ANALYZING THE IMPORTANCE OF GAME SPECIES FROM ARGEŞ COUNTY

Ciontu Cătălin Ionel*, **Dincă Lucian**, Enescu Cristian Mihai***, Oneț Aurelia****, Oneț Cristian******

* "Marin Drăcea" National Institute for Research and Development in Forestry, Timișoara, Romania,
e-mail: Ciontu_Catalin@yahoo.com
**"Marin Drăcea" National Institute for Research and Development in Forestry, Brașov, Romania
e-mail: dinka.lucian@gmail.com
***University of Agronomic Sciences and Veterinary Medicine, Bucharest, Romania
****University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048,
Oradea, Romania, e-mail: cristyonet@yahoo.com

Abstract
The surface of Argeş' County forest fund is of 117.212 ha, from which 114.285 ha are covered by forests and 2.927 ha by other fields. The area has a mountain climate in the North part, a hill one in the middle part and a field one in the South part. 51 game funds are present here, amounting to a surface of 641.933 ha. The main game species from this county are: bear, common deer, chamois, roebuck, wild boar, rabbit, marmot, capercaillie, pheasant, badger, fox, marten, ferret, and weasel. 8 species (bear, common deer, wild boar, capercaillie, roebuck, fox and pheasant) were chosen and classified based on 19 criteria with the help of an analytical hierarchy process (AHP) and with the Expert Choice Desktop software package. As such, the most important species resulting from the analytical hierarchy (AHP) are the common deer and the wild boar, and the least important are the capercaillie and the fox.

Key words: Argeş County, game species, harvesting**,** analytical hierarchy

INTRODUCTION

The concept of non-wood forest products (NWFPs) was introduced four decades ago in the tropical silviculture in order to cater for the general production from the forest sector (Enescu, 2017; Timiș-Gânsac et al., 2018).

In order to practice hunting, humans need certain tools and methods, based on the game species and the distance at each it can be found. Primitive humans were confined to gather fruits and meat remains from animals killed by predatory animals, or to catch small or young animals (Cotta et al., 2001).

Only later did humans start to procure their food through hunting. Weapons have constantly evolved, from rocks and forest rods, used for making spears, to the sophisticated and evolved guns from our days.

As long as their number was sufficiently low, the exploitation of natural resources had an insignificant impact. However, once the human population started to grow, unfavorable signs followed by consequences started to appear in different parts of the Earth, steadily leading to the loss of

some populations and even species from the wild flora and fauna (Crăciunescu, Gărgărea, 2014; Dinca et al., 2018).

Nowadays, the concept of hunting includes beside the actual hunting actions, a large range of actions for conserving biodiversity, managing the wild fauna that presents a game interest, forming specialists, realizing research and substantiation works for managerial solutions, acknowledging and promoting the role of wild fauna, sociological studies and many more (Crișan et al., 2017).

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

The concern for protecting game was steadily accompanied by measures for conserving and improving its natural living conditions (meaning its habitat) (Crăciunescu, Gărgărea, 2014; Crișan et al., 2017).

As such, the present concept was obtained which states that "the game interest fauna is a natural renewable resource, a public national and international interest good", while "hunting is done today in order to ensure an ecological equilibrium, to improve the quality of game interest fauna populations, for scientific studies as well as for teaching or for recreational-sporting activities" (art. 2 and 3 from Law number 407/ 2006, with its ulterior changes).

Hunting is a domain that offers not only food resources, but also an economical growth based on its resulting products (fur, trophies, etc.) (Iarca, et al., 2011). The gaming fund and game protection law includes a number of 18 mammalian species and 39 bird species that constitute the gaming interest fauna (Appendix 1), as well as 11 mammalian species and 110 bird species that can be hunted in Romania (Appendix 2) (Law number 407/2006, with its ulterior addendums and changes).

The present study intends to emphasize the most important game species found in Argeş County.

MATERIAL AND METHOD

The study was realized in Argeş County, situated in the superior Argeş basin, from where it takes its name. The county is bordered in North by Făgăraşi crest, with Moldoveanu (2.543 m) and Negoiu Peaks (2.535 m), and in South by the Romanian Plain, a landmark of Wallachian history. As such, all three relief forms can be found from North to South (mountains, hills and plains), as well as two hydrographic basins (Argeş Basin in the mountain area and Vedea Basin in the hill and plain area) (Fig. 1) (www.adrmuntenia.ro).

The surface of Argeş County is of 6.800 km^2, which represents 29% of the country's total surface, while the number of its inhabitants reaches 663.206. They are distributed in three municipalities (Piteşti, Câmpulung-Muscel and Curtea de Argeş), four cities (Mioveni, Topoloveni, Costeşti and Ştefăneşti) and 95 villages (www.adrmuntenia.ro).
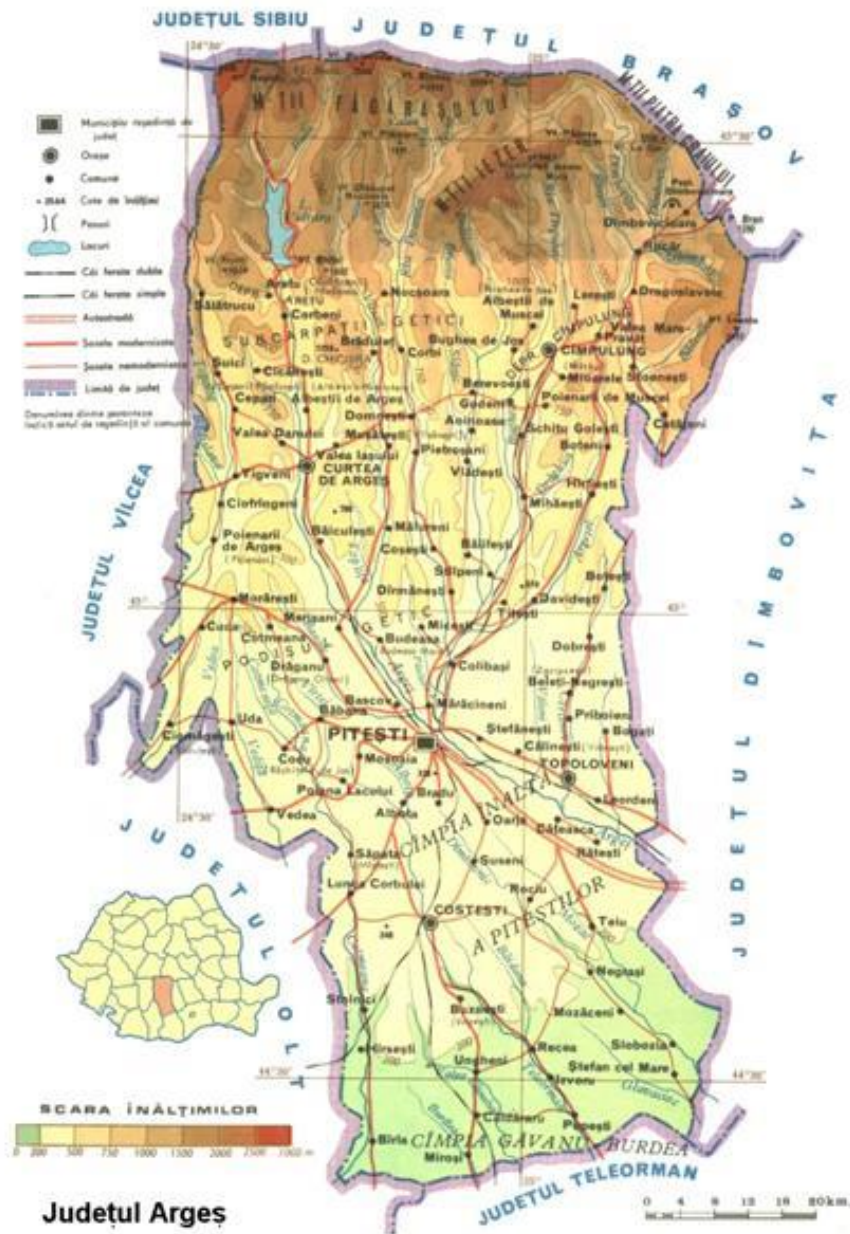

Fig. 1. Location of Argeş County (www.pe-harta.ro)

140

Piteşti municipality is the residential town, also known as "The Tulips City". This locality is representative for the combination of traditional values with European aspirations (www.adrmuntenia.ro).

The forest fund surface of Argeş County is of 117.212 ha, from which 114.285 ha are covered by forests and 2.927 ha by other fields. The management of this forest fund is achieved through 11 forest districts, from the highest summits of Făgăraş Mountains to Burdea Plain, managed by Argeş Forest Administration. The extension of forest surfaces is realized through the regeneration of all forests from which wood mass was gathered, followed by cuttings of main products and the afforestation of fields without forest vegetation without any other usages. The 117.212 ha of forest fund managed by Argeş Forest Administration hosts a fascinating variety of wild animals. Argeş Forest Administration manages 8 game funds, ranging from the plain up to the mountain area, from the 51 game funds that can be found in this county (www.rosilva.ro).

The main species that hold a game interest from Argeş County are: bear, common deer, chamois, roebuck, wild boar, rabbit, marmot, capercaillie, pheasant, badger, fox, marten, ferret and weasel. Amongst them, 8 species (bear, common deer, wild boar, capercaillie, fox, rabbit and pheasant) were studied and used in an analytical hierarchical process (AHP), while the analyses were obtained by using the Expert Choice Desktop software package.

AHP is one of the most used worldwide models of decisional support for solving complex problems for decision making in many domains, including biological sciences (Aras et al., 2004; Wang et al., 2004; Park et al., 2013). The analytical hierarchical process uses pair comparisons of the selected criteria in order to evaluate the importance of the others (Huang et al., 2011). As such, the complex problem (namely the purpose of this research) is hierarchically structured, its main objective being at the top of the hierarchy, while the criteria (and sub-criteria, if they exist) and the alternatives (meaning the eight selected non-wood forest products) are situated at the hierarchy's bottom (San Cristóbal, 2011).

The selected species were the following: bear (*Ursus arctos* L), common deer (*Cervus elaphus* L), wild boar (*Sus scrofa* L), capercaillie (*Tetrao urogallus* L), roebuck (*Capreolus capreolus* L), fox (*Vulpes vulpes* L), rabbit (*Lepus europaeus* Pallas) and pheasant (*Phasianus colchicus* L).

RESULTS AND DISCUSSION

The AHP classification for the 19 criteria taken into consideration is rendered in Table 1.

Taking into account the AHP results, the most important species with a game interest from Argeş County were common deer and wild boar, while the least important ones were capercaillie and fox (Fig. 2).

AHP alternative ranking

	Criterion	Animal species							
		Ursus arctos L	*Cervus elaphus L*	*Sus scrofa L*	*Tetrao urogallus L*	*Capreolus capreolus L*	*Vulpes vulpes L*	*Lepus europaeus Pallas*	*Phasianus colchicus L*
1	Harvesting period	2	3	7	1	6	8	5	4
2	Portfolio of derived products	4	8	6	1	7	2	5	3
3	Harvested quantity / worker / 8 hours	2	4	6	1	3	5	7	8
4	Harvesting cost	8	7	6	4	5	1	2	3
5	Knowledge for recognition	2	1	8	4	3	6	5	7
6	Knowledge for harvesting	3	8	6	7	5	1	2	4
7	Tools needed for harvesting	4	8	7	1	6	2	3	5
8	Complexity of harvesting process	4	8	5	7	6	1	2	3
9	Distribution range	6	7	8	1	5	4	3	2
10	Market potential	6	8	7	2	5	1	4	3
11	The price of raw product	8	7	5	2	6	1	4	3
12	The price of the derived product	7	8	5	2	6	1	4	3
13	Transport (harvesting - storage center)	8	7	6	2	5	1	4	3
14	Perishability	3	4	5	2	8	1	6	7
15	"Celebrity" of the product on market	6	8	7	2	5	1	4	3
16	Market demand	7	8	6	2	5	1	3	4
17	Biotic threats	1	5	3	4	6	2	7	8
18	Abiotic threats	1	4	3	7	5	2	8	6
19	Development of harvesting process	2	4	8	3	7	1	6	5

According to this study's results, even though the deer does not have a harvesting period as long as the wild boar, it has a larger portfolio of derived products, a larger distribution range and a higher market request, although the harvesting, transport (from the harvesting place to the storage center) and derived products costs are much higher. In comparison with the other species, the most important challenge in regard with this species is represented by its harvest, which is not always easy.
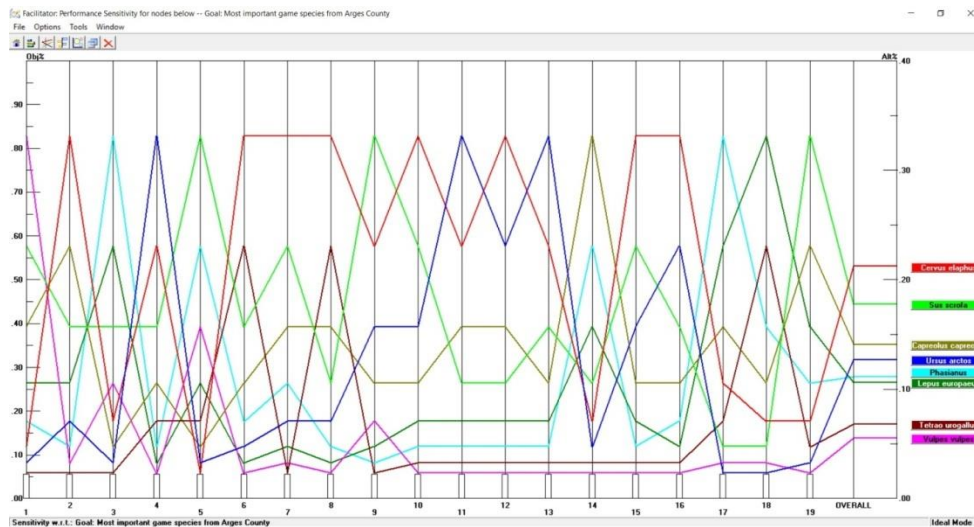

Fig. 2. Ranking of the selected NWFPs

The second product as importance, the wild boar, has a longer harvesting period, a larger portfolio of deriver products, a significant distribution range and an increased market request.

The least important species of game interest from this study are capercaillie and fox. This is caused by the fact that the capercaillie is prohibited from hunting, while the fox, although it has the largest period of hunting (all year long), does not present interest because its derived products (fur) is less or not at all used in the textile industry.

Foxes are harvested only during control hunting or as an auxiliary game species for pheasant or wild boar hunts. The fox must be taken to the Veterinary and Public Alimentation Sanitary Direction (DSVSA) for antirabic testing.

As in the case of Tulcea County, wild boar and roebuck had similar classifications (first place in Tulcea and second place in Arges for wild boar and second place in Tulcea and third place in Arges for roebuck) (Dincă et al., 2018). By analyzing 8 non-wood forest products (including mushrooms and forest fruits), the roebuck was situated on the first place in Prahova

county (Enescu et al., 2018), while the common deer reached the fourth place in Maramures County (Enescu et al., 2017).

The wild boar (*Sus scrofa* L) is the most profitable gaming species from our country (53.134 ex. in the national harvesting quota for 2018/2019 and 1.204 ex. in the harvesting quota for Argeş County) (Table 2).

In regard with small hair game, the first place is occupied by rabbit (*Lepus europaeus* Pallas) with 106.235 ex. in the country harvesting quota for 2018/2019 (Fig. 3) and 1.412 ex. in the harvesting quota for Argeş County (Order number 540/15.05.2018, appendix 2).

Table 2

Harvesting quota for mammalians from Argeş County during the 2018-2019 season

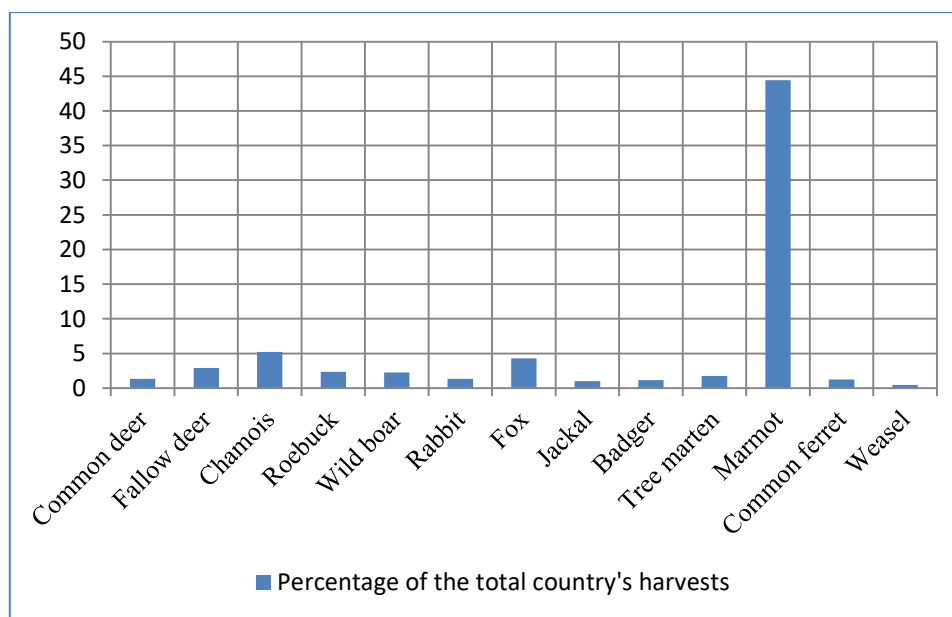| Species	Common deer	Fallow deer	Chamois	Roebuck	Wild boar	Rabbit	Fox	Jackal	Badger	Tree marten	Marmot	Common ferret	Weasel
Harvesting quota	55	45	28	634	1.204	1.412	2.105	103	42	23	4	34	11

Fig. 3. Percentage of mammalian harvesting quota in the season 2018-2019 for Argeş County, compared with the national harvesting quota

The pheasant (*Phasianus colchicus* L) is the most valuable species of small game with feathers from our country (119.772 ex. in the national quota for 2018/2019 and 2.535 ex. in the harvesting quota for Argeş County – (Table 3, Fig. 4) (Order number 540/15.05.2018, appendix 2).

144

Bird harvesting quota for Argeş County in the season 2018-2019

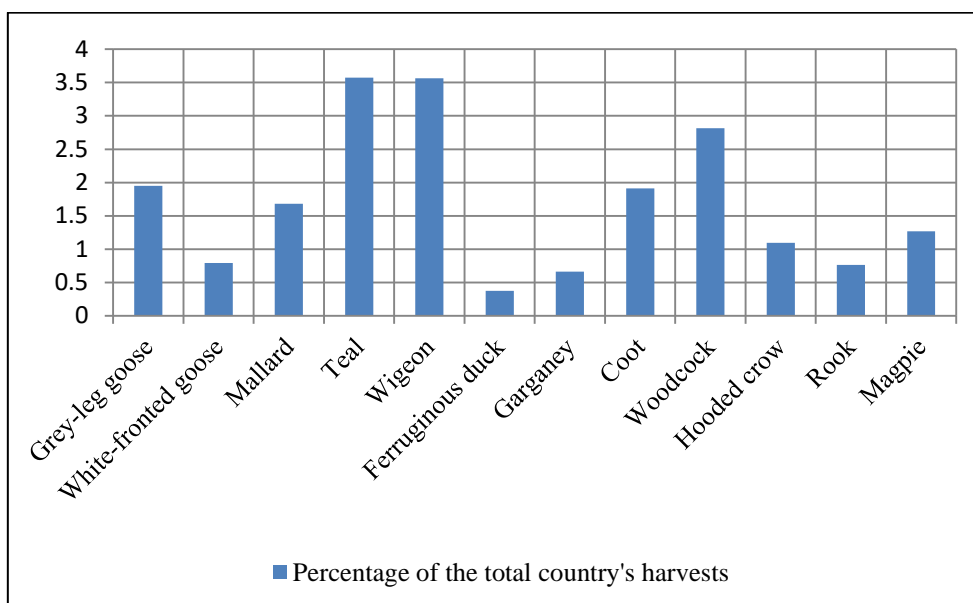| Species	Grey-leg goose	White-fronted goose	Mallard	Teal	Wigeon	Ferruginous duck	Garganey	Coot	Woodcock	Hooded crow	Rook	Magpie
Harvesting quota	310	417	2.241	2.224	124	20	34	309	381	1.475	838	1.838

Fig. 4. Percentage of bird harvesting quota in the season 2018-2019, for Argeş County, compared with the national harvesting quota

CONCLUSIONS

The diversity and potential for harvesting and trading gaming interest species in Argeş County is high due to the fact that the forest area is very well represented, so that the game interest species have the space and environment in which they can develop. The harvesting and trading of these species represents an important revenue source for the owners of game funds.

The most important species with a game interest (that can be hunted on the area of 51 gaming funds, having a surface of 641.933 ha) from this area have resulted by analyzing eight species and using an analytical hierarchical process.

As such, the most important species are the common deer and wild boar, while the least important ones are the capercaillie and fox. The

common deer and wild boar are hunted because they have a larger portfolio of derived products, a larger distribution area and an increased market request, while the capercaillie is strictly forbidden from harvesting and the fox is considered harmful, being hunted to protect the species with which it feeds.

The results of this study represent an important contribution for evaluating the NWFP potential, with a focus on harvesting, marketing and other related activities.

The combination between the analytical hierarchical process and Expert Choice Desktop proved to be a tool that is very used to use in order to resolve a complex decision making problem. In order to obtain more representative results, further studies will have to take into account additional criteria and to involve specialists and interested factors from different domains.

REFERENCES

1. Aras H., Erdogmus S., Koc E., 2004, Multi-criteria selection for a wind observation station location using analytic hierarchy process. Renewable Energy 29, pp.1383-1392
2. Cotta V., Bodea M., Micu I., 2001, Vânatul și vânătoarea în România. Ed. Ceres București, pp.17
3. Crăciunescu A., Gărgărea P., 2014, Cinegetică-Salmonicultură – Îndrumar de lucrări practice. Ed. Ceres București, pp.17-18
4. Crișan V., Dincă L., Oneț A., Oneț Cr., 2017, The Description of Forest Soils from Brăila County. Natural Resources and Sustainable Development, 7, pp.21-26
5. Crișan V., Dincă L., Oneț Cr., Oneț A., 2017, Collection Species from Potentilla Genre. Natural Resources and Sustainable Development, 7, pp.27-34
6. Dincă L., Dincă M., Pantea S.D., Timiș-Gânsac V., Oneț Cr., 2018, Amaranthus Plant – Between Myth and Usage, Natural Resources and Sustainable Development, 8, No 1, pp.9-16, DOI: 10.31924/nrsd.v8i1.002
7. Dincă L., Enescu C.M., Timiș-Gânsac V., 2018, Game species from Tulcea county and their management. Scientific papers series Management, Economic Engineering in Agriculture and Rural Development, Vol. 18, Issue 3, pp.101-106
8. Enescu C.M., 2017, Which are the most important non-wood forest products in the case of Ialomița county? AgroLife Scientific Journal, 6(1), pp.98-103
9. Enescu Cr.M., Dincă L., Vasile D., 2017, Importance of non-wood forest products for Maramureș county. Revista de Silvicultură și Cinegetică, nr.40, pp.92-97
10. Enescu M.C., Dincă L., Crișan V., 2018, The most important non-wood forest products from Prahova County. Revista Pădurilor, nr.1, pp.45-51
11. Huang I.B., Keisler J., Linkov I., 2011, Multi-criteria decision analysis in environmental sciences: Ten years of applications and trends. Science of the Total Environment 409, pp.3578-3594
12. Iarca I., Popović Z., Dusmanescu D., Subić J., Andrei J., Done I., 2011, The evaluation of economic investments projects in intensive breed of game: A study case for European deer (Cervus elaphus L.) and wild boar (Sus scrofa L.) in the

context of the best investment decision. African Journal of Business Management Vol. 5(3), pp.934-943

13. Molnár L.M., 2011, Vânătoare şi pescuit în epoca romană. Analele Universităţii Creştine „Dimitrie Cantemir", Bucureşti, Seria Istorie –Serie nouă, Anul 2, Nr.1-2, pp.101-124

14. Momir B., Petroman I., Petroman C., Stefanovic M., Gavruta A., Firu A., Marin D., 2015, Management of hunting and hunting fund (a case study). Lucrări Ştiinţifice Management Agricol, Vol. 17, No. 14, pp.44-50

15. Park S., Choi C., Kim B., Kim J., 2013, Landslide susceptibility mapping using frequency ratio, analytic hierarchy process, logistic repression, and artificial neural network methods at the Inje area, Korea. Environmental Earth Sciences 68, pp.1443-1464

16. San Cristóbal J.R., 2011, Multi-criteria decision-making in the selection of a renewable energy project in Spain: The Vikor method. Renewable Energy 36, pp.498-502

17. Timiş-Gânsac V., Enescu C.M., Dincă L., Oneţ A., 2018, The Management of Non-Wood Forest Products in Bihor County. Natural Resources and Sustainable Development, v8, i1, pp.27-34, DOI: 10.31924/nrsd.v8i1.004

18. Wang G., Huang S.H., Dismukes J.P., 2004, Product-driven supply chain selection using integrated multi-criteria decision-making methodology. International Journal of Production Economics 91, pp.1-15

19. ***, 2006, Legea 407/2006, Legea vânătorii şi a protecţiei fondului cinegetic nr. 407/2006 din 09/11/2006 (actualizata 24/07/2015)

20. ***, 2018, Ordinul ministrului Apelor şi Pădurilor nr. 540 din 15.05.2018 privind aprobarea cotelor de recoltă pentru speciile de faună de interes cinegetic, la care vânătroarea este permisă, pentru perioada 15 mai 2018-14 mai 2019. Ministerul Apelor şi Pădurilor Monitorul Oficial, Anexa 2

21. https:// www.adrmuntenia.ro

22. https:// www.rosilva.ro

23. www.pe-harta.ro