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**ANALYSIS OF THE FEATURES OF HUNTING GROUNDS IN SERBIA***Vukan M. LAVADINOVIĆ<sup>1</sup>, Zoran POPOVIĆ<sup>2</sup>, Dejan BEUKOVIĆ<sup>3</sup>,  
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*Summary:* Covering almost the entire territory of Serbia, hunting grounds occupy a unique role not only in the country's hunting practices but also in game management and wildlife conservation. Therefore, it is useful to be acquainted with their characteristics in order to manage game in a sustainable manner. Nevertheless, there has not been a proper study on the condition of hunting grounds in Serbia since the country's transition process, which reshaped the hunting sector as a whole. The purpose of this research is to identify and analyze the features of hunting grounds in Serbia in order to establish a base for future scientific research and appropriate decision making. The research results were obtained on the basis of the data on 272 hunting grounds in Serbia, collated during the hunting year of 2012/2013 and compared with the last comprehensive hunting analysis at the national level in 2001. The analysis suggests that the regal hunting system is still predominant in Serbia. The quality of hunting grounds has been enhanced to a certain extent, although there are yet some challenges which pose a threat to sustainable management such as the oversized hunting areas, lack of employees and poor financial condition.

**Key words:** hunting grounds, features, Serbia, analysis

**INTRODUCTION**

Hunting grounds in Serbia cover 88,280.44 km<sup>2</sup>, which constitutes 99.86% of the country's total area (Vlada Republike Srbije, 2004; Popović et al., 2011). According to Banković et al. (2008), around 4% of the country is covered by settlements, which indicates that hunting areas claim a somewhat smaller share approximating to 96% of the total area. Apart from settlements, historical structure sites, industrial centers and transportation routes, hunting is allowed in almost all other parts of Serbia. As they cover almost the entire area of the country, hunting grounds occupy an important and unique role in Serbia, the use of which overlap with other land uses. Hunting grounds are used for hunting, but also for all wildlife management activities and conservation measures. Hunting managers, gamekeepers, wildlife managers, wildlife biologists, veterinarians and wildlife scientists, as well other professionals focused on wild animals and game species, conduct their research in hunting grounds.

Hunting grounds are also used by approximately 80,000 Serbian hunters, which is around 1.1% of the total population (Vlada Republike Srbije, 2004a).

Over the past years, Serbia has undergone a process of political transition in order to access the European Union. One of the results of the transition was a new hunting legislation, which caused changes in the hunting sector. Although it has reshaped the Serbian hunting sector, the transition process has not motivated the scientific community to adequately analyze its impact. The extent of change in the features of hunting grounds in Serbia has not been fully studied yet. In order to provide a profound insight into the issue, this study aims to analyze the current condition of hunting grounds in Serbia and to identify the changes caused by the transition process.

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## MATERIALS AND METHODS

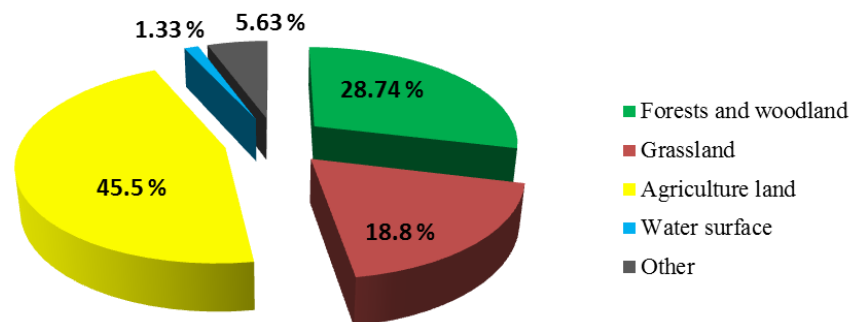
The data used in this research were collected in Serbia during the hunting year of 2012/13 by the Directorate of Forestry, the Ministry of Agriculture and Environment (former Ministry of Agriculture, Forestry and Water Management). Hunting ground managers were asked to provide data on their management plans. The data obtained included a total of 272 (out of 354) hunting grounds, which account for 77% of all hunting grounds in Vojvodina and Central Serbia. The data from Kosovo and Metohija were not available. A total of 82 hunting ground managers failed to provide the data due to unknown reasons. One of the possible explanations is that the response rate was affected by the fragmentation of existing hunting grounds, so that newly established ones did not have defined management plans. Although this could render the data obtained partial, a high response rate assures the reliability of findings.

In order to describe the samples collected, data means and standard deviations were used for the numerical data, whereas frequencies and percentages were utilized for the categorical data. The t-test for independent samples and the One-Way ANOVA were used for difference testing between various groups. The differences between measurement replications were tested using the paired sample t-test. Regression analyses were used for computing the dependent and independent variables multiple regressions and for the binary logistic regression.

## RESULTS AND DISCUSSION

In Serbia, 78.3% of hunting grounds are managed by hunting fellowships, whereas the rest is used by various stakeholders, among which the most numerous are forest state enterprises. Other users are national parks, universities and the army, all of which are the representatives of the State. This research identified only one private hunting ground.

The average size of hunting grounds in Serbia is 22,107 ha (valid sample N =265) with a range from 117 ha (the hunting ground Trešnja managed by SE Srbijašume) to 105,856 ha (the hunting ground Caričin grad managed by a hunting fellowship). All Serbian hunting grounds consist of hunting and non-hunting areas. The hunting area in Serbian hunting grounds has an average size of 19,491 ha (valid sample N = 236), whereas non-hunting areas are, on average, 3,403 ha (valid sample N =225). Hunting grounds with fenced areas account for 14% (N=39). The majority of hunting grounds are in the lowlands (47%) or in lowland-hilly areas (9%), while hunting grounds in hilly and mountainous-hilly regions account for 31%. Due to their size, around 6% of hunting grounds cover all altitude categories, i.e. lowland up to 200 meters above sea level, hilly from 200 to 600 m.a.s.l. and mountainous above 600 m.a.s.l. (Službeni glasnik, 2010/80/10). The most predominant land use category is agricultural land, followed by forests (Figure 1).



*Figure 1.* Share of land use in hunting grounds

The results obtained indicate that employees in hunting grounds are either wildlife professionals or gamekeepers, which is in accordance with the hunting legislation. The majority of hunting grounds (almost 80%) have only one wildlife professional. Only two hunting grounds in Serbia have more than three engaged wildlife professionals. The results confirm that more than half of the hunting grounds employ one gamekeeper, while approximately one third of the hunting grounds have two gamekeepers. Less than 5% of the hunting grounds have more than three gamekeepers. Therefore, more than half of the Serbian hunting grounds have one wildlife professional and one gamekeeper.

Infrastructure is often an indicator of hunting ground management, thus it was included in this research. Among the hunting grounds analyzed, 34 have the infrastructure for pheasant breeding, which approximates to 12%. On average, hunting grounds have 97 small game feeding stations, with a range up to 800 (valid sample N = 209), and 32 large game feeding stations, with a range up to 210 (valid sample N = 252). Food storages are present in 74

hunting grounds, which is slightly more than ¼ of the whole sample. Salt licks, important for large ungulate management, are present in 87.5% of all the hunting grounds (valid sample N = 238), in contrast with mud baths, which are not so common in the Serbian hunting grounds with a recorded total of 17. Water ponds were recorded in 38% of all the hunting grounds. With regard to the infrastructure for game utilization, only 10% of the Serbian hunting grounds have warm high seats. Closed high seats were recorded in 24%, covered high seats in 50% and open high seats in 47.4% of all the hunting grounds analyzed. Closed low seats are present in 3.3% and opened low seats in 9.9% of all the hunting grounds. Cold storage facilities for venison were recorded in 24% of the hunting grounds, out of which a majority has no more than one such facility. Dog parks are quite rare and they were recorded in no more than 3% of the hunting grounds. Tourist facilities in the Serbian hunting grounds include hunting cabins, houses and villas. Among these facilities, cabins are considered the most modest. The results obtained show that hunting cabins are not very common as they were recorded in approximately 12% of the hunting grounds in Serbia. Compared to cabins, hunting houses are more numerous because they have been reported in 40% of all the hunting grounds. Hunting grounds most commonly have one house for hunters (65% of the valid sample), but their number can rise up to 20 per a hunting ground. Hunting villas are the rarest tourist hunting facility as they were recorded in only 4% of the hunting grounds.

## DISCUSSION

The data on hunting grounds were collected and analyzed to identify the current condition and provide the adequate information to stakeholders, decision-makers and researchers for their future scientific work. Serbia has a regal hunting system, which is considered obsolete in the majority of European countries, and as such was not suitable for a proper comparison. Consequently, the Program of Hunting Development in Serbia 2001-2010 (Šelmić et al., 2001) was used as the last proper analysis of the hunting sector at the national level.

The comparison of the results obtained in this research with those of Šelmić et al. (2001) showed that the hunting sector did not change significantly, but the number of hunting ground users slightly increased. This is due to the partition of the state forest enterprise and the national hunting association into two parties each. In 2001, the Hunting Association of Serbia and the state enterprise Srbijašume managed 98.3% of all the hunting grounds in the country and 90% of their total number. At present, the state forest enterprises Srbijašume and Vojvodinašume, together with the Hunting Association of Serbia (together with the Hunting Association of Vojvodina) and the Hunting Association of Central Serbia, occupy the leading role in the sector. In comparison with the previous research, it can be noticed that the number of hunting grounds managed by hunting fellowships have increased from 70% to 78%. This is a consequence of the fragmentation of existing hunting grounds in Vojvodina due to the establishment of hunting regions. Admittedly, the only significant change is discernible in private hunting grounds in Vojvodina, which are still low in number and without any noticeable impact on the hunting sector. Nevertheless, this innovation could reshape the Serbian hunting sector in the future.

Hunting grounds in Serbia cover almost the entire territory, which is not so common in the European countries. Nevertheless, there are few exceptions with a high proportion of hunting areas like Denmark and Germany (around 90%), Poland with 91.5% and Austria with hunting grounds covering around 98% of the country (FACE, 1995; FACE, 2002; FACE, 2003; FACE, 2008). The average size of hunting grounds in Serbia decreased from 27,503 ha in 2001 year to 22,107 ha at present. This is a result of the fragmentation of hunting grounds due to the establishment of hunting regions, which was the most common in Vojvodina. Even with a 20% decrease, the Serbian hunting grounds are oversized, especially in comparison with the European hunting grounds. The average size of hunting grounds in Belgium is around 300 ha (FACE, n.d.) and 105 ha in Finland (FACE, 2009), whereas it is 75 ha in Austria (FACE, 2002). The Netherlands has the average hunting ground size similar to Serbia, which is slightly smaller in Denmark approximating to 21,000 ha (FACE, 2004). The Serbian hunting grounds consist of hunting and non-hunting areas, where the latter occupies 3,400 ha on average (greatly exceeding the average hunting ground in many European countries). Moreover, there is also an issue of the size disproportion between hunting grounds in the Serbian regions. This study identified that hunting grounds in the hilly and mountainous regions of Serbia are up to 3 times larger than those in the lowlands. Therefore, hunting and wildlife management in such large hunting grounds is even more difficult due to the rugged terrain.

A total of 14% of the Serbian hunting grounds are enclosed or partially enclosed, even if smaller than 1 ha. In 2001, the smallest fenced area was 7 ha. Although it seems that the number of fenced hunting grounds has increased in comparison with the findings of Šelmić et al., (2001), it is very likely that this number is influenced by small areas and has no significance for the Serbian hunting sector in general. According to the survey conducted by the CIC – Young Opinion Group (International Council for Game and Wildlife Conservation) in 2012, only approx. 1% of hunters were interested to hunt in fenced hunting grounds. It shows a decrease in the interest of international hunters to hunt in such areas.

The results of this research on the land use in hunting grounds were compared to the findings of Šelmić et al. (2001) on the land use in hunting grounds in 2001. The data obtained are presented in Table 1. Although the results are not fully consistent, as the land use categories used by Šelmić et al. (2001) do not take into consideration water surfaces, there are not many noticeable differences between these two periods. The data indicate that the Serbian hunting grounds have a ratio of agricultural land similar to that of Austria (FACE, 2002), but their forest coverage is almost less than half. Forests and woodlands in the Serbian hunting grounds claim the share similar to that of Germany (FACE, 2003).

**Table 1.** Comparison of the land use in hunting grounds at the national level in 2001 and 2013

<b>Land use category</b>	<b>2001 (%)</b>	<b>2013 (%)</b>
Forests and woodland	27.8	28.7
Agricultural land	46.4	45.5
Grassland	18.4	18.8
Water surface	-	1.3
Other	7.4	5.7
Total	100.00	100.00

The number and education of employees in hunting grounds has been taken into consideration as a factor which directly influences the management practices and control. According to the results obtained, around 80% of the hunting grounds have only one wildlife manager employed. This number fits the ratio of hunting grounds in Serbia managed by hunting fellowships. The number of gamekeepers is slightly different. Half of the Serbian hunting grounds have only one gamekeeper and around one third has two of them. Therefore, around 80% of the hunting grounds have up to two gamekeepers, again the same number compared to the ratio of the hunting grounds managed by hunting fellowships. Around 95% of the hunting grounds employ up to three gamekeepers. With regard to the hunting regulations (FornetSerbia, 2009; Službeni glasnik 2011/84/11), which obligate hunting ground users to have at least one wildlife professional and one gamekeeper per surface of 20,000 ha, it is obvious that the number of employees has to meet the legal requirements. A large number of employees are needed to improve the hunting and wildlife management in the country (Lavadinović et al., 2012), but this is not possible due to the poor financial condition, especially in the hunting grounds managed by hunting fellowships.

The infrastructure of hunting grounds is considered to be an indicator of their management quality. These results were compared with the findings of Šelmić et al. (2001) in order to evaluate the current condition of the hunting sector. The comparison shows that certain improvements can be noticed. The number of pheasant farms has increased, but this seems to be insufficient because Ristić et al. (2013) and Đorđević et al. (2013) consider that the abundance of pheasants has decreased in the country. Šelmić et al. (2001) estimated that Serbia had a small number of feeding stations (6,418 for big game and 17,965 for small game) and suggested that those numbers had to be increased to 10,000 for big game and 22,000 for small game in 2010. The calculations based on the findings in this research confirmed 10,410 feeding stations for big game and 26,527 for small game. Moreover, the research estimated that the number of salt licks increased from 14,000 (Šelmić et al., 2001) to 21,362. These figures show a certain improvement in the quality of hunting grounds, which should be taken with caution because the condition of these facilities, as well as their durability, effectiveness and positioning, also have an important role. Similar recommendations were given by Šelmić et al. (2001). As opposed to the increase in the number of hunting facilities, the number of water ponds is 1,669, which is below 4,000 recommended by the same authors for 2010. However, it has to be taken into consideration that water ponds are not necessary if hunting grounds have suitable natural water regimes. In their research, Šelmić et al. (2001) estimated that Serbia would have around 3,800 high seats and 1,700 low seats for hunters in 2010. The present calculations indicate that Serbia has 8,293 high seats, which is more than twice the number predicted for 2010, and 956 low seats, which is almost a half of the planned number. Therefore, the planned goals were met and even exceeded, which has surely improved the hunting practices, game monitoring and hunting grounds as tourist attractions. However, the number of low seats is not as planned, but they are used only for wild boar group hunts. In addition to the increased number of high seats, the Serbian hunting sector has a better offer of the accommodation for hunters-tourists than Šelmić et al. (2001) listed in their study. They identified 330 hunting houses and cabins, whereas the estimates in this research suggest that Serbia nowadays has 84 cabins, 350 hunting houses and 18 hunting villas. Therefore, it can be argued that the Serbian hunting sector is undergoing improvements which should result in better tourist offers and increased revenues. This is in accordance with the recommendations given by Ranković et al. (2004). However, the development of hunting tourism can be hindered by the regulations which control the handling of killed game animals (Službeni glasnik, 2010/68/10) and the inadequate response of

hunting ground managers and stakeholders. Although the hunting grounds are obligated to have storages for killed game animals, only 25% of them are reported to meet this requirement. The remainder either uses cold storages of their neighbors or some other methods of storing killed individuals. Poor financial situation is the most likely reason why the majority hunting grounds have not procured cold-storage facilities yet.

### CONCLUSION

According to the results obtained and the comparison with the previous findings, the quality of hunting grounds in Serbia has slightly improved. This is a consequence of the enhanced infrastructure in the hunting grounds. The involvement of the private sector in the Serbian hunting ground management is a significant innovation, which is expected to bring competition and further improvement. Nevertheless, the management of hunting grounds in Serbia still faces important challenges, such as the lack of employees and oversized hunting areas, especially in the mountainous regions of the country. These issues, accompanied by illegal activities such as poaching, greatly influence game management. Since financial matters are of utmost importance to future improvement, the only sound solution for hunting ground users would be market orientation.

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## ANALYSIS OF THE FEATURES OF HUNTING GROUNDS IN SERBIA

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**Izvod:** Lovišta u Srbiji imaju jedinstvenu ulogu, pošto se prostiru preko skoro celokupne državne teritorije i služe na samo za lov, nego i za gazdovanje divljači i zaštitu divljih životinja. Zbog toga je korisno poznavati njihove osobine da bi se moglo gazdovati divljači na održiv način. Uprkos svojoj ulozi, od tranzicionih promena u Srbiji koje su preoblikovale i lovstvo, nije bilo odgovarajuće studije koja bi na nacionalnom nivou utvrdila stanje lovišta. Cilj ovog istraživanja je da analizira osobine lovišta u Srbiji i identifikuje njihove karakteristike radi uspostavljanja osnove za buduća naučna istraživanja i odgovarajuće donošenje odluka. Rezultati ovog istraživanja su dobijeni na osnovu podataka prikupljenih iz 272 lovišta u Srbiji za lovnu 2012/2013 godinu i upoređeni sa poslednjom sveobuhvatnom analizom lovstva na nacionalnom nivou iz 2001. godine. Analiza ukazuje da je u Srbiji i dalje dominantan regalni sistem gazdovanja. Kvalitet lovišta je donekle poboljšan, iako i dalje postoje izazovi koji ugrožavaju održivo gazdovanje, kao što su prevelike površine lovišta, nedovoljan broj zaposlenih i teška finansijska situacija.

**Ključne reči:** lovišta, karakteristike, Srbija, analiza

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