Ministry for Economic Cooperation and Development and implemented by the German Society for International Cooperation (GIZ) in collaboration with Ministry of Environment and Physical planning of the Republic Macedonia, the Ministry of Environment, Forestry and Water Management of the Republic of Albania, Ministry of Sustainable Development and Tourism of Montenegro, scientific institutions and national parks in the Drin Basin
6. WWF project " DinaricArc Parks" (2011-2014), funded by the Norwegian Ministry of Foreign Affairs and MAVA Foundation
7. GEF / UNEP / MEPP project "Support for the Implementation of National Biosafety Framework for the Republic of Macedonia" (2011-2014), funded by the GEF;
8. SECO / MEPP / MAFWE project "Bregalnica Watershed Management Plan" (2012-2016), funded by the Swiss State Secretariat for Economic Affairs, Ministry of Environment and Physical Planning and the Ministry of Agriculture, Forestry and Water Management of the Republic of Macedonia, and the project partners are 11 municipalities in the East Planning Region and the three municipalities that gravitate in the River Bregalnitsa watershed: Sveti Nikole, Lozovo and Konce.
9. IUCN project "Strengthening protection planning in Southeast Europe" (2014-2016), implemented by the IUCN Office in collaboration with relevant national institutions for the preservation of nature and other relevant stakeholders.
10. "Environment and Climate Regional Network for countries joining the EU (ECRAN)", began implementation during 2013, as an extension of RENA project and will be implemented by 2016, funded by the European Commission and implemented by Human Dynamics
11. Project "Developing capacities for sustainability of Dojran Lake" (2014-2015), implemented by the Regional Environmental Center (REC) - Office in Macedonia, and funded by the Critical Ecosystems Partnership Fund(CEPF)
12. Cross-border project "Improvement of transboundary cooperation and development of Jablanica - Shebenik mountain range through active involvement of the local population" (2013-2014), implemented by the Macedonian Ecological Society, funded by the EU IPA cross-border cooperation between Macedonia and Albania

13. "Water for lakes, bogs, springs and people on Jablanica Mt." (2014-2015), implemented by the Macedonian Ecological Society, funded by the CEPF (Critical Ecosystems Partnership Fund)

4. LARGER POTENTIAL PROJECTS EXPECTED TO BE FINANCED FROM THE EU AND GEF FUNDS:

1. Project «Biodiversity protection through the creation and effective management of protected areas and the integration of biodiversity in land use planning «, funded by the GEF STAR 5 Operational Programme. According to the project concept (PIF), the project is structured in three components: creation and effective management of protected areas, land use planning by integrating biodiversity and implementation of pilot projects. Making full project document is expected to be realized during 2014. This project will provide support for the preparation of national Red Lists and Red Data Book, a digital map of important habitats, identification of biodiversity richforests; will contribute to expanding the network of protected areas, etc. The results of this project will serve as a basis for planning of nature conservation and biodiversity in Macedonia
2. IPA TAIB 2011 - Strengthening the central and local administrative capacity for the implementation of Natura 2000 in the Republic of Macedonia.

   The project is planned to prepare inventory for development of EU ecological network Natura 2000 in the Republic of Macedonia. In order to identify and select suitable places in Macedonia for their designation as special protection areas according to the Birds Directive, and areas suitable for designation as special areas of conservation, according to the Habitats Directive. It also plans to prepare two bylaws relating to the establishment, identification and mapping of habitat types and study to prepare for the development and maintenance of GIS system for the protection of nature. The project is planned to carry out a public campaign with all stakeholders of the importance of Natura 2000, preparation of promotional and educational material for Natura 2000 and developing a web portal for Natura 2000.
3. IPA TAIB 2013 - Strengthening the administrative capacity for implementation and enforcement of EU legislation on environment and climate change

   In the framework of nature component, draft management plans for three pilot protected areas in category monument of nature are planned to be developed,as well as action plans for key species and habitats in these protected areas, in accordance to the Birds and Habitats directives.

ANNEX III–LIST OF ADOPTED SECONDARY LEGISLATION ON THE BASIS OF THE LAW ON NATURE PROTECTION

1. Rulebook for issuing permits for collection of threatened and protected wild species of plants, fungi and animals and their parts (Official Gazette of RM no. 102/2009)
2. Rulebook for issuing permission for carrying out scientific research in nature (Official Gazette of RM no. 101/2009)
3. Rulebook on the form and content of the application form, license and certificate for trade in endangered and protected species of plants, animals and their parts, as well as the necessary documentation attached to the application (Official Gazette no. 134/2010)
4. List of threatened and protected species of plants, animals and their parts (Official Gazette of RM no. 15/2012)
5. Decree on the manner and procedure for issuing the license or certificate, and the type of license or certificate and determination of border crossing points where trade in endangered and protected species of plants, animals and their parts is allowed(Official Gazette of RM no. 135/2010)
6. Decree on the manner of handling the trade in endangered and protected species of plants, fungi, animals and their parts by the customs authorities, other competent authorities at border crossings, and scientific and professional institutions, and authorized depositories of confiscated samples in illegal trade (Official Gazette of RM no. 177/2011)
7. Rulebook on the form and content of the request for issuing the license or certificate of trade import and/or export and/or transit and/or re-export or for failure to adopt a decision rejecting the application for issuance of license or certificate proemt import and/or export and/or transit and/or re-export (Official Gazette of RM no. 31/2012)
8. Lists of determining the strictly protected and protected wild species (Official Gazette of RM no. 139/2011)
9. Rulebook for measures and activities for protection of monuments of nature, form and content of the license for carrying out special measures and activities for protection and restoration of the natural monument (Official Gazette of RM no. 126/2010)
10. Rulebook for measures and activities for protection of the Nature Park (Official Gazette of RM no. 126/2010)
11. Rulebook on content of study for valorization or re-evaluation of protected areas (Official Gazette of RM no. 26/2012)
12. Rulebook on the content of management plans for protected areas and annual programs for nature protection (Official Gazette of RM no. 26/2012)
13. Rulebook on the program for taking the proffecional exam for a ranger in a protected area and manner of passing the exam (Official Gazette of RM no. 126/2010)
14. Rulebook for the layout and type of official uniform, its durability and method of use - carrying the needed equipment of rangers and the content and form of official identification, as well as the issuance and revocation of identity cards (Official Gazette of RM no. 103/2012)
15. Rulebook for records keping for nature protection (Official Gazette of RM no. 102/2012)
16. Rulebook on the form and content of the invitation for education, way of implementation of education and the manner of keeping records on conducted only education (Official Gazette of RM no. 118/2011)

ANNEX IV–OVERVIEW OF THE RATIFIED MULTILATERAL AGREMENTS IN THE AREA OF ENVIRONMENT AND NATURE

Convention on Biological Diversity (Rio de Janeiro, 1992)	- Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 54/97) - Entered into force in 1998
Cartagena Protocol on Biosafety to the Convention on Biological Diversity (Cartagena, 2000)	- Signed on 26 July 2000 - Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 40/05)
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)	- Ratified with Decree on ratification (Official Gazette of SFRJ no. 9/77) - Republic of Macedonia became Party to the Convention with nomination of Lake Prespa on World Ramsar List in 1995
Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)	- Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 38/99) - Entered into force in 1999
Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979)	- Ratified with the Law on Ratification ("Official Gazette of the Republic of Macedonia no. 49/97) - Entered into force in 1999
UNESCO Convention for the protection of the World Cultural and Natural Heritage (World heritage Convention, 1972)	- Ratified with act on succession from SFRJ in 1977 (Official Gazette of SFRJ no. 56/74) - Republic of Macedonia became Party to the Convention on 08.09.1991
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1972)	- Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 82/99) - Republic of Macedonia became Party to the Convention on02.10.2000
European Convention for the Protection of Vertebrate Animals Used for Experimental and other Scientific Purposes (Strasbourg, 1996)	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 13/2002)
Protocol of Amendment to the European Convention for the Protection of Vertebrate Animals Used for Experimental and other Scientific Purposes	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 13/2002)
European Landscape Convention (Florence, 2000)	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no.44/2003)
Agreement on the Conservation of Bats in Europe (London, 1991)	- Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 38/99) - Entered into force for the Republic of Macedonia on 10.09.1999
Amendment of the Agreement on the Conservation of Bats in Europe	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 13/2002)
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (Hague, 1995)	- Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 32/99) - Entered into force for the Republic of Macedonia on 01.11.1999
Memorandum of Undarstanding on the Conservation and Management of the Middle-European Population of the Great Bustard (Otistarda)	Memorandum was signed on 07.10.2000 in Aman, Jordan
Convention on environmental impact assessment in a transboundary context (Espo, 1991)	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 44/99)

Protocol on strategic environmental assessment to the Convention on environmental impact assessmentin a transboundary context	- Signed on May 2003 in Kyiev Ukraine, during 5th Ministerial Conference "Environment for Europe" - Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 120/13)
Multilateral Agreement between South-Eastern European countries for implementation of the Convention on environmental impact assessmentin a transboundary context	- Signed in May 2008 in Bucharest, Romania during 4th COP of Espoo Convention -Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 157/10)
Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Aarhus, 1998)	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 40/99)
UN Framework Convention on Climate Change (Rio de Janeiro, 1992)	- Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 6/97) - Entered into force for the Republic of Macedonia on 28.04.1998
Kyoto Protocol under UN Framework Convention on Climate Change (Kyoto, adopted 1997, entered into force 2005)	Ratified with the Law on Ratification (Official Gazette of the Republic of Macedonia no. 49/2004)
Stockholm Convention on Persistent Organic Pollutants – POPs (Stockholm, 2001)	- Signed on 22 May 2001, in Stockholm, Sveden - Ratified with the Law on ratification (Official Gazette of the Republic of Macedonia no. 17/2004)
UN Convention to Combat in Those Countries Experiencing Drought and/or Desertification, Particularly in Africa – UNCCD (Paris, 1994)	- Ratified with the Law on ratification (Official Gazette of the Republic of Macedonia no. 13/2002) - Entered into force for the Republic of Macedonia on 06.06.2002
Ljubljana Declaration on Spatial Dimension of Sustainable Development	Republic of Macedonia adopted the Declaration on 13th session of European Conference of Ministers responsible for spatial planning policy (CEMAT), in Ljubljana on 16-17 September 2003

ANNEX V – REFERENCES AND USED SOURCES OF INFORMATION

Ajtić, R., Tomović, L., Sterijovski, B.,Crnobrnja-Isailović, J., Djordjević, S., Djurakić, M., Golubović, A., Simović, A., Arsovski, D., Andjelković, M., Krstić, M., Šukalo, G., Gvozdenović, S., Aïdam, A., Michel, C. L., Ballouard, J.-M. & Bonnet, X. (2013). Unexpected life history traits in a very dense population of dice snakes. Zoologischer Anzeiger, http://dx.doi.org/10.1016/j.jcz.2012.10.001

Albrecht, C., Hauffe, T., Schreiber, K., Wilke, T. (2012). Mollusc biodiversity in a European ancient lake system: lakes Prespa and Mikri Prespa in the Balkans. Hydrobiologia 682 (1): 47-59 doi: 10.1007/s10750-011-0830-1

Albrecht, C. and Wilke, T. (2008). Ancient Lake Ohrid: biodiversity and evolution. Hydrobiologia, 615: 103-140

Balkan Consulting DOO Skopje (2011). Environmental Impact Assessment Study of the project Construction of highway "Shtip - Strumica", Skopje (in Macedonian)

Bauer-Petrovska, B., Karadelev, M. & S. Kulevanova (2008a). Medicinal species of macromycetes recorded in the Republic of Macedonia. Studii și Cercetări Biologie, Universitatea din Bacău, 14: 41–45

Bauer-Petrovska, B., Karadelev, M. & S. Kulevanova (2006). Medicinal species of macromycetes recorded in the Republic of Macedonia. Proceedings of 4th Conference of Medicinal and Aromatic Plants of South-East European Countries, Iasi, Romania, pp 31-37

Bauer-Petrovska, B., Karadelev, M., Kirovska Cigulevska, O., Sulejmani, S. & S. Memisi (2008b). Selenium in selected species of edible mushrooms from the Republic of Macedonia. Proceedings of 5th Conference on Medicinal and Aromatic Plants of Southeast European Countries, Brno, Czech Republic.

Bauer-Petrovska, B., Karadelev, M., Kirovska Cigulevska, O., Sulejmani, Ugrinova, Lj., S. & S. Memisi (2008c). Nutritional attribute of some Macedonian edible mushrooms. Proceedings of 5th Conference on Medicinal and Aromatic Plants of Southeast European Countries, Brno, Czech Republic.

Baur, B., Cremene, C., Groza, G., Rakosy, L., Schileyko, A. A., Baur, A. & Erhardt, A. (2006). Effects of abandonment of subalpine hay meadows on plant and invertebrate diversity in Transylvania, Romania. Biological Conservation, 132(2), 261-273

Bernáldez, F. G. (1991). Ecological consequences of the abandonment of traditional land use systems in central Spain. Options Méditerranéennes, 15, 23-29

BIOECO (2008). Expert elaborate for natural values of the site Begovo Pole with an action plan for protection of Macedonian ground squarel. Final report, MEPP, 34 p.

BIOECO & PI NP Galicica (2013). Draft amendments to the Management plan of "Galicica" National Park for the period 2011-2020. Public Institution National Park "Galicica", Ohrid (In Macedonian)

BirdLife International (2014) Species factsheet: Pelecanus crispus. Downloaded from http://www.birdlife.org on 02/04/2014

Brajanoska, R., Melovski, Lj., Hristovski, S., Sarov, A. & Avukatov, V. (2011). Bear Corridor Management Plan. Report of the project "Development of national ecological network in the Republic of Macedonia (MAK-NEN)". Macedonian Ecological Society, Skopje, 114 p.

Brotons, L., A. Wolff, G. Paulus, and J.-L. Martin (2005). Effect of adjacent agricultural habitat on the distribution of passerines in natural grasslands. Biological Conservation 124:407–414

Bureš, I. (1941). Risove v Makedonija (Lynx in Macedonia). Priroda, 42 (3): 51-52 (in Bulgarian).

Burkhard, B., Kroll, F., Müller, F., Windhorst, W. (2009). Landscapes' capacities to provide ecosystem services – a concept for land-cover based assessments. Landscape Online 15, 1–22

CBD/UNEP (2012). Quick guides to the Aichi Biodiversity Targets

Cekova, M. (2005). Review of the Bryoflora of the Republic of Macedonia. Faculty of Natural Sciences, Skopje, 1-40

Ceroni, M. (2013). Breaking new grounds in conservation in the Republic of Macedonia: The economic case for long-term protection of the Ezerani Nature Park. Skopje: Ministry of Environment and Physical Planning.

Chakar & Partners (2013). Strategic environmental impact assessment report for infrastructure project for construction of express road A3 Kosel (linked with A3) – Ohrid – Border with R. Albania (gp Ljubanishta), section Ohrid-Pestani, length of 14,943 km (km 9+325,96 to km 23+819,91) Ohrid municipality (Technical No. 107/2013). Skopje, Public enterprise for state roads

Čarni, A., Matevski, V., Šilc, U. (2010). Morphological, chorological and ecological plasticity of Cistus incanus in the southern Balkans. Plant biosystems, 144 (3):602-617, Roma

Čarni, A., Matevski, V. (2010). Vegetation along mountain streams in the southern part of the Republic of Macedonia. Braun-Blanquetia, 46:157-170, France

Chavdarova, S., Kajevska, I., Rusevska, K., Grebenc, T. & M. Karadelev (2011). Distribution and ecology of hypogeous fungi (excluding Tuber) in the Republic of Macedonia. Biol. Macedonica. No 62: 37-48, Skopje, Macedonia

Chobanov, D. P., Mihajlova, B. (2010). Orthoptera and Mantodea in the collection of the Macedonian Museum of Natural History (Skopje) with an annotated check-list of the groups in Macedonia. Articulata 25(1): 73-107

Costanza, R. (2008), "Ecosystem services: Multiple classification systems are needed", Biological Conservation, 141(2): 350-352

Crivelli, A.J., Koutseri, I. & Petkovski, S. (2008). The Prespa Trout, Salmo peristericus Karaman (1938). Species Action Plan, Society for the Protection of Prespa, Agios Germanos, Greece

Dekons Ema (2012). Integral study for the state of Studenchista swamp remains and measures for its revitalization 116 pp.

Dekons Ema (2010). Environmental Impact Assessment Study of the project for construction of railway Kichevo – Lin (border with R. Albania)

DIK Chakar Partnersc (2012). Environmental Impact Assessment Study of the project for construction of the highway „Miladinovci – Sveti Nikole - Shtip". Skopje

Dogan, H. & M. Karadelev (2009). Xeromphalina junipericola a rare species new to Southeastern Europe. Mycotaxon 110: 247-251. IF=0.568

State Statistical office (2007). Statistical Yearbook of the Republic of Macedonia for 2006, Skopje

State Statistical office (2014). Statistical Yearbook of the Republic of Macedonia for 2013. Skopje, 167 p.

ECNC/REC project "Biodiversity and ecosystem services in local sustainable development in the Western Balkans" (first phase 2009-2011, second phase 2012-2013)

Eptisa (2012). Environmental and social impact assessment Railway Corridor VIII, eastern section

European Environment Agency (2007). Corine Land Cover (CLC) 2006 technical guidelines. Copenhagen: EEA

GEING Krebs und Kifer International and other DOO (2013). Environmental Impact Assessment Study of the "Highway A2, section Kichevo – Trebenishta and highway A3, sections crossroads Trebenishta (link A2) – crossroad Podmolje - Ohrid"

GEF Small Grant Programme in Macedonia. More information on the projects results are available at: www.gefsgpmacedonia.org.mk

GEF/UNDP/MEPP project "Integrated Ecosystem Management in the Prespa Basin" (2006-2012)

GEF/UNDP/MEPP project "Strengthening the environmental, institutional and financial sustainability of the system of protected areas in Macedonia" (2008-2011)

GEF/UNDP/MEPP project „Support for implementation of National Biosafety framework in the Republic of Macedonia". More information on the project are available at: www.biosafety.gov.mk

GEF/UNDP/MEPP project „Third National Communication on climate change". More information on the project are available at: www.klimatskipromeni.mk

Construction Institute Macedonia (2008). Environmental Impact Assessment Study of the project: upgrade of corridor 10, highway E-75 section: Demir Kapija – Smokvica (32.8/27.8 км)

ILF Consulting Engineers, Eurotrans project, ADT Omega SA & Dekons-Ema (2013). Environmental and Social Impact Assessment Study for reconstruction of railway section Dracevo – Veles of corridor X

IPCC (2000). Special report of IPCC for emission scenarios (SRES)

Speleological Society "Ursus Speleos" (2011). Studies for valorization of natural values in multipurpose area "Jasen" (GEF/UNDP/MEPP project "Strengthening the environmental, institutional and financial sustainability of the system of protected areas in Macedonia"), Skopje

IUCN (2013). IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on 01 April 2014

Jovanovska, E., Nakov, T. & Levkov, Z. (2013). Observations of the genus Diploneis (Ehrenberg) Cleve from lake Ohrid, Macedonia. Diatom Research 28(3): 237-262

Kajevska, I. Rusevska, K. & M. Karadelev (2013). The family Pyronemataceae (Pezizales, Ascomycota) in the Republic of Macedonia. Macedonian Journal of Ecology and Environment. 15(1): 11-22

Karadelev, M. & S. Spasikova (2006). Second contribution to hallucinogenic fungi in the Republic of Macedonia. IV Balkan Botanical Congress with International Participation. Sofia, Bulgaria (June 2006

Karadelev, M., Kost, G. & K. Rexer. (2007a). New macromycetes species (Ascomycetes and Basidiomycetes) for mycota of the Republic of Macedonia. Collection of papers dedi¬cated to Academician Kiril Micevski. Maced. Acad. Sci. Arts. Skopje. pp. 311-327

Karadelev, M., Rusevska, K. & S. Spasikova (2007b). The family Boletaceae s.l. (excluding Bole¬tus) in the Republic of Macedonia. Turk. J. Bot. 31 (6): 539-550. IF=0.593

Karadelev, M. & E. Murati (2008a). Ecology and distribution of macromicetes (Basidiomycota) on Dobra Voda Mountain in the Republic of Macedonia. Proceedings of International conference on Biological and Enveronmental Sciences, Tirana, Albania, 26.-29.09.2008. Tirana, pp. 459–466

Karadelev, M., Rusevska, K. & N. Markova (2008b). Distribution and ecology of genus Tricholoma (Tricholomataceae) in the of Macedonia. Ekol. Zašt. Život. Sred., 11(1-2): 27-42. (in Macedonian)

Karadelev, M. & S. Spasikova (2009a). Second contribution to hallucinogenic fungi in the Republic of Macedonia. – In: Ivanova, D. (ed.), Plant, fungal and habitat diversity investigation and conservation. Proceedings of IV Balkan Botanical Congress, 20–26 June 2006. Sofia, Bulgaria. pp. 441–449

Karadelev, M., Rusevska, K. & K. Stojkoska (2009b). Distribution and ecology of the gasteromycete fungi – orders Phallales and Sclerodermatales in the Republic of Macedonia. Proceedings of III Congress of Ecologists of the Repub¬lic of Macedonia with International Participation. Struga, 06-09.10.2007. Macedonian Ecological Society, Skopje, Macedonia. pp. 208–216

Karadelev, M. & K. Rusevska (2009c). Ecology and distribution of species from genus Tulostoma (Gasteromycetes) in the Republic of Macedonia. – In: Ivanova, D. (ed.), Plant, fungal and habitat diversity investigation and conservation. Proceedings of IV Balkan Botanical Congress, 20–26 June 2006. Sofia, Bulgaria. pp. 437–440

Karadelev, M., Rusevska, K & L. Taukcieva (2009d). Diversity and ecology of macromy¬cetes on Ograzden Mountain, Republic of Macedonia. Biol. Macedonica 61: 29 - 45. Skopje, Macedonia

Karadelev, M., Rusevska, K. & K. Stojkoska. (2009e). First data of mycodiversity on Jablanica Mountain.Proceedings of III Congress of Ecologists of the Repub¬lic of Macedonia with International Participation. Struga, 06-09.10.2007. Macedonian Ecological Society, Skopje, Macedonia. pp. 175–181

Karadelev, M., Sylejmani, S. & E. Murati. (2009f). Ecology and distribution of macromycetes (Basidiomycota and Ascomycota) in Quercetum frainetto-cerris macedonicum association on Dobra Voda Mountain. Proceedings of III Congress of Ecologists of the Repub¬lic of Macedonia with International Participation. Struga, 06-09.10.2007. Macedonian Ecological Society, Skopje, Macedonia. pp. 217–223

Karadelev, M., Rusevska, K. & Pampurova, S. (2009g). Ecology and distribution of Morels (Morchellaceae, Helvellaceae) in the Republic of Macedonia. Екологија и заштита на животната средина. 12 (1/2): 45-55

Karadelev, M & Rusevska, K. (2012). Contribution to Macedonian Red list of fungi. Poceedings of the 4th Congress of Ecologists of Macedonia with International Participation, Ohrid, 12-15 October 2012. Macedonian Ecological Society, Skopje, 68-73

Karaman, M. G (2009). An introduction to the ant fauna of Macedonia (Balkan Peninsula), a check list (Hymenoptera, Formicidae). Natura Montenegrina 8(3): 151-162

Katsavouni Sotiria and Svetozar Petkovski (editors) (2004). Lake Doiran-An overview of the current situation. Greek Biotope/Wetland Centre (EKBY), Society for the Investigation and Conservation of Biodiversity and the Sustainable Development of Natural Ecosystems (BIOECO).Thermi, 117 p.

Krpac, T. V., Dercemont, C., Krpac, M. & Lemonnier-Dercemont, M. (2011). Fauna of butterfl ies (Papilionoidea) in the National Park Galičica, Republic of Macedonia. Nota lepid. 34 (1): 49 – 78

Krpač, V. T., Darcemont, C. (2012). Red list of butterflies (Lepidoptera: Hesperioidea & Papilionoidea) for Republic of Macedonia. Rev. Écol. (Terre Vie) 67: 117-122

Kryštufek, B. & Petkovski, S. (2003). Annotated checklist of the mammals of the Republic of Macedonia. Bonner zoologische beitrage, 51 (4): 229-254

Kryštufek, B. & Petkovski, S. (2006). Mammals of Macedonia – current state of knowledge. pp 95-104 In Anniversary proceedings (1926-2006). Mac.Mus.Sci.Nat

Lasoi DOO (2013). Environmental Impact Assessment Study of the project: Construction of express road A1, from bridge of river Raec, denivelated road node "Drenovo" to Gradsko (link with Highway A1)

Levkov, Z., Krstic, S., Metzeltin, D & Nakov, T. (2007). Diatoms of Lakes Prespa and Ohrid (Macedonia). Iconographia Diatomologica 16: 1–603. R.G. Gantner Verlag K.G.

Levkov, Z. & Williams, D. M. (2008). Checklist of diatoms (Bacillariophyta) from Lake Ohrid and Lake Prespa (Macedonia), and their watersheds. Phytotaxa, 45:1-76

Levkov, Z. (2009). Amphora sensu lato. Diatoms of Europe, Diatoms of the European Inland waters and comparable habitats Vol: 5: 1–916. A.R.G. Gantner Verlag K.G.

Levkov, Z. & Williams, D.M. (2012). Checklist of diatoms (Bacillariophyta) from Lake Ohrid and Lake Prespa (Macedonia), and their watersheds. Phytotaxa 45: 1–76

Levkov, Z., Metzeltin, D. & Pavlov, A. (2013). Luticola and Luticolopsis. Diatoms of Europe, Diatoms of the European Inland waters and comparable habitats Vol: 7: 1–697. A.R.G. Gantner Verlag K.G.

Macedonian Ecological Society (2008). Monospitovo Marsh: the last wetland in Macedonia. Strumica, 56 p.

Macedonian Ecological Society (2011). Representative national protected area network, final report (GEF/UNDP/MEPP project "Strengthening the environmental, institutional and financial sustainability of the system of protected areas in Macedonia "), Skopje

Maletic, V. & Cirovic, D. (2010). Analisys and valorisation of the mammalian fauna in protected area National Park "Mavrovo". Report of the project "Environmental protection, economic development and promotion of sustainable eco-tourism in NP Mavrovo"

Marini, L., Fontana, P., Battisti, A., & Gaston, K. J. (2009). Response of orthopteran diversity to abandonment of semi-natural meadows. Agriculture, ecosystems & environment, 132(3), 232-236

Martinčič, A., (2009). Contributions to the Bryophyte Flora of Republic of Macedonia. Hacquetia 8,2 • 97–114

Matevski, V. (2003). Study for assessment of the status of populations and biomass of Common Bearberry (Arctostaphyllos uva ursi) in the Republic of Macedonia. Ministry of Environment and Physical Planning, Skopje

Matevski, V. (2010). Flora of the Republic of Macedonia. Macedonian Academy of Sciences and Arts, 2/1, 1-190, Skopje

Matevski, V. & Čarni A. (2003). Spomladanska nitrofilna vegetacija na južnem delu Balkanskega polotoka. Hladnikia, 15-16:73-83, Lubljana, Slovenija.

Matevski, V., Čarni, A., Kostadinovski, M. (2005). New data regarding the Flora in the Republic of Macedonia. 8th Simposia of.Flora in Southeast Serbia and neighboring regions, Nis, p.64.

Matevski, V., Čarni, A., Kostadinovski, M., Kosir, P., Silc, U. & Zelnik, I. (2008). Flora and vegetation of the Macedonian steppe. Zalozba ZRC, ZRC SAZU, Ljubljana, p.96.

Matevski, V., Čarni, A, Avramovski, O., Juvan, N., Kostadinovski, M., Košir, P., Marinšek, A., Paušič, A., Šilc, U. (2011). Forest vegetation of the Galičica mountain range in Macedonia. Zalozba ZRC, ZRC SAZU, 1-200, Ljubljana.

Matevski, V., Čarni, A., Kostadinovski, M., Marinšek, A., Mucina, L., Paušič, A., Šilc, U. (2010). Notes on phytosociology of Juniperus excelsa in Macedonia (southern Balkan Peninsula). Hacquetia, 9,1: 93-97, Ljubljana

Matevski, V., Lozanovski, R., Kostadinovski, M.(2007). Sileno-Thymetum ciliatopubescentis ass. nova in the vegetation of fill pastures in the Republic of Macedonia. Collection of Papers Devoted to Academician Kiril Micevski on the occasion of the 80 years of his birth, MANU, Skopje, 223-235

Matzinger, A., Jordanoski, M., Veljanoska-Sarafiloska, E., Sturm, M., Müller, B., & Wüest, A. (2006). Is Lake Prespa jeopardizing the ecosystem of ancient Lake Ohrid?. Hydrobiologia, 553(1), 89-109

Melovski, Lj. & Hristovski, S. (2008). Valorisation of natural values of Shar Planina Mt. and assessment of their market value (final report). Ministry of Environment and Physical Planning, Skopje, 186 p.

Melovski, Lj., Matevski, V., Kostadinovski, M., Karadelev, M., Angelova, N. & Radford, E. (2010). Important plant areas in Macedonia. Macedonian Ecological Society, Skopje, 128 p.

Melovski, Lj., Hristovski, S., Melovski, D., Kolcakovski, D., Velevski, M., Angelova, N., Levkov, Z., Karadelev, M. (2010). Natural values of Shara Planina Mt. Special edition of Macedonian Ecological Society, Vol.10, Skopje, 82 p.

Melovski, D., Ivanov, Gj., Stojanov, A., Avukatov, V., Trajce, A., Hoxha, B., Von Arx, M., Breitenmoser-Wursten, Ch., Hristovski, S., Shumka, S. & Breitenmoser, U. (2013). Poceedings of the 4th Congress of Ecologists of Macedonia with International Participation, Ohrid, 12-15 October 2012. Macedonian Ecological Society, Special issue 28, Skopje

Melovski, Lj., Velevski, M., Matevski, V., Avukatov, V. and Sarov, A. (2012). Using important plant areas and important bird areas to identify Key Biodiversity Areas in the Republic of Macedonia. Journal of Threatened Taxa 4:2766–2778

Micevski, K. & Matevski, V. (2005). Flora of the Republic of Macedonia 1 (6). Macedonian Academy of Sciences and Arts, Skopje 1437 – 1716

Micevski, N. & Micevski, B. (2005). Fauna of butterflies (Lepidoptera) in National Park Pelister. for Birds study and protection society in Macedonia BSPSM, 102 p.

Micevski, B, Popstojanov, D., Chobanov, D. (2003). Fauna of Orthoptera of National Park Pelister. BSPSM special issue nr. 4/03

Miljanović, B., Kostov, V., Živić, N., Djukić, N., Teodorović, I., and D. Stešević (2004). Characteristics of the bottom macroinvertebrate fauna of the Streževo Reservoir and its alimentary water bodies, In: Proceedings of the Second Congress of Ecologists of the Republic of Macedonia with International Participation, Ohrid, Republic of Macedonia, Oct 25-29, 2004, 257-7-261. Macedonian Ecological Society

Mirić, Dj. (1978). Lynx lynx martinoi ssp. nova (Carnivora, Mammalia) – neue Luchsunterart

MEPP (2012). Prespa lakes watershed management plan. GEF/UNDP project 'Integrated Ecosystem management in the Prespa Lakes Basin. Skopje

MEPP (2014). CDDA - Common database on designated areas, EEA-European Environmental Agency, извештај 2014 година

MEPP (2003). First National Communication of the Republic of Macedonia to the United Nations Framework Convention on Climate Change. Ministry of Environment and Physical Planning, Skopje

MEPP (2008). Second National Communication on Climate Change. Ministry of Environment and Physical Planning, Skopje, 124 p.

MEPP (2008). Development of National Emerald Network in the Republic of Macedonia

MEPP (2009). National Environmental Investment Strategy (2009-2013), Skopje, 34 p.

MEPP (2011). Environmental indicators in the Republic of Macedonia 2010. Skopje, 222 p.

MEPP (2014). Third National Communication on Climate Change. Ministry of Environment and Physical Planning, Skopje, 275 p.

Myers, N., Mittermeler, R. A., Mittermeler, C. G., da Fonseca, G. A. B., Kent, J. (2000). Biodiversity hotspots for conservation priorities. Nature 403: 853–858

Nikolov, N. (2014). Vulnerability assessment and adaptation sectoral reports – Forestry. Downloaded from http://www.unfccc.org.mk/ on 02/04/2014

Nikolov, S. C. (2010). Effects of land abandonment and changing habitat structure on avian assemblages in upland pastures of Bulgaria. Bird conservation international 20:200–213

Nikolov, S. C., Demerdzhiev, D. A., Popgeorgiev, G. S. and Plachiyski, D. G. (2011). Bird community patterns in sub–Mediterranean pastures: the effects of shrub cover and grazing intensity. Animal Biodiversity and Conservation 34:11–21

Nomenclature of Territorial Units for Statistics ("Official Gazette" No. 158/2007)

Papp & Erzberger (2012): Contribution to the Bryophyte Flora of the former Yugoslav Republic of Macedonia. Polish Botanical Journal 57(1): 205–221, 2012

Pavlov, A. & Levkov, Z. (2013): Diversity and distribution of Eunotia Ehrenberg in Macedonia. Phytotaxa 86: 1–117

Pavlov, A. Levkov, Z., Williams, D.M. & Edlund, M.B. (2013). Observations on Hippodonta (Bacillariophyceae) in selected ancient lakes. Phytotaxa 90: 1–53

Petkovski S. (2009). National Catalogue (Check List) of Species. Ref. UNDP Contract: Biodiversity and Protected Areas Consultant (National) within the Project 00058373 "Strenghtenening the Ecological, Institutional and Financial Sustainability of Macedonia's National Protected Areas System"., 325 S.

Petkovski, S. (2009). Analysis and valuation of biodiversity at national level (report) and national catalog (check list) of species in digital form. Skopje, 100 p.

Prima (2008). Preparation of documentation for effective protection of biodiversity of Prilep's part of Mariovo by making recommendations for sustainable development of the region (report to the Ministry of Environment and Physical Planning), Skopje

Popovska, C., & Bonacci, O. (2008). Ecohydrology of Dojran Lake. In Dangerous Pollutants (Xenobiotics) in Urban Water Cycle (pp. 151-160). Springer Netherlands

SDC/UNDP/MEPP project "Revitalization of Prespa Lake ecosystems". More information about the project are available at:

http://www.mk.undp.org/content/the_former_yugoslav_republic_of_macedonia/en/home/operations/projects/environment_and_energy/restoration-of-the-prespa-lake-ecosystem.html

SDC/Farmahem/MEPP "Programme for Conservation of Nature in Macedonia". More information about the programme are available at: www.bregalnica-ncp.mk

SECO/MEPP/MAFWE project "Bregalnica Watershed Management Plan. More information are available at: http://bregalnica.mk/.

Slavevska-Stamenković, V., Stafilov, T., Smiljkov, S., Paunović, M., & Hristovski, S. (2009). The quality of water of the Mantovo reservoir, Republic of Macedonia. Archives of Biological Sciences, 61(3), 501-512

Smiljkov, S. (1996). The dominant benthic invertebrate fauna of the Matka Reservoir. Ann. Biol. Skopje 49, 95-105

Society for the Protection of Prespa (SPP), WWF-Greece, Protection and Preservation of Natural Environment in Albania (PPNEA), Macedonian Alliance for Prespa (MAP) (2005). Strategic Action Plan for the Sustainable Development of the Prespa Park, Executive Summary, Aghios Germanos, pp.76.

Soška, Th. (1933). Beitrag zur Marmorflora der Umgebung von Prilep (Südserbien). Bull. Inst. et Jard. Bot. Univ. Beograd, 2(3):176-182. (kniga br. 17)

Spirkovski, Z., Talevski, T., Ilik-Boeva, D., Kostoski, G. & Sandlund, O.T. (2007). A summary of the environmental and socio-economic characteristics of the Crna Reka (Crna River) watershed, Macedonia. – NINA Report 293. 37pp + 12 Annexes

SPP (Society for the Protection of Prespa) 2014. In: Action: Conservation and monitoring of the Dalmatian Pelican (Pelecanus crispus). Downloaded from http://www.spp.gr on 02/04/2014

Stampfli, A., & Zeiter, M. (1999). Plant species decline due to abandonment of meadows cannot easily be reversed by mowing. A case study from the southern Alps. Journal of Vegetation Science, 10(2), 151-164

Stankovic, S. V., Stojkoska, E., Norris, A. (2006). Annotated Checklist of the Terrestrial Gastropods (Gastropoda) of the Republic of Macedonia. Anniversary Proceedings (1926-2006). Mac. Mus. Sci. Nat.: 43-55. Skopje, 2006

Sterijovski, B., Ajtić, R., Tomović, L., Djordjević, S., Djurakić, M., Golubović, A., Crnobrnja-Isailović, J., Ballouard, J.M., Groumpf, F., Bonnet, X. (2011). Natrix tessellata on Golem Grad, FYR of Macedonia: a natural fortress shelters a prosperous snake population. Mertensiella 18: 298-301

Sterijovski, B., Tomović, Lj. and Ajtić, R. (in prep). Contribution to the knowledge of the Reptile fauna and diversity in the FYR of Macedonia. North-Western Journal of Zoology 10 (1): 83-92

Forestry Faculty Skopje (2008). Study and medium-term program of measures for revitalization of the old molika pine forest in NP Pelister. UKIM, Forestry Faculty, Skopje

Forestry Faculty Skopje (2008). Program of measures for control, restriction of use of the douglas fir in NP Pelister. UKIM, Forestry Faculty, Skopje

Talevski, T. (2007). Preliminary research on marshy terrain in the region Debarca and recommendation of measures for their protection as parts of nature of special interest (final report). Macedonian Limnological Society, Ohrid

Teofilovski , A. (2011). Contribution to the flora in the Republic of Macedonia, private edition

UNEP Vienna ISCC. (2010). Feasibility study on establishing a transboundary protected area Sharr/Shar Planina – Korab – Deshat. Bolzano, 130 p.

UNDP (2009). Report on the progress towards millennium development goals. Skopje, 92 pp

Van Swaay, C. Warren, M. (editors). Prime Butterfly Areas in Europe (2003). Priority sites for conservation von der Balkanhalbinsel, Glasn. Prir. muz., B 33:29-36, Beograd.

Velevski, M. (2013). Characteristics of the life history and distribution of the Egyptian vulture Neophron percnopterus in the Republic of Macedonia. Doctoral dissertation. University in Belgrade, 168 p.

Velevski, M., Hallmann, B., Grubač, B., Lisičanec, T., Stoynov, E., Lisičanec, E., Avukatov, V., Božič, L. and B. Štumberger (2010). Important bird areas in Macedonia: Sites of Global and European importance. Acrocephalus 31, 147: 181-282

Velevski, M., Putilin, K., Uzunova, D., Shtrumberger, B., Lisicanec, E., Grubac, B. & Shkorpikova, V. (2013). State of birds in Macedonia 2012. Macedonian Ecological Society (special edition), Skopje

Watzin, M.C., Puka, V. & Naumoski, T.B. (2002). Lake Ohrid and its watershed, State of the Environment report. Lake Ohrid Conservation project. Tirana, Albania and Ohrid, Macedonia, 134 p.

Wilke, T., Vainola, R., and Riedel, F. (2008). Preface. In: T. Wilke, R. Vainola, and F. Riedel (eds.) Patterns and Processes of Speciation in Ancient Lakes, 1-3. Hydrobiologia, 615

Wood, A., Stedman-Edwards, P. & Mang, J. (eds). (2000). The root causes of biodiversity loss. WWF and Earthscan, London and Sterling, VA. 399 p.

WWF project „Dinaric Arc Parks". More information is available at: www.dinaricarcparks.blogspot.com