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RESEARCH AND ANALYSIS OF BIODIVERSITY CONSERVATION ON STARA PLANINA

IN THE BORDER REGION BULGARIA - SERBIA, RARE AND PROTECTED SPECIES, MODELS AND METHODS OF LOCAL AND REGIONAL CONSERVATION

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Introduction

Protecting and conserving biodiversity is a millennium task for all generations. Areas under national protection, such as Stara planina, are of utmost importance. The aim of this paper is to present data on the state of the biodiversity of Stara planina, what is known about species, ecosystems, habitats and genetic diversity.

The theme of the publication was processed through 8 sections.
The first section refers to getting to know Stara planina through its so-called "Personal map", starting from the geographical location, the topography of the terrain and numerous characteristics (geomorphological, geological, seismological, climatic, etc.) in order to gain insight into the locality that is the subject of further processing.
In the second part, the emphasis is on plant and animal species whose habitats are on Stara planina through the identification and selection of rare and protected species.
The third section deals with trends in the development and disappearance of certain species with the identification of those species that are endangered due to low reproduction, natural habitat disturbance, extermination or some other reason.
The fourth section recognizes the key types of diversity and their territorial distribution in old-plan villages. Spatial analysis of biodiversity, section 5, presents sites that are categorized into two groups: strict nature reserves and nature monuments.
Swot analysis of biodiversity, dealing with the sixth whole, identifies the strengths and chances, as well as the weaknesses and threats of the Old Mountain region. By enhancing the positive and neutralizing the negative factors of this analysis, a strong influence can be made on the preservation and development of the Stara Planina ecosystem.
The seventh section points out the importance and role of non-governmental organizations in the process of preserving biodiversity, their activities in education and population awareness and regional integration.
The final part records the existing measures and models of conservation of biodiversity, as well as new, innovative models of ecosystem protection.
Through this publication, the authors tried to give their views of the state of the diversity of Stara planina by preserving the existing diversity as a long-term goal in the coming times.

The publication is part of the IPA cross-border cooperation project Bulgaria-Serbia "Joint cross-border initiatives for the creation of an eco-friendly region".

Team of authors

1. Stara planina - general information

Stara planina is of great national interest, but it is vital for residents of the Pirot district. The locals inhabit the old-fashioned villages for centuries and they are existentially dependent on it. It is a mountain of exceptional beauty, picturesque landscapes, rich cultural and historical heritage. It offers innumerable opportunities for tourism, archiving, conservation and protection of flora and fauna, for the development of many activities. Therefore, it needs to be approached extremely seriously and responsibly in order to preserve its and further improvement.

1. 1 The geographical location of Stara planina

Nature Park Stara planina extends in the eastern part of Serbia. It covers the territories of four municipalities: Pirot, Knjaževac, Dimitrovgrad and Zaječar and covers an area of 142,219 hectares and 64 acres.
The geographical position of Stara Planina can be characterized as optimal: it is located 70 km from Niš, Pirot and Knjaževac 50 km, 330 km from Belgrade, 100 km from Zajecar. Stara planina ranges from 43 to 44 degrees latitude (north) and from 22 degrees 16 minutes to 23 degrees geographical longitude (eastern).

Stara planina belongs to a group of marine mountains. It's 530 km long. Its name is the Balkans, and therefore the name of the Balkan peninsula came from the name of this mountain. It is to a lesser extent located in Serbia (its western part), while its major part belongs to the territory of the Republic of Bulgaria. The area of the Serbian part is 1.802 square km. The largest part of the territory, an area of 1,143 km or in the percentage of 91,44%, is under protection within the Nature Park of Stara planina.

The very popular and recognizable peak of Stara Planina is Babin zub, which is located at 1.758 m above sea level and which, except for the authentic name, has developed infrastructure and a functional and modern hotel complex has been built. It can be reached by motor vehicles and the richness of the ski slopes and the possibility of Nordic skiing, the attraction of untouched nature brings enthusiasts of sports and recreational tourism throughout the year

1.2 Topography of terrain and geomorphological characteristics

Stara planina is made up of mountain ranges that were created by the action of internal forces that sampled horizontal movements and the accumulation of rocky layers of the earth's crust. The most prominent features of the mountain ranges are that they are high and have sharp peaks, as is the case with Stara planina. The massif of Stara planina is part of a steep mountain range called the Carpathian - Balkan arch.

The relief of Stara planina is quite rugged. It is distinguished by deeply rooted valleys with short flows. It is basically of tectonic origin. The valleys of Stara planina cover about 35 square kilometers.

On Stara Planina, the following forms of geomorphological heritage are noticed:

- The area between the villages of Rsovci and Jelovica, wherein the length of 8 km there are fossil remains from the Mesozoic period. In this period, the continental masses that we know today are created.

- Village Rosomac - profile of Jurassic sediments represents gray limestone with ammonia fauna created in the deepest parts of the sea.

- Gorge Vladikine ploče. It is 2 kilometers long and the depth in some places reaches 300m. It is located between the villages of Rsovci and Pakleštica and belongs to the municipality of Pirot. The Visocica River made the gorge in the Jurassic sediments. The access to the gorge is very inaccessible. It is known for its entrenched meanders (the meander is the term for the river bed curving in the form of a Latin letter S. The name was given by the River Meander in Turkey) and by a large number of caves that are part of the gorge. The most famous and largest is Vladika's cave. The entrance is 18 m high, 12 m wide, and the basic cave canal is 190 m long.

- Cave Baranica near Knjaževac with fossil remains of vertebrates.

- Babin zub - where the largest group of various rock formations of coarse sandstones can be found. By the passage of time, the rocky mass of Babin zub has been transformed into two axes, one higher and the other lower. Its domination is visible because it is the opposite of the environment that is under the lush vegetation. In the immediate vicinity of this summit, there is a large number of cold and pure springs. It belongs to the municipality of Knjaževac and is also recognized as the most beautiful viewpoint of Stara planina.

- Entranched meanders of Temstica in a 160-160 m high cliff with various shapes of stones in red sandstone.

1.3 Geological characteristics of Stara planina

The geological structure of Stara planina indicates the presence of various forms of regional diversity. From the geological point of view, the Stara planina region is very diverse. In the valleys, there are widespread shales and fine-grained sandstones,and in the higher areas there are sharp walls and cracks. Areas with higher altitudes (above 1,450 m) consist of red sands and conglomerates. These walls are stable, waterproof and resistant to erosion. Areas below 1.450 m above sea level consist of crystalline shale. The Toplodoskal river basin is characterized by red sandstone. Region Babin zub abounds with large-scale sandstone. Ponor, Vrtibog and Kovačevo are characterized by limestone bays. In the area of Visok, there is a myriad of lonely peaks sprinkled with numerous tributaries of Visočica that form narrow and short gorges. The higher parts of

Stara planina were built predominantly to Mesozoic sandstones (Jurassic and Lower Cretaceous formations)[1].

In the older Palaeozoic there are: crystalline shale, gneiss, amphibolites, filites, quartzites, marbles, argilloscopes. Permian sandstones are very present, which in certain parts of Stara planina reach a thickness of over 1,300 meters[2].The spring parts of the Dojkinačka River, Ponor, Kopren and Kaca were built from these sandstones.

1.4 Hydrological characteristics of Stara planina

The hydropotential makes up a large number of extremely clean and cold rivers and streams. The most important rivers of this region are the Crnovrška Reka, Visočica, Toplodolska and Dojkinačka Reka, Jelovička Reka, river, Rosomačka river, river Temska and artificial reservoir - Zavoj Lake. Watercourses are characterized by maximum water level and flow in the spring months, as well as the minimum water level at the end of the year, in the period August-October. The rivers and streams of the Stara planina basin have torrential characteristics that are seen through great differences in the level of water levels, especially at Toplodolska, Dojkinačka and Crnovrška rivers.

River beds are used in rocky ground, and because of the high inclination, there are frequent occurrences of rapids and cascades.

The water resources of Stara planina are largely preserved. They have an uneven water level and are extremely spontaneous in character, so they are not suitable for water supply and economic exploitation. The quality of water is good because it flows through villages with a small number of inhabitants and the possibility of devastation is reduced to the lowest possible extent. In addition, watercourses have great self-purification ability due to the configuration of the terrain through which they flow.

1.5. Seismological characteristics

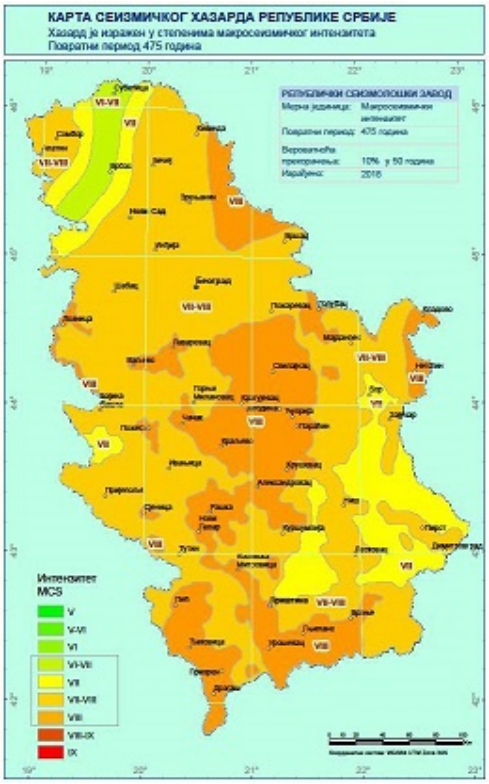
The area of Stara Planina on the seismological map of Serbia is located in the domain of the basic degree of seismic intensity of 7 - 8°MCS scale and is not considered as a seismic area. There are no strong epicenters around Pirot and its surroundings. The basic degrees of seismic intensities for the territory of Serbia are determined by the Maps of seismic reionization.

Measuring information system in the Republican Seismological Institute of Serbia covering the area of Stara Planina is located at the seismological station Zavoj Pirot. Transfer of data from the Zavoj station is done in satellite, in real time. The processing of seismological data takes place at the central seismological station in Belgrade.

[1] “Climate of Stara planina "Boško Milovanović Geographical Institute" Jovan Cvijić "Serbian Academy of Sciences and Arts, Belgrade 2010

[2] “Climate of Stara planina "Boško Milovanović Geographical Institute" Jovan Cvijić "Serbian Academy of Sciences and Arts, Belgrade 2010

Picture no. 1 Map of the seismic hazard of the Republic of Serbia[3]



1.6 Climate and weather features

The climate of Stara planina is continental - mountainous, which means that the flights are short and fresh and the winters are long and cold. In winter, the air temperature is between -1 to -3 C ° and in summer around 15 C °. The average temperature of the air is about 5C.

Climate change is expressed in relation to the mountain's position and altitude. Three climate zones are distinguished: a moderate mountainous region that is usual for 200 to 800 m above sea level; a true mountain (sub mountain- subalpine climate) represented at altitudes from 800 to 1,400 m and highland (alpine climatic) at altitudes above 1,400 m.
The climate of Stara planina is influenced by the Vlasina plateau from the west, the Carpathian Sea, the Black Sea and the Mediterranean influence from the south.[4] The month

[3]Republic Seismological Institute - http://www.seismo.gov.rs/indexl.htm
[4]www.serbiaecotour.rs/sr/zasticena-podrucja/stara-planina

with the lowest temperature is January and the highest is July. Snowfall is present in the period from November to March. The number of days with snow ranges from 90 to 180 days a year, depending on the slope of the terrain, side of the mountain and altitude. The height of the snow cover of 50 cm lasts for about 70 days, while the average maximum height of the snow cover varies between 110 cm and 150 cm.[5]

[5] 4th Serbian congress of geographers with international participation "Achievements, actualities and challenges of geographical science and practice" Records of young researchers of the University of Belgrade - Faculty of Geography, Serbian Geographical Society, Belgrade 2015.

2. Biodiversity of Stara planina, term and statistics of species with a view to updating existing data on rare and protected species

Stara planina is characterized by exceptional biodiversity. Biodiversity refers to the diversity of living organisms that originate from all available ecosystems (aquatic, sub-species, and others). Biodiversity or biological diversity (bios - life and diversity -heterogeneity, diversification) is biodiversity that encompasses the specificities of living organisms (microorganisms, mushrooms, plants and animals). Biodiversity can be considered as genetic, special and ecosystemic biodiversity. Biodiversity allows all living beings, including the human population, to shift to changes and to make effective use of available resources. Global diversity can be defined as all species of life forms on the Earth in its diversity, interdependence and connectivity.

The Stara Planina is specific in many conditions that favor the appearance, development and existence of the plant and animal world. The extraordinary biodiversity of the Old Mountain is reflected in the next review showing the number and representation of the species in the area.

On Stara Planina, it is recorded the existence of:
- about 1200 species and subspecies of higher plants,
- 115 endemic plant species,
- over 100 protected and strictly protected species,
- more than 50 species on the list of endangered European flora,
- 52 species of forest, bushy and herbaceous plant communities,
- about 150 species of nesting birds,
- 30 species of mammals, 6 species of amphibians,
-12 types of reptiles,
-26 species of fish.[6]

Stara planina reflects the richness of flora and fauna, as well as the diversity of habitats it owns. Exceptional diversity places this area in relation to other European mountains of similar characteristics. The key types of biodiversity on Stara Planina are: lichens, macromycetes, mosses (bryophytes), vascular plants and fauna of Stara planina.

[6]National Park Stara planina, Institute for Nature Protection of Srbia, Pirot, August 2016

2.1. The diversity of lichens

Lichens have been insufficiently explored in the territory of Serbia, and further research is needed to give a more accurate insight into the biodiversity and distribution of this group to the branches. The existing international conventions on the protection of endangered plants and animals (Bern, 1979, CITES 1973 and others) and the European red list of globally endangered plants and animals (ECE / ENVNJA / 20) have not been included. From the species on the red list of the European Union, 11 species have been registered in the territory of Serbia and Montenegro (included in the list of potentially globally significant species.[7]Based on targeted field research, the number of lichens on Stara Planina is 59 species out of a total of 406 species in Serbia. Since the variety of lichen-flora is conditioned by the level of diversity of climatic, geological and vegetational factors that are strongly expressed on Stara Planina, it is realistic to expect a higher percentage of lichen-flora in the structure of lichen communities in Serbia. Lichens occur mostly on limestone and eruptive rocks on high-terrain and gorges and in lower slopes.

2.2.The diversity of macromycetes (mushrooms)

There are no valid data about the data related to the macromycetes of Stara planina. This area of the flora has not been sufficiently explored and there is fuller research in the floristic and phytogeographical view. So far, 116 species and one variety of macromycetes have been identified, which is very low compared to similar mountains (Kopaonik - 180 species, Tara 251). Insufficient myological research is the reason for an unrealistic picture of microfond on Stara planina. The assumption is that up to 1000 different forms of macromycetes can be found on the Stara Planina Mountain, provided that the research lasts for several years and covers the entire vegetation period.

2.3. The diversity of Bryophytes (moss)

The mosses are widespread on Stara Planina. They inhabit habitats of different characteristics: peat bogs, wet meadows, forest parts in which they are positioned on stumps, trees, walls that abound with moisture, rivers, waterfalls, springs and so on. The mosses that live on decomposing trees and peat bogs suffer the greatest threat. The real danger for mosses is hydrogeographic works that affect the water regime, thus endangering the habitat of these species. The bryophytes flora in the territory of Stara Planina counts 344 species and a large number of them are under different forms of protection. The structure of bryophyte is dominated by mosses (281 species), but there are also liverworts (63 species). Among the found macromycetes, species that have a high level of vulnerability at the international, national and local levels are recognizable. Local threats occur in those species that grow on the rotting areas and due to the collapse of their natural habitats. For example, some species, buxaumia viridis, are protected by the Berne Convention and the Habitat Directive throughout Europe.

[7] 2011, Local action plan for biodiversity of the municipality of Zabljak (LBAP)
Regional Environmental Center for Central and Eastern Europe, Office in Montenegro*:*

2.4. The diversity of vascular plants

A very rich and pronounced diversity refers to vascular plants. 1.742 taxa (recognized groups of living beings) are registered in the form of species and subspecies of various plants that can be found on the Stara Planina terrain. Due to this number, Stara planina is famous for its landscape with the largest floristic diversity and density of flora in the Balkans and Europe. The problem of insufficient research is also present in the flora, so the assumptions of the biologists are that on Stara Planina the total flora amounts to at least 2000 taxa.

2.5. The diversity of fauna

According to the previous studies, the fauna of Stara planina includes one type of cyclostomi (predecessor of fish), 26 species of fish, 9 species of amphibians, 15 species of reptiles, 205 bird species and 61 species of mammals, or the total of 311 species of vertebrates. [8] Ihtiofauna is distinguished by a small number of species, but the presence of stream trout contributes to the quality of the existent fish species. Stara planina watercourses are known as the chub- barbel regions, while the waters of higher altitudes are known as trout - salmonid regions. The best-studied group of fauna is birds. Nesting birds consist of 154 species, and those with migratory properties make the others. Nesting birds make up 59.2% of all recognized nests in Serbia.

The exceptional diversity of plant and animal species does not imply the equal importance of each of them, regardless of their relationship. Some species are more numerous, others less numerous, but their presence points to the development of the living world, vitality or some other characteristic. Therefore, based on the research, the basic types of Stara Planina, which were used for the establishment of a protected natural good, the Nature Park "Stara planina", but also the separation of zones with protection regimes.

[8] "Biodiversity of Stara Planina in Serbia, Regional Environmental Center, result of the project" Cross-border cooperation through the management of common natural resources - Promotion of networking and cooperation between the countries of South East Europe, Belgrade 2007

3. Trends in the development and disappearance of certain plant and animal species in the cross-border region

The Protection of Stara planina includes the preservation of stable habitat conditions in order to develop its diversity and maintain it. In order to achieve this, it is necessary to preserve the natural values of its resources, preserve the characteristics of the landscape, apply the measures of protection in accordance with international criteria and harmonize the development of the economy in the Nature Park.

3.1 Natural cycle of endangered species on Stara Planina: a review of the stream trout

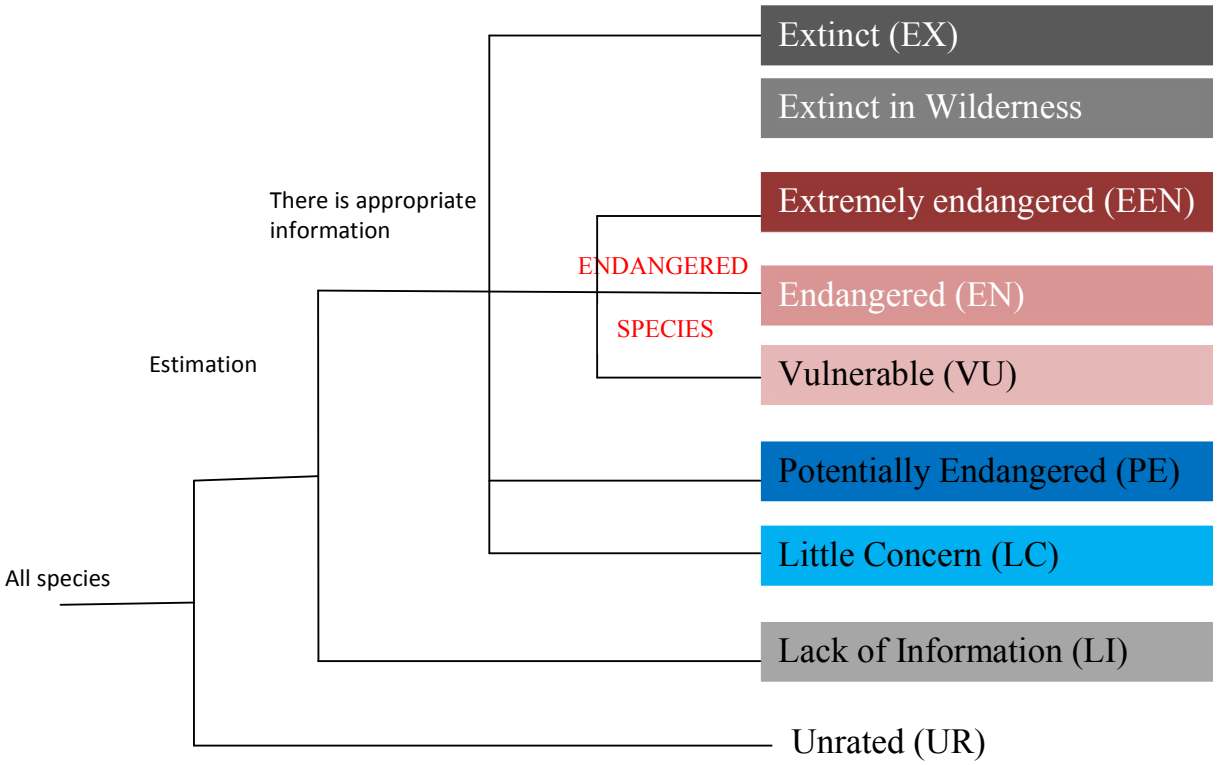
Stream trout (Salma trutta) is a type of ichthyofauna characteristic of cold and clean watercourses of Stara planina. It is mostly found in Golema reka, Visočica, Jelovica river, Dojkinačka river and Temštica. The presence of a stream trout in the hydroelectricity of Stara Planina only confirms the ecologically correct composition of water, rich in oxygen and without any devastation, with the appropriate water temperature and the character of the bottom. The basic preconditions for the reproduction and existence of this extremely demanding fish species are optimal.
Stream trout inhabits watercourses characterized by clear water with high oxygen content, temperature 10 to 15 C and not prone to blur. It does not reach a large length. Its average length is 35 to 40 cm and it belongs to the line of medium-length fish. Growth and development take place at an average speed and is ready for hunting after 2 to 3 years. Its lifetime is a maximum of 20 years. Its meat is extremely healthy and nutritious, and due to localized distribution and excellent quality on the market, it reaches a high price.
There are real threats of disappearance of the species, but they have been placed under control of measures that prevent overfishing, restrictions on daily catch, ban on catching sprats less than 25 cm, banning fishing in the period from October to June, reducing daily fishing, catching by using exclusively artificial baits, timely harvesting of autochthonous young fish and other ways of preserving the fish fund. The implementation of these measures must be consistent and continuous so that this rare species do not suffer the risk of extinction and disappearance.

3.2. The development and disappearance of plant and animal species from Stara planina

Changes in nature are happening and should be seen in the right way. The most common cause of change is an anthropogenic factor (all changes in nature created under the influence of human neglect towards the environment). The causes of species disappearance are numerous. First, disturbance of natural habitat types, natural sensitivity of populations, uncontrolled hunting and poaching, wildlife trade, the introduction of foreign species into certain areas that disturb the food chain as well as the ecosystem of plants, human arrogance and greed. The changes in nature created by man's action are so great that the living conditions in some parts of the planet have changed dramatically. Studies carried out earlier conclude that if nothing is done drastically, during the 21st century 2/3 of all plants and animals will disappear. According to official data from the World Organization for Nature Conservation (IUCN), about 60,000 plant species are endangered and their disappearance is anticipated in the not too distant future. Over the past 400 years, more than 600 species of animals have disappeared.

In Serbia, the degree of endangered species is determined in two ways: based on monitoring and generally accepted criteria, and it is shown in different lists, such as: Ordinance on the designation and protection of strictly protected and protected species of plants, animals and fungi ("Official Gazette of RS" no. 5 / 2010,47 / 2011), Red List (IUCN), as well as related laws governing relationship to species - Law on Protection and Sustainable Use of Fish Fund, Law on Wildlife and Hunting, etc.

Figure 2: Red List Categories[9]



[9] Biodiversity Strategy of the Republic of Serbia for the period from 2011 to 2018

Based on the estimated relative vulnerability of endangered species on Stara Planina, the most endangered among mammals are: deer, lynx, otter, *Spermophilus* or sousliks, bear; Among the birds: blackcock, corncrake, gray shrike, black stork, saker falcon, Eurasian Eagle-owl; among reptiles: adder, vivaparous lizard, Hermann's tortoise, European snake-eyed skink or juniper skink;among the amphibians: newt, Greek frog (Rana graeca), The marsh frog and many others. The plants also represent very endangered species, and many of them are distinguished as the most endangered: Hypecoum pseudograndiflorum Petrović, oštrelj plant, carnivorous plant, red-rattle, dwarf mountain pine and a number of other plants.

Among the most endangered species in the territory of Stara planina, and Serbia is a white-headed vulture. It is thought that there are only a dozen couples in the whole country. Black bear is also in extinction, and there are 100 to 200 of them in Serbia.

Endangered habitats in which these species are widespread are gorges, stony coastal streams, thick grassland, bushes, beech forests, oak-hornbeam forests, mixed forests, spruce forests, transitional wetlands, etc. Observing this habitat list, it seems that the whole area of Stara planina is endangered. It is actually not the case because the vulnerability of one or several species at the same time does not characterize the habitat as an endangered zone.

Stara planina changed its appearance and characteristics over time. In the past, it was rich in cattle and many areas (the slopes of Žarkova čuka, Ponor, Kopren, Vrtibog) kept their vegetation cover exactly thanks to pasture. Today, the cattle fund has fallen down several times, the pasture lands have grown into juniper and are mostly under the protection of the second degree. Additionally, changes in climate are also evident, which are reflected in the reduction of rainfall, increasing the average air temperature. The results of these events are natural changes in living conditions. The disappearance of plant and animal species can be prevented by conserving populations of species in their natural habitats. An effective way of preserving the ecosystem is the artificial return to the place from which they have disappeared, as well as the preservation of populations in artificial habitats (zoo, botanical gardens or gene banks). Funds for these projects are provided from the budget of the Republic of Serbia, from the Environmental Protection Fund, from the fees for the use of the protected area, from eco projects, from donations, etc.

4. Identification and mapping of the key types of biodiversity of Stara planina, including the prevalence in the villages on Stara planina, the region of Pirot

The types of biodiversity that are listed above have their own characteristics and characteristic manifestations. Key types of biodiversity exist in each group.

4.1. Key species in the diversity of lichens

Research related to lichens is neither sufficient nor complete, so it is difficult to accurately determine the real state of the species. The fact is that there is a decrease in the diversity of lichens in environments where urbanization is visible primarily due to deterioration of air quality. The greatest influence on epiphytic lichens (which are at the same time the most sensitive group) has aero pollution. Also unplanned planting, which implies the planting of monocultures as well as the planting of non-indigenous vegetation, leads to stagnation in the development and even complete disappearance of lichenflora. Lichens correspond to autochthonous tree species. From the endangered species of lichens on Stara Planina, we can distinguish Hypogymnia vittata (curved-striped lichen), Peltigera venosa and Ramalina capitata. According to the Regulation on the designation and protection of strictly protected and protected wild species of plants, animals and fungi of strictly protected species are: Centraria islandica (Indian lichen), Evernia prunes (oak lichen), Pseudevernia furfuracea (fake oak lichen) and Usnea (forest limestone).[10]

4.2. Key types of fungus diversity

Astraeus hygrometricus is a species that is rare and thrives on warm habitats in broad-leaved deciduous forests, on a sandy basis. Succeeds from August to November. It is endangered and in immediate danger of extinction. It is found in European and national red books**.**

4.2. Key types of fungus diversity

Astraeus hygrometricus is a species that is rare and thrives on warm habitats in broad-leaved deciduous forests, on a sandy basis. Succeeds from August to November. It is endangered and in immediate danger of extinction. It is found in European and national red books. It is endangered because of its scarcity.
Boletus edulis (penny bun, cep, porcini) is a species with a large number of varieties. It is a delicious and delicious mushroom, and it grows on sour terrains, on sunny slopes along with moss. There is neither international nor national protection status. The threat comes from the small recognition of the local population and the constant collection by the local population.
Cantharellus cibarius is a mushroom which is located on Stara Planina without precisely located habitats. It is widespread but in small quantities. It's jeopardized because of being

[10]Ordinance on proclamation and protection of strictly protected and protected wild species of plants, animals and fungi "RS Official Gazette no 5. of 5th February 2010, 47. of 29th June 2011, 32. of 30th March 2016, 98. of 8th December 2016

collected. It simulates symbiosis with the roots of trees, mostly oak and fir. Not a protected species.
Cratharellus cornucopioides - black trumpet. This is an edible mushroom, a black-brown color whose fruit looks like a trumpet and hence its name. This species is not protected and thrives in deciduous forests.
Deadalea quercina is a mushroom that has been in danger of extinction, it is not protected and is endangered due to uncontrolled wood cutting.

4.3. Key types of moss diversity

On Stara planina the most famous species of moss is Buxbaumia viridis. It thrives on wet terrain, rotten trees. The habitats are small in size, and microhabitats have no tendency to expand. This species is under the protection of the Berne Convention and the Habitat Directive in the European territories.
Dicranum is a species of moss that is also protected by the Berne Convention. The main risk factor of this type is the destruction and degradation of the habitat due to the fall of the area of old forests. This species depends strongly on the existence of stable habitats with high and constant humidity. This species has a low dispersion capacity.
Certain types of white moss are also protected under the Berne Convention and the Habitat Directive: Spagnum cuspidatum, Spagnum capilifolium, Spagnum palustre, Spagnum rubellum, Spagnum squarrosum and Spagnum subsecundum. There are some types of moss on the Stara Planina which are recorded in the European Red Book of Bryophyta: Brachythecium geheebii, Brym neodamense, Encalyptra microstoma, Grimmia caespiticia, Lophozia dscendens, Paraleucobrym sauteri and Psedoleskea saviana.[11]Construction works undertaken for the purpose of tourism development such as the construction of a ski center on Babin zub and the capture of the water from the Dojkinci springs influenced the survival of the following mosses: Anastrophyllum minutum, Barbilophozia floerkei, Barbilophozia hatcheri, Bazzania trilobata, azzania tricrenata, Lophozia adscendens, Leiocolea badensis, Leiocolea collaris, Leiocolea hetrocolpos and Scapania aequiloba and moss species such as Amphidium Mougeotia, Anomodon rugelii, Buxbaumia viridis, Cynodontium brutonii, Dichodontium palustre, Dicranum fuscescens, Dicranum viride, Diphyscium foliosum, Encalypta ciliata, Grimmia caespiticia, Physcomitrium piriforme, Pohlia longicolla, Orthotrichum obtusifolium, Paraleucobrium sauteri, Pseudoleskea saviana, Sphagnum capillifolium, Sphagnum cuspidatum, Sphagnum palustre, Sphagnum rubellum, Sphagnum squarrosum, Sphagnum subsecundum, Tetraphis pellucida and Timmia bavarica.[12]

[11] www.jpstaraplanina.rs/lat/priroda/

[12] www.jpstaraplanina.rs/lat/priroda/

4.4. Key species in the diversity of vascular plants

Vascular plants that exist on Stara Planina are divided into two types: ferns (Pteridophyta, Pteridophytina) and seedlings (Spermatophytina, Spermatophyta). Vascular plants have leaf, stem and root. The type of ferns is represented by several classes: Lycopodiopsida, Ophioglossopsida, Equisetopsyda and Polypodiopsyda. True ferns of the Polypodiopsyda have the largest number of genera, families and species, followed by the Equisetopsyda horsetail class. Lycopodiopside and Ophioglossopsida classes have a small number of species and genera. The type of gymnosperms,naked-seed-bearing group (Gymnosperme) is represented only by the class of conifers (pinopsida), which is divided into three families (Pinaceae, Cupressaceae and Taxaceae). The flowering plants, also known as angiosperms (Magnoliophyta) are floristically the richest in the vascular flora. [13] A large number of vascular flora makes an invaluable treasure of Stara planina. Species that have a significant place are numerous.

Abies alba miler (fir) is without national protection. The species is not endemic, its habitat is coniferous forests and is endangered due to deforestation, the high mortality rate of young people, agriculture, infrastructure. It is spread on Stara planina in the basin of the Dojkinačka river (Arbinje), Kopren (Bratkova strana), St Nikola, Toplodolska river, Tri čuke, Belap, Rišor, Vis, Vrtibog. Aceraceae (the maple family) is a species without protection. Its habitat is in wide deciduous forests, the population is endangered and highly dependent on habitat. It is located in the areas of St. Nikola and Balta Berilovac.

Betulaceae, the birch family is protected by the European Red Books as a vulnerable species and National Red books as a species in danger of extinction. It is spread on Stara Planina in many destinations: Crnovrška river, Dojkinačka river, Kopren, Gocine kočine, Midžor, Toplodolska river, Tri čuke. Its habitats are bushy formations of a moderate zone.
Asteraceae (palamida) is a weed plant, without protection, widespread in the area of Stara planina. It is located in the Dobrodolska river, Dojkinačka river (Bloody ponds), Jelovica River, Kopren, Tri čuke, Ivankovica.

Drosera rotundifolia (the round-leaved sundew) is a plant that is a natural rarity in Serbia. It belongs to the family of carnivores because it feeds on small insects and flies. Produces fluid like dew and when an insect accidentally falls on its leaf, it will soon be swallowed. Hence its name is sundew, and it is known to the people as dew grass or dew. This species is under international and national protection but is threatened with extinction. It is mostly on the plain Jabučko ravnište and on Kopren, in the area of the village Osmakovo on the hill Kolaš. It is endangered due to being collected, pollution, cutting of old forests, construction of traffic.

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data.sfb.bg.ac.rs/sftp/.../Zaštita%20florističkog%20diverziteta.ppt

Leotopodium alpinum (edelweiss) is a rare protected species and a recognizable plant of the preserved nature of inaccessible areas. It resembles the lion's paw, from where its name steams (in Greek leon means lion, and the podium means a foot).
Gentiana lutea (yellow gentian) is a rarity that can still be seen on Stara Planina. It has been used for more than 2000 years and is an extremely medicinal plant. Uncontrolled reading led to its extermination. Its habitats are inaccessible and the terrain is rocky . It is used in pharmacology.
Nymphaea alba (white lollipop) is a natural rarity. It is located on Krupac Lake because its habitats are standstill, fresh water. It is very sensitive to pollution and fishing.
Characteristic endemic plant species, in addition to the aforementioned, are: Pančić's wormwood, Swiss mountain pine or mugo pine which is the smallest pine in Europe, spruce, various types of oak, black pine in the village of Rsovci.

4.5. Key species of fauna diversity

The Animal World of Stara planina represents a treasure of rare and endangered species. Perhaps the primate should be given to birds, with 203 species of which 92 are considered to be natural rarities. The biggest diversity of birds in the Balkans is on the Stara Planina Mountain. Authentic species are numerous.
Ciconia nigra (black stork) is a natural rarity and is present in the gorges of Toplodolska and Temštica river. The main reasons for its vulnerability are low reproducibility and population isolation.
Aquila chrysaetos (the golden eagle) has a national status as a vulnerable species. It is present on the route from Janošica to the Rosomač cliff and Senokos, on Kopren and Hajdučki kamen (Hajduks Rock).
Gypsum fulvus (the griffon vulture) is rarely seen today, but it previously inhabited the areas of Orlov kamen, Midžor, Babin zub, Vidlič mountain range near Krupac. Adaptable habitats include high cliffs and exposed rocks. Types of birds worth mentioning are: large blackcock, the Eurasian woodcock, various species of owls, The black redstart, the collared flycatcher, the European crested tit, the lesser grey shrike and many others.
There are many types of mammals in the group.
Cervidae (deer), who is the candidate for the red list at the national level, is widespread at Crni Vrh and Rakitska hill. Hunting, high mortality rate of young animals, low productivity are some of the reasons for its extermination.
Lynx lynx (lynx) is a species that is highly endangered. There is a permanent hunting ban in Serbia in order to preserve this species. The population is small and is widespread on the mountain Belava, Orlov kamen, Topli Dol, Zaskovci. Representative mammals of this territory include otters, wild boar, snow vole, bear, The lesser mole-rat , marten, the European pine marten, wolf, fox and others.
It is necessary to point out the river crayfish, karaman, etc; from amphibians large long-legged newt, Marsh Frog, Common Frog, The European tree frog, from reptiles: Hermann's tortoise, forest turtle, mountain lizard, nose-horned viper, common adder, snake-eyed skinks.

4.6. Villages on Stara planina - examples of richness of diversity

Of the total area of the Nature Park Stara Planina, 54,376 hectares belong to the territory of the municipality of Pirot. This area covers the entire cadastral municipalities of Zaskovci, Topli Do, Zavoj, Koprevenik, Koprivstica, Mala Lukanja, Gostuša, Dobri Do, Velika Lukanja, Bela, Pakleštica, Dojkinci, Rsovci, Brlog, Jelovica, Visočka Ržana, Slavinja and Rosomač and part of the cadastral municipality Temska. [14]

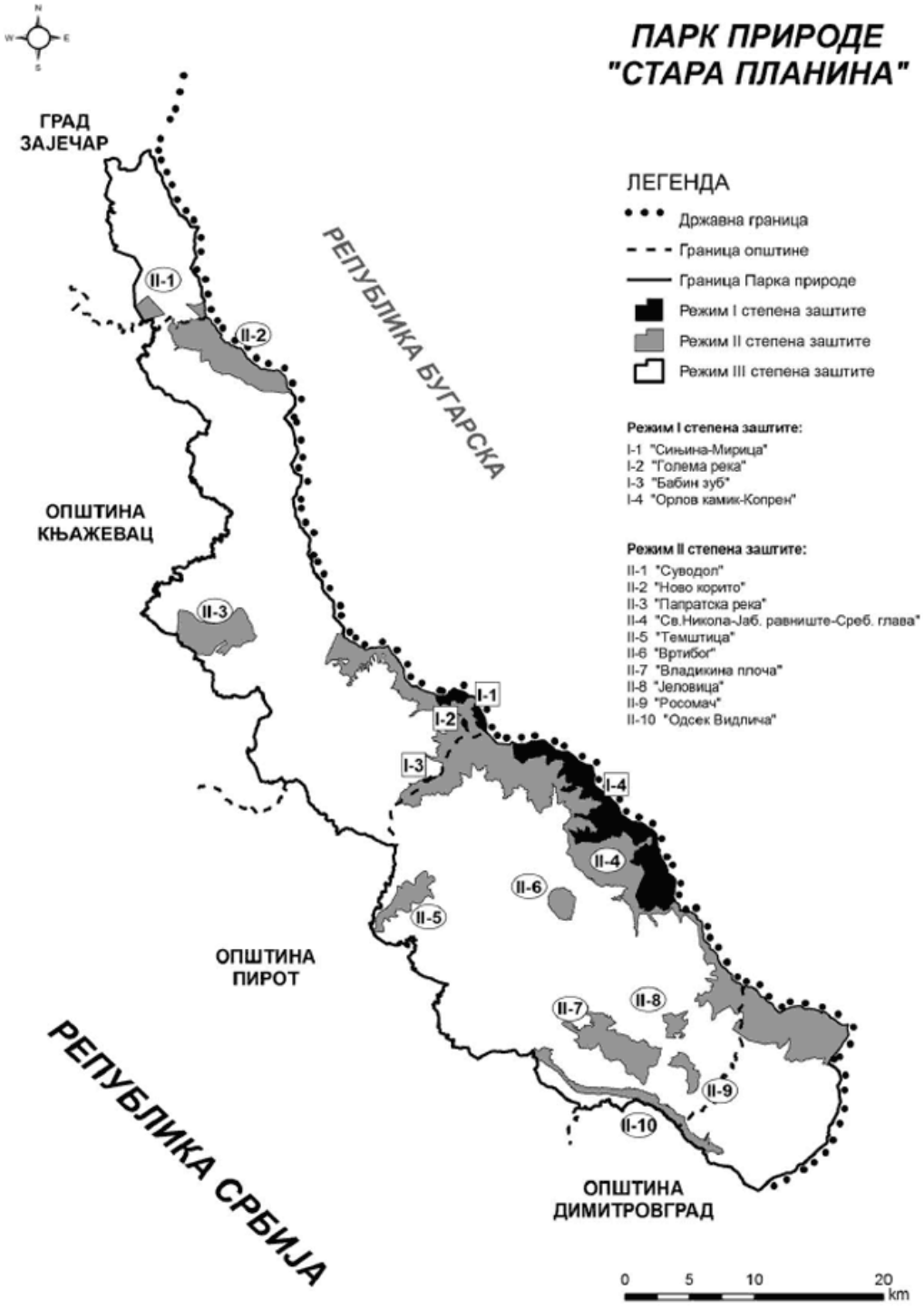
Villages on Stara planina, precious in beauty, are synonymous with ecologically healthy environment. There are many of them, but they are threatened with real danger of extinction and disappearance. Many old-fashioned villages are real treasures of wealth of biodiversity. Some of them are:

1. Dojkinci. The village is located on the territory of the Stara Planina Nature Park. It retained its specific architectural features that are reflected in the existence of barns, weeds and others buildings that are out of office today, houses are in ethno style, etc. There are pedestrians coming to the strict nature reserves (Arbinje, Tri čuke, Kopren). The area is rich in birds: quails, turtle doves, wood pigeon, cock-of-the-plains, etc.; fish - on the first place is stream trout. The round-leaved sundew (drossera rotundifolia), a plant of the carnivorous plants is located on the slopes of Stara planina in the vicinity of the village.
2. Visočka Ražana is significant for the great availability of plants from the hypericum family and in particular the St John's wort or Hypericum perforatum. It is located at the confluence of the Dojkinačka and the Slavinjska river, and it is rich in fish: stream trout, chub, barbel. The European silver fir, abies alba miller is largely prevalent.

3. Slavinja is a village from the standpoint of biodiversity, recognizable by the endemic species of stream trout in the Rosomac River and the presence of river crayfish. Both of these fish species exist only in extremely pure, clear waters, with stable temperature and no blur.
4. Jelovica is at the very border with Bulgaria. It is recognizable by the population of alnus alnobetulus - green alder.
5. Rsovci is one of the upper-mountain villages at the foot of Stara planina on the left bank of the Visočica River. The natural attraction of the gorge Vladikine ploče is 2 km from the village. The abundance of ichtyofauna, birds and medicinal herbs is characteristic of this region.
6. Pakleštica is located at the foot of Stara planina. The richness of biodiversity is present. It is the favorable excursion of the local population.
7. Topli Do is the farthest village of Stara Planina. There is a bushy alder, mugo pine, wolf, owl, etc. Absolutely clean and untamed area.

[14] Regulation on the Protection of the Stara Planina Nature Park («Official Gazette of the Republic of Serbia» No. 23/2009)

Picture 3: Nature Park “Stara planina” [15]



[15] Regulation on the Protection of the Stara Planina Nature Park («Official Gazette of the Republic of Serbia» No. 23/2009)

5. Spatial analysis of distribution of biodiversity (identification of zones on Stara Planina which are part of the region of Pirot)

The earliest research of bio and geo-diversity of Stara Planina were carried out in the second half of the 19th century, and they have served for subsequent comparison of plant and animal species, comparing the status and distribution, threats and variations that have occurred since then until today. By the 1997 regulation, Stara planina was placed under protection and declared a nature park (as an area extremely valuable from the point of view of the diversity of the flora and fauna and their communities, as well as geomorphologic, geological, hydrological and hydrogeological features and phenomena, in which the traditional form of life and cultural goods is present [16]). It is classified in the first category of protection. The total protected area is 114.332 ha and the area is nominated for the Biosphere Reserve under the UNESCO program "Man and Biosphere".

Biodiversity of Stara planina includes a large number of plant and animal species. There are more than 1,200 species and subspecies of higher plants among which there are 115 enedemic species, 40 species that are natural rarities of Serbia, 50 species on the list of endangered European flora, 52 forest, bushy and herbaceous plant communities, 150 species of nesting birds, 30 species of mammals, 26 species of fish, a large number of mosses, lichens, fish and insects (the number is not precisely determined), indigenous varieties of domestic animals and plant crops.[17]

Plant species account for 34% of national flora. About 40 protected plant species represent natural rarities, out of which 18 are under the strict protection regime. Characteristic endemic plant species include sundew, edelweiss , gentian, white water lily, mugo pine, spruce, English oak or pedunculate oak, etc. Fauna is also diverse and numerous. Of the butterflies that inhabit the Balkans, almost 40% of the total butterflies' fauna live on Stara Planina Mountain; Ichtyofauna is represented by 26 species, amphibians with 6 species and 12 species of reptiles, 203 species of birds (92 are systematized as natural rarities), over 30 species of mammals. From the group of birds are characteristic blackcock, golden eagle, white eagle, jackdaw , owl. Among the other animals, bear, deer, wild boars, otters, wild goat, the fellow deer, marten, wolf, fox, etc.
This is why the area of Stara Planina is part of an ecological network for the conservation of wild flora and fauna and the Emerald area; an internationally significant plant area (IPA), an international and nationally significant area for birds (RS04IBA), and a selected area for daily butterflies (PBA36).
On the territory of Pirot, the area of Stara planina belonging to the municipality is categorized in strict nature reserves and natural monuments.

[16]« Pictures of Stara planina in poetry »www.topirot.com/multimedija/brosure

[17] Regulation on protection of Nature Park "Stara planina" ("Official Gazette of RS" no.23 / 2009)

Strict natural reserves include the following sites:

- The "Arbinje" site, near the village of Dojkinci, which has been under protection since 1985 and is called "Smrča". The name implies that this site is a habitat of high-mountain spruce. The area is separated due to the most well-preserved spruce forests, which are the habitats of the Tresava community.
- The "Three Steps" site has also been under protection since 1985, and the area is the habitat of mugo pine, low juniper, spruce and blueberries. A rare Swiss mountain or mugo pine community is found on the highest peaks, and this is the only site of the mugo pine that has been preserved to this day.
- The locality of "Bratkova strana" is a big blackcock, a high-mountain community of spruce, low juniper and blueberries. The site has been under protection since 1985.
- The location of "Vražja glava" is a territory under beech and mountain maple, protected since 1985. In this forest complex there is also a rare vegetal species of Pirola minor.
- The "Kopren" site is the habitat of the sundew plant, protected in 1985. This site is the site of plants from the carnivorous family.
- Draganište locality includes ecosystem of spruce forests.
- The strict nature reserve "Golema Reka" includes the forest community of mountain beech.

Natural monuments are as follows:
- in the village of Rsovci, a tree of black pine;
- in Osmakovo village, on the Kolaš Hill, there are "small tree trunks" which are under protection since 1966;
- in the area of the village of Sopot, the Pedunculate oak has been protected since 1985. Areas rich in fauna provide opportunities for hunting and fishing, and there is also a branched network of hunting and fishing grounds on Stara Planina. The largest of them are "Stara Planina 2" hunting area, which covers an area of 40,804 ha and a hunting association "Ponišavlje" with an area of 187,540 ha. Hunting on wild boar, buck and doe, wolf, fox, marten, pheasant, wild goose, wild duck, woodcock and others are taking place in these hunting grounds. Fresh trout, chub, carp, pike, bream and other types of white fish are found on the fishing grounds of Stara Planina.

6. SWOT analysis of biodiversity on the Pirot side of Stara Planina

Swot analysis is a method for defining the decisive factors that affect the subject of the swot analysis itself. It includes 4 groups of factors: strengths, weaknesses, chances and threats. SWOT is an acronym of English terms for the advanced terms - Strengths, Weaknesses, Opportunities and Threats. These factors are empirically and practically analyze and study the influence of each group of factors on the observed phenomenon. Prior to the creation of the swot analysis, it is necessary to clearly define what is to be achieved by making the analysis, what is the goal and in what time interval the goal needs to be achieved.

Picture no. 4 Swot analysis scheme

	Positive	Negative
Internal factors	Strengths	Weaknesses
External factors	Chances, oportunities	Threats

The purpose of the SWOT analysis is to identify critical points in preserving the biodiversity of Stara Planina and selecting the strategy and direction of action in order to achieve the goal successfully. The greatest danger after successful swot analysis is not undertaking any measures to change the identified situation.

SWOT analysis

Strengths	**Weaknesses**
1. The richness of biodiversity - wild and animal diversity, indigenous preserved species, significant fund of medicinal herbs and forest fruits, preserved forest fund, fertile agricultural land and pastures, adequate water potential, a large number of sources, richness of ichtyofauna 2. The monetary value deriving from forestry, edible mushrooms, animals, energy ... 3. Human resources - support of local government, Tourist Organization of Pirot, NGOs and local population 4. Professional staff with knowledge in the field of nature conservation and protection of the ecosystem, whose main activity is closely correlated with Stara planina 5. National protection 6. Legal regulations are appropriate. 7. There are no significant environmental pollutants 8. Existence of a Regional Landfill for	1. Low level of population awareness of the existence of preserved areas and zones with high biodiversity potential and methods for its sustainable use 2. Low level of awareness of the decision-makers because, due to economic prosperity, priority is given to some other development potentials (poverty reduction, infrastructure construction, employment ...). 3. Lack of research papers and local studies in the field of biodiversity, databases on habitats and species have not been systematically investigated 4. Public information media are insufficiently interested in promoting the protection of nature and biodiversity 5. Creating a tourist offer based on natural values 6. Lack of water treatment system on Stara Planina

Waste Management 9. Existence of public contests to which the municipality allocates funds for projects in the field of ecology 10. JP »Srbijašume» Pirot is in charge of Nature Park Stara Planina (fishstocking, produces hunting and fishing licenses, monitoring, controls hunting and poaching...)	7. Agobiodiversity is not sufficiently used for irrigation of crops 8. Careless activities of individuals - poaching, setting up fire ... 9. Lack of a unified database on biodiversity 10. Inappropriate treatment of municipal wastewater discharged into the environment 11. Absence of more rigorous control of the exploitation of natural resources 12. Insufficient awareness of the need to comply with the regulations on environmental protection
Opportunities	**Threats**
1. Regional Networking of NGOs 2. Creating policy in the field of environmental protection 3. Regional cooperation with different sectors 4. Diversity and preservation of biodiversity 5. Relatively untouched nature 6. EU-Serbia Ecological State Funds 7. The actualization of biodiversity-related issues by external entities and entities outside the municipality has been defined through donor assistance and support from international and national institutions investing in municipal projects and projects of business people and associations of citizens related to the environment 8. EU pressures to harmonize biodiversity laws and their implementation 9. Existing expertise in the region is the existence of good legal regulations, from national laws, propositions and regulations, through local regulations. 10. Creation of LEAP for the period 2009-2013. in the town of Pirot 11. Monitoring of the state and detection of changes in the qualitative and quantitative composition of species and habitats 12. Planned fish stocking because the uncontrolled pouring can lead to the destruction of indigenous species	1. Inadequate technology and application of environmental standards 2. Incomplete application of the legislation 3. Cutting forests in increased volume than planned 4. Human factor, that is, pollution of the nature done by careless tourists. 5.Sanitary cuttings is not done enough, the diseased trees are not removed, and a large part of the felled trees are trapped in the forests and subject to rotting 6. Large threats are fires, because each year large forest areas and habitats of plant and animal species are burnt, and the problem is that most of the areas affected by the fire are very inaccessible 7. Gravel exploitation degrades aquatic ecosystems 8. The expansion of forests due to the abandonment of agricultural land while at the same time reducing the wood volume and quality of timber 9. Construction of facilities and infrastructure without respect for ambient and landscape criteria 10. Existence of poaching and disrespect of hunting rules, which undermines the stability of the ecosystem 11. Collection of medicinal herbs and forest fruits in a way that irreversibly destroys the habitats of rare and endangered species.

13. Attracting foreign donors to fund projects of the municipality and / or associations 14. Insisting on professional and scientific assistance in research activities 15. Preservation of healthy forests with important habitats of biodiversity 16. Maintaining the numerous fauna status 17. Preservation of all existing plant species	

6.1. Strengths

The forces of the Stara planina region are reflected in the variety of biodiversity, the richness of hydro potential, the number of habitats and the beauty of the area.

Local self-government is directly interested in preserving Stara planina. A series of activities and the realization of numerous projects reanimated this region and influenced the increase in its significance. Adaptation of the Sport and Recreation Center "Dojkinci" provided adequate conditions for a visit of nature lovers, for holding professional meetings of the society of biologists, geographers, etc. The Pirot Tourist Organization, within its regular activities, performs a permanent promotion of Stara planina. It has published a series of brochures with focus on certain segments of Stara planina. It also has maps indicating the vegetation belts of Stara planina as well as maps of special nature reserves, caves, canyons and gorges, etc.The essential strength of the city of Pirot is the existence of human resources for the protection of biodiversity and the sustainable use of ecosystems. Significant funds for the implementation of the Environmental Protection Program are being drawn from the budget of the city of Pirot (in 2019 it is planned to have 2,200,000 dinars), which implies the implementation of certain measures starting from the organization of green areas, education of the population, arrangement of illegal dumpsites and monitoring activities in the field of ecology. The development of the Local Environmental Action Plan (LEAP) is progress. The degree of preservation of biodiversity and ecosystems is at an enviable level.

6.2. Weaknesses

One of the key weaknesses is the low awareness of the population and the decision-makers on the importance of preserving biodiversity. Although in the municipality there is a fund for environmental protection and a solid number of people involved in the field of nature protection, it is nevertheless evident that there is an uncoordinated work of the mentioned experts and a lack of cross-sectoral cooperation and communication. Also, there is no clearly defined development strategy as well as precisely defined laws regulating property-legal relations in order to prevent illegal construction, which represents a serious factor of biodiversity disruption. A serious disadvantage is the lack of continuous monitoring of the state of the environment as well as measuring stations that would control the condition of the air, the land waters and detect the pollution in a timely manner. Funds allocated to the

Environmental Protection Fund, although they are intended, are often insufficient to trigger more serious activities.

6.3. Opportunities

The announcement of Stara planina as "The Nature Park" has influenced the increase of the tourist potential of the same. In addition to the cross-border cooperation that exists with the implementation of projects related to Stara planina, with the support of the state and local self-government, priority should be given to the protection of nature and preservation of the biodiversity of the area. In order to achieve this goal, it is necessary to increase the allocations from the budget of the city and the state which (although they exist) are insufficient for more intensive progress. Also, by involving the economy and the business sector, NGOs, (alongside with the local self-government, State enterprise for forest management "Srbijašume" Pirot and the Tourist Organization of Pirot)we will increase their care and take more active protection over Stara planina. To this purpose, a contaminator cadastre should be established, more efficient use of renewable energy sources, permanent monitoring of the status of plant and animal populations and permanent monitoring of ecosystem status.

6.4. Threats

Very often, legislation is not properly implemented in practice. Environmental threats are present by careless individuals causing immeasurable damage to the ecosystem. Uncontrolled logging, illegal hunting and poaching, inadequate picking of medicinal herbs and harvesting of forest fruits, overfishing lead to permanent endangerment and disappearance of entire species populations. Also, due to the tourist attractiveness of Stara planina, inadequate construction is present, which besides aesthetic pollution affects the biological pollution (primarily due to wastewater of newly built objects). For the foregoing reasons, one affects the change of microclimate, on the occurrence of erosion and elemental disorders. These processes can not be easily controlled by people and it is even more difficult to limit their impact on vulnerable ecosystems. The process of restoring a natural balance is long and requires additional funds.
Preserving biodiversity is a costly process and is insufficiently profitable because there is no clearly conceptualized value system for ecosystem.

7. The role of non-governmental organizations in preserving the biodiversity of Stara Planina

Non-governmental organizations play a very important role in preserving biodiversity. NGOs are active associations that create and carry out actions themselves. NGOs are flexible and adaptable to the real state, more attractive to a wider circle of interested ones than formal education systems. They are not dependent on politics and they are free to express their views. They are especially important from the point of view of ecological education and raising the ecological awareness of the population.

NGOs are the most important factors in strengthening direct civic participation in public life. They affect citizens' awareness of their role in processes that are important for community development. Civil organizations dealing with ecology in the territory of Pirot are: Stara Planina, Temska, Gea and Logos. The city of Pirot has been a partner to many organizations when submitting a project proposal and many of them have been implemented. Cooperation between local government and NGOs in the implementation of projects is excellent. In recent years, there has been visible progress in the number of projects aimed at ecology and biodiversity protection. A positive example is a project that should ensure the return of griffon vulture to Stara planina. This project will take place in 4 phases: 1) raising the awareness of the local population about the importance of the griffon vulture for Stara planina; 2) organizing the "Center for settling the griffon vulture" in Rsovci; 3) organizing a nutrition store for griffon vulture; and 4) settling the griffon vulture and monitoring it [18]
NGOs can affirm in different ways the conservation of biodiversity. Numerous public education campaigns on grandstands,through discussions and lectures which raise the awareness of the conservation of biodiversity. Publishing and distribution of ecological material, catalog production, are very receptive to citizenship. Making eco-friendly movies that would be presented to students is the right way to recruit an army of young nature lovers.NGOs from the town of Pirot, organize ecological tours on Stara planina. Being in touch with nature influences the formation of their ecological awareness. Stara planina has an ecological mountain camp in the open air in the village of Dojkinci (for holding various trainings, grandstands and schools in the nature). In this way, by direct contact with nature, the values of biodiversity and the need for its active preservation are promoted.With the support of the local government in Pirot,through the organization of several associations and associations (Association "Temska", NIDSBE "Josif Pancic", DBI "Branislav Bukurov", EID "Mladen Karaman", BD "Sava Petrovic", BID "Josif Pancic", MZ Temska)[19], during the summer months, the Stara planina Science and Research Camp is organized to bring together students of biology, chemistry, tourism and geography, as well as natural societies, high school students and volunteers from the country and the region.

[18] Renewal of the project „Griffon vulture return to Stara planina“ by the Ministry of the Environment and Spatial Planning of the Republic of Serbia 2009-2013.
[19] https://www.topirot.com/posts/kamp_temska

The role of NGOs is also relevant at regional and international level in order to ensure efficient conservation and sustainable use of biodiversity. In order to make the cooperation of the non-governmental sector more successful, it is necessary to harmonize national legislation, to set targets at the state level for biodiversity protection, to harmonize laws related to the conservation of biodiversity with the laws of the European Union, to harmonize the laws related to GMOs (genetically modified organisms) with the EU Protocol on Biological security and establish cooperation between state authorities and NGOs on preserving biodiversity.[20]

At the regional level, NGOs organize biodiversity conservation forums where they exchange information, knowledge and experiences. Cross-border cooperation with the Biodiversity Initiative of Stara planina (preservation of key species, e.g. bears, or flowers) is very effective through the transfer of knowledge and the implementation of synchronous actions. The exchange of reproductive material for the recovery of indigenous cross-border species is an action whose results would be visible in the following period. Creating a bilingual, and a trilingual website (Serbian, Bulgarian and English) that would enable communication and exchange of information on the preservation of biodiversity in the trans-boundary region would have an impact on the monitoring and maintenance of the world of bio-life on Stara planina.

[20]Biodiversity Strategy of the Republic of Serbia for the period from 2011 to 2018, the Ministry of Environment and Spatial Planning, Belgrade 2011.

8. Proposal of measures and models of biodiversity preservation at the local and regional level

The biodiversity of Stara planina should not be left to the flow of time, without any reaction to the visible changes that are taking place. Numerous tasks are to be fulfilled by undertaking appropriate measures and models for successful implementation.

8.1. Measures and models of forest preservation

In the Stara planina region, the degradation of forests is evident, which is reflected through the drying of forests for reasons that are not precisely fixed and fires (sporadic) that make invaluable damage. Illegal logging reduces wood mass, leads to erosion of soil and destruction of significant forest sites. Measures for preserving wood should include monitoring of all essential forest habitats (a system of continuous monitoring and analysis of forests as ecosystems), checking the state of the trunk and possibly preventing disease of the tree if it is determined that there are deviations in development. Also, long-term forest exploitation plans should be made with the plans for planting new young men to avoid them disappearing over time. In afforestation, only indigenous trees should be used that are in accordance with the potential vegetation of the area. On the other hand, they prohibit the use of invasive species for new afforestation, as they can lead to an absolute change in the habitat and the collapse of ecosystems that exist in them. Knowing the sensitivity of forests to particular pests is of great importance for their conservation. Forests under the influence of various biotic factors can respond healthily in terms of weakening the vitality of trees and attacks of some pathogenic organisms. For example, the black pine is prone to the infection of the highly pathogenic mushroom Sphaeropsis sapinea, the pine are infected by Rhyacionia buolian as well as the scale insects, etc. Forest conservation measures relate to the prevention of illegal dumping of waste in the forest and the emergence of "wild" landfills - by placing bins and determining the waste disposal site.

8.2. Measures and models of fauna conservation

The area of Stara planina represents the habitat of many animals. Habitats are seriously endangered due to low quantity, poor production and poaching. In order to maintain a large number of fauna, it is first necessary to make more precise monitoring of all the more important animal species. It is also necessary to strengthen the protection of existing habitats. To preserve certain species, they need first to identify them, strengthen control and monitoring over them, increase their production and thus the number. And finally, but not least, setting up a feeding room.

8.3. Measures and models of flora conservation

The area itself of the Nature Park Stara planina has over 1,200 species of plants that imply the need to protect the floral fund. As the flora is numerous, it is realistic to preserve and valorize it for tourist and educational purposes. For the purpose of conservation it is necessary to determine the habitats of endemic and rare species. It is very important to

educate the population about the method of collecting wild medicinal herbs in order to avoid the disappearance of their habitats. In connection with the collection of fruits and herbs, it is necessary to inform the local population about the most favorable collection time and to limit quantities such as blueberry and cranberry. The forest fruits collected from Stara planina (primarily blueberries, cranberries, raspberries and mushrooms) can only be purchased by authorized purchaser (licensed from State enterprise "Srbijašume"). Depending on the year, more than 50 tones of blueberries and up to 100 tones of mushrooms are purchased. In the case of low to moderate production of blueberries and cranberries (as was the case in 2017), the State enterprise for forest management ”Šumsko gazdinstvo” from Pirot did not issue licenses for reading and marketing of forest fruits. With this measure of prohibition, these cultures are kept away from disappearance. Stara planina is a treasure of wild medicinal herbs. For this reason, the population has to be educated on how to collect it.

8.4. Measures and models for raising awareness of the population

One of the most effective ways of raising awareness of the importance of preserving biodiversity is through public information. Citizens must be involved in measures and strategies for biodiversity, and this can not be without the available information. The information comes first through formal education. The goal of the education system is to better understand the importance of biodiversity through curricula. The educational program should be cumulatively upgraded starting from preschool institutions through primary to secondary schools. During the studies, academic programs related to biodiversity must be improved and the current trends in biodiversity being monitored. Teachers themselves need to be trained for a given issue through professional training. Continuous work at all levels builds awareness of biodiversity.
Education outside the education framework should also be implemented. An effective way is to train for many categories of population: for the business sector, for hunters, fishermen, collectors of medicinal herbs, touristic organizations and other interested organizations, for journalists and the media, for individuals. The existence of a website on the biodiversity of Serbia and smaller territorial units would enhance the awareness of nature conservation.Only the educated population can influence the conservation of biological diversity.

8.5. Measures and models of consultation with citizens in order to preserve the environment

Gathering opinions, remarks and proposals from citizens is of utmost importance that local authorities get a complete insight into the real state of the environment in the surrounding area.

8.5.1. Formal consultations

Citizens can take part at the local level in the work of the working and advisory bodies of the municipality. They may also be members of the interim working bodies and may propose any amendments to the agenda of the municipal assembly.

8.5.2. Informal consultations

Public debates are enacted by the Law on Environmental Impact Assessment and allow each individual to comment on issues of local importance. Local government receives first-hand information about citizens' views on local issues. The interest of citizens and the wider public

during the first meeting for the development of the LEAP in the town of Pirot was enormous. Representatives of institutions, public enterprises, businesses, local communities and schools attended the meeting.

8.6. Measures to encourage private and public investment in "green and natural infrastructure".

Conservation and development of biodiversity requires an encouraging financial support to achieve different effects: sustainable use of land, forests and rivers, expanding the market for healthy products.

8.7. Establishment of a kind of Eco Fund or the Biodiversity Fund

These funds would be spent deliberately. Also, as an alternative to the Fund, an account can be opened for raising funds from campaigns, various partnerships, payment of ecosystem services for protected areas.
Comprehensive protection of ecosystems is an extremely complex job. It consists of a series of procedures that fall into the field of applied biological disciplines (forestry, agriculture, horticulture, etc.), in the field of fundamental science, in the field of law and legislation, etc. The task of the nation, of all the relevant structures to the very individual, is to enable survival and to improve the development of the bio-system for the benefit of ourselves and the generations to come.

SOURCES AND LITERATURE:

1. The Biodiversity Strategy of the Republic of Serbia for the period 2011-2018, Ministry of Environment and Spatial Planning, Belgrade 2011
2. Biodiversity of Stara planina in Serbia - Regional Environmental Center Serbia, Belgrade 2007
3. "Climate of Stara Planina" Boško Milovanović Geographical Institute "Jovan Cvijić", Serbian Academy of Sciences and Arts, Belgrade 2010
4. Serbian Congress of Geographers with International Participation "Achievements, Actualities and Challenges of Geographical Science and Practice" The collection of Young Researchers, University of Belgrade - Geographical Faculty, Serbian Geographical Society, Belgrade 2015
5. Local Action Plan for Biodiversity of the Municipality of Žabljak (LBAP) 2011
6. Regional Environmental Center for Central and Eastern Europe, Office in Montenegro:
7. Stara Planina Nature Park, Institute for Nature Conservation of Serbia, Pirot, August 2016
8. Biodiversity of Stara Planina in Serbia, Regional Environmental Center, result of the project "Cross-border cooperation through the management of common natural resources - Promotion of networking and cooperation between the countries of South-East Europe, Belgrade 2007
9. Biodiversity Strategy of the Republic of Serbia for the period from 2011 to 2018
10.Regulation on the proclamation and conservation of strictly protected and protected wildlife, plant and animal species "Official Gazette of the RS b5.5 from 5 February 2010, 47 from 29 June 2011, 32 from 30 March 2016, 98 from 8 December 2016
11. Regulation on the protection of nature park "Stara planina" ("Official Gazette of RS" No. 23/2009)
12. Renewal of the project The return of the griffon vulture to Stara planina, Ministry of the Environment and Spatial Planning of the Republic of Serbia 2009-2013
13. State enterprise »Stara planina» elaboration on the study adequacy for the creation of tourist area on Stara Planina, Belgrade June 2013
14. Tourism development plan on Stara Planina with pre-investment study and physical and technical characteristics of ski resorts, Ministry of Economy and Regional Development, June 2007
15.http://www.srbija.travel/upload/documents/brosure/priroda_srbije_odmor_u_pokretu_5izdanje.pdfased 27.09.2018.
16.Republic Seismological Institute - http://www.seismo.gov.rs/indexl.htm17.www.serbiaecotour.rs/sr/zasticena-podrucja/stara-planinabased 16.08.2018.
17. www.jpstaraplanina.rs/lat/priroda/VISITED 09/12/2018

18. www.topirot.com/multimedija/brosure - «Old song lyrics» visited on 24.08.2018.

19. https://www.topirot.com/posts/kamp_temska visited 09.10.2018.

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