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STUDY CONCERNING THE EVALUATION OF GAME AND FISH SPECIES FROM CARAŞ-SEVERIN COUNTY

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ABSTRACT
The total surface of the 76 game funds from Caraş-Severin County is of approximately 827.445 ha, from which 324.430 ha are managed by the state. The climate is moderately continental with Mediterranean influences during summer. The main game species that can be found in this county are: brown bear, common deer, fallow deer, chamois, buck, wild boar, hare, capercaillie, pheasant, woodcock, badger, fox, marten, weasel, as well as fish species that live in lakes and rivers: carp, cat-fish, trout, chub, grayling. Amongst them, eight species (fallow deer, wild boar, capercaillie, hare, woodcock, cat-fish, chub and grayling) were chosen and classified based on 19 criteria established by specialists based on an analytical hierarchic process (AHP) and the Expert Choice Desktop software. The results have emphasized the main game species from this county, namely wild boar and fallow deer.
KEY WORDS*: game funds, Caraş-Severin, hunting, wild boar, fallow deer*

INTRODUCTION

Hunting is a recreation mean, for restoring physical and intellectual capacities especially for people who have a daily job. Going back to work, they are more productive, have better results and are more efficient.

Through its action of fighting against harmful agents such as predatory animals and stray dogs, hunting is an efficient mean of ensuring the dynamic equilibrium of forest and agricultural ecosystems (Cotta *et al.*, 2001).

In present times, the concept of game includes besides the actual hunting activities a large array of actions for conserving biodiversity and managing wild fauna, as well as actions for training specialists, research studies, managerial solutions, sociological studies or actions for promoting and acknowledging the role of wild fauna.

The management of gaming funds limits the number of hunted species and intends to maintain habitats and biodiversity (Molnár, 2011, Momir *et al.*, 2015).

The preoccupation for protecting game species was steadily accompanied by measures regarding the conservation and improvement of their natural life conditions, namely their habitat (Crăciunescu *et al.,* 2014). As such, the present concept was obtained that states that "the game fauna is a renewable natural resource, as well as a national and international interest asset" and that "hunting should be done today for ensuring an ecologic equilibrium, for improving the quality of game fauna, for scientific investigations as well as for a teaching or leisure-sport purpose" (art. 2 and 3 from Law number 407/ 2006, with ulterior addendums and changes).

Hunting is a domain that offers food resources as well as an economic growth based on its resulted products (furs, trophies etc.) (Iarca, *et al*., 2011). The game fund and protection law includes approximately 18 mammal species and 39 bird species that comprise the game interest fauna (Appendix 1) and 11 mammal species and 110 bird species that cannot be hunted in Romania (Appendix 2) (Law number 407/ 2006, with its additional alterations and addendums).

The present study intends to emphasize the most important game species from Caraş-Severin County and to evaluate them through an analytical hierarchical process (AHP). The results were obtained by using the Expert Choice Desktop software (Ciontu *et al.,* 2018).

In Romania, non-wood products are mainly represented by forest fruits, mushrooms, medicinal plants and game, namely 350 species (Vechiu *et al.,* 2018; Dincă *et al.,* 2016; Bragă *et al.,* 2019).

MATERIALS AND METHODS

The study was realized in Caraş-Severin County, in the historical region of Banat, with the county capital in Reşiţa. It is neighboured in West-North-West with Timiş County, in North-East with Hunedoara County, in East with Gorj County, in South-East with Mehedinţi County and in South with Serbia. With a surface of 8.514 km^2, the county amounts to 3,6% of the country's surface. The area belongs to the West development region and is comprised of 2 municipalities (Reşiţa and Caransebeş), 6 cities (Anina, Băile-Herculane, Bocşa, Moldova Nouă, Oraviţa and Oţelu Roşu), 69 de communes and a total of 287 villages.

The County was formed in 1968 in its current form, through Law number 2/1968 as an administrative-territorial reorganization. The previous inter-war counties Caraş and Severin were united, without Lugoj and Faget areas that were allocated to Timiş County. In addition, Orşova area was incorporated to Mehedinţi County. (http://enciclopediaromaniei.ro).

Caraş-Severin Forest District, a unit of Romsilva – National Forest Management, manages a surface of 324.430 ha public forest fund, with 12 game funds. The forests from Caraş-Severin occupy approximately half of the county's

surface, a reason for which the county is situated amongst the greenest areas from Romania.

The pedoclimatic conditions from this area have allowed the presence of all forest species known for our country. This has also caused forest interventions in order to manage this natural treasure of an inestimable value.

As such, the silviculture practiced in Caraş-Severin has become over time one of the most valuable and steadfast activities from Banat.

In its 827.445 ha, namely the total surface of its 76 game funds, a compelling variety of wild animals can be found, from the plain area up to the mountain one (http://www.rosilva.ro).

The interest game species from Caraş-Severin County are: brown bear, wolf, common deer, fallow deer, chamois, buck, wild boar, hare, capercaillie, pheasant, partridge, woodcock, badger, marten, weasel. Eight of them (fallow deer, wild boar, capercaillie, hare, woodcock, cat-fish, chub and grayling) were taken into study. An analytical hierarchic process (AHP) was used, while the analyses were obtained with the Expert Choice Desktop software.

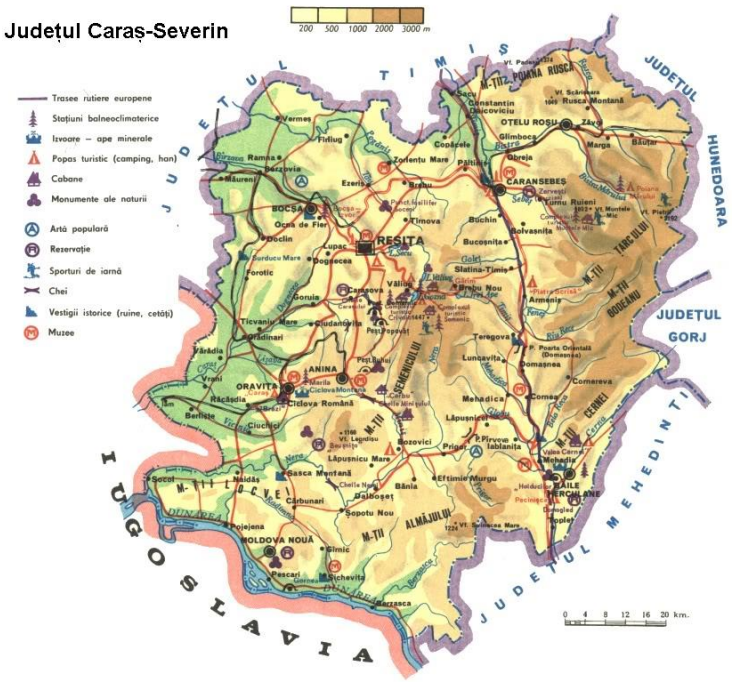

FIGURE 1. Location of Caraş-Severin County (www.blog.worldlifetimejourneys.com)

AHP is one of the most used decisional support models for solving worldwide complex problems for decision making in many domains, including biological studies (Aras *et al.*, 2004, Wang *et al.*, 2004, Park et al). The analytical hierarchy process uses pair comparisons of selected criteria in order to evaluate the most important ones (Huang *et al.*, 2011). As such, the complex problem (namely the purpose of this research) is structured hierarchically, with the objective at the hierarchy's top, while its criteria (and sub-criteria if they exist) are hierarchy levels and the alternatives (namely the eight non-wood forest products selected) are situated at the hierarchy's lower part (San Cristóbal, 2011).

RESULTS AND DISCUSSIONS

The species selected and taken into account for this study were the following: fallow-dear (*Dama dama* L), wild boar (*Sus scrofa* L), capercaillie (*Tetrao urogallus* L), hare (*Lepus europaeus* Pallas), woodcock (*Scolopax rusticola* L), cat-fish (*Silurus glanis)*, chub (*Squalius cephalus*) and grayling (*Thymallus thymallus*).

The AHP alternative classification for the 19 criteria taken into consideration is rendered in Table number 1:

TABLE 1. AHP alternative ranking

Criteria		Animal species							
		Fallow-deer	Wild boar	Hare	Capercaillie	Woodcock	Grayling	Cat-fish	Chub
		1	2	3	4	5	6	7	8
1	Harvesting period	2	8	7	1	4	3	6	5
2	Harvested quantity by one worker in 8 hours	2	4	5	1	3	7	6	8
3	Harvesting cost	8	7	5	6	1	2	4	3
4	Harvesting knowledge	6	7	1	8	2	4	5	3
5	Tools needed for harvesting	8	7	3	2	1	5	6	4
6	Complexity of harvesting process	7	8	5	6	2	3	4	1
7	Development of harvesting process	7	8	6	5	1	2	4	3
8	Knowledge for recognition	1	3	2	4	5	8	6	7
9	Distribution range	5	8	7	1	2	3	4	6
10	Biotic threats	2	1	8	6	7	5	3	4
11	Abiotic threats	1	2	8	7	6	4	3	5
12	Perishability	2	1	3	4	5	6	7	8
13	Market potential	6	7	5	4	1	2	8	3
14	Market demand	6	8	7	2	1	3	5	4
15	Celebrity" of the product on the market	7	8	6	2	1	3	5	4
16	The price of raw product	8	7	6	4	1	3	5	2
17	The price of the derived product	8	7	6	1	4	3	5	2
18	Portfolio of derived products	7	8	6	3	4	1	5	2
19	Transport from the harvesting point to the storage centre	7	8	6	5	4	3	2	1

Taking into consideration the AHP results, the most important species with a game interest from Caraș-Severin County were the wild boar and fallow deer, while the least important ones were the grayling and woodcock (Figure 2).

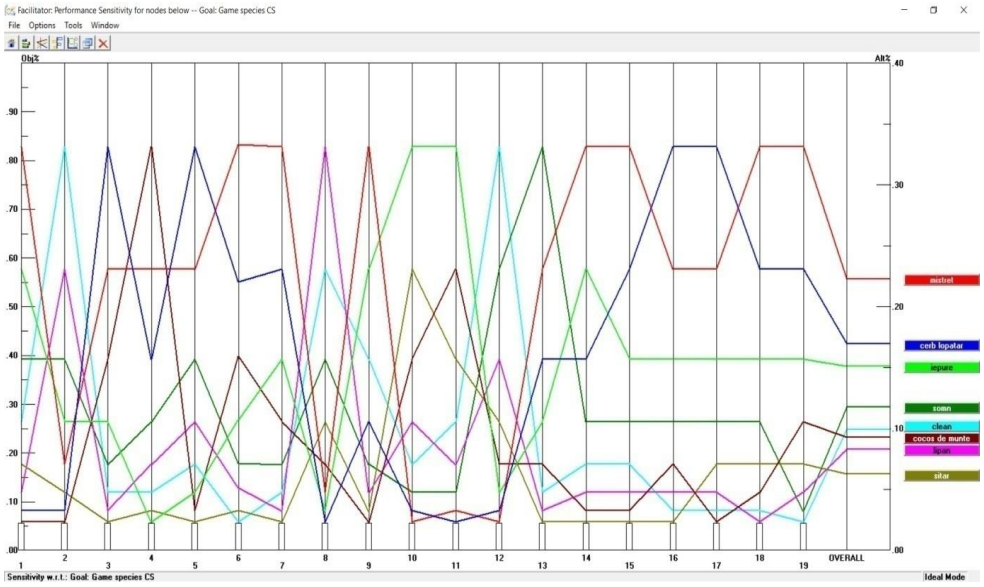

FIGURE. 2. Ranking of the selected NWFPs

As for the results, it can be seen that the wild boar occupies the first place, with a long harvesting period, a large portfolio of derived products, a large distribution array and an increased market request. Similar results were also recorded in Bihor (Ciontu *et al.*, 2018) and Tulcea (Dincă *et al.*, 2018). The wild boar is the most promising game species from our country (65.560 ex. in the country harvest quota for 2019/2020 and 3.532 ex. in the quote harvested in Caraş-Severin) (Order 673/13.05.2019, appendix 1-6).

Fallow deer, the second product as importance presents a high interest for hunters even though the harvesting costs, the transport from the harvesting point to the storage centre and the derived products costs are higher.

The hare has occupied the first place in Dolj (Cântar *et al.*, 2018), the second place in Timiș (Enescu *et al.*, 2018), but only the third place in Caraș-Severin (102.406 ex. in the national quota for 2019/2020 and 489 ex. in the quota from Caraș-Severin) (Order 673/13.05.2019, appendix 1-6).

The least important game species taken into account were woodcock and grayling. As in Bihor County where it occupies the seventh place (Timiș-Gânsac *et*

al., 2018), woodcock does not present a special interest among the hunters from Caraș-Severin, due to its low numbers and harvesting quota and a heavy shoot hunting that requires expertise. In regard with the grayling, the least spread out in the county's rivers, the fish is not considered important for fishers even though its fishing is hard but also attractive.

TABLE 2. Harvesting quota for mammals from Caraș-Severin County in the 2019-2020 season

Species	Common deer	Fallow deer	Chamois	Buck	Wild boar	Hare	Fox	Jackal	Badger	Tree marten	Common Ferret	Weasel
Harvesting quota	73	3	19	760	**3.532**	489	1.302	200	234	48	37	24

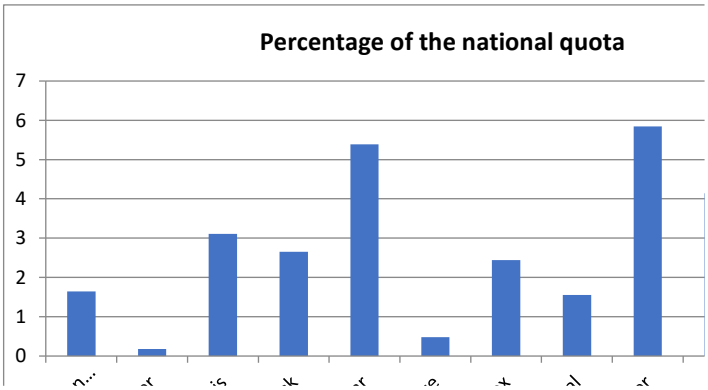

FIGURE. 3. Percentage of harvesting quota for mammals for the 2019-2020 season for Caraș-Severin County compared with national quota

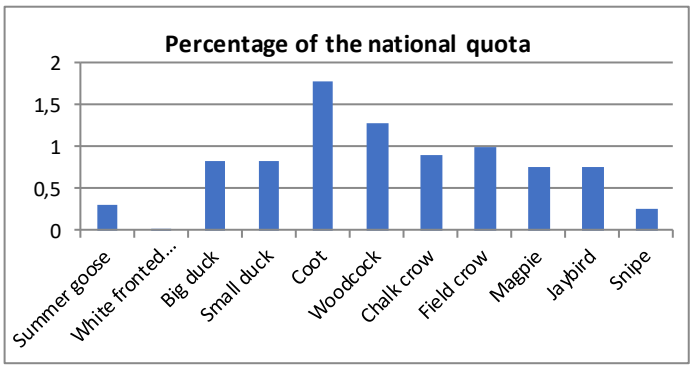

FIGURE. 4 Percentage of harvesting quota for birds for the 2019-2020 season for Caraș-Severin County compared with national quota

TABLE 3. Harvesting quota for birds from Caraş-Severin County in the 2019-2020 season

Species	Summer goose	White fronted goose	Big duck	Small duck	Coot	Woodcock	Chalk crow	Field crow	Magpie	Jaybird	Snipe
Harvesting quota	45	5	1.075	511	280	189	1.129	979	1.017	160	36

CONCLUSIONS

The diversity and potential of harvesting and distributing game species in Caraş-Severin County is high due to the fact that the forest area is well represented (76 game funds, amounting to a surface of 827.445 ha). As such, the interest game species have the space and the environment to develop while their hunting and distribution has become an income source for the owners of game funds.

By analysing eight species with the help of an analytic hierarchical process, the most important game species are the wild boar and follow deer, while the least important ones are the woodcock and grayling. If the wild boar and fallow deer are hunted due their longer harvesting period, their large distribution array, varied derived product portfolio and market request, the grayling does not have a high market request while the woodcock has lower numbers and harvest quota. Due to this aspect, they do not present a special interest, being situated on the latest places in the analytical hierarchical process.

Based on this study's results, we can say that an important contribution is brought to the county's species from an evaluation, harvesting and marketing aspect as their potential was evaluated from a game interest point of view.

The Expert Choice Desktop software combined with the analytical hierarchy process proved to be an easy to use instrument in solving a complex decision problem. In order to obtain more detailed results, future studies should take into account additional criteria and especially the interested factors.

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