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ODRŽIVO ŠUMARSTVO

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BIRCH FORESTS IN PEŠTER PLATEAU

Mihailo Ratknić, Ljubinko Rakonjac, Milorad Veselinović, Biljana Nikolić¹

Abstract: Roughly 10 million acres of forest disappears each year pointing to the gravity of the problem and calling for urgent tackling measures for stopping degradation and devastation of the existing forest ecosystems. According to the concept of ecocentric (biocentric) resource use the ecosystem represents the complexity of living organisms and has value in itself because it views differently the needs of people and their relationship toward Nature. The work is based on the Sustainable Development Concept and its focus on smaller territorial wholes (areas). The research was conducted in birch forest on Pešter Plateau (Southwestern Serbia). Bearing in mind the fact that destruction of plant resources over the centuries has brought them into jeopardy; thus having the direct consequence on the socio – demographic status of the people inhabiting the Pešter Plateau area. The aim of these researches is to define the condition of the natural resources, give priority to the activities for stopping the negative influences and set measures for improving the state of things.¹

Key words: birch forest, G191B, sustainable use, natural resources

ŠUME BREZE NA PEŠTERSKOJ VISORAVNI

Apstrakt: Nestajanja šuma od oko 10 miliona hektara godišnje ukazuje na ozbiljnost problema i zahteva hitno preduzimanje mera na zaustavljanju degradacije i devastacije postojećih šumskih ekosistema. U konceptu ekocentričnog (ili biocentrično) korišćenja resursa ekosistem predstavlja kompleksnost živih organizama i ima svoju vrednost sam po sebi zato što razmatra na drugi način potrebe ljudi i njihov odnos prema prirodi. Rad bazira na Konceptu održivog razvoja i usredsređena je na manje teritorijalne celine (područja). Istraživanje je obavljeno u šumi breze Pešterskoj visoravni (jugozapadna Srbija). S obzirom da je vekovnim uništavanjem biljnih resursa na području Pešterske visoravni njihovo stanje ugroženo i to se direktno odnosi i na sociodemografski status stanovni-

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štva. Cilj ovih istraživanja je da se definiše stanje prirodnih resursa, odrede prioriteta aktivnosti za zaustavljanje nepovoljnih uticaja i zatim odrede mere za unapređenje stanja.

Ključne reči: šume breza, G191B, održivo korišćenje, prirodna bogatstva

1 INTRODUCTION

Roughly 10 million acres of forest disappears each year pointing to the gravity of the problem and calling for urgent tackling measures for stopping degradation and devastation of the existing forest ecosystems. According to the concept of ecocentric (biocentric) resource use the ecosystem represents the complexity of living organisms and has value in itself because it views differently the needs of people and their relationship toward Nature. The way Nature creates and maintains ecosystems is respected. The ecocentric concept protects, maintains and regenerates the functioning of natural ecosystems, while at the same time using all resources and services to provide for the needs of people on permanent and stable bases. The advantage is given to ecological processes in ecosystems, in order to provide for society's economic needs, but not in the way of industrial use. The integral part is the care for soil, water, biodiversity and biomass. The realization of these aims is based on ecologic, socio-demographic and economic criteria. The work is based on the Sustainable Development Concept and its focus on smaller territorial wholes (areas).

2 MATERIAL AND METHOD

The research was conducted in birch forest on Pešter Plateau (Southwestern Serbia). The pedologic characteristics were tested on the basis of pedologic profiles, and type determination was conducted according to the soil classification (Škorić, Filipovski, Ćirić, 1985) as well as on the basis of FAO classification. The habitat classification was performed according to the EUNIS classification. "Flora of Republic of Serbia" (1970-1986), "Ikonographie der flora des südöstlichen Mitteleuropa" ("Iconography of flora for south-east Middle-Europe") (Jávorka, Csapody, 1979), "Flora and Vegetation of Golija and Javor" (Gajić, 1990), "Flora of the National park Tara" are used for determination of species types. The floral element spectrum was analyzed in accordance with Kojic and others (1997). The division on basic types of life forms was conducted according to Raunkiaer (Raunkiaer, 1934). The area under forests and forest stands, the area division based on the stand types, wood volume and volume accretion were analyzed. The representation of trees with diameter under 30cm was analyzed separately.

3 RESEARCH RESULTS

The birch forests in EUNIS classification belong to:

G1 – BROADLEAVED DECIDUOUS FORESTS

G1.9 – Birch forest<*Betula*>, common aspen<*Populus tremula*>, European rowan<*Sorbus aucuparia*> or hazel tree<*Corylus avelana*> outside the waterway zones

G1.91 – Birch<*Betula*> forests in not swamped terrain

G1.91B – Balkan birch <*Betula*> forest in not swamped terrain

Equivalent community: *Betuleum verrucosae* Glisic, 1950

The birch (*Betula pendula*) is found on Pester plateau on acidic and very acidic soils (e.g. on Javor mountain under Suvi Rt in pasture terrain of high acidity (pH 3.5 – 4.5). The pure stands were noted in Ursule, in Kamena Glava (1265) and between Tasic and Papic, as well as between hamlets Brezdje and Nesovine. The tallest trees are found on Ursule meadows. It is also found in progressive succession on deserted meadows and pastures on acidic brown soil in the areas of villages Uvac and Lopize, as well as in felled beech forests on higher altitudes and in recently founded cultures. The birch is not capable of withstanding a longer fight with other species in recently founded cultures, especially spruce which places birch in subordinate position. The birch overpowers hazel and creates the upper layer in hazel bushes. The community is especially spread in form of young stands formed over the last twenty years (with the decrease of the cattle fond and abandoning of nomadic cattle breeding), in former pastures and meadows not mowed now. The community is expanding and densely populating these areas.

The pioneer birch community is found in the altitude range from 1110 to 1300 m, on inclines from 7° to 30°. The geologic foundation is sandstone. The soils belong to district cambisols; and according to the mechanic structure soils are mostly clays and sandy clays, from 65 to 90 cm depth.

The floristic structure of birch forests – 105 plants are found in birch forests, nine tree species, seven bush species and 89 species of low-level flora (table 1).

Table 1- Birch forest floristic structure

<i>Acer pseudoplatanus</i> L.	<i>Juniperus communis</i> L.
<i>Ajuga reptans</i> L.	<i>Knautia arvensis</i> (L.) Coult.
<i>Alchemilla vulgaris</i> L.	<i>Knautia dinarica</i> (Murb.) Borb.
<i>Allium pulchellum</i> Don.	<i>Knautia drymeia</i> Hauff.
<i>Anemone nemorosa</i> L.	<i>Koeleria gracilis</i> Pers.
<i>Angelica palustris</i> (Bess.) Hoff.	<i>Lathyrus niger</i> (L.) Bernh.
<i>Antennaria dioica</i> (L.) Gaertn.	<i>Leontodon crispus</i> Vill.
<i>Aremonia agrimonoides</i> (L.) DC	<i>Leontodon vulgaris</i> Kitt.
<i>Asarum europaeum</i> L.	<i>Lilium martagon</i> L.
<i>Astrantia major</i> L.	<i>Luzula campestris</i> (L.) Lam.et DC
<i>Betula pendula</i> Roth.	<i>Luzula luzulina</i> (Vill.) Tore et Sar.
<i>Brachypodium silvaticum</i> (Huds.) P.B.	<i>Luzula luzuloides</i> (Lam.) Dan.
<i>Briza media</i> L.	<i>Melampyrum pratense</i> L.
<i>Bupleurum praealtum</i> L.	<i>Melampyrum silvaticum</i> L.
<i>Campanula patula</i> L.	<i>Melica uniflora</i> Retz.
<i>Campanula trachelium</i> L.	<i>Molinia coerulea</i> (L.) Mnch.
<i>Carex limosa</i> L.	<i>Myrrhis odorata</i> (L.) Scop.
<i>Carex pilosa</i> Scop.	<i>Nardus stricta</i> L.
<i>Carex pseudocyperus</i> L.	<i>Pedicularis comosa</i> L.
<i>Centaruea jacea</i> L.	<i>Peucedanum officinale</i> L.
<i>Centaurea montana</i> L.	<i>Phyteuma spicatum</i> L.
<i>Cerastium brachypetalum</i> Desp.	<i>Picea abies</i> Kars.
<i>Chamaecytisus ciliatus</i> (Wahlenb.) Rothm.	<i>Pirus piraster</i> Burg.
<i>Chamaecytisus hirsutus</i> (L.) Link	<i>Poa trivialis</i> L.
<i>Chamaespartium sagittale</i> (L.) P.Gibbs.	<i>Polygala major</i> Jacq.
<i>Cirsium acaule</i> (L.) Scop.	<i>Populus tremula</i> L.
<i>Cirsium candelabrum</i> Gris.	<i>Potentilla erecta</i> (L.) Rausch.

Corylus avellana L.
Crataegus monogyna Jacq.
Danthonia provincialis Lam.et DC
Deschampsia flexuosa (L.) Tr.
Dorycnium herbaceum Vill.
Echium vulgare L.
Euphorbia amygdaloides L.
Evonymus europaeus L.
Fagus silvatica L.
Festuca amethystina L.
Festuca valesiaca Schl.
Filipendula hexapetala L.
Fragaria vesca L.
Frangula alnus Mill.
Galium boreale L.
Galium cruciata (L.) Scop.
Galium mollugo L.
Galium verum L.
Genista ovata W.etK.
Geranium sanguineum L.
Hieracium bauhini Schult.
Hieracium cymosum L.
Hieracium pilosella L.
Hieracium sparsum Friv.
Hypericum elegans Steph.
Hypericum perforatum L.

Potentilla chrysantha Tievir.
Potentilla heptaphylla Jusl.
Potentilla recta L.
Potentilla taurica Willd.
Primula veris Huds.
Prunella vulgaris L.
Prunus spinosa L.
Pteridium aquilinum (L.) Kuhn.
Ranunculus polyanthemus L.
Ranunculus repens L.
Rhamnus falax Boiss.
Rosa arvensis Huds.
Sanguisorba minor Scop.
Silene vulgaris (Mnch.) Gar.
Solidago virga-aurea L.
Stachys officinalis (L.) Trev.
Stellaria graminea L.
Stellaria holostea L.
Teucrium chamaedrys L.
Tragopogon dubius Scop.
Trifolium alpestre L.
Trifolium repens L.
Vaccinium myrtillus L.
Veratrum album L.
Veronica officinalis L.

Typical species are: *Betula pendula*, *Chamaespartium sagittale*, *Crataegus monogyna*, *Euphorbia amygdaloides*, *Genista ovata*, *Hypericum perforatum*, *Juniperus communis*, *Poa trivialis*, *Prunella vulgaris*, *Pteridium aquilinum*, *Trifolium arvense*, *Veronica officinalis*, *Fragaria vesca*.

The high presence of hemicryptophytes (58. 25%) pointing to colder climate conditions is noted in the **life-form spectrum** (table 2). The participation of geophytes (11. 65%) points to favorable soil conditions (humidity, structure and soil depth). The participation of phanerophytes and nanophanerophytes is 15. 54%. Chamaephytes participate with 7. 76% (wood and herbaceous 3. 88% each), therophytes 3. 88% and therophyte/ chamaephyte participate with 2. 91%.

Table 2- Plant life-form spectrum in birch forests

Life-forms (%)							
p	np	wc	hc	h	g	t	th
8.74	6.80	3.88	3.88	58.25	11.65	3.88	2.91
15.54		7.76					

Legend: p - Phanerophytes; np - Nanophanerophytes; wc - Woody chamaephytes; hc - Herbaceous chamaephytes; h - Hemicryptophytes; g - Geophytes; t - Terrophytes; th - Terrophytes/Chamaephytes

The largest community group is formed by middle – European floral elements (26. 92%); the individual area types of the said group are sub middle – European (15. 38%)

and middle – European floral elements (9.62%) (table 3). There is also high participation of euro-Asian floral elements (25.00%), with the highest participation of euro-Asian and sub euro – Asian elements as individual area types. There are only 8.65% of sub-Mediterranean floral elements, and more specifically sub-Mediterranean and east Mediterranean participate with 2.88%. The low participation of Balkans floral elements (1.92%), as well as Mediterranean and sub-Mediterranean elements, points to the low influence of sub-Mediterranean area over this community. Pontic – central Asian elements make up 15.38%. Circum – polar and cosmopolite elements participate with 11.58% and floral elements of northern regions with 6.73%, giving a grand total of 18.31% pointing to colder habitats. Sub-Atlantic floral elements comprise 4.81%.

Table 3- Spectrum of floral elements in birch forests

Name of floral element group	Floral element	Participation %	
1. FLORAL ELEMENTS – NORTHERN REGION			
African floral elements			
Boreal floral elements	Subboreal –European-West Siberian	0.96	
	Subboreal –Circum-polar	2.88	
	Boreal-Euroasian	2.88	6.73
2. MIDDLE-EUROPEAN FLORAL ELEMENTS			
Middle-European	Middle European	9.62	
And European	Submiddle European	15.38	
	Submiddle Russian	0.96	
	Alpe-Carpatian	0.96	26.92
3. SUBATLANTIC FLORAL ELEMENTS			
Sub-atlantic and atlantic	Sub-atlantic –sub-mediterranean	4.81	4.81
4. SUBMEDITERRANEAN FLORAL ELEMENTS			
Sub-mediterranean	Sub-mediterranean	2.88	
East- Sub-mediterranean	East- Sub-mediterranean	2.88	
Balkan and	Subilirc	0.96	
Balkan-apenninian	Balkan	1.92	8.65
5. PONTIC and CENTRAL-ASIAN FLORAL ELEMENTS			
	Pontic- Central-Asian	0.96	
	Sub-pontic-Central-Asian	3.85	
Pontic	Pontic	0.96	
	Sub-pontic	4.81	
	Pontic- Sub-mediterranean	2.88	
	Sub-pontic-East- Sub-mediterranean	0.96	
Pannonian	Sub-pannonian	0.96	15.38
6. FLORAL ELEMENTS of DESERT REGION			
	Sub_taurin	0.96	0.96
7. EURO-ASIAN FLORAL ELEMENTS			
	Sub-South-Siberian	3.85	
	Euro-Asian	11.54	
	Sub-Euro-Asian	9.62	25.00
8. CIRCUM-POLAR and COSMOPOLITE FLORAL ELEMENTS			
	Circum-polar	8.65	
	Sub-circum-polar	0.96	
	Cosmopolite	1.92	11.54

The birch community is mono-dominant; birch dominates in all trees and bush layers. The tree top coverage degree in the first layer ranges from 0.4 – 0.8. The tree height depends on the stand age and goes from 3.5 – 25 m. The first layer tree diameter is 20 cm depending on the stand age (from 4 cm on Lopiz slopes in young stands, to 30 cm in adult stands in Lemica gaj). The bush layer is built from a large number of species, and regarding the degree of presence besides birch there are: hazel bush (*Corylus avellana*), common juniper (*Juniperus communis*), *Populus tremula*, *Crataegus monogyna*, *Frangula alnus*, *Prunus avium*, *Rosa canina*, *Acer pseudoplatanus*, *Evonymus europaeus*, *Prunus spinosa*, *Rhamnus fallax*, etc. The low-level flora layer is very lush and the soil coverage ranges from 0.3 to 0.7. The highest coverage degree is found in stable, old stands where the airy birch tree tops enable the plant growth in low-level flora layer. The lowest coverage (0.4) is in densely connected stands on northern slopes where the light is reduced.

Ecological birch forest indexes

The ecological humidity index average value is 2.73 (depending on the recording value ranging from 2.57 to 2.93). Sub- mesophyll plants, which are best suited by mesophyll habitats, could be found here, as well as in xerophyll conditions.

The average value of ecological soil chemical reaction is 3.06 (from 2.87 to 3.35) pointing to neutrophilic plants found on neutral low-acidic soil.

The ecological nutrient indexes (the amount of nitrogen in the soil) are 2.41 (from 2.31 to 2.64) specifying that plants somewhere between oligotrophic and mesotrophic are found there.

The ecological light indexes are 3.31 (3.02 to 3.36) meaning that semi-sciophytes are found in birch forests.

The ecological temperature indexes are 3.07 (ranging from 2.97 to 3.22) pointing to the presence of mesothermal species found in mountain conditions.

Medicinal herbs in birch forests - The existence of 105 plant species has been recorded in birch forests. The 40 of the said number are medicinal herbs i.e. 38.1%.

Seven species belong to the first category i.e. 6.7%: *Betula pendula*, *Crataegus monogyna*, *Hypericum perforatum*, *Juniperus communis*, *Primula veris*, *Vaccinium myrtillus* and *Veratrum album*. *Veratrum album* is found in the Red Book and according to the UCN category this taxon is extremely endangered and vulnerable so its collecting is prohibited. Other species from this group are under collecting and selling control.

The second category contains three species *Sanguisorba minor*, *Solidago virgaurea* and *Veronica officinalis*. All species noted are on the market. Species *Solidago virgaurea* is under collecting and selling control.

The third category numbers eight species i.e. 7.6% (*Ajuga reptans*, *Antennaria dioica*, *Asarum europaeum*, *Evonymus europaeus*, *Fagus sylvatica*, *Populus tremula*, *Potentilla erecta* and *Prunus spinosa*). Species *Ajuga reptans*, *Antennaria dioica* and *Populus tremula* are not on the market and only have significance in traditional folk medicine. Species *Evonymus europaeus*, *Fagus sylvatica*, *Prunus spinosa* are not on the market. Species *Potentilla erecta* and *Asarum europaeum* from this group are characterized by unequal and irregular collecting, and because of that they are placed under the collecting control.

The fourth category includes 10 plant species i.e. 9.5% (*Acer pseudoplatanus*, *Campanula trachelium*, *Corylus avellana*, *Euphorbia amygdaloides*, *Filipendula*

hexapetala, *Fragaria vesca*, *Galium verum*, *Ranunculus repens*, *Stachys officinalis* and *Teucrium chamaedrys*). Species *Acer pseudoplatanus*, *Filipendula hexapetala* and *Ranunculus repens* are under no legal boundaries concerning the amounts collected in natural habitats. Species *Corylus avelanna*, *Fragaria vesca*, *Galium verum* and *Teucrium chamaedrys* are under controlled collecting and selling. Species *Campanula trachelium*, *Euphorbia amygdaloides* and *Stachys officinalis* are significant in traditional folk medicine.

The fifth category has 12 species i.e.11.4% (*Alchemila vulgaris*, *Anemone nemorosa*, *Centaruea jacea*, *Frangula alnus*, *Galium boreale*, *Hieracium pilosella*, *Lilium martagon*, *Picea abies*, *Potentilla recta*, *Prunela vulgaris*, *Pteridium aquilinum* and *Trifolium repens*). Species *Picea abies* and *Potentilla recta* are on the market without restrictions, *Alchemila vulgaris* is under controlled collecting and selling, while the rest of the species have little economic significance.

Fruit trees in birch forests - Taking into consideration the pioneer character of birch forest the community is poor in forest fruit trees, especially woody forest fruit trees. The presence of bushy species *Crataegus monogyna*, *Juniperus communis*, *Vaccinium myrtillis*, *Frangula alnus*, *Rhamnus falaxi* and *Rosa arvensis* has been noted, as well as the presence of specie *Fragaria vesca*.

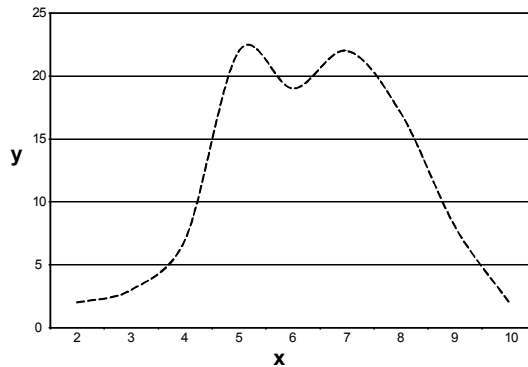
Melliferous plant species in birch forests - Based on the analysis conducted in birch forests are found 38 melliferous plant species, out of which five are woody plants, eight are bushy and 25 herbaceous (table 4, chart 1). The community average honey yield is 2.28. The number of bee plants in bloom is the highest in May, June, and July, thus providing the long term bee nourishment during summer months.

Table 4 - Melliferous plant species and blossoming time in birch forests

Species	Melliferous	Month									
		2.	3.	4.	5.	6.	7.	8.	9.	10.	
Trees											
<i>Populus tremula L.</i>	D3	+	+								
<i>Picea abies Kars.</i>	D3			+	+	+					
<i>Betula pendula Roth.</i>	D2			+	+						
<i>Fagus sylvatica L.</i>	D2				+						
<i>Acer pseudoplatanus L.</i>	D2			+	+						
Shrubs											
<i>Corylus avelanna L.</i>	Ž4	+									
<i>Crataegus monogyna Jacq.</i>	Ž3				+	+					
<i>Evonymus europaeus L.</i>	Ž3		+	+	+						
<i>Prunus spinosa L.</i>	Ž3		+	+	+						
<i>Teucrium chamaedrys L.</i>	Ž3					+	+	+			
<i>Frangula alnus Mill.</i>	Ž3				+	+	+	+			
<i>Genista ovata W.etK.</i>	Ž3				+	+					
<i>Vaccinium myrtillis L.</i>	Ž2				+	+					
Herbaceous plants											
<i>Campanula trachelium L.</i>	Z4						+	+	+		
<i>Stachys officinalis (L.)Trev.</i>	Z4						+	+			
<i>Anemone nemorosa L.</i>	Z4			+	+						

Species	Melliferous	Month									
		2.	3.	4.	5.	6.	7.	8.	9.	10.	
<i>Centaruea jacea L.</i>	Z4					+	+	+	+	+	
<i>Centaurea montana L.</i>	Z4							+	+	+	
<i>Echium vulgare (L.)</i>	Z4										
<i>Geranium sanguineum L.</i>	Z4				+	+	+				
<i>Trifolium alpestre L.</i>	Z4				+	+	+				
<i>Veratrum album L.</i>	Z3						+	+			
<i>Solidago virga-aurea L.</i>	Z3						+	+	+		
<i>Ajuga reptans L.</i>	Z3				+	+	+				
<i>Filipendula hexapetala L.</i>	Z3				+	+	+				
<i>Galium boreale L.</i>	Z3					+	+	+			
<i>Galium mollugo L.</i>	Z3				+	+	+	+	+		
<i>Potentilla recta L.</i>	Z3				+	+	+				
<i>Prunela vulgaris L.</i>	Z3						+	+			
<i>Astrantia major L.</i>	Z3				+	+	+	+			
<i>Phyteuma spicatum L.</i>	Z3					+	+				
<i>Polygala major Jacq.</i>	Z3						+	+			
<i>Hypericum perforatum L.</i>	Z2						+	+	+		
<i>Primula veris Huds.</i>	Z2			+	+						
<i>Fragaria vesca L.</i>	Z2				+	+					
<i>Lilium martagon L.</i>	Z2						+	+			
<i>Trifolium repens L.</i>	Z2				+	+	+	+	+		
<i>Knautia arvensis (L.) Coult.</i>	Z2				+	+	+	+	+		

Chart 1- The number of melliferous plants in bloom in birch forest over the year (x- months, y- number of plants)



The wood resources of birch forests - The birch forest is found on 169.14 ha (table 5). The tall forest occupies 1.3% of the total number and the others are shoot stands. The devastated shoot stands cover 27.5%. The total wood volume is 15,238 m³; the tall forest volume is 394 m³, and the shoot stand volume is 14,844 m³. The trees with the diameter under 30cm cover 87.7%.

Table 5 - Wood resources of birch forests

Area (ha)	Total volume (m ³)	Volume in thickness degrees										Volume accretion (m ³)
		< 10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90	
High birch forest												
2.20	394		123	153		48						11.3
Coppice birch forest												
120.40	14238	1578	5495	5339	1580	245						407
Devastated coppice birch forest												
46.54	606	605										5.7

4 DISCUSSION

Bearing in mind the fact that destruction of plant resources over the centuries has brought them into jeopardy; thus having the direct consequence on the socio – demographic status of the people inhabiting the Pešter Plateau area. The aim of these researches is to define the condition of the natural resources, give priority to the activities for stopping the negative influences and set measures for improving the state of things. Carrying into effect the research aims on the sustainable use of plant resources in Pester plateau sets the foundation for:

- Implementing of European standards, models, creating methodology for registering restorable plant resources;
- creating strategic span for sustainable management of restorable resources according to the sustainable development principles and the current exploration degree of the existing natural resources;
- maintaining and raising ecological, biological, climate, socio – cultural and economic contribution to plant resources use;
- protecting the environment, the social and spiritual function, natural ecosystem values achieved through establishment, expansion and adequate management of protected areas and communities, forest preservation in characteristic ecological systems and regions, wild life preservation and management, genofond preservation, setting up support and security measures for sustainable use of biological resources and biodiversity preservation;
- supporting and improving national afforestation programs and re – cultivation of degraded habitats, setting up new and improving the existing forests for various uses, in order to relieve the pressure on current forest ecosystems;
- founding the planning concept for permanent management of restorable plant resources on the criterion preserving the quality of environment, meaning that the economical use of restorable plant resources must not reduce numerous ecological functions, accompanied by sustaining and enhancing habitat biodiversity;
- creating conditions for ascertaining sustainable agricultural production;
- Preserving and improving biodiversity.

The data assembled enabled the multilayer comparative analysis of the area by GIS technology, as well as the establishment of the natural ecosystems endangerment degree and spatial suitability for certain activities. It enables forecasting direct and indirect consequences of aimless use of the area, permitting prevention

of higher level mistakes before reaching the final decision. The array of subprogram activities interacting can be formulated as a few general program tasks: environment protection, optimum natural resource use, strengthening of the secondary activities, market analyses and analyses of commercialization offers on this area, strictly in the function of preserving natural resources and environment protection (by applying the principle on sustainable development of restorable plant resources).

5 CONCLUSIONS

The birch forests appear as a stage of progressive succession on former pastures and meadows after ceasing of zoo – anthropogenic influences.

According to EUNIS classification they belong to the broadleaved deciduous forests (**G1.91 – Balkan birch < *Betula* > forests on non-swampy soil**).

The soil types are district cambisols, pseudogley, and luvisols.

A total of 105 plant species is recorded, nine of which are tree species, seven bush species and 89 species of low-level flora.

Ecological indexes have the following average values for: humidity 2.73, soil chemical reaction 3.06, nutrients 2.41, light 3.31 and temperature 3.07.

Out of the total number of registered plants 40 are medicinal herbs i.e. 38.1% and seven belong to the first, three to the second, eight to the third, ten to the fourth and twelve species to the fifth healing property category.

Owing to the pioneer character of the birch forests the community is poor in fruit trees, especially in woody fruit trees. The bushy species *Crataegus monogyna*, *Juniperus communis*, *Vaccinium myrtillus*, *Frangula alnus*, *Rhamnus falax* and *Rosa arvensis* have been recorded, as well as *Fragaria vesca*.

A total of 38 bee plant trees have been recorded in birch forests, five are woody, eight bushy and 25 herbaceous plants. The average honey yield is 2.82. The number of bee plants in bloom is at its highest in May, June and July providing the long term bee-nourishment during summer months.

The birch forest is recorded on 169.14ha; the tall birch forest occupies 1.3%, while the rest are shoot stands. Devastated shoot stands cover 27.5%. The total volume is 15,238 m³, 394 m³ is found in tall forest and 14,844 m³ in shoot stands. Trees with the diameter under 30cm cover 87.7%.

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BIRCH FORESTS IN PEŠTER PLATEAU

Mihailo Ratknić, Ljubinko Rakonjac, Milorad Veselinović, Biljana Nikolić

Summary

The birch forests appear as a stage of progressive succession on former pastures and meadows after ceasing of zoo – anthropogenic influences. According to EUNIS classification they belong to the broadleaved deciduous forests (G1.91 – Balkan birch < *Betula* > forests on non-swampy soil). The soil types are district cambisols, pseudogley, and luvisols. A total of 105 plant species is recorded, nine of which are tree species, seven bush species and 89 species of low-level flora. Ecological indexes have the following average values for: humidity 2.73, soil chemical reaction 3.06, nutrients 2.41, light 3.31 and temperature 3.07. Out of the total number of registered plants 40 are medicinal herbs i.e. 38.1% and seven belong to the first, three to the second, eight to the third, ten to the fourth and twelve species to the fifth healing property category. Owing to the pioneer character of the birch forests the community is poor in fruit trees, especially in woody fruit trees. The bushy species *Crataegus monogyna*, *Juniperus communis*, *Vaccinium myrtillus*, *Frangula alnus*, *Rhamus falax* and *Rosa arvensis* have been recorded, as well as *Fragaria vesca*. A total of 38 bee plant trees have been recorded in birch forests, five are woody, eight bushy and 25 herbaceous plants. The average honey yield is 2.82. The number of bee plants in bloom is at its highest in May, June and July providing the long term bee-nourishment during summer months. The birch forest is recorded on 169.14ha; the tall birch forest occupies 1.3%, while the rest are shoot stands. Devastated shoot stands cover 27.5%. The total volume is 15,238 m³, 394 m³ is found in tall forest and 14,844 m³ in shoot stands. Trees with the diameter under 30 cm cover 87.7%.

ŠUME BREZE NA PEŠTERSKOJ VISORAVNI

Mihailo Ratknić, Ljubinko Rakonjac, Milorad Veselinović, Biljana Nikolić

Rezime

Šuma breze se javlja kao stadijum progresivne sukcesije, na nekadašnjim pašnjacima i livadama posle prestanka zooantropogenih uticaja. Po EUNIS klasifikaciji pripadaju širokolisnim listopadnim šumama (G1.91B - Balkanske brezove < *Betula* > šume na nezamočvarenom terenu). Zemljišta su distrični kambisoli, rede pseudoglejevi i luvisoli. Konstatovano je 105 biljaka, od čega 9 vrsta drveća, 7 vrsta žbunova i 89 vrsta prizemne flore. Ekološki indesi za vlažnost imaju prosečnu vrednost 2.73, za hemijsku reakciju zemljišta 3.06, za hranljive materije 2.41, za svetlost 3.31 i za temperaturu 3.07. Od ukupno registrovanih biljaka 40 je lekovito, odnosno 38.1% i to: 7 pripadaju prvoj, 3 drugoj, 8

trećoj, 10 četvrtoj i 12 vrsta petoj kategoriji lekovitosti. Kako su šume breze pionirskog karaktera zajednica nije bogata šumskim voćkarcama, naročito drvenastim vrstama voćkarica. Konstatovano je prisustvo žbunastih vrsta *Crataegus monogyna*, *Juniperus communis*, *Vaccinium myrtillis*, *Frangula alnus*, *Rhamnus falax* i *Rosa arvensis*, kao i prisustvo vrste *Fragaria vesca*. u šumama breze konstatovano je 38 medonosnih vrsta, od čega 5 drvenastih, 8 žbunastih i 25 zeljastih. Srednja mednost zajednice iznosi 2.82. Broj medonosnih biljaka u cvetu je najveći tokom maja, juna i jula, što obezbeđuje dugotrajnu pčelinju pašu tokom letnjih meseci. Šuma breze konstatovana je na 169.14 hektara. Na ovoj površini visokih šuma ima svega 1.3%, dok su ostale izdanačke sastojine. Devastirane izdanačke sastojine breze učestvuju sa 27.5%. Ukupna zapremina je 15238 m³ od čega je, u visokim šumama 394 m³, a izdanačkim 14844 m³. Stabla sa tanjim prečnikom od 30 cm učestvuju sa 87.7%.

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