Original scientific paper

UDK 005.336.3:630*911(497.6PC)
DOI 10.7251/COMEN2402164G

CRITERIA AND INDICATORS OF FOREST MANAGEMENT IN THE REPUBLIC OF SRPSKA: CASE STUDY FOR KOTORVAROŠKO FOREST MANAGEMENT AREA AND KALINOVAČKO FOREST MANAGEMENT AREA

Zoran Govedar*

University of Banja Luka, Faculty of Forestry, Banja Luka, Republic of Srpska, B&H
Academy of Sciences and Arts of the Republic of Srpska, Banja Luka, Republic of Srpska, B&H

* Corresponding author: zoran.govedar@sf.unibl.org

Abstract: Successful monitoring of forest management is based on criteria and indicators of the quality of forest ecosystems. In this sense, methods of comparing specific forests with reference models or the remaining old forest communities are used. Several parameters are used as indicators (quantity and quality of volume and volume increment, health status, degree of renewal, origin and method of establishment of forests, etc.). The indicators provide feedback based on which decisions can be made on future activities in order to improve the general condition and functions of forests. To implement the strategic goals of sustainable development of the European Union's forestry, criteria are used that enable the adoption of forestry policy, forest management plans and the development of cross-sectoral cooperation. At the level of the European Union, six pan-European criteria have been defined, and due to the specifics of forestry and the regional character of the forests of the Republic of Srpska, for the purpose of drafting a new Forestry Development Strategy, harmonization was carried out on the basis of 40 sub-criteria and 70 indicators were defined. This paper includes quantitative indicators related to the silvicultural quality of stands.

Keywords: Criteria, indicators, forest management, sustainable development, stand quality.

1. INTRODUCTION

Strategic forest management plans involve the application of criteria and indicators (C&I) that enable monitoring of plan implementation. Criteria define important elements or principles by which the sustainability of forest management is assessed, with mandatory consideration of the production, ecological, and social roles of forest ecosystems. Each criterion is defined by quantitative or qualitative indicators, which are regularly measured and monitored to determine the effects of forest management over time [1]. The need for sustainable development of forest ecosystems has led to the gradual development and application of C&I for monitoring forest management systems. Thus, C&I have been recognized as suitable tools for defining, monitoring, reporting, and assessing progress toward Sustainable Forest Management (SFM) [2,3]. The principles of sustainable development have necessitated a holistic approach to the development and application of C&I [4]. This paper identifies the actual and potential C&I that are significant for the sustainable development of forestry in the Republic of Srpska on the example of two forestry areas in relation to forest quality. Understanding C&I is crucial due to their application in strategic goals and measures defined in the guidelines for the new forestry development strategy of the Republic of Srpska up to 2032, as well as for monitoring its implementation. Indicators are often needed in global processes, such as global sustainable development goals, which frequently require significant resources for data collection. The size or qualitative expression of indicators at the end of a given period required for achieving forest management goals can be more realistically assessed based on models [5,6].

To obtain high-quality timber products, the quality of the trees from which high-quality timber can be sourced is a primary prerequisite. Improving forest quality requires the availability of appropriate indicators or quality standards. For example, due to the hierarchical nature of forests, indicators are provided at different levels. This includes landscapes, forest management units, and indicators at the regional and stand levels [7]. Additionally, sustainable forest management criteria have been proposed in relevant research literature [8, 9]. Furthermore, due to different researchers focusing on various values or functions, indicators for assessing forest quality have been generated for different management goals. In addition to methods that assess the quality of individual trees terrestrially, modern forest quality assessment methods are based on new technologies where spatial structure, ecological function, and green strength of forests, as well as forest stability and health, are used as indicators (Tab. 1).

Table 1. *Forest ecosystem quality assessment indicators [10]*

Dimensions Involved	Indicator Factors	Applications
Forest structure	Stand origin, community structure, stand age, canopy structure, stand density, tree species composition, depression	[11]
Ecological function	Water conservation, soil conservation, carbon sequestration and oxygen release, air purification, biodiversity conservation, nutrient sequestration, forest recreation, etc.	[12]
Green Vitality	Normalized difference vegetation index (NDVI), stand volume, leaf area index, biomass, forest growth per unit area, litter thickness	[13]
Stability	Net primary productivity (NPP) stability, NDVI stability	[14]
Site conditions	Elevation, slope direction, slope, slope position, soil thickness, soil fertility, soil erosion degree, etc.	[15]

Subjective methods for determining weights for indicators are applied based on hierarchical decision-making (*Analytical Hierarchy Process*, AHP), as well as objective methods based on variance analysis, factor analysis, and principal component analysis. The most commonly used modern methods for determining forest quality indicators today include comprehensive evaluation method, remote sensing assessment method, process modeling method, and machine learning method [10]. These methods are generally based on combined monitoring of indicators using terrestrial data collection, remote sensing, and modeling, with indicators expressed both qualitatively and quantitatively.

1.1. Pan-European Criteria and Indicators for Sustainable Forest Management

To monitor sustainable forest management, criteria are applied as categories of assessed conditions and processes, while indicators are typically measurable metrics related to longer periods for analyzing trends in management processes [1,16] (Tab. 2).

Considering the Pan-European Criteria and Indicators according to the guidelines for developing the new forestry development strategy of the Republic of Srpska [17], five strategic goals for the sustainable development of forestry in the Republic of Srpska have been defined:

1. Increase Forest Area, Productivity, and Quality: This includes enhancing the contribution to global efforts to mitigate climate change.
2. Enhance Multifunctional Benefits of Forestry: This encompasses economic, ecological, and social benefits from forestry, including improving living conditions in rural areas.
3. Conserve Biodiversity: This involves increasing the area of protected forests and other special-purpose forest areas.
4. Increase Financial Resources: Aim to boost new and additional financial resources from all sources for sustainable forest management and the development of education, scientific-technical cooperation, and partnerships.
5. Sustainable Forest Management: This includes public promotion, international agreements, cooperation, coordination, coherence, and synergy with sectors, partner organizations, and relevant stakeholders connected to forestry at all levels.

Table 2. *Pan-European Criteria and Indicators for Sustainable Forest Management*

No.	Paneuropean criterion	Indicator
1.	Maintenance and Appropriate Enhancement of Forest Resources and Their Contribution to the Global Carbon Cycle	• Forest area • Timber volume • Age structure of forests • Diameter structure of forests • Carbon stock
2.	Maintenance of Forest Ecosystem Health and Vitality	• Accumulation of pollutants • Chemical and physical soil properties • Defoliation • Forest damage
3.	Maintenance and Promotion of Forest Production Functions	• Ratio of growth to allowable cut • Volume of merchantable wood • Quantity and quality of non-wood forest products • Value of forest and forest land services • Area of forests managed according to current management plans
4.	Maintenance, Conservation, and Appropriate Enhancement of Biological Diversity in Forest Ecosystems	• Tree species composition • Type and method of forest regeneration • Area of forests by naturalness • Area of forests dominated by non-native species • Amount of deadwood • Area of forests for ex situ and in situ conservation of genetic resources • Degree of landscape fragmentation • Degree of species threat • Area of forests under various protection levels (according to Ministerial Conference on the Protection of Forests in Europe, MCPFE)
5.	Maintenance, Conservation, and Appropriate Enhancement of Protective Functions in Forest Management	• Area of protective forests according to MCPFE • Area of forests for infrastructure protection • Management of natural resources against natural hazards
6.	Maintenance of Other Socio-Economic Functions and Conditions	• Number of forest enterprises by ownership and size • Contribution of forestry, wood, and pulp industries to gross domestic product • Net income from forestry • Expenditures on forest services • Number of employees and their proportion in the forestry sector by gender, age, and education • Number and type of work accidents and occupational diseases in forestry • Consumption of wood and wood products per capita • Quantity and type of wood import and export • Share of energy from wood in total energy consumption • Area of forests for recreational purposes and intensity of use • Number of places within forests dedicated to cultural or spiritual values

Achieving each of the aforementioned goals depends on measures to meet these objectives. Given the long-term nature of their implementation, it is essential to have indicators to assess the success of realizing strategic goals. Due to the specificity of forest resources, different C&I should be applied for various regions or types of forests (boreal, temperate, tropical, dry forests, or low-forest-cover) [18].

In line with this, additional indicators have been proposed for the forests of the Republic of Srpska to enable better monitoring of the realization of strategic goals. Due to the specificity of forestry and the regional nature of the forests of the Republic of Srpska, harmonization was carried out based on 40 sub-criteria (e.g. forest area according to purpose, damage from climatic disasters, annual contractor plans, dead wood in the forest, etc.) and 70 indicators were defined (e.g. purpose of forests and forest land, level of forest preservation, list of permitted pesticides and fertilizers, health condition of forest land, nutrients and soil acidity, level of biodiversity protection - suitability of plans, amount of dead wood in the forest, etc.). However, one of the fundamental drawbacks preventing the application of necessary indicators is the lack of information on baseline values for indicators (e.g. age structure of single-aged high forests with natural regeneration, amount of stored CO_2, forest conditions by developmental stages, data on the physical and chemical properties of forest soils, etc.). Many of the required data are not collected during the development of forest management plans (FMP), particularly regarding the ecological and social functions of forests.

Current methodologies are primarily adapted to obtain high-quality information and indicators related to the production function of forests. Therefore, it is necessary to adjust the existing methodology for developing planning documents to meet the requirements of modern forestry, which increasingly emphasizes the importance of the overall benefits of forests. However, some information related to the production function of forests is not sufficiently researched and does not receive adequate attention. For example, in addition to knowing the volume of wood in a forest, understanding its quality is of utmost importance.

Various classifications are used to determine the growth or technical quality of trees, which indicate the quality of stands. These classifications are often based on phenotypic characteristics of trees (trunk shape, crown length, branching, health, etc.) and were primarily developed for thinning operations. Examples include Kraft's classification [19], Schädelin's classification [20, 21], and methods for intensive thinning [22]. At the IUFRO Congress held in Oxford in 1953, Leibundgut proposed a classification based on biological, qualitative, and silviculture characteristics of trees. This classification has wide application in research and, in terms of the breeding role of trees, does not differ significantly from the silviculture-technical (ST) classification used for spruce forest cultures [23].

In the development of forest management bases in the Republic of Srpska, two classifications of trees are used: silviculture-technical and technical [24]. These classifications can be employed as reliable indicators of stand conditions concerning their quality, provided that field data are collected according to the methodology for preparing FMP [25]. The ST classification (three classes) can be used as an indicator of the effects of the forest management system. The first class includes trees of a quality that, on average, can be cultivated if systematic care measures are implemented. Trees in the third class are those that should not exist in a commercial forest (e.g., rotten, severely damaged, diseased, etc.). The second class comprises the remaining trees. This classification was initially accepted as a temporary measure with the goal that, over several decades, the third ST class would become irrelevant. After the first large-scale forest inventory in Bosnia and Herzegovina (1964-1968), it was estimated that around 54% of trees in high beech forests belonged to the third ST class. However, in the preparation of forest management plans in the Republic of Srpska, the proportion of the third class remains high, often exceeding 30% in terms of volume in pure beech forests.

The issue of applying indicators is further complicated by differences in methods, which can lead to incorrect conclusions. The methods used in conducting two large-scale forest inventories in the Republic of Srpska/BiH differ, making it challenging to compare results. Although one of the objectives of the Second Forest Inventory was to provide comparable data with the First Forest Inventory, the Second Inventory significantly altered the layout of plots and the method for determining the area of forest categories and forest land, as well as partially changing the classification method used in the First Inventory [26]. This has led to discrepancies in area measurements due to methodological differences rather than actual changes in management practices. Additionally, preliminary results, which should be taken with caution, indicate a high proportion of ST3 (over 40%) in pure high beech forests with natural regeneration. This is corroborated by results from trial felling in management plans (e.g., Kalinovačko and Kotorvaroško Forest Management Plans).

2. MATERIAL AND METHODS

Data were collected from forest management bases for two forest management areas (Fig. 1) and relate to the management classes of secondary high beech forests within the beech, fir, and spruce forest belt (Tab. 3).

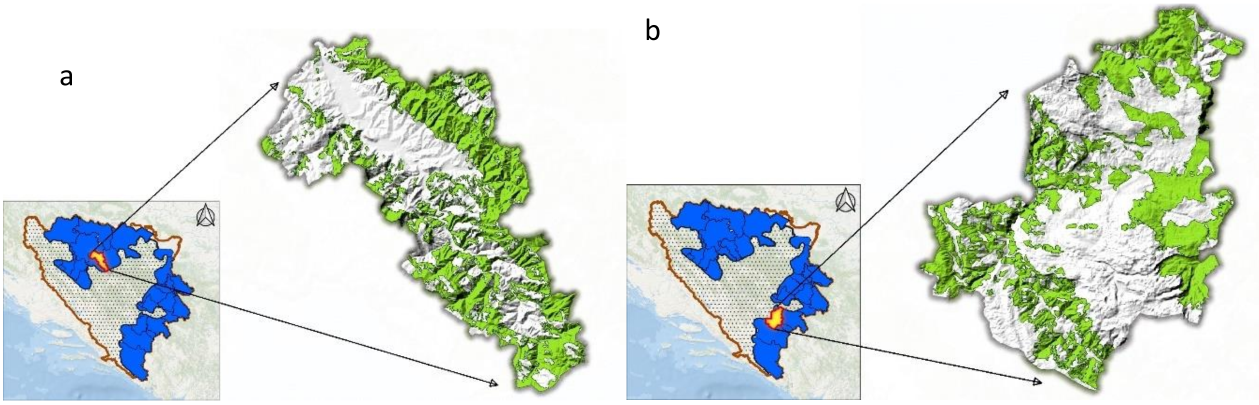

Figure 1. *Geographic Location of Forest Management Area*
(a – Kotorvaroško Forest Management Area, KV; b – Kalinovačko Forest Management Area, KAL)

Table 3. *Basic information of the objects research*

<table>
<tr><th>No.</th><th>Forest Management Area (FMA)</th><th>Management period (MP)</th><th>Management Classes (MC)</th></tr>
<tr><td>1.</td><td>Kalinovik
KAL</td><td>2003 - 2012
2014 - 2023
2024 - 2033</td><td rowspan="2">1103 - High secondary beech forests in the beech, fir and spruce forest belt on deep acidic brown soils
(P_{KAL} = 2882,82 ha; P_{KV} = 5250,34 ha)
1109 - High secondary beech forests in the belt of beech, fir and spruce forests on predominantly shallow limestone soils
(P = 1533,12 ha; P_{KV} = 322,62 ha)
1110 - High secondary beech forests in the belt of beech, fir and spruce forests on predominantly deep limestone soils
(P = 207,56 ha; P_{KV} = 2236,26 ha)</td></tr>
<tr><td>2.</td><td>Kotor Varoš
KV</td><td>1999- 2008
2009 - 2018
2019 - 2028</td></tr>
</table>

The habitat productivity for beech ranges from the second to the fourth class. The ST classification of trees was carried out based on quantitative indicators related to tree species, diameter, and tree quality [27]. Data analysis to determine the impact of management practices during the FMP on volume by ST classes was conducted using variance analysis [28].

3. RESULTS AND DISCUSSIONS

The representation of ST classes in the total volume for the category of secondary high beech forests shows that during management periods, the proportion of higher-quality classes (ST1 and ST2) declines while the proportion of ST3 increases (Fig. 2). This is particularly pronounced in FMA_{KAL} between MP1 and MP2. The indicator concerning the percentage representation of ST classes across different management plans reveals that the management of high beech forests with natural regeneration has been inadequate, as the proportion of better classes decreased while ST3 classes increased. This is contrary to the goals outlined in the management plans.

A more detailed insight into this forest management indicator is obtained through variance analysis (Table 2). The ANOVA results show that there is no statistically significant difference between the FMP regarding the volume of ST classes per hectare. However, there is a statistically significant difference between the ST classes in terms of their volume at a 5% significance level (Tab. 4).

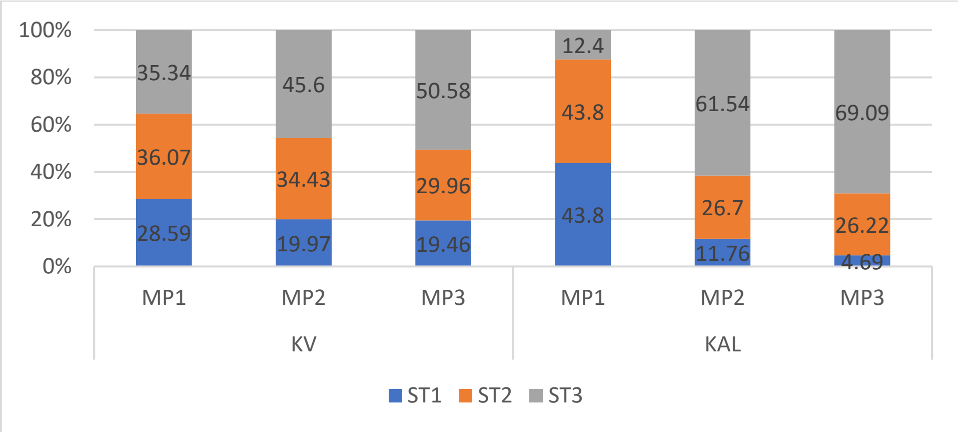

Figure 2. *Participation ST classes in high beech forests with natural regeneration in FMA and MP*

Table 4. *ANOVA for the Effect of Two Factors of Variability (FMA and ST) on Volume*

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
FMA	6.100417	1	6.100417	0.006547	0.935846	4.042652
ST classes	108865.3	2	54432.67	58.42038	1.38E-13	3.190727
Interaction	12213.65	2	6106.826	6.554208	0.003043	3.190727
Within	44723.58	48	931.7413			
Total	165808.7	53				

Table 5. *One-Way ANOVA volume ST classes*

Groups	*Count*	*Sum*	*Average*	*Variance*		
ST1	6	367,0005	61,16676	1539,791		
ST2	6	565,7734	94,29556	331,0286		
ST3	6	794,4561	132,4093	3748,733		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	15251,37	2	7625,685	4,070975	0,038698	3,68232
Within Groups	28097,76	15	1873,184			
Total	43349,13	17				

SS (Sum of Squares); df (Degrees of Freedom); MS (Mean Square); F (The ratio of MS between the groups to MS within the groups; used to determine if the variation between groups is significantly greater than within groups); P-value (Indicates the probability of observing the data given that the null hypothesis is true); F crit (The value of the F-distribution for the given degrees of freedom and significance level, used as a threshold to determine significance).

One-way analysis of variance shows that there is a statistically significant difference between the ST classes with respect to the average volume size within the broader category of high beech forests with natural regeneration (Tab. 5; Fig. 3).

We can conclude that the difference in the volume of ST classes has resulted from the impact of stronger interventions in ST1 and ST2 classes during previous FMP. The increased proportion of ST3 indicates a decline in beech tree quality (e.g., greater trunk

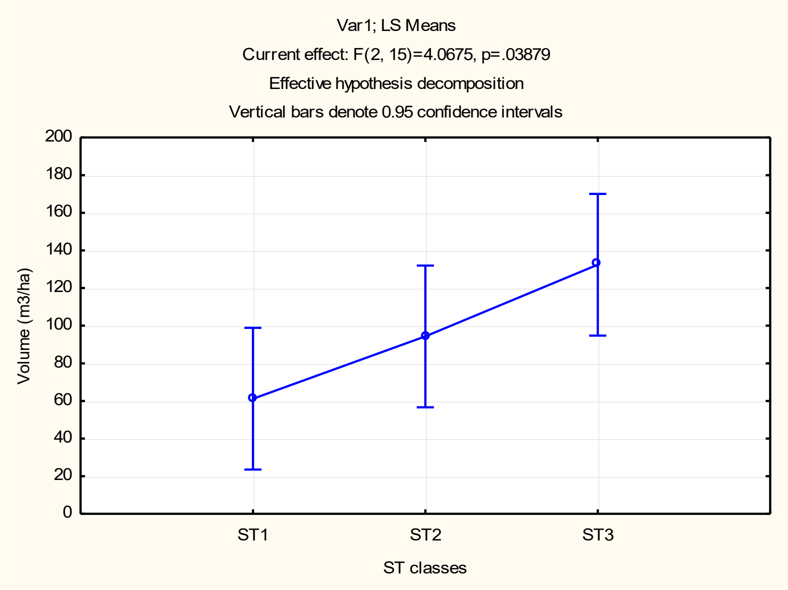

Figure 3. *Average Volume Sizes by Growth-Technical Class Effect*

Table 6. *LSD Test for Volume Differences Between Growth-Technical (ST) Classes*

Sample	Mean volume (m^3/ha)	Sample		
		ST1	ST2	ST3
ST1	61,18	-	0,204710	***0,012169***
ST2	94,32	-	-	0,148315
ST3	132,4	-	-	-

curvature, poorer health, longer crown relative to tree height, etc.). To determine where statistically significant differences exist between ST classes, an Least significance difference test (LSD test) was applied (Tab. 6). It was found that the difference in volume between ST1 and ST2, as well as ST2 and ST3, is statistically random, whereas the difference between ST1 and ST3 is statistically significant at a 5% risk level.

The application of indicators related to the quality of volume resulting from forest management has practical significance. By monitoring these indicators, silvicultural measures can be directed towards improving the overall quality of forest stands. Additionally, during the preparation of plans and analysis of past management practices, issues and errors in management can be identified and addressed. The ST classification of trees in forest stands is based on descriptive and numerical characteristics, which are used for field classification during the development of operational management plans.

During forestry operations or the implementation of plans and projects in work units (compartments), various effects may arise. Forest management is conducted according to the prescribed management system, and tree harvesting, especially in commercial forests, impacts the structure and quality of trees and stands. The decline in the volume of higher-quality ST classes and the increase in the volume of ST3 indicates management practices that deteriorate the stand structure in terms of quality and reduce their value. Therefore, preventive measures such as education and strict adherence to the management system are necessary to maintain the condition of the stands at least at the level they were before interventions. This is one of the conditions for the continuity of forest management and aligns with global sustainable development goals [29]. These goals, among other things, promote the need for environmental protection, and forests represent one of the most significant resources for its preservation.

4. CONCLUSION

Based on the research conducted in this study, the following conclusions can be drawn:

- Within the indicators of sustainable forest development for the Republic of Srpska, it is essential to use indicators related to stand quality within management classes or types of forests to achieve strategic goals and pan-European criteria.
- Quality monitoring should be carried out during successive management periods and applied in the analysis of past management practices to improve the development of operational management plans.
- The quality structure of secondary high beech forests is unsatisfactory due to the high proportion of ST3.
- Future management of this category of forests, aimed at improving stand quality, should be based on the application of group (seed) and group-selection (thinning) cuts, with particular attention to stand care, especially in younger developmental stages.

5. REFERENCES

[1] Wijewardana D. Criteria and indicators for sustainable forest management: The road travelled and the way ahead. Ecological Indicators, Vol 8 (2008) 115–122.

[2] Siry J., Cubbage F., Ahmed M. Sustainable forest management Global trends and opportunities. Forest Policy and Economics, Vol 7 (2005) 551–561.

[3] Wolfslehner B., Linser S., Pülzl H., Bastrup-Birk A., Camia A., Marchetti M. Forest bioeconomy—A new scope for sustainability indicators. In From Science to Policy, European Forest Institute: Joensuu, Finland, Vol 4 (2016) 1–32.

[4] Linser S., Wolfslehner B., Asmar F., Bridge SR., Guadalupe V., Gritten D., Jafari M., Johnson S., Laclau P., Robertson G. 25 years of criteria and indicators for sustainable forest management: Why some intergovernmental C&I processes flourished while others faded. Forests, Vol 9 (2018) 515.

[5] Anderson SM., Heath LS., Emery MR., Hicke JA., Littell JS., Lucier A., Masek JG., Peterson DL., Pouyat R., Potter KM., Robertson G., Sperry J. Developing a set of indicators to identify, monitor, and track impacts and change in forests of the United States. Climatic Change, Vol 165 (2021) 13

[6] Tarasewicz NA., Jönssonm AM. An ecosystem model based composite indicator, representing sustainability aspects for comparison of forest management strategies. Ecological Indicators, Vol 133 (2021) 108456

[7] Zhang H., Lei X., Zhang C., Zhao X., Hu X. Research on theory and technology of forest quality evaluation and precision improvement. J. Beijing For. Univ. Vol 41 (2019) 1–18.

[8] Shi CN., Wang LQ. A review of research on evaluation system of forest resources quality in China. World Forest Resource, Vol 20 (2007) 68–72.

[9] Mao SJ., Hu YM. Discuss on evaluation of forest quality. Guangdong Forest Science Technology, Vol 23 (2007) 67–71.

[10] Guo K., Wang B., Niu X. A Review of Research on Forest Ecosystem Quality Assessment and Prediction Methods. Forests 14(2) (2023) 317.

[11] Li W., Chen J., Zhang Z. Forest quality-based assessment of the Returning Farmland to Forest Program at the community level in SW China. Forest Ecologi Management, Vol 461 (2020) 117938.

[12] Zhang M., Zhang L., He H., Ren X., Niu Z., Lü Y., Xu Q., Chang Q., Liu W., Li P. Quality changes of China's ter-restrial ecosystem based on reference system. Acta Ecologica Sinica, Vol 41 (2021) 7100–7113.

[13] Ding Z., Li R., O'Connor P., Zheng H., Huang B., Kong L., Xiao Y., Xu W. Ouyang Z. An improved quality assessment framework to better inform large-scale forest restoration management. Ecological Indicators, Vol 123 (2021) 107370.

[14] De Keersmaecker W., Lhermitte S., Honnay O., Farifteh J., Somers B., Coppin P. How to measure ecosystem stability? An evaluation of the reliability of stability metrics based on remote sensing time series across the major global ecosystems. Global Change Biology, Vol 20 (2014) 2149–2161.

[15] Burger JA., Kelting DL. Using soil quality indicators to assess forest stand management. Forest Ecology
Management, Vol 122 (1999) 155–166.
[16] Brand DG. Criteria and indicators for the conservation and sustainable management of forests: Progress to date and future directions. Biomass and Bioenergy, Vol 13(4–5) (1997) 247–253.
[17] Govedar Z., Mataruga M., Dukić V., Čomić D., Stupar V., Glavonjić B., Vaško Ž., Dražić S., Zubić G., Bosnić M., Marković B. Guidelines for the Forestry Development Strategy of the Republic of Srpska (2022-2032). Faculty of Forestry, Banja Luka, (2023) 236 (*In Serbian*)
[18] Franc A., Laroussinie O., Karjalainen T. Criteria and Indicators for Sustainable Forest Management at the Forest Management. Unit Level Nancy, France 21–25 March, EFI Proceedings No. 38, (2001) p 277.
[19] Kraft G. Beiträge zur Lehre von den Durchforstungen, Schlagstellungen und Lichtungshieben. Klindworth's Verlag, Hannover, (1884) p 147.
[20] Schädelin W. Die Auslesedurchforstung als Erziehungsbetrieb höchster Wertleistung. Bern, (1942) p 147.
[21] Schädelin W. Die Durchforstung als Auslese und Veredelungsbetrieb höchster Wertleistung. Verlag Paul Haupt, Bern, Leipzig (1934) p 96.
[22] Dekanić, I., 1964: Metodi intenzivnog prorеđivanja sastojina visokog uzrasta. Dokumentacija za tehniku i tehnologiju u šumarstvu, Vol 46 (1964) 7–79.
[23] Govedar Z. Klasifikacija stabala i efekti prorednih zahvata u vještački podignutoj sastojini smrče na području Sokolina – Kotor Varoš. Glasnik Šumarskog fakulteta u Beogradu, 96 (2007) 29–43.
[24] Matić V. Metodika inventure šuma za velike površine I, II i III dio. Institut za šumarstvo Šumarkog fakulteta u Sarajevu, (1964) 156.
[25] Matić V. Metodika izrade šumskoprivrednih osnova za šume u društvenoj svojini na području SR BiH, Sarajevo, (1977) 255.
[26] Koprivica M. Recenzija knjige „Stanje šuma i šumskih zemljišta u Bosni i Hercegovini". Glasnik Šumarskog fakulteta Univerziteta u Banjoj Luci, Vol 29 (2019) 93–110.
[27] Matić V., Drinić P., Stefanović V., Ćirić M. Stanje šuma u SR Bosni i Hercegovini prema inventuri šuma na velikim površinama u 1964–1968. godini. Šumarski fakultet i Institut za šumarstvo u Sarajevu, Posebno izdanje, Vol 7 (1971) s 639.
[28] Hadživuković S. Statistički metodi (drugo prošireno izdanje). Univerzitet u Novom Sadu, Poljoprivredni fakultet, Institut za ekonomiku poljoprivrede i sociologiju sela, Novi Sad (1991)
[29] UNDP (2015): Sustainable development global goals. Available online: https://sdgs.un.org/goals (accessed on 22 July 2024).

КРИТЕРИЈУМИ И ИНДИКАТОРИ УПРАВЉАЊА ШУМАМА У РЕПУБЛИЦИ СРПСКОЈ: СТУДИЈА СЛУЧАЈА ЗА КОТОРВАРОШКО ШУМСКО ГАЗДИНСТВО И КАЛИНОВАЧКО ШУМСКО ГАЗДИНСТВО

Сажетак: Успјешно праћење управљања шумама заснива се на критеријумима и индикаторима квалитета шумских еко-система. У том смислу, користе се методе упоређивања конкретних шума са референтним моделима или са преосталим старим шумским заједницама. Као индикатори се користе различити параметри (количина и квалитет запремине и прираста, здравствено стање, степен обнављања, поријекло и метод оснивања шума итд.). Индикатори пружају повратне информације на основу којих се могу донијети одлуке о будућим активностима ради побољшања општег стања и функција шума. За спровођење стратешких циљева одрживог развоја шумарства Европске уније користе се критеријуми који омогућавају усвајање шумарске политике, планова управљања шумама и развој међусекторске сарадње. На нивоу Европске уније дефинисано је шест паневропских критеријума, а због специфичности шумарства и регионалног карактера шума Републике Српске, за потребе израде нове Стратегије развоја шумарства извршена је хармонизација на основу 40 супкритеријума и дефинисано је 70 индикатора. Овај рад обухвата квантитативне индикаторе повезане са шумскоузгојним састојина.

Кључне ријечи: Критеријуми, индикатори, управљање шумама, одрживи развој, квалитет састојина.

Paper received: 31 July 2024 **Paper accepted: 12 December 2024**