

Forest management planning and biodiversity in Serbia

Nenad Petrović, PhD

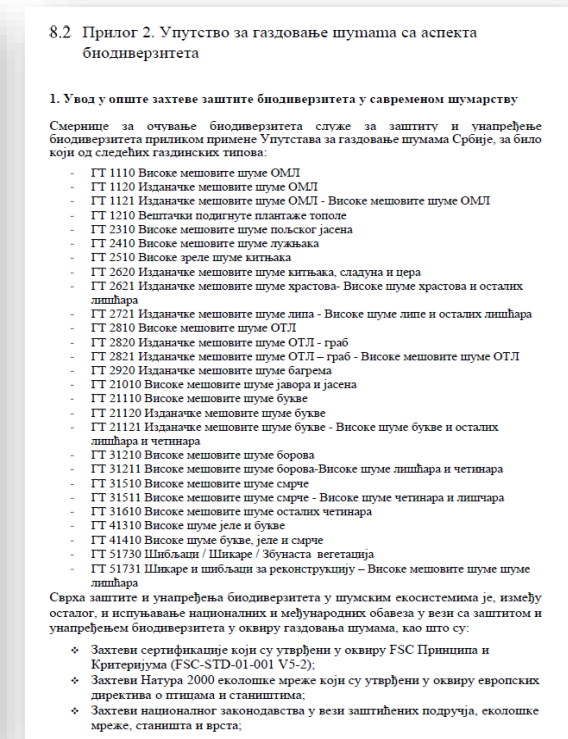
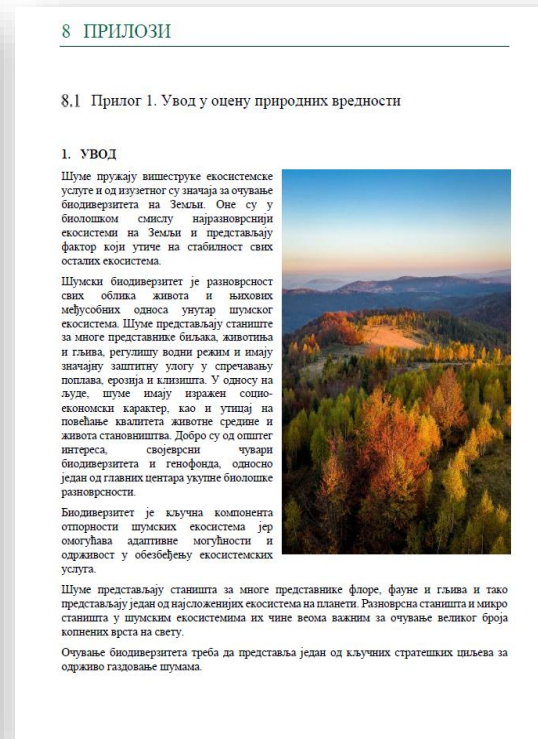
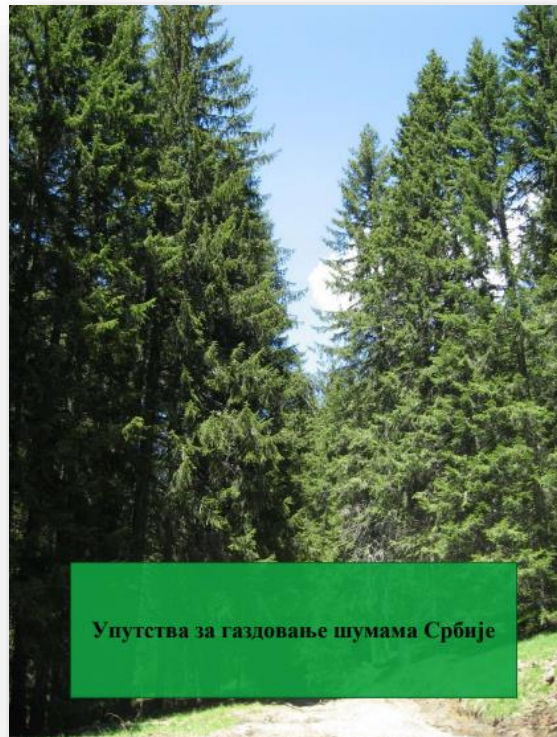
13th – 15th of November,
Skopje, North Macedonia

How forest biodiversity has been addressed by forest policy in your country/territory?

- Chapter 6. in Law on Forests: „general usefull“ function benefits ... is maintain of biodiversity“
- Chapter 1. 5,19,20 Bylaw on FMP: describe biodiversity inventory obligation
- General instruction for forest management describe data to be collected

1) Guidelines for forest management in Serbia

- Chapter 6 – Biodiversity: Assessment of Natural Values
- Annex 1. Introduction to the assessment of natural values
- Annex 2. Guidelines for forest management from a biodiversity perspective



Procedures for the Assessment of Natural Values in the Forest Management Planning Process

❖ Three phases:

1. Preparatory phase: selection of stands, preparation of maps, collection of existing data,
2. Data collection in the stand – done for each stand except clearings and thickets
 - ✓ Manual for assessment of natural values – part of Data collection manual
3. Data analysis – software „Osnova In“



Assessment of natural values 1/4

Biodiversity Indicators		Feature or structure in forest stand	Positive score		Negative score	
Structures and Composition	Structural shape of the stand	Uneven-aged stand	Present: (+1)			
		Selective stand	Present: (+1)			
		Virgin forest	Present: (+3)			
		Two-layered stand	Present: (+1)			
	Regeneration	Group regeneration (young trees height > 1m and dbh ≤ 5 cm)	Present: (+1)			
	Dead wood / Litter	Standing dead wood trees larger than 30cm d.b.h.	Present: (+1)			
		Laying dead wood trees larger than 30 diameter	Present: (+1)			
		Laying dead wood trees larger than 30 diameter, longer than 2m	Present: (+1)			
		Part of laying dead wood trees larger than 50 diameter, longer than 2m	Present: (+1)			
		Broken trees diameter larger than 30 diameter, longer than 2m	Present: (+1)			
		Absence of dead wood			Absent (-1)	
	Naturalness	Firts degree of protection	Present: (+3)			
		High natural forests	Present: (+1)			
		Tree species number (< 2, monocultures)			Absent (-1)	
		Artificial stands			Present (-1)	

Шупљине у гранама

Отвори испуњени водом

Гнезда

Отвори и пукотине

Суве гране у крошњи

Повреда и цурење сокова

Оштећена кора

Пукотине у кори

Епифите

Гљиве на деблу

[illegible]

Приказ стабла од значаја за биодиверзитет / хабитатно стабло

Assessment of natural values 3/4

Key and important habitats	Important habitats in forest stands	Areas with high concentration of old trees and dead wood (>0.2 ha)	Present: (+1)			
		Wetlands - marsh, fen; small pools/ponds/wet zones (>0.2 ha)	Present: (+1)			
		Natural springs	Present: (+1)			
		Seasonal / permanent streams	Present: (+1)			
		Steep slopes (inclination >30 degrees)	Present: (+1)			
		Cliffs, ravines (>0.2%)	Present: (+1)			
		Caves	Present: (+1)			
		Large rocks with high mosses/lichens coverage	Present: (+1)			



Assessment of natural values 4/4

Key species	Protected wild species	Strictly protected wild species	Present: (+1)			
	Invasive species	Presence of invasive species			Present (-1)	
	Alochtonous tree species	Presence of alochtonous tree species			Present (-1)	
	Vulnerability to harmful impacts	Significant presence of antropogenic harmful impacts			Present (-1)	

✓ Vulnerability to adverse impacts

- Vulnerability to adverse impacts – Positive (+1)
- ✓ Vulnerability to adverse impacts – Negative



Final assessment

- The value of the score of natural points

Nature Value Assessment Field Form						
Biodiversity Indicators		Feature or structure in forest stand	Positive score		Negative score	
Structures and Composition	Structural shape of the stand	Uneven-aged stand	1			
		Selective stand	Present: (+1)			
		Virgin forest	Present: (+3)			
		Two-layered stand	Present: (+1)			
	Regeneration	Group regeneration (young trees height > 1m and dbh ≤ 5 cm)	Present: (+1)			
	Dead wood / Litter	Standing dead wood trees larger than 30cm d.b.h.	Present: (+1)			
		Laying dead wood trees larger than 30 diameter	Present: (+1)			
		Laying dead wood trees larger than 30 diameter, longer than 2m	Present: (+1)			
		Part of laying dead wood trees larger than 50 diameter, longer than 2m	Present: (+1)			
		Broken trees diameter larger than 30 diameter, longer than 2m	Present: (+1)			
		Absence of dead wood			Absent (-1)	
	Naturalness	Firts degree of protection	Present: (+3)			
		High natural forests	Present: (+1)			
		Tree species number (< 2, monocultures)			Absent (-1)	
Artificial stands				Present (-1)		
Trees important for biodiversity/Habitat trees	Living special trees	Large dimension trees	Present: (+1)			
		Large solitary, sun-exposed trees with wide crown	Present: (+1)			
	Trees with microhabitats	Standing but clearly visible dying trees (old growth)	Present: (+1)			
		Trees with broken / damaged top	Present: (+1)			
		Any stages of deterioration or clearly coarse bark	Present: (+1)			
		Nesting trees	Present: (+1)			
		Hollow trees (cavities) DBH > 30 cm	Present: (+1)			
	Trees with fungi, moss and lichens	Significant moss cover on tree stem (> 40%)	Present: (+1)			
		Significant lichen cover on tree stem (> 40%)	Present: (+1)			
		Presence of fungi species on tree stem	Present: (+1)			
Key and important habitats	Important habitats in forest stands	Areas with high concentration of old trees and dead wood (> 0.2 ha)	Present: (+1)			
		Wetlands - marsh, fen; small pools/ponds/wet zones (> 0.2 ha)	Present: (+1)			
		Natural springs	Present: (+1)			
		Seasonal / permanent streams	Present: (+1)			
		Steep slopes (inclination > 30 degrees)	Present: (+1)			
		Cliffs, ravines (> 0.2%)	Present: (+1)			
		Caves	Present: (+1)			
		Large rocks with high mosses/lichens coverage	Present: (+1)			
Key species	Protected wild species	Strictly protected wild species	Present: (+1)			
Impacts and threats	Invasive species	Presence of invasive species			Present (-1)	
	Allochthonous tree species	Presence of allochthonous tree species			Present (-1)	
	Vulnerability to harmful impacts	Significant presence of antropogenic harmful impacts			Present (-1)	
Nature Value Score (sum of positive indicators and sum of negative indicators)			0		0	

FMU		Cmpt.		Section		MGT Gr		MGT		
Plot Nr.		Worker				Date				
Plot accessibility (yes/no)	Type of plot		Sample type		Coordinates (perm.)					
	1	Regular			X					
Slope (°)	2	Detailed/Perm.	2	Concentric	Y					
Assessment of natural values - Trees of importance for biodiversity/habitat trees										
Microhabitat trees (pcs)	Standing but clearly visible dying trees				Trees with mushrooms, mosses and lichens (pcs)	Significant moss cover on tree stem (>40%)				
	Trees with broken / damaged top					Significant lichen cover on tree stem (>40%)				
	Any stages of deterioration or clearly coarse bark					Presence of fungi species on tree stem				
	Nesting trees				Special living trees (pcs)	Large dimension trees				
	Hollow trees (cavities) DBH >30 cm					Large solitary, sun-exposed trees with wide crown				
Tree Nr.	Tree species	Ds (cm)	Hs (dm)	Stem length (dm)	Degree of drying	Social status	Tchn. Class	Test tree marking	Distance (m)	Azimuth (°)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										

en

ОНЦЕ

КНЕ 30

ОВИНС

Tree Nr.	Tree species	Ds (cm)	Hs (dm)	Stem length (dm)	Degree of drying	Social status	Tchn. Class	Test tree marking	Distance (m)	Azimuth (°)
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
Dead wood	Tree Nr.	Tree species	Tree position	Ds (cm)	L or H (dm)	Tree Nr.	Tree species	Tree position	Ds (cm)	L or H (dm)
	1					6				
	2					7				
	3					8				
	4					9				
	5					10				
Permanent insurance of plot			sketch			Sample types with survey attributes				
Tree (object)	Azimuth (°)	Distance (m)				Regular	Tree species; Ds; Hs; Degree of drying; Social status; Tchn. class; Test tree marking; Dead wood			
1						Detailed	Tree species; Ds; Hs; Stem length; Degree of drying; Social status; Tchn. class; Test tree marking; Dead wood			
2						Permanent	Tree species; Ds; Hs; Stem length; Degree of drying; Social status; Tchn. class; Test tree marking; Distance; Azimuth; Dead wood			
3										
Additional comment										

s of

3) Catalogue of Codes

■ New codes for assessment of natural values defined

RedBr Atributa	Naziv atributa (lat)	Naziv atributa (ćir)	SIFRA	Ime Šifre (lat)	Ime Šifre (ćir)
96 (BD)	Strukturni oblik sastojine	(BD) Структурни облик састојине	1	Jednodobna sastojina	Једнодобна састојина
96 (BD)	Strukturni oblik sastojine	(BD) Структурни облик састојине	2	Raznodobna sastojina	Разнодобна састојина
96 (BD)	Strukturni oblik sastojine	(BD) Структурни облик састојине	3	Prebirna sastojine	Пребирна састојине
96 (BD)	Strukturni oblik sastojine	(BD) Структурни облик састојине	4	Prašuma	Прашума
98 (BD)	Spratnost sastojine	(BD) Спратност састојине	0	Jednospratna sastojina	Једноспратна састојина
98 (BD)	Spratnost sastojine	(BD) Спратност састојине	1	Višespratna sastojina	Вишеспратна састојина
100 (BD)	Podmladna jezgra	(BD) Подмладна језгра	1	Podmladak je prisutan u odseku	Подмладак је присутан у састојини
110 (BD)	Odsustvo mrtvog drveta	(BD) Одсуство мртваг дрвета	0	Nema mrtvog drveta	Нема мртваг дрвета
110 (BD)	Odsustvo mrtvog drveta	(BD) Одсуство мртваг дрвета	1	Ima mrtvog drveta	Има мртваг дрвета
112 (BD)	Mrtvi pokrivač (> 60% površine)	(BD) Мртви покривач	0	Nije prisutno	Није присутно
112 (BD)	Mrtvi pokrivač (> 60% površine)	(BD) Мртви покривач	1	Prisutno	Присутно
114 (BD)	Šume bez intervencije čoveka	(BD) Шуме без интервенције човека	0	Ne	Не
114 (BD)	Šume bez intervencije čoveka	(BD) Шуме без интервенције човека	1	Da	Да
114 (BD)	Šume bez intervencije čoveka	(BD) Шуме без интервенције човека	2	Ne	Не
116 (BD)	Visoke prirodne šume	(BD) Високе природне шуме	0	Ne	Не
116 (BD)	Visoke prirodne šume	(BD) Високе природне шуме	1	Da	Да
116 (BD)	Visoke prirodne šume	(BD) Високе природне шуме	2	Ne	Не
120 (BD)	Veštačke sastojine	(BD) Вештачке састојине	1	Prirodna sastojina	Природна састојина
120 (BD)	Veštačke sastojine	(BD) Вештачке састојине	2	Veštački podignute sastojine	Вештачки подигнуте састојине
122 (BD)	Očuvanost sastojine	(BD) Очуваност састојине	1	Očuvana sastojina	Очувана састојина
122 (BD)	Očuvanost sastojine	(BD) Очуваност састојине	2	Devastirana ili razređena sastojina	Девастирана или разређена састојина
124 (pokrovnost >50%)		(покривност >50%)	0	Nije prisutno	Није присутно
124 (pokrovnost >50%)		(покривност >50%)	1	Prisutno	Присутно
126 flore (pokrovnost >50%)		флоре (покривност >50%)	0	Nije prisutno	Није присутно
126 flore (pokrovnost >50%)		флоре (покривност >50%)	1	Prisutno	Присутно
152 starih stabala i mrtvog drveta (>0,2 ha)		концентрацијом старих стабала и	0	Nije prisutno	Није присутно
152 starih stabala i mrtvog drveta (>0,2 ha)		концентрацијом старих стабала и	1	Prisutno	Присутно
154 bare, lokve, vlažne zone (>0,2 ha)		тресаве, баре, локве, влажне зоне	0	Nije prisutno	Није присутно
154 bare, lokve, vlažne zone (>0,2 ha)		тресаве, баре, локве, влажне зоне	1	Prisutno	Присутно

Final assessment of natural values

❖ Values:

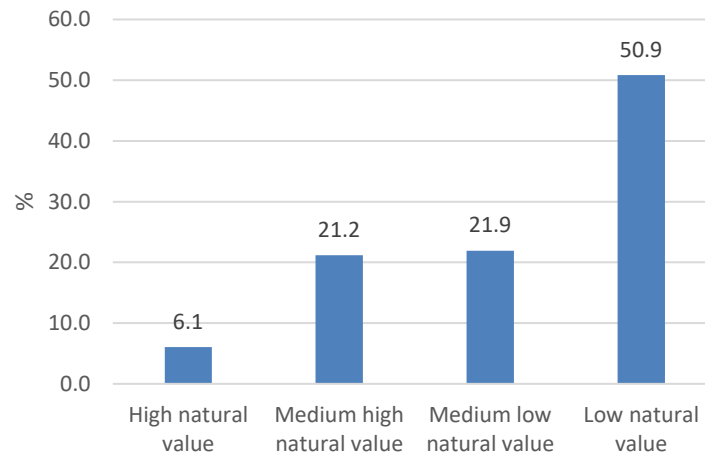
- **A - High natural values - key habitats**, e.g. rainforests, old stands with high structural or genetic variability (≥ 7 points)
- **B - Medium higher natural values**, e.g. as a result of close-to-nature management with a high level of naturalness (3-6 points)
- **C - Medium lower natural values**, e.g. as a result of close-to-nature management with a lower level of naturalness (0-2 points)
- **D - Low natural values**, e.g. forest plantations, intensive management (< 0 points).

Natural value of stands		
Value	Description	Final assessment
1	High natural value	≥ 7
2	Medium high natural value	3-6
3	Medium low natural value	1-2
4	Low natural value	≤ 0

Biodiversity in Serbia

Table: Frequency of final assessments of natural values of stands

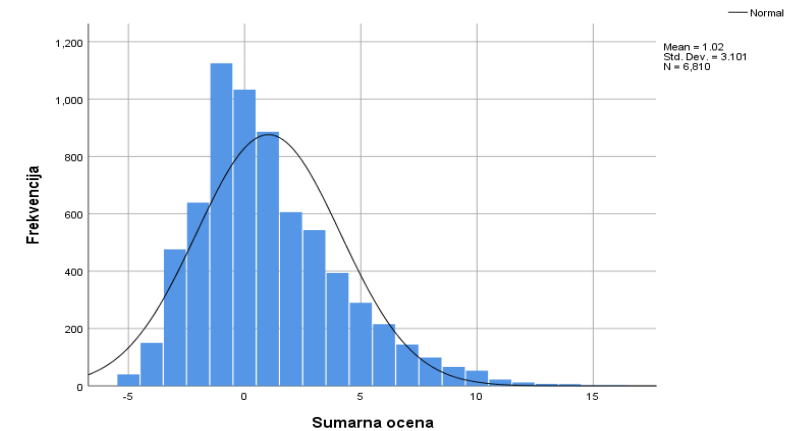
Final assessment			
Value	Natural value of stands	Frequency	%
1	High natural value	413	6.1
2	Medium high natural value	1442	21.2
3	Medium low natural value	1492	21.9
4	Low natural value	3463	50.9
Total		6810	100.0



Graph: Frequency distribution of final evaluations of the natural values of stands

Table: Descriptive statistics of the summary assessment of natural values of stands

Sum of values	Parameters	Value
	Arithmetic mean	1.02
	St. deviation	3.101
	Minimum	-5
	Maximum	16



Graph: Frequency distribution of summary evaluations of natural values of stands

Dead wood

Table: Statistics of the value of dead wood on the territory of Serbia

	No. of plots	Minimum	Maximum	Arithmetic mean (m3/ha)	Std. deviation	Arithmetic mean Europe* (m3/ha)
Dead wood	6809	0.0	320.5	7.1	17.6	15.8

Table: Statistics of the value of dead wood per MT

Management type	No. of plots	Arithmetic mean (m3/ha)	Std. deviation
High forests of beech and fir	49	31.19	31.772
High forests of narrow-leaved ash	44	27.02	48.130
High forests of beech, fir and spruce	45	22.81	23.725
High forests of Pedunculate oak	88	15.43	18.031
High forests of beech	864	15.07	24.205



*Puletti, N., Canullo, R., Mattioli, W. *et al.* A dataset of forest volume deadwood estimates for Europe. *Annals of Forest Science* **76**, 68 (2019). <https://doi.org/10.1007/s13595-019-0832-0>

Conclusion

- The high participation of the low level of biodiversity in Serbia, after the obtained results, needs to be observed critically. In the context of the range of categorical values - especially medium-low and medium-high and perhaps suggest different ranges of categories.
- Collected attributes for the assessment of the state of biodiversity in binary form (presence and absence) without defining the number of elements, reduces the possibility of defining a better categorical range and locality with greater or lesser participation of certain elements for a better assessment of biodiversity.
- The methodology provides a good basis for defining the state and monitoring of biodiversity in forest ecosystems, including values from permanent plots of stand inventory.
- It is necessary to organize a public discussion with other interested sectors regarding participation in the costs of data collection for biodiversity assessment.
- It is necessary to perform an analysis of the state of biodiversity using the data of the national and stand inventory in the first protection zones with the state of biodiversity outside the protected natural areas.
- It is necessary to create clear biodiversity protection guidelines for the forest managers to be able to improve low level and to maintain medium and high level forest biodiversity categories

THANK YOU FOR ATTENTION!

