THE FAUNA FROM HUNEDOARA COUNTY - AN EVALUATION

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Abstract: *The total forest fund surface of Hunedoara County is of approximately 149.425 ha, comprising 70 game funds with a surface of 676.446ha. Amongst the game species present in this County, eight (chamois, common deer, bear, boar, grouse, beech marten, trout and pickerel) were selected and classified based on 19 criteria (harvesting period, the quantity gathered by a worker in eight hours, harvesting cost, harvesting knowledge, knowledge for harvesting the species, distribution domain, biotic threats, abiotic threats, outage, market potential, market request, the product's "popularity" on the market, gross price, derived product price, portfolio of derived products, the transport from the harvesting point up to the storage center). Notes from 1 to 8 were given for each species taken into account for this study by specialists from the domain and by using an analytical hierarchical process (AHP) based on the Expert Choice Desktop Software. As such, the species with an important game interest are the common deer and chamois due to the fact that they have a large portfolio of derived products, a large distribution range and a high demand on the market. On the other side, the least important species are the bear and beech marten as the bear is hunted only in exceptional cases approved by authorities such as the multiplication of attacks on domestic animals, agricultural cultures or humans while the beech marten does not present an interest from either a hunting or capitalization point of view. Overall, the harvesting potential and commercialization of game species, as well as their diversity, in this County is high. This aspect is the cause of a well represented forest area that allows the space and environment in which these species can reproduce and develop. Hunting and trading these species also represents an important income source for the owners of hunting funds.*

Keywords: *game funds, Hunedoara, common deer, chamois, beech marten*

INTRODUCTION

A good management of the country's treasures requests that all of its natural resources should not be left unused. Game is one of this most important resources and, even if it does not reach a number corresponding with the environment's alimentation and shelter capacities, it does not affect the agricultural, silvicultural or zootechnical production. A good game management allows the achievement of two benefits from the same terrain surface: cereals and game or wood and game. An economic loss will also appear if game did not exist at all. Actually, from another perspective, fields and mountains can not be imagined without their wild fauna which, in most cases, constitutes hunting. Regardless if it is agricultural or forest, the vegetation, is well integrated in nature, being in an equilibrium with the basic components of the ecosystems in which it can be found.

Game is a recreation mean for restoring the physical and intellectual forces of working men. Going back to the workplace, they have a better performance, are more productive and efficient.

Through its action against some harmful agents such as rapacious animals and especially stray dogs, hunting is an efficient element for ensuring the dynamic equilibrium of agricultural and forest ecosystems.

The propaganda aspect of hunting should not be excluded. Personalities from other countries that come to hunt in our country and get to know it also are factors that influence the promotion of our country's uniqueness. Game exhibits from Romania or from abroad that contain game hunted in our country contribute to the recognition of our rich fauna.

Last but not least, game is also useful as it adorns field and mountain landscapes. Humans relish in regarding it. Scientific researchers from Romania or from abroad are enterprising studies, investigations and experimentations concerning our game fund. The field would lose most of its appeal if it lacked rabbits, partridge, quails or pheasants, while the forest will be voided of deers, fawns, grouse or boars (COTTA, et al., 2001).

At the present time, the concept of game includes, beside the actual hunting actions, a wide range of actions for preserving the biodiversity and management of wild fauna that presents a game interest. This is complemented by training specialists, specialty studies and scientific consolidation of managerial solutions, awareness actions for promoting the role of the fauna or sociological studies. The management of game funds limits the number of hunted species and intends to preserve habitats and biodiversity (MOLNÁR, 2011, MOMIR, et al., 2015).

The present article intends to emphasize the most important game species that can be found in Hunedoara County, as well as evaluating them through an analytical hierarchical process (AHP), while the results were obtained through 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 (ENESCU et al., 2018).

MATERIAL AND METHOD

The location. The study was realized in Hunedoara County, situated in Transilvania, Romania. The County belongs to the West Development Region, with the district capital in Deva Municipality.

The first human settlements from Hunedoara district date back to the Paleolithic, almost ten thousand years ago. One of the oldest Neolithic cultures from Europe, "Starcevo-Criş" Culture, has left its remains in this area. "Turdaş" Culture is represented by the most widespread habitation marks (in Nandrului Valley, near Hunedoara, with approximately 10 hectares). This culture was probably the first to use writing, exceeding the Sumerians with over a thousand year. They were followed in chronological order by "Petreşti" Culture (4500-5000 years ago), "Coţofeni" Culture (when copper and gold were firstly extracted), "Bronze Age", "Iron Age" and finally, "Dacic Age". All these cultures have left marks as nowhere in the world.

Hunedoara County is known for its richness in minerals. Gold-silver minerals are extracted from here, together with coal (especially pit coal from Jiului Valley). Other well represented industries are the automobile, chemical, electrical energy, furniture or construction materials industry. Thermal water stations are also present here, especially at Geoagiu and Călan (ro.wikipedia.org).

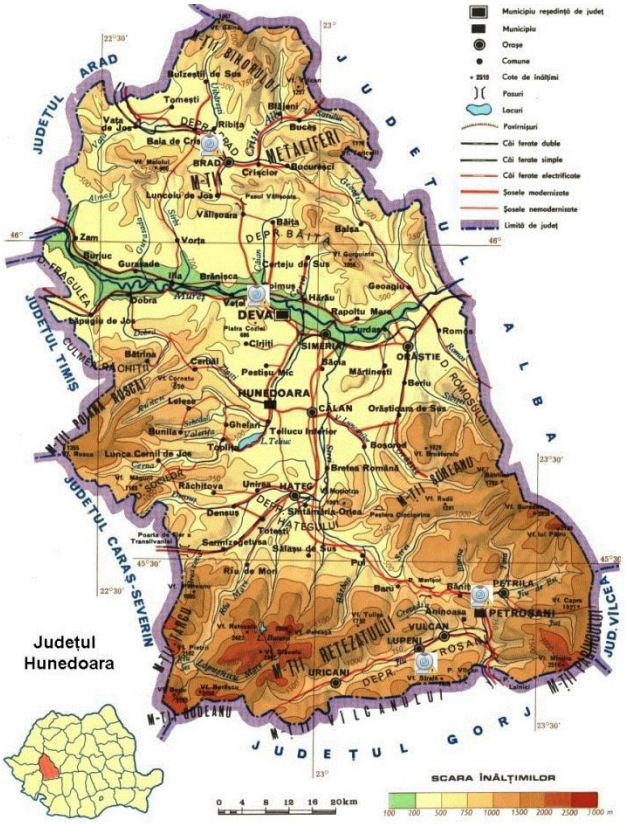

Fig. 1 Location of Hunedoara County (www.pe-harta.ro)

Hunedoara Forest Administration, as part of Romsilva - National Forest Administration, manages the public state forest fund covering 149.425 ha, of which: 145.600 ha in Hunedoara County, 413 ha in Alba County, 78 ha in Arad County, 2.639 ha in Caraș-Severin County, 687 ha in Gorj County, and 8 ha in Timiș County.The total surface of the public state forest fund property is managed by Hunedoara Forest Administration through its 11 Forest Districts. The surface covered by forest covers 146.135 ha from which 103.465 ha is represented by forests situated in the first functional group (forests with special protection functions), while 42.670 ha are situated in the second functional group (forests with production and protection functions).

Hunedoara Forest Administration presently manages 10 game funds from a total of 70 game funds present in this county, from parts of Mureș Meadow up to mountain massifs such as Ruscăi Clearing, Metaliferi, Șureanu, Parang and Retezat (www.rosilva.ro).

Research method. The fauna from Hunedoara County contains game species of interest from which we mention: bear (*Ursus arctos* L), boar (*Sus scofa* L.), common deer (*Cervus elaphus* L), chamois (*Rupicapra rupicapra* L), buck (*Capreolus capreolus* L.), pheasant (*Phasianus colchicus* L.), partridge (*Perdix perdix* L.), rabbit (*Lepus europaeus* Pallas), wolf (*Canis lupus* L), fox (*Vulpes vulpes* L.), and beech marten (*Martens foina* Erxl).Lakes and swamps are populated by otters (*Lutra lutra* L.), large ducks (*Anas platyrhincos* L.) or small ducks (*Anas crecca* L). Eight of these species (chamois, common deer, bear, boar, grouse, beech marten, trout and pickerel) were taken into consideration for this study by using an analytical hierarchical process (AHP). The analyses were obtained by using the Expert Choice Desktop Software.

AHP is one of the most used worldwide decisional support models for solving complex decision-making problems in a wide range of domains, including biological sciences (ARAS, et al., 2004, WANG, et al., 2004, PARK, et al., 2013). The analytical hierarchical process uses pair comparisons based on selected criteria in order to evaluate their importance (HUANG, et al., 2011). As such, the complex problem (namely the purpose of this research) is hierarchically structured, with the objective situated at the hierarchy's peak, while the criteria (and sub-criteria) are placed at the bottom of this hierarchy (SAN CRISTÓBAL, 2011). AHP was used for evaluating the non-wood products from certain counties (ENESCU et al., 2017, ENESCU et al., 2018, TIMIS-GANSAC et al., 2018), as well as for evaluating game species from Tulcea (DINCA et al., 2018), Arges (CIONTU at al., 2018) or Bihor counties (TIMIS-GANSAC et al., 2018).

RESULTS AND DISCUSSIONS

The present paper has used an analytical hierarchical process (AHP) in order to evaluate the performance of the alternatives selected through pair comparisons, while the analyses were achieved through the Expert Choice Desktop Software.

The selected NWFPs were the following: chamois (*Rupicapra rupicapra* L), common deer (*Cervus elaphus* L), bear (*Ursus arctos* L), boar (*Sus scrofa* L), grouse (*Tetrao urogallus* L), beech marten (*Martens foina* Erxl), trout (*Salmo trutta*) and pickerel (*Esox lucius*).

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

Table 1

AHP alternative ranking

Criteria		Animal species							
		Chamois	Red deer	Bear	Wild boar	Capercaillie	Beech marten	Trout	Pickerel
		1	2	3	4	5	6	7	8
1	Harvesting period	5	6	2	8	1	7	3	4
2	Harvested quantity by one worker in 8 hours	4	3	2	6	1	5	8	7
3	Harvesting cost	8	6	7	5	4	1	2	3
4	Knowledge for harvesting	7	6	2	4	8	1	5	3
5	Tools needed for harvesting	6	5	3	4	2	1	7	8
6	Complexity of harvesting	7	6	5	4	8	3	2	1

	process								
7	Development of the process of harvesting	5	4	2	3	8	1	6	7
8	Recognition knowledge	2	3	1	7	8	4	6	5
9	Distribution range	2	7	3	8	1	6	4	5
10	Biotic threats	7	5	1	2	8	3	4	6
11	Abiotic threats	8	5	1	3	6	2	7	4
12	Perishability	5	6	2	3	4	1	8	7
13	Market potential	5	7	3	8	1	2	6	4
14	Market demand	6	8	4	7	1	2	5	3
15	"Celebrity" of the product on the market	5	7	8	6	1	3	4	2
16	Raw product price	7	8	4	6	1	3	5	2
17	The price of the derived product	6	8	5	7	1	3	4	2
18	Portfolio of derived products	5	8	3	7	1	2	6	4
19	Transport from the harvesting point to the storage center	8	6	7	5	4	3	1	2

Taking into consideration the AHP results, the most important game species from Hunedoara County were the common deer and chamois, while the least important ones were the bear and beech marten (Figure 2).

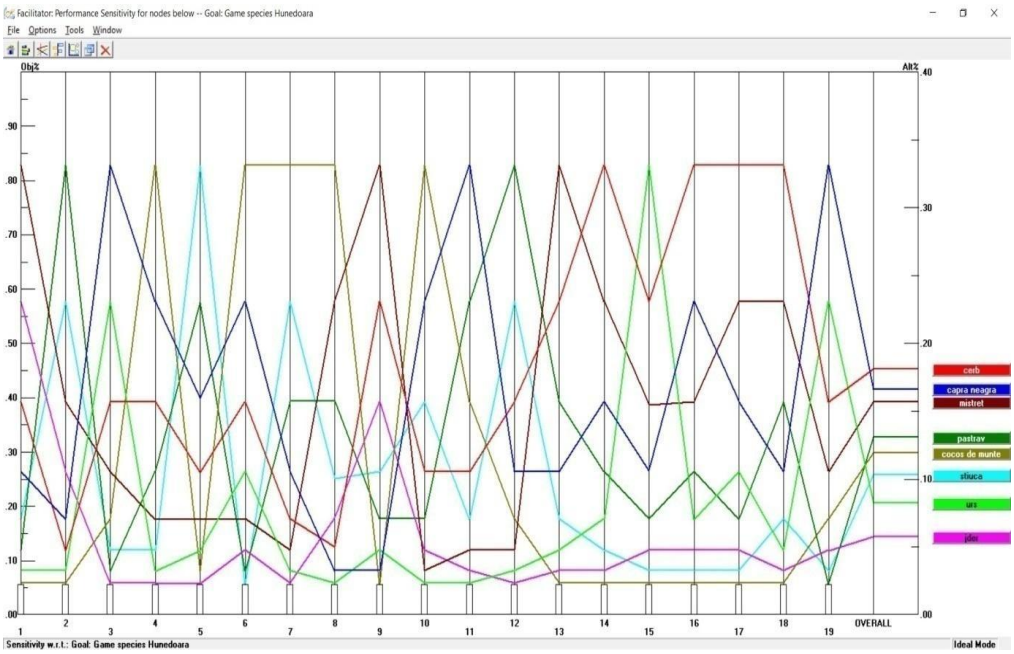

Fig. 2 Ranking of the selected NWFPs

By observing the results of this study, we can ascertain that the common deer and chamois have a larger portfolio of derived products, a larger distribution range and a high market demand, even though the boar has a longer hunting period and despite the fact that the costs for gathering them or transporting them to the storage location are much higher. In comparison with the other studied species, the most important challenge for this two species is represented by their harvesting, that is not always easy.

Common deer (*Cervus elaphus* L) is one of the most tenderer game species from our country (4.060 exemplars in the harvesting quota per country for the 2018/2019 hunting season and 195 exemplars in the harvesting quota for Hunedoara County) (OMAP 540/15.05.2018, appendix 2).

In regard with the **chamois** (*Rupicapra rupicapra* L), the harvesting quota for the 2018-2019 season were of 536 exemplars (in the national quota for the 2018/2019 hunting season) and 62 exemplars (in the harvesting quota for Hunedoara County) (OMAP 540/15.05.2018, appendix 2).

The least important game species from the ones taken into account for this study are the **bear and beech marten**. The bear (*Ursus arctos* L) is not hunted, with the exception of certain cases such as the multiplication of attacks on domestic animals, agricultural cultures or humans and must be authorized by the Ministry through intervention quotas. The beech marten (*Martens foina E*rxl) has recorded the following harvesting quota for the season 2018-2019: 465 exemplars (in the national quota for the 2018/2019 hunting season) and 13 exemplars (in the quota for the Hunedoara County) (OMAP 540/15.05.2018, appendix 2). As such, this species does not present a game interest as the fur industry is in decline and with a low market request.

CONCLUSIONS

The hunting and commercialization potential of game species, as well as their diversity, in Hunedoara County is high as the forest area is well represented. As such, the game species have the space and environment in which to reproduce and develop. Furthermore, hunting and trading these species represents an important income source for the owners of game funds.

Analyzing the eight selected species through an analytic hierarchical process has emphasized the fact the most important game species (that can be hunted on the surface of 70 game funds having a surface of 149.425 ha), are the common deer and chamois, while the least important ones are the bear and beech marten. If the common deer and chamois are hunted due to their varied portfolio of derived products, a large distribution and a high market request, the bear is prohibited from hunting (with the exception of special cases such as the multiplication of attacks on domestic animals, agricultural cultures or humans). The beech marten, on the other hand, does not present a game interest because the fur industry is almost nonexistent in our country and the market request for furs is in decline.

Based on the results of this study, we can ascertain that the evaluation of the potential of NWFPs focused on the gaming activity from Hunedoara County brings an important contribution in the evaluation and marketing of interest gaming species from this county.

The analytical hierarchical process as well as the Expert Choice Desktop Software were used in order to solve complex decision problems, proving to be instruments easy to use. In order to obtain better results in future studies, we recommend the accountability of additional criteria, especially interesting factors from the analyzed domain that can bring a significant input.

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