

# PERSPECTIVES OF DEVELOPMENT OF FORESTRY IN CONTEXT OF SUSTAINABLE AGRICULTURE OF THE CITY OF NOVI SAD<sup>1</sup>

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## **Abstract**

*Forest ecosystems are crucial in environmental protection and improvement of living conditions in urban and rural communities. Novi Sad, as the capital of AP Vojvodina, has a forest fund and natural forest communities. The aim of this paper is to analyze the state of the forest fund under the administration of the city of Novi Sad. The data considered are related to the forest communities of Fruška Gora and rhytic water ecosystems within the Upper Danube region. Forest plantations under the management of state forest farms were considered. Perspectives of the development of forestry in the territory of Novi Sad were considered in the context of sustainable development of agriculture.*

**Key words:** *forest farms, forest fund, ecosystem, sustainable development.*

## **Introduction**

Forest ecosystems are dominant in terms of representation on the Earth's surface, occupying about 4 billion hectares, which is about 30% of the world's land (Food and Agriculture Organization 2006). The forest life community is diverse of the plant and animal species, as well as fungi and microorganisms. Forests are terrestrial ecosystems that account for 75% of the gross primary production of the Earth's biosphere and produce 80% of our planet's biomass. (Pan Yude et al., 2013) Forests are the most complex land-based ecosystems that have a very intense influence on the geological base on which they are rooted. Forests, as plant communities, in the highly active process of photosynthesis, the metabolic exchange of carbon dioxide and oxygen affect the composition of the air in the

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wider area. At the surface of the forest of 1 ha per day, about 4 t of carbon dioxide is consumed and about 3 t of oxygen is released into the atmosphere. Forests absorb harmful gases, sediment the dust, filter solid radioactive particles (the wild chestnut tree can absorb about 120 kg of dust and about 80 kg of aerosol per year), therefore in urban areas where air pollution is very pronounced, the planting of tree plantations should be undertaken to the greatest extent possible surfaces. Forests contribute significantly to environmental protection and are a significant noise reduction factor (depending on the type of forest, density, tree height, peakness and seasons). Air in coniferous forests is rich in essential substances that have a bactericidal effect. It is believed that from a hectare of dairy forests about 30 kg of etheric materials are discharged into the atmosphere, which can disinfect the air of the smaller city (<http://ekovrba.com/sume-i-znacaj-suma.html>).

The importance of the forest is to prevent the formation of torrents in the course of the river. The catchment areas of the forests have 30-50% lower water levels than non-forested plains. Forests prevent land cover and soil erosion. Forests also represent the best filter for drinking water.

In the context of climate change, which is a global problem with serious consequences at the local level, forests are ecosystems that somewhat compensate for these changes, but also under the influence of these changes. Forests are in many ways endangered by climate change: fires are more frequent and more dangerous, more frequent diseases, epidemics and pests (Mijajlović, 2012).

The exploitation of forests in order to meet the needs of the human population on a world scale has reached a very high new level, due to which the forests, especially in the tropics, are endangered. Annually, about 16 million hectares of forest are cut worldwide. Many world organizations (such as the World Wildlife Fund, WWF) work on afforestation and implementation of forest protection and conservation programs.

Forests are a significant component of global carbon cycle. The forests are in an interdependent relationship with the climate and are an important factor in the global warming of the planet. Forests are the most important type of vegetation in terms of net source, binding and retention of carbon. Forest ecosystems and land for which they are bound have a great capacity to accumulate and liberate carbon (Mijajlović, 2015).

Sustainable development by definition means the use of existing natural resources in order to meet the needs of the present generations, without compromising the ability of future generations to use resources for their own needs. Forests as a very important resource in the context of sustainable development are included in terms of conservation, protection and improvement both in the legislation of the world level and at the local level.

### **Forests of Serbia**

Regarding the areas under the forest Serbia belongs to the middle forests. Of the total territory of Serbia, 29.1% is under forest (in Central Serbia it is 37.6% under forest, while in Vojvodina it is 7.1% under forest). (According to the National Forest Inventory of the Republic of Serbia, 2009). Worldwide the forest is 30% of the territory, the European average is higher and amounts to 46% of the forest. In relation to the number of inhabitants in Serbia, the forest is 0,3 ha per capita (in Russia, 11,11 ha per capita, Norway 6,93 ha, Finland 5,91 ha, Bosnia and Herzegovina 1,38 ha and Croatia 1,38 ha). Of the total forest area of 2.252.387 ha, state ownership is 1.194.000 ha (53%), the rest that makes 1.058.387 (47%) is privately owned, or managed by other social enterprises or national parks (<http://www.srbijasume.rs/sumskifond.html>).

In geographical sense, Serbia has three parts: the Pannonian plain (the lowland with hilly mountains and the lower mountains), the northern part of Vojvodina, which consists of fertile plains and mountainous parts (the central part and the southern part of Serbia with preserved forests).

In the biogeographical sense, two zonal vegetation (biomes) are present in Serbia. Most of the surface belongs to the biomass of broad-leaved and mixed forests in the moderate climatic region, while the areas above the upper forest border represent biom tundra.

Forest biom is composed of four eco-regions: Balkan mixed forests, Pannonian mixed forests, Dinaric mixed forests and Rodopic mixed forests. Balkan mixed forests occupy the area south of the Sava and the Danube. This eco-region is within the paleo-arctic biomass of temperate broad-leaved and mixed forests. These forests extend from Podrinje to the west to the Black Sea coast in the east, from the periphery of the Pannonian Plain and the Carpathian slope in the north to the Aegean and the Marmara Sea in the south.

Pannonian mixed forests are distributed along the periphery of the Pannonian Plain. These forests are geographically limited to the Pannonian Plain and the eco-region that consists of broad-leaved and mixed forests of temperate landscapes.

Dinaric mixed forests are an eco-region on the mountains of the Balkan Peninsula and extend from the southeastern Alps to Prokletije at an area of 58.200 km<sup>2</sup>, mostly in the Dinaric Mountains.

Rodopic mixed forests are small areas in the southeast of Serbia. Rhodope Mountain mixed forests are mostly in the Balkan and Rhodopes mountains in Bulgaria, while they are in smaller territories in Serbia, Macedonia and Greece.

The legal regulations in the area of environmental protection in Serbia are adapted to the international, especially taking into account protected areas. Legislation in Serbia is a forestry area that is adapted to European and world standards. In line with this, many international documents that are important for environmental protection and which are directly or indirectly important for the development of forestry have also been signed and accept. Among these documents, the following should be highlighted: Agenda 21 (1992), UN Framework Convention on Climate Change (1992), Convention on Biodiversity (1992), Convention on Long-range Transboundary Air Pollution (1979), Convention on Wetlands (Ramsar) 1977), Convention on International Trade in Endangered Species - CITES Convention (1973), Convention on the Protection of the World Cultural and Natural Heritage (1972), (<https://upravazasume.gov.rs/wp-content/uploads/2015/12/Strategija-razvoja-sumarstva.pdf>).

In accordance with the adopted international documents at the level of the Republic of Serbia, many legal acts were adopted which are influenced by the forestry sector: Some of them are the Constitution of the Republic of Serbia (1990); Law on Forests (1991); Law on Environmental Protection (2004); Law on Strategic Assessment of the Environmental Impact (2004); Law on Environmental Impact Assessment (2004); Hunting Act (1993); Law on Spatial Plan of the Republic of Serbia (1996); Inheritance Act (1995); Water Law (1991); Law on Agricultural Land (1992); Law on National Parks (1993); Law on assets owned by the Republic of Serbia (1995); Law on Business Enterprises (2004); Law on reproductive material of forest trees (2004).

Regarding the composition of forests in Serbia, 90,7% of the deciduous forests are represented in the largest percentage, and coniferous forests with 6,0%, while remaining 3,3% of mixed forests of deciduous forests and coniferous forests remain. Beech forests are dominant with 27,6%, then oak forests 24,6%, other hardwoods 6,0%, poplar 1,9%, other softwoods 0,6% and mixed hardwood forests 30%. General condition of state-owned forests in Serbia is unfavorable: age structure, unsatisfactory densities and health conditions, there is great deal of participation of interrupted forest assembly and weed area due to unplanned, uncontrolled and often illegal logging and exploitation

([www.fornetserbia.com/doc/shared/Strategija\\_razvoja\\_sumarstva.pdf](http://www.fornetserbia.com/doc/shared/Strategija_razvoja_sumarstva.pdf)).

Climate change in Serbia has mostly affected the forest communities in the Danube-Carpathian basin. In this respect, climate change reflected the movement of the boundaries of certain types of forests in relation to the latitude and altitude, the change in the composition of individual plant communities, the disappearance and withdrawal of individual forest communities, the change in the relation of individual trees to light. All these changes due to the cumulative effect could endanger biodiversity and management of these natural resources in accordance with the principles of sustainable development (Medarević et al., 2007).

Regarding forest communities that have been placed under different types of protection in Serbia, about 543.000 ha (6,1%) of territory are five national parks: Fruška gora, Kopaonik, Tara, Šar planina and Đerdap. In addition, 15 nature parks, 50 strict and 21 special nature reserves, 284 nature monuments, 16 landscapes of exceptional features, 37 sites of cultural and historical importance and 624 natural rarities are being protected as protected natural assets (<https://upravazasume.gov.rs/wp-content/uploads/2015/12/Strategija-razvoja-sumarstva.pdf>).

Based on the annual plans in the Republic of Serbia, artificial afforestation is carried out within the existing forests and outside the forest (karst, bare, live sand, eroded and agricultural land). Public enterprises “Srbijašume” and “Vojvodinašume” and public companies of national parks, on the basis of these annual plans, carry out activities of raising and cultivating forests and planning woodcutting.

**Table 1.** *Surface areas in the Republic of Serbia with indexes*

Republic of Serbia	Afforestation (ha)		(ha)
	In the Forest	Outside of Forest	
2015	1338	398	1736
2016	890	390	1280
Index 2015=100	66	98	74

**Source:** *Statistical Office of the Republic of Serbia - release Statistic of forestry, number 128, LXVII, May 19, 2017.*

Table 1 shows the achieved afforestation activities in the Republic of Serbia in 2015 and 2016 and indexed data. The total forest area in 2016 is lower compared to 2015. Within the forest there were less afforestation than on the areas outside the forest where this activity was maintained at the same level. Within the activities of the state-owned company “Srbijašume”, forestation and exploitation activities are coordinated in order to increase the areas under the forests that were exposed to uncontrolled exploitation in the previous period in order to improve the state of the environment at the state level.

### **The state of forest in Vojvodina**

Forest areas in Vojvodina (which occupies the territory of 21.506 km<sup>2</sup>) make 175.136,05 ha, of which 130.589.26 ha are under the management of the Public Enterprise Vojvodinašume. Vojvodina forests, which are managed by state forests, are organized as four Forest Company: “Sremska Mitrovica”, “Novi Sad”, “Sombor” and “Banat” Pancevo. Large state-owned forested complexes as a special larger continent are within protected areas such as Fruska Gora National Park, Deliblatska peščara, Vršачki breg, Subotička peščara, Posavina, Podunavlje, Potamišje and Potisje.

The arrangement of the remaining forests in Vojvodina is bad, so that in some areas of 500.000 ha there is not even 1% of the forest, and in some areas of 100.000 ha the humidity is less than 1%. Therefore, Vojvodina, which has become a desert in an ecological sense, if it reaches the planned 14% of the area under the forest, would not become a real desert. The economic importance of the forests in Vojvodina is reflected in the increase in the production of wood, especially of willow and poplar trees (in the last 40 years, the increase has increased for these species 6 times). In these Vojvodina urban areas, in addition to

the economic importance of forests, the following forest functions are important: in protection of soil from aquatic and eolic soil erosion, protection of the plow from excessive drainage, mitigation of the effects of climate change, greenhouse effect reduction, carbon dioxide bonding and oxygen production, conservation of biodiversity and geno-fonda of forest woody plant species.

In the forests fed by Public Enterprise “Vojvodinašume” the types of trees that are mostly represented are: European oak, poplar, willow, narrow-leafed ash and American ash and acacia. In the area of the Forestry company Sremska Mitrovica there are mostly forests of oak forests, while these forests are less represented on the forest companies Novi Sad and Sombor. The types of black poplar and willow are selected and planted with the application of agro-technical measures. There are also natural communities of these species in the riverside areas of the Danube, Tisa, Sava and Tamiš. The narrow-leafed ash is in the community with European oak in the lower and wet areas. The American ash can be found in unprotected areas in the river bank, due to its high spontaneous propagation capacity, this species represents a serious competition to indigenous species of forest trees, and is less economically significant compared to narrow-leafed ash.

**Table 2.** Average timber volume in the Republic of Serbia (balance at the end of 2014)

Region District City Municipality	Cut timber volume			
	Total m <sup>3</sup>		Technical wood %	
	Deciduous forests	Coniferous forests	Deciduous forests	Coniferous forests
Republic of Serbia	2.551.738	402.087	34	58
Vojvodina Region	696.042	4.379	53	50
South Bačka District	171.005	209	51	94
City Novi Sad	39.220	196	45	93
Municipality of Novi Sad	20.236	-	65	-
Municipality of Petrovaradin	18.984	196	24	93

**Source:** Statistical Office of the Republic of Serbia, Municipalities and Regions in the Republic of Serbia, 2016.

Table 2 shows the comparative data on felled timber at the level of the Republic of Serbia, Vojvodina, South Backa District, the City of Novi Sad and its municipalities. Of the total volume of felled wood at the level of the republic of Serbia, the share of felled deciduous forests for Vojvodina is 27.27%, while for the city of Novi Sad 1.53%. Of the total cut wood volume in Vojvodina, 53% of the deciduous forests are large, of which there is a large share of quality wood of acacia trees.

Acacia is a species that is cultivated on sandstone in the function of forest protection belts. Acacia has a very wide use value, its wood is used for technical purposes, in construction and as firewood. In addition to the mentioned woody species in Vojvodina there are some other types of forest trees: *Quercus cerris*, black and white pine, linden, white poplar, European hornbeam and others ([www.vojvodinasume.rs/sume/](http://www.vojvodinasume.rs/sume/)).

**Table 3.** *The survey of forested areas (ha) in certain regions, areas, cities and municipalities in Serbia (data refer to the situation at the end of 2014)*

Region District City Municipality	Afforestation (ha)				Forest surface total (ha)
	In the Forest		Outside of Forest		
	deciduous forests	coniferous forests	deciduous forests	coniferous forests	
Republic of Serbia	884,00	454,00	184,00	214,00	2.168.746,00
Vojvodina Region	656,18	6,02	-	-	123.811,38
South Bačka District	250,70	-	36,78	-	22173,55
City Novi Sad	14,00	-	-	-	5.503,98
Municipality of Novi Sad	11,00	-	-	-	2.927,98
Municipality of Petrovaradin	3,00	-	-	-	2.576,00

**Source:** *Statistical Office of the Republic of Serbia, Municipalities and Regions in the Republic of Serbia, 2016.*

Table 3 shows the data related to afforestation in the Republic of Serbia within the planned activities of state forest enterprises. The data relate to afforestation of seedlings of deciduous trees and coniferous species. It also shows the total areas under the forests on the basis of which it can be noticed that the Vojvodina region should continue to be intensively afforested in order to prevent ecologi-



cal degradation of this area. To this end, the forest company “Banat” should be mentioned, under whose management there are forests and three protected areas. This forest company occupies an area of 52.190 ha, of which 96% is under state administration, and the remaining 4% is privately owned. Of the total forest area in state ownership, the area by 66% (32.820 ha) is covered by the forest, 40% of which is under of natural forest (20,001 ha, which is a percentage that is much higher than the average at the level of the provincial Vojvodina and exceeds the republic average) and under forest culture is 26% (12.447 ha). Forestry company “Banat”, within its plans and activities, deals with the following: cultivation and protection of forests, restoration, maintenance and use of forests, production of planting material, raising new forests and, breeding and hunting of game, fishing, forest products trade, management protected areas, tourism, hospitality and research and development.

The wood fund of this company is 4 million cubic meters. Within this fund, 81% are deciduous forests, while 19% are conifers. Poplar cultures are 36% of the total wood fund, then are acacia, black and white pine, linden, oak, white willow, ash and others.

According the annual plan cut about 140.000 m<sup>3</sup> of hardwood deciduous (oak, ash, acacia, beech) and softwood deciduous (lime, poplar aspen). In the total timber assortment structure, 60% are quality poplar logs, which serve further for the production of veneer or peeling.

There are three protected areas on the surface of 33.666 ha within the “Banat” forestry farm. These protected areas are Delibatic sandstone, Vršac mountains and Imperial Bar. The special nature reserve of the Delibatic sandstone represents the largest European area built of Eolian sand with expressive forms of the dino relief. In this nature reserve there are sandstone, steppe, forest and wetland ecosystems. There are about 1000 species of plant species, including rarities, relics, endemic species and subendems. Deliblato Sand is considered to be the last and largest oasis of autochthonous vegetation of the Pannonian lowland, and the biodiversity center in Europe. By the Decree of the Government of Serbia since 2002, this reserve was declared a protected area managed by a public company “Vojvodinašume”.

## State of the forest fund in Novi Sad

Novi Sad is the capital of the province of Vojvodina. This city with its surroundings is a unique and indivisible urban-rural environment. The city is located on the banks of the river Danube between 1252 and 1262 km of river flow. On the left bank of the Danube, there is a plain part of the city belonging to Backa, while the hilly part of the city belonging to Srem is located on the right bank of the hills of Fruška Gora. The elevation from the side of the side is from 72 to 80 m, while from the Srem side it is from 250 to 350 m. In Novi Sad, Mali Bački Channel flows into the Danube, which is part of the Danube-Tisa-Danube Channel.

The city of Novi Sad occupies an area of 702,7 km<sup>2</sup>, with the narrower area of Novi Sad with Petrovaradin and Sremski Kamenic on a surface of 129.4 km<sup>2</sup>. The city's construction area occupies 106.2 km<sup>2</sup>. The city of Novi Sad as an administrative center belongs to 15 suburban settlements.

Novi Sad is located on important road corridors with road, rail and river connections. Corridor 10 crosses the city, connecting eight countries in the direction of Salzburg-Thessaloniki, while Corridor 7 or the Danube Corridor represents a significant waterway connecting the countries of Western Europe with the Black Sea through the Danube ([https://sr.wikipedia.org/srec/%D0%9D%D0%BE%D0%B2%D0%B8\\_%D0%A1%D0%B0%D0%B4](https://sr.wikipedia.org/srec/%D0%9D%D0%BE%D0%B2%D0%B8_%D0%A1%D0%B0%D0%B4)).

Regarding the forest fund in the territory of the City of Novi Sad, out of the total 70.270 ha on which this city lies, 5.234,45 ha is under the forest. Out of which state-owned land is 3.468,11 ha, and in private ownership 1.776,34 ha is under forest. (Development Plan of the South Bačka Forest Area for the period 2016-2025, 2017). With regard to the percentage representation, this represents 7,45% of the total area (which is slightly higher than the provincial average of 7.1%), which is much less compared to the republic average, which is around 29.1% (at the level of central Serbia it is 37.6%). (National Forest Inventory of the Republic of Serbia, 2009)

In the area of the city of Novi Sad there are different ecosystems that are characterized by significant biodiversity. The Danube's floodplains are distinguished by various aquatic, wetland, marshland ecosystems, which alternate with low occasional flooding meadows and forests. These ecosystems have a diverse flora and fauna with many endangered rare, relict and endemic species. Regarding the fish fund in the Danube and the flooding area, 46 species of fish are registered,

of which 38 are domestic. Koviljsko -petrovaradinski rit is distinguished by a significant number of bird species of 172 species of which 118 species are nests.

Considering that the Fruška gora in the tertiary was an island, first in the Mediterranean, then in the Pannonian Sea there is a flora gets of over 1500 species. The forest is covered with 90% of Fruška Gora, of which 30% is lime (tilia) forest. There are 30 types of orchids in the plant communities of Fruška. On the slopes and the foothills of Fruška Gora mountains there are pastures, vineyards and orchards. The vineyards of Fruška Gora are grown over 2500 years from the time of the Roman Empire. There are 200 species of birds found on Fruška Gora, of which there are 11 species of birds of prey that are here and nest. In terms of hunting game, deer, fallow deer, and moufflon are limited to hunting grounds and hunting reserves, while rabbits and roe deers can be found in the wider area. The Danube, Futoški and Kamnik parks are protected monuments of culture due to the rich flora and fauna.

In the town of Novi Sad there are urban greenery, parks, lawns, avenues and flower alleys that contribute to the aesthetic experience of the city, but are also significant in the healthcare aspect. From the parks in Novi Sad it stands out as the most interesting Danube Park. Some examples of unusual and unique trees in Novi Sad were placed under the protection of the state (Koprivić in the center of Novi Sad (1st category), American platan on Sajlov (3rd category), American platan in Futog (3rd category), Platan in the courtyard of the Basic school "Miloš Crnjanski" (3rd category), mulberry on Čenejski salaš (category 3), *Platanus × acerifolia* in Novi Sad (3rd category)). Status protected trees or "monuments of nature" are obtained on the basis of exceptional dendrological and aesthetic qualities, as representatives of rare species in this area or as rare representatives of species typical in this area.

On the wider area of Novi Sad, represented typical agro-eco systems on the Backa side are represented, forest complexes are located on Fruška gora, and the Fruška Gora gorge is distinguished by the cultural landscape and the Danube regions by marshland forests and floodmeadow. In this very diverse area we encounter forest vegetation of Fruška gora, plant communities of loess plane, vegetation of the alluvial plane Danube, wetland and meadow plant communities and anthropogenic forests.

Forest communities are reduced and degraded to a great extent, which greatly disturb the stability of biological, climatic, hydrological and pedological (forests prevent soil erosion) opportunities.

In the area of Novi Sad, forest complexes are located on the coastal belt and Danube river islands, on the left bank of the Danube there are forests in cadastral municipalities Begeč, Futog, Novi Sad, Kać and Kovilj, while on the right there is a forest between Petrovaradin and Srem Karlovci and Sremska Kamenica and Beočin. The forests of this area are exposed to deforestation and are suppressed in low-lying areas or in the areas in front of the embankments. Thus, the inundation flat and the remaining low-flowing forests became significant in an ecological, recreational, touristic way. Forests in the coastal belt of the Danube are of importance for the development of excursion tourism. The Danube banks are under special protection in the width of 100 m, in order to preserve the nature and used for tourist, recreational, fishing activities, on the principles of sustainable development. (Environmental Protection Study in the area of Novi Sad, 2009)

Public Enterprise Vojvodinašume with a branch of forestry company Novi Sad (Novi Sad) performs planned exploitation and afforestation in its area of the city. On the basis of the plans of this forestry company there is logging: willow, poplar, acacia, American ash, hornbeam, lime (tilia). In addition, afforestation of the following woody species is planned: acacia, white poplar, field ash, spruce, willow, tilia and oak (Plan of development of South Bačka forest area for the period from 2016 to 2025, 2017).

**Table 4.** *Presentation of forested areas in the territory of the City of Novi Sad for certain wood species planned in 2017.*

Municipality	Afforestation (ha)							Total (ha)
	Acacia	White poplar	Poplar clones	Field ash	Spruce	Willow	Tilia	
Novi Sad	3,09	31,19	970,39	12,85	-	262,35	-	1279,87
Petrovaradin	-	-	62,33	0,47	-	15,34	-	78,14
Total state forests	3,09	31,19	1032,72	13,32	-	277,69	-	1358,01
Novi Sad	26,87	12,07	214,43	37,97	-	148,39	7,63	447,36
Petrovaradin	12,07	0,93	0,87	-	0,08	0,56	-	14,51
Total private forests	38,94	13,00	215,30	37,97	0,08	148,95	7,63	461,87
Novi Sad	29,96	43,26	1184,82	50,82	-	410,74	7,63	1727,64
Petrovaradin	12,07	0,93	63,20	0,47	0,08	15,90	-	92,65
Total City Novi Sad	42,03	44,19	1248,02	51,29	0,08	426,64	7,63	1820,29

**Source:** *Data taken from the Forestry Novi Sad*

On the basis of Table 2, it is noticeable that at the level of the city of Novi Sad the largest percentage of felled wood is used as a technical tree. Based on this, it is

concluded that the leafy wood species that are processed here are of high quality. Table 3 shows the data on afforestation at the level of the city of Novi Sad by species of deciduous forests. Table 4 shows which wood species are represented in the afforestation plan. The largest share in the afforestation of Novi Sad Forestry is occupied by seedlings of poplar clones after willow. In addition to the listed species, according to the data obtained from this farm, on the territory of the municipality of Novi Sad, on the surface of 0.42 ha, sowing seed of oak ore was carried out.

Part of the Novi Sad Forest Fund belongs to the Koviljsko-Petrovaradinski rit as a special nature reserve (this nature reserve extends in the territories of the municipalities: Novi Sad, Petrovaradin, Sremski Karlovci, Indjija and Titel). Koviljsko-petrovaradinski rit is a complex of marshland ecosystems along the Danube at 4,840 ha, as a nature reserve of exceptional importance, it is classified in the first category of protection. Among the woody plant species represented in this area are the willow (white and almond), poplar and ash. Poplar plantations are in more than half of the area (55.6%) of this protected area. (Annual program for the editing of agricultural land 2017).

In Novi Sad, in the settlement Begeč, there is a nature park Begeč jama. Begeč jama is located on an area of 489 ha and represents the natural good of the II category under the protection of the state. Begeč jama is the Danube branch, which represents a specific preserved ecosystem of exceptional biodiversity. The floodplain lake, Šašićeva ada, river beams and still water are included in this nature park. Around the lake on a surface of 40 hectares there are reeds, white poplar forest (*Populus alba*) and black poplar (*Populus nigra*), black mulberry, white willow. There are 125 taxa of higher plants, and among them rare species such as, white water lily, frogbit, water caltrop, water ferns, etc.

## Conclusion

Novi Sad, as the administrative and cultural center of Vojvodina, represents the urban industrialized zone and the backbone of the economic progress of the region. The intensive agricultural activity has led to the suppression of forest ecosystems throughout the territory of Vojvodina and Novi Sad. Preservation and improvement of the remaining natural forests, planned forest management and afforestation are the goals that are being pursued in accordance with sustainable agricultural development. In accordance with the accepted international standards and the National Strategy for Sustainable Development, it is possible to promote sustainable forest

management in protected natural resources, based on harmonized development of ecological, economic, social and cultural functions of forests. Based on the data presented, it can be concluded that in Novi Sad, as a metropolitan area within the Danube region, activities of improvement and rehabilitation of the state of the forest fund are planned in accordance with the principles of sustainable development.

Forestry company Novi Sad, as part of the public company “Vojvodinašume”, undertakes activities aimed at improving the existing state of forests and preserving natural forests within protected areas. According to the data of this activity, afforestation must be enhanced, in order to make Novi Sad an ecological better environment. Natural protected reserves and natural parks and natural resources within the city of Novi Sad do not represent large areas but preserved natural ecosystems that are improving and represent a growing tourist value in recent times.

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