

NATURE PROTECTION IN BOSNIA AND HERZEGOVINA: STATE AND PERSPECTIVES

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Abstract

Nature protection in Bosnia and Herzegovina: state and perspectives

Bosnia and Herzegovina is distinguished by a very unique mosaic of high biodiversity level. However, current development activities and initiatives for construction of new dams, together with activities in the forestry sector throughout the country, emphasizes the need for establishment of new protected areas in all major ecosystem types that should be ecologically viable and effectively managed. A review of the history of protected areas and administration developments in Bosnia and Herzegovina provide useful input for analysis. However, the data on the current state and size of protected areas in the country are obsolete and inaccurate. The results of the analysis have shown that in spite of a very high biodiversity level, Bosnia and Herzegovina managed to designate only 2.6% of its territory as protected areas, which is far below regional and European level. Lack of protected areas system is one of the main direct threats to biodiversity conservation. The primary objective of establishment of protected area network (PAN) in Bosnia and Herzegovina is to ensure conservation of valuable natural areas, which contain representatives of all main ecosystem types that could be found in the country. Only in this way, sustainable conservation of biodiversity could be achieved.

Key words

Protected areas, biodiversity management, Bosnia and Herzegovina

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1. Introduction

Bosnia and Herzegovina is located in the Southeastern Europe, on the Balkan peninsula with land area of 51 129 km² and 24 km of coastline. All watersheds and major biogeographical regions are transboundary. The country is distinguished by the presence of highly diverse ecosystems, distributed from sea level in eumediterranean belt to the highest mountain peaks in alpine belt (the highest peak in Bosnia is Mt. Maglić, 2386 m).

Several climate types – typical Mediterranean and submediterranean, mid-continental, continental, as well as specific varieties of mountain climate type could be found in this relatively small area (Drešković 2004). There are also a very diverse bedrock types. A dominant role play carbonate rocks – limestone and dolomite and dolomitized limestone. In the central, the northern and the northeastern parts of the country, silicate rocks from various geological ages could be found (Čičić and Pamić 1977; 1979). Soils are various stages in development of carbonate and silicate soils with domination of cambric and illymerized soils. In the southern part of the country, dominant roles play dark, fertile soils and rendzines (Resulović and Čustović 2002). Heterogeneous abiotic factors contributed to the development of a unique mosaic of rich biodiversity. Bosnia and Herzegovina is one of the European hot-spot countries with a very high level of species and ecosystem diversity and high endemism rate.

There are three main biogeographical regions in Bosnia and Herzegovina: Mediterranean, Continental, and Alpine region (World Wildlife Fund 2000). Richness of the flora has enabled development of a very rich and diverse ecosystems (Lakušić 1981; 1984). Considering geographical, geological, climatic and historical circumstances, it could be possible to distinguish three main phytogeographical regions in the country: (1) Mediterranean, (2) Euro-Siberian-Boreo-American with Illyrian and Moesian province. The highest mountain peaks belong to the (3) Alpine-high Nordic region with high Dinaric province (Lakušić 1981). The results of the analysis of land cover have shown that 44% of the territory is covered with natural forests (CORINE Land Cover 2006 Project in Bosnia and Herzegovina). Herzegovina and the Western Bosnia with large karst areas are distinguished by the presence of vegetation typical for submediterranean region. Current distribution of vegetation formation is not only result of prevailing natural conditions, but it is also influenced by various factors in distance past of vegetation development. An important role in this process have played deep river valeys and canyons, which acted as corridors for dispersal of certain floral elements from the north to the south, from the east to the west, and vice versa. They have also served as refugia for members of old vegetation that had been endangered due to the climate changes and invasions of new species.

Bosnia and Herzegovina has a very rich flora, with some 5200 taxa of vascular plants (Šoljan, Muratović, Abadžić 2009). Considering the number of species and its relatively small country size, the species density and diversity in Bosnia is among the highest in Europe. It is estimated that there are about 500 endemic plant species (Šilić 1984). A full inventory of vascular flora in Bosnia has yet to be conducted. It is possible that additional species would be identified through such an inventory. A listing of plants thought to occur in Bosnia that are included on the Red List was conducted in 1990 using only literature and herbarium sources. This provisionally Red List for Bosnia was finally published in 1995. Some 678 species or

13.5% of total flora thought to occur in Bosnia are on the list. It includes 3 extinct species, 43 at the verge of extinction, 286 vulnerable species, and 289 that are rare or potentially under the threat, and 52 species of concern whose status has not been defined (Šilić 1995). The very high percentage of total species in Bosnia considered under threat give rise to the need for urgent conservation and protection of species and their communities in the country.

Similar to the vascular plants, the number of endemic animal species is also a very high (Lelo 2009). It includes, among others, 18 amphibian, 29 reptile, 330 bird, and 99 mammal taxa. Since Bosnia is a mainly mountainous country, much of its fauna is adapted to mountain habitats. In the central and the southern parts of Bosnia and the northern and northeastern Herzegovina area, dense stands of coniferous and broadleaved forests, meadows, pastures and mountain turfs are habitat for a numerous animals. Chamois and brown bear, as well as an endemic race of marten also live here. Important and rare bird species include grouse, vulture, and ural owl. Alpine salamander and viper are two additional important species. Although they could be found in the neighboring countries, in Bosnia they are represented with very small populations critical for their survival. Changes in general physical geographical conditions, and particularly appearance and destruction of natural isolation barriers in geological history have very strong impacts on the development and composition of living world in waterways and lakes. Ichthyofauna of Bosnia and Herzegovina with 11 species of cartilaginous and 194 species of bony fish represents a unique European biological resource considering both total richness and presence of numerous interesting endemic forms (Hamzić and Lelo 2009).

2. The history of establishment of protected areas in Bosnia and Herzegovina

A review of the history of protected areas designation and insight into existing legislation in Bosnia and Herzegovina provide useful input in the research. Nature protection in Bosnia and Herzegovina, as in other countries in the region, has started in the second half of 19th century with protection of certain wild game species. The first officially protected area in Bosnia and Herzegovina was established in June 1954, in the southeastern part of the country in the watershed of Perućica creek, where pristine forest was developed. Just two months later, in August 1954, National institute for protection of cultural monuments and natural rarities of People Republic of Bosnia and Herzegovina on the basis of the Law on protection of cultural monuments and natural rarities from 1947, protected Prokoško lake on Mt. Vranica in the Central Bosnia as natural rarity. In 1965, the first National park Sutjeska was established, and Perućica became core area of the park (Fukarek 1970).

Spatial plan of Bosnia and Herzegovina for period 1981-2000 predicted protection of 8062 km² or 15.03 % of the state through an integral approach (Table 1). Up to 1990, according to the Law on Protection of Nature and Law on Protection of Cultural, Historical and Natural Heritage, only 0.55% of the territory of Bosnia and Herzegovina was protected (253 areas – 28 127 ha), as follows: 5 Strict Reservations, 3 Managing Reservations, 2 National Parks, 29 Special Reservations, 16 Natural sights, 195 various natural monuments, and 7 species of plants and 259 species of animals (257 bird species) (NEAP BiH Directorate 2003).

Tab. 1: Natural heritage and protected parts of nature in Bosnia and Herzegovina – projection for protection by 2000 (Source: Draft of Spatial plan of Bosnia and Herzegovina for the period 1981 – 2000).

	Type of protected area	Total	
		km ²	%
1.	Nacional park (7)	1730	3,38
2.	Regional park (32)	4532	8,86
3.	Special landscape (50)	1243	2,41
4.	Memorial park (22)	107	0,21
5.	Reservats an monuments of nature	10	0,02
6.	Water (1 - 4)	440	0,15
	Sum	8062	15,03

The categories specified in the table 1 do not correspond to IUCN categories of protected areas. The protected area designations were defined in the 1970 law, and they are outdated. Also, the status of individual species should be discussed within IUCN criteria for the Red Lists of Threatened Plants, Animals and Fungi, instead within the protected parts of nature.

2.1 Protected areas development

After the war (1992-1995), fragmentation and disturbance of habitats, together with overexploitation of natural resources, and introduction of alien species have resulted in dramatically increased environmental degradation. This has urged the need for the establishment of new and reevalutaion of existing protected areas in the whole country. The first newly protected areas, based on IUCN criteria, have been designated in Sarajevo Canton. Responsible governmental bodies and cantonal parliament have declared three protected areas: Nature monuments Vrelo Bosne and Skakavac, and Protected landscape Bijambare. Also, all activities in preparation of necessary legislation for designation of Bentbaša (canyon of the river Miljacka upstream from Sarajevo to interentity boundary line) as protected landscape have been completed by the end of 2008 (Drešković and Đug 2008). Several new protected areas have been designated in other cantons in the entity of Federation of Bosnia and Herzegovina, as well. In Herzegovina-Neretva Canton Nature monument Blidinje lake was designated in 1995. In the Central Bosnia Canton the nature monument Prokoško lake was established in 2005 (Đug and Drešković 2005). In Zenica-Doboj Canton – Nature monument Tajan (2008) and in Tuzla Canton Protected landscape Konjuh in 2009 have been designated. In 2008, National park Una was established as the first national park in Federation of Bosnia and Herzegovina (Dalmatin, Drešković, Đug 2008). All these protected areas have baseline studies and management plans.

There are 21 protected areas in entity of Republic of Srpska covering 24 632 ha (Ljubojević and Marčeta, 2007). Here are located two national parks Kozara (3 494.5 ha), and Sutjeska (17 250 ha) and two pristine forests reserves Janj (195 ha) and Lom (297.75 ha). The current state of other enlisted protected areas is still problematic, since they are under significant human impacts.

Physical plan of entity Republic of Srpska in its first stage (1996-2015) set a very ambitious goals to set 15 to 20% of its territory, including among others, new 11

national parks and 11 nature parks (Kadić and Marković 2006). In spite these intentions, even existing protected areas are under the threat. For example, forest reserve Bukov Do (100 ha) is almost completely destroyed today due to various human impacts, while forest reserve Omar (97 ha) is under the threat. Also, 12 reserves of Pančić spruce (*Picea omorica* (Panč.) Willk.) covering 320 ha are endangered due to the mismanagement and lack of proper protection. After the war, there were no new designated areas in entity Republic of Srpska (Ljubojević, Marčeta 2007). Due to its high biodiversity and importance as bird habitat, wetland Bardaca in the northern part of Bosnia and Herzegovina has been designated as wetland of international importance on the International wetland day on February 2, 2007, that is Ramsar site number 1658 (Ramsar Convention Secretariat 2007). That is the second Ramsar site in the country, since Hutovo blato in Herzegovina (IUCN category III) was declared as Ramsar site in 1972.

It is necessary to note that in Bosnia and Herzegovina exist a large number of mainly individual nature monuments which are not either in jurisdiction of entities or Cantons. They are enlisted as protected natural heritage in municipalities where they are situated. Those mainly physical geographical natural features, such as waterfalls, small canyons, etc., with high values cover small areas and therefore they cannot be protected as separate protected areas according to IUCN criteria. Official data on the state of protected areas in Bosnia and Herzegovina are in the most cases obsolete and inaccurate. For example, official data for Bosnia and Herzegovina presented in the Common Database on Designated Areas (CDDA) are not reliable (EEA, 2006) and they do not reflect current situation in the field of nature protection. One of the most recent official documents, Draft of the Strategy of Environmental Protection of the Federation of Bosnia and Herzegovina for the period 2008-2018 states that only 0.53% of the state territory has been designated as protected areas (Federal Ministry for the Environment and Tourism, 2008), while the most recent document in this field, The Fourth Report to the United Nations Convention on Biological Diversity 2010 Biodiversity Targets National Assessments states that 0.63% of the state territory was protected by the end of 2005, which increased to 1.8% by the end of 2009. However, the results of original investigations and analysis of other available data have shown that, in spite all efforts, Bosnia and Herzegovina managed to designate only 2.6% of its territory as protected which is far below regional and European level. The results of our analysis have shown that in Federation of Bosnia and Herzegovina 109 808.8 ha is currently protected, and in Republic of Srpska 24 632 ha (Ljubojević, Marčeta 2007), or in the whole country 134 440.8 ha.

Unfortunately, there is no defined unique strategy for protected area designation at the state level. The existing concept of the nature conservation based upon formal protection of species and establishing of protected areas together with absence of reliable environmental information and monitoring systems needed to generate inputs for sound environmental management showed to be insufficient. Due to the very complex administrative and political organisation of the state it is not possible at the state level to implement planned conception guidelines. Outcome of this situation is that a very ambitious strategy to protect 15% of the state territory was not implemented at all.

2.2 Policy and management in nature protection

In accordance with Dayton Peace Agreement, all environmental legislation was retained from former SR BiH, until adoption of new laws. New set of environmental

laws went into effect in 2003. The intention was to adjust legislation in the country with EU legislation in order to ensure efficient environmental protection. In the previous period, environmental regulations have been dispersed in various acts, laws, and regulations. These laws have proscribed obligation to pass numerous other acts and to define obligations of various responsible bodies. This set of laws exists separately in both entities, and they are not completely adjusted. In the entity Federation of Bosnia and Herzegovina nature protection is regulated by the Law on nature protection. This law defines conditions and modes for sustainable protection and management of natural areas, plants, animals, and their habitats, minerals and fossils, and other components of nature, responsibilities of bodies which carry out activities in the field of nature protection, and general and special measures for nature protection, information system, funding of nature protection, monitoring, etc. This law, in Article 25 defines four categories of protected areas: (1) protected natural area, (2) national park, (3) nature monument, and (4) protected landscape. In the entity Republic of Srpska Law on Nature Protection in Article 25 categories of protected areas are defined as follows: (1) protected natural area, (2) national park, (3) nature monument, (4) habitat management area, (5) protected landscape, and (6) managed resource protected area.

Unfortunately, Bosnia and Herzegovina still do not have roof institution or agency responsible for nature protection at the state level which would coordinate adjustment of existing laws and activities in the field of nature protection. At the state level, Ministry of Foreign Trade and Economic Relationships of Bosnia and Herzegovina is responsible for international conventions and agreements. Federal Ministry for Environment and Tourism (FBIH) is responsible for designation of national parks, while cantonal ministries are responsible for designation of nature monument and protected landscape. In Republic of Srpska (RS) Ministry for Physical Planning, Building and Ecology is responsible for designation of protected areas at all levels.

Projections of establishment and development of new protected areas are based on relevant documents of Spatial plan of Bosnia and Herzegovina from 1981 (Phase B – Valorisation of natural and cultural-historical values), guidelines of NEAP for Bosnia and Herzegovina, as well as on the numerous strategic documents prepared in the recent years, such as Project of protected forest and mountain areas – environmental assessment, Strategy of development of tourism in FBIH, etc. Experts from various fields gave also valuable inputs that have been also incorporated in preparation of the strategy for future protected areas. Particular important role in these activities play NGO's which often initiate and carry out activities related to valorisation and establishment of protected areas following IUCN criteria and guidelines.

Current mainly negative trends in the field of nature protection are caused by attitudes of responsible entity, cantonal or municipal authorities to nature protection and preservation of natural heritage since they often promoted unsustainable economic activities, such as usurpation and conversion of natural areas with high values into construction or industrial sites, landfills, etc. Particularly negative impacts in protected areas have forestry sector activities, such as forest clearing and cutting, which leads to degradation of ambiental values, deterioration of biodiversity and acceleration of erosion and generation of landslides. All these factors make significant obstacles for implementation of integral solutions in

preservation of existing and planning of new protected areas and organisation of unique network of protected areas at the state level.

3. Proposed protected areas and development of protected areas network

On the basis of above mentioned facts, it could be concluded that goals of natural values protection include establishment of more efficient system of long-term protection of the most valuable and most important natural areas which are distinguished by high biodiversity values and in accordance with contemporary ecological criteria and standards of EU. In order to achieve this goal, it would be necessary to develop and implement methodology which would enable permanent monitoring of the state and changes in protected areas and in their surroundings. The highest priority should be given to the development of comprehensive information system as a main tool necessary for efficient monitoring and prompt and objective insight of the state natural heritage. This would assist in prevention of further deterioration of natural resources and in restoration and recovering of biodiversity to the state of natural equilibrium and harmonisation with development activities. It also would be necessary to very carefully carry out planning infrastructure in the ecologically sensitive areas taking into account visual identity and landscape values. Nature protection should have an equal status to other sectors in spatial plans. Only in this way it would be possible to secure right of the citizens to live in healthy environment.

Mentioned objectives in the field of nature protection in Bosnia and Herzegovina could be achieved only by strict implementation of existing legislation and through innovation or changes of certain regulations which are not functional. Responsible state institutions and bodies should pay much more attention to education and improvement of the knowledge of local communities on importance of protected areas.

Taking into account high level of biodiversity and significant negative human impacts on the environment, it would be necessary to extend the size and number of the protected area in the country. Habitat fragmentation and the theory of island biogeography stress the need for establishment of protected area network (PAN). The proposed PAN would have three main structural elements: core areas, islands, and ecological corridors. National parks will make core areas in PAN. Therefore, main focus should be given to the designation of new protected areas in the category national parks in order to facilitate preservation of the most representative ecosystems and their main features with simultaneous promotion of sustainable forms of tourism with participation of local communities.

Small reserves could be useful, but if they represent just small isolated areas without any direct connection with core areas (national parks), the species that depend on them may be very vulnerable to extinction. The core areas are linked by ecological corridors, both terrestrial and aquatic. The corridors serve for regular seasonal migration of certain animal species. They are also very important for the plants and their dispersal over long distances. Ecological corridors should enable free gene flow and biological communication between areas with high biodiversity and high sensitivity. The main principle is to allow natural processes to continue without any human interventions, unless they are really necessary. One of very important objectives is development of strategy for establishment of protected area

network and preparation of necessary documentation and management plans for all protected areas.

Spatial data gathered from various sources have been used for creation of thematic layers (geology, soil types, climate, hydrology, main vegetation units – at the level of alliance, data on protected areas, CLC 2000, satellite imagery) in order to identify elements of future PAN. GIS analysis and existing data on biodiversity from literature and field research in the post war period have been used for the selection of future PAN elements. Methodology used in valorisation of natural diversity and categorisation of protected areas was based on the guidelines given by IUCN. Also, one of the main elements used in this approach was relative small percentage and bad condition of existing protected areas.

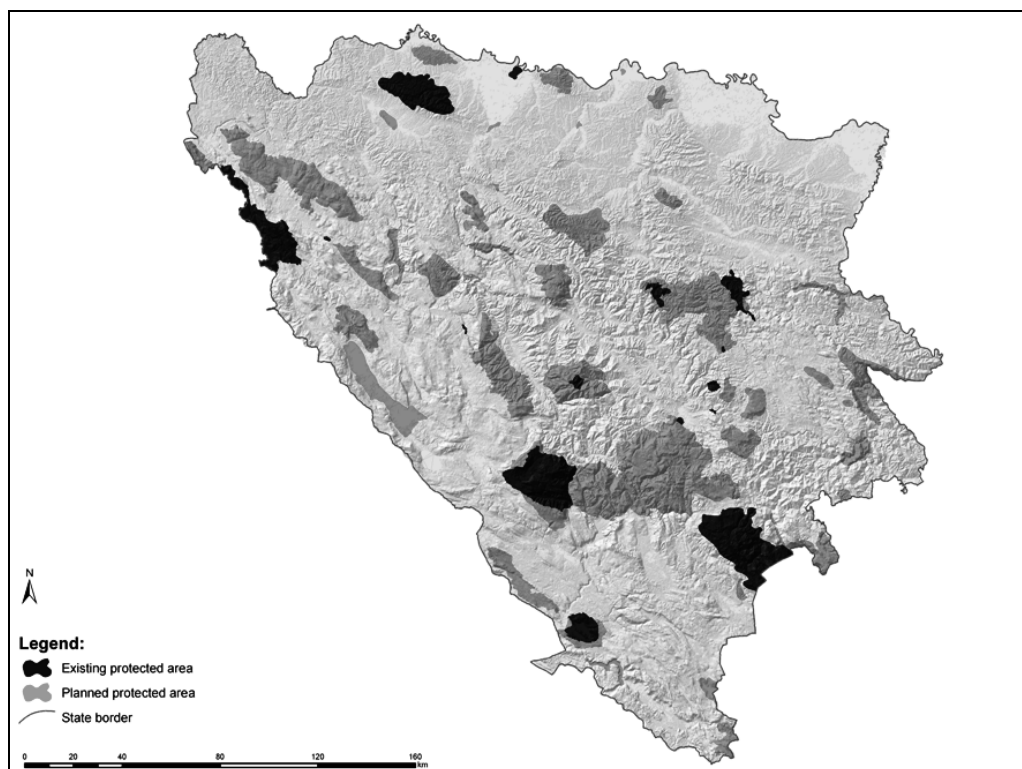


Fig. 1: Distribution of protected areas in Bosnia and Herzegovina.

Besides existing three national parks (Sutjeska, Kozara and Una), on the basis of the obtained results the following areas have been selected as additional core areas in the future PAN: 1) Olympic mountains – Mt. Igman and Mt. Bjelašnica in Sarajevo canton, 2) Mountains of endemic center in Herzegovina – Mt. Prenj, Mt. Čvrsnica and Mt. Čabulja, 3) Mt. Vranica in Central Bosnia, 4) Mountain complex Konjuh – Zvijezda – Tajan in Central Bosnia, 5) Livanjsko polje in SW Bosnia as the largest karst field in the world, 6) Mt. Šator in the western Bosnia, and 7) Mt. Grmeč in NW Bosnia. Other areas proposed in the physical plans of both entities would serve as islands and corridors in PAN of Bosnia and Herzegovina.

With protection of these new core areas the total size of protected areas in the country would increase to 9.6%. Spatial plan of Federation of Bosnia and Herzegovina has projected that 444 321.2 ha should be protected, while Spatial plan of Republic of Srpska plan to protect 315 192 ha. This means that in Bosnia and Herzegovina 759 513.2 ha or 14.85% should be designated as protected areas.

One of the most important current activities in the field of nature protection is WWF MedPO project Europe's Living Heart: Preserving B&H's natural heritage using EU-tools (II phase and III phase). The objective of the project is development of Natura 2000 network which will assist to fulfill existing gaps in protected area network and to achieve, in the first place, higher degree of efficient protection of species and habitats which are not included in protected area network.

4. Conclusion

Since the United Nations have declared 2010 as the International Biodiversity Year, Biodiversity for Development, this could give an additional impetus for promotion of development of protected area network in Bosnia and Herzegovina, particularly taking into account that with only 2.6% of protected areas, the country is far from both regional and European level. The current situation in the field of nature protection does not reflect high biodiversity level at both species and ecosystem level. Lack of strategy and coordination efforts at the state level and absence of reliable information additionally complicate already a very complex situation in this field. Development of information system and focusing of research on the role and importance of protected areas in the sustainable development should play a crucial role in long-term preserving of biodiversity in Bosnia and Herzegovina. In order to strengthen conservation strategies at the national level it would be necessary to strengthen the capacity and capability of government institutions to manage natural resources. Lack of protected areas system is one of the main direct threats to biodiversity conservation. Therefore, primary objective of establishment of protected area network (PAN) in Bosnia and Herzegovina is to ensure conservation of valuable natural areas, which contain representatives of all main ecosystem types that could be found in the country. Development of PAN is the best way to protect biodiversity and threatened species and ecosystems. Only in this way, sustainable conservation of biodiversity could be achieved.

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Summary

Geographical position of Bosnia and Herzegovina in the southeastern Europe, including its specific geological composition and a very dynamic relief created a very suitable conditions for development of a very high level of biodiversity. Particular importance have climate features of the country since it is a dividing zone of two main climate types: the northern moderate climate belt and the northern subtropical climate belt. Although investigations of both the flora and the fauna have a very long tradition, with the first records dated back into 18th century, organised nature protection in Bosnia and Herzegovina has begun in the second half of the last century. A very first fully protected natural area was established in 1954 in the area of the Sutjeska river canyon – the pristine forest Perućica. After that, the establishment of all protected areas was based on the national legislation from that period, and it was not followed the IUCN guidelines and criteria for protected areas. During that period, only up to 1% of territory was designated as protected areas, with the National park Sutjeska as the most important. In the post-war period, Bosnia and Herzegovina has completely included all IUCN criteria in protected area establishment. This resulted in development of new protected areas and in the increase of the size of protected areas up to 3%. The most important are National park Una, Natural monuments Prokoško lake, Tjanište and Skakavac. Planning of the future development of protected area network is defined by the Spatial plans of two entities. The plan is that in the next 20 years more than 16% of the state territory should be protected. At the moment, in Bosnia and Herzegovina are implemented the results of NATURA 2000 and the Red lists of plants, animals and fungi, which will represent solid base for identification of biodiversity hot spots in the country.