The potential of non-wood forest products for Brașov County

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Abstract: In Romania, forest management is mainly focused on timber production, little attention being given to the potential of non-wood forest products (NWFPs). Compared with wood industry, the economic activities related to the harvesting and marketing of the NWFPs (especially mushrooms, forest fruits and game products) have a very low contribution to the turnover of the forestry units in Romania. The low importance of NWFPs is also indicated by the lack of the policies and normative acts in this domain, harvesting and marketing of NWFPs being done in most of the cases in a chaotic way, without respecting the principles of sustainable management. Across the country, there are several regions with high potential in terms of harvesting NWFPSs, Brașov County being one of them. The aim of this research was to highlight the most important non-wood forest products from Brașov County. The analysis model proposed within FP1203 COST Action *European non-wood forest products network* was used and therefore four categories (Mushrooms, Understorey plants, Tree products and Animal origin) of NWFPs and nineteen criteria were taken into consideration. The Analytic Hierarchy Process (AHP) was used and the alternatives (i.e. the NWFPs) were pairwise compared against each in order to determine the NWFPs with the highest potential for Brașov County. The analysis were done with Expert Choice Desktop software package. The selected NWFPs consisted in dog rose (*Rosa canina* L.), raspberry (*Rubus idaeus* L.), honey fungus [*Armillaria mellea* (Vahl) P.Kumm.], truffles (*Tuber* spp.), Christmas trees (*Abies alba* Mill.), chamois (*Rupicapra rupicapra* L.), brown bear (*Ursus arctos* L.) and St John's wort (*Hypericum perforatum* L.). The truffles were the NWFPs with the highest potential for Brașov County, followed by the Christmas trees and the chamois. The less promising (i.e. with the lowest potential) NWFPs were dog rose' berries and the St John's wort. By taking into consideration that in the case of more than half of the forests from Brașov County wood harvesting is not permitted, it is expected that the forest managers and forest owners will pay more attention to the NWFPs, that could become an important source of income.

Keywords: AHP, Brașov, non-wood forest products, NWFPs

1. Introduction

Non-wood forest products (NWFPs) represent natural resources of vegetable origin, other than wood, supplied by forests or other lands without tree cover from the forest fund, being valued raw or in different processing stages in several purposes (Beldeanu, 2008). Worlwide, it is estimated that more than 150 NWFPs are the subject of international trade

(Schvidenko et al., 2005), the most common categories of NWFPs being represented by forest fruits, truffles and edible mushrooms, forest seeds, medicinal plants, understory plants, game products and tree saps.

The marketing of non-wood forest products represents an important source of income for rural households (Shackleton et al., 2007a, b). This is mainly due to the fact that the harvesting requires little capital and labor resources, and people have the knowledge and skills needed to carry out these activities. Also, in many cases, access and collection rights are not regulated (Beck and Nesmith, 2001), this activity being essential for poor and marginalized households (Beck and Nesmith, 2001; Fisher, 2004; Shackleton et al., 2008).

In Romania, the capitalization of NWFPs was a major concern, especially after the Second World War, when technical means of processing were developed (Beldeanu, 2008). During the communist era, the value of NWFPs had a high share in the production of forestry units (40% in 1978), the share of income from activities of marketing of NWFPs fluctuated at county level between 22% and 73% (Petrescu et al., 1984).

Nowadays, in Romania, due to the diversification of the forest fund ownership, but also thanks to the legislative transition, the harvesting of NWFPs from the forest fund is no longer a priority, selling timber products being the main source of income for the forest managers and forest owners. The very little attention that is given to the management of the NWFPs in Romania is also highlighted by the low level of economic contribution of specific NWFPs to the turnover of the forest districts, like in the case of game products (Enescu and Hălălișan, 2017), but also by the low harvested quantities of forest fruits, mushrooms and forest seeds recorded in the last years. For example, in the last decade, as regards the forest fruits, the harvested and marketed quantites ranged between 2.442 tons (in 2016) and 6.562 tons (in 2010), while in the case of the edible mushrooms, the lowest quantity was recorded in 2008 (312 tons) and the highest quantity in 2012 (717 tons), respectively (INS 2008-2016).

Across the country, there are several regions with high potential in terms of harvesting and marketing of NWFPs, Brașov County being one of them.

The aim of this study was to highlight the potential of the non-wood forests products from Brașov County.

2. Materials and methods

Brașov County is situated in the center of Romania (Figure 1), being the county with the highest share (88.5%) of managed forests by private forest districts (INS, 2016). Only about 20.000 hectares of forests are managed by Brașov Forestry Department (a branch of National Forest Administration Romsilva) throught its three forest districts, and 2.400 hectares are managed by Săcele Exprimental Base (a branch of "Marin Drăcea" National Institute for Development and Research in Forestry) (Dincă and Enescu, 2017).

The total woodland area in Brașov County accounts for 202.200 hectares,

with a share of two-thirds of hardwood species, mainly beech (*Fagus sylvatica* L.), and one third of coniferous species, mainly Norway spruce [*Picea abies* (L.) H.Karst] (INS, 2016).

Fig. 1 Location of Brașov County (Source: Wikipedia)

Based on the centralized quantitative data contained in the forest management plans of the forest districts from Brașov County and by taking into account the information from the ministerial orders regarding the size of population and annual quota of the main hunting species, a selection of the most common NWFPs was done.

The analysis model proposed within FP 1203 COST Action *European non-wood forest products network* was used and therefore four categories (Mushrooms, Understorey plants, Tree products and Animal origin) of NWFPs and nineteen criteria were taken into consideration (Huber et al., 2016). The same 19 criteria were used in similar studies conducted for Ialomița County (Enescu, 2017) and Maramureș County (Enescu et al., 2017).

For each criterion a scale ranging from 1 to 8 was used, namely: criterion 1: harvesting period (from 1: the shortest harvesting period to 8: the longest harvesting period); criterion 2: portfolio of derived products (from 1: the smallest number of deriver products to 8: the highest number of derived products); criterion 3: harvested quantity by one worker in 8 hours (from 1: the lowest quantity to 8: the highest quantity); criterion 4: harvesting cost (from 1: the lowest cost to 8: the highest cost); criterion 5: knowledge for recognition (from 1: most recognizable product to 8: hardest recognizable product); criterion 6: knowledge for harvesting (from 1: the less knowledge necessary to 8: most knowledge necessary); criterion 7: tools needed for harvesting (from 1: the least to 8: the more); criterion 8: complexity of harvesting process (from 1: lowest to 8: highest); criterion 9 - distribution range (from 1: lowest to 8: highest); criterion 10 - market potential (from 1: lowest to 8: highest); criterion 11 - the price of raw product (from 1: lowest to 8: highest); criterion 12 - the price of the derived product (from 1: lowest to 8: highest); criterion 13 - transport from the harvesting point to the storage center (from 1: the most easy to 8: the most complicated); criterion 14 - perishability (from 1: lowest to 8: highest); criterion 15 - "celebrity" of the product on the market (from 1: the least known to 8: the most popular); criterion 16 - market demand (from 1: lowest to 8: highest); criterion 17 - biotic threats (from 1: the fewest threats to 8: the most threats); criterion 18 - abiotic threats (from 1: the fewest threats to 8: the most threats) and criterion 19 - development of the process of harvesting (from 1:

undeveloped to 8: extremely developed).

The Analytic Hierarchy Process (AHP), developed by Thomas Saaty (Saaty, 2008), was applied to generate an explicit ranking of the alternatives (*i.e.* the NWFPs) that are represented in Brașov County. By the aid of AHP, the decision problem (*i.e.* the aim of this research) is decomposed into a hierarchy sub-problem (*i.e.* the selected criteria) which can be independently and deeply analyzed, by comparing them to each other two at the time. The analysis were done with Expert Choice Desktop software package v. 11.5.1683.

3. Results

The selected NWFPs consisted in dog rose (*Rosa canina* L.), raspberry (*Rubus idaeus* L.), honey fungus [*Armillaria mellea* (Vahl) P.Kumm.], truffles (*Tuber* spp.), Christmas trees (*Abies alba* Mill.), chamois (*Rupicapra rupicapra* L.), brown bear (*Ursus arctos* L.) and St John's wort (*Hypericum perforatum* L.). The AHP alternative ranking, based on experts' opinion, is presented in Table 1.

Table 1. AHP alternative ranking

Criterion	Mushrooms		Tree products	Understory plants			Animal origin	
	Armilaria mellea	*Tuber* spp.	*Abies alba*	*Rubus idaeus*	*Rosa canina*	*Hypericum perforatum*	*Ursus arctos*	*Rupicapra rupicapra*
1	4	7	1	5	6	3	8	2
2	5	8	1	7	6	4	2	3
3	6	1	3	5	4	2	8	7
4	3	7	8	2	6	1	4	5
5	7	8	2	5	4	6	1	3
6	3	7	1	2	5	4	6	8
7	5	7	8	2	6	1	3	4
8	3	7	8	2	4	1	5	6
9	8	7	5	2	4	3	6	1
10	6	8	7	5	4	3	1	2
11	3	6	5	4	2	1	8	7
12	5	8	1	4	3	2	7	6
13	4	5	6	2	3	1	7	8
14	6	8	1	7	2	3	5	4
15	5	6	3	4	2	1	7	8
16	5	8	7	6	4	3	2	1
17	7	6	3	8	5	4	1	2
18	6	7	4	8	5	3	1	2
19	3	8	7	2	4	1	5	6

According to AHP results, the non-wood forest products with the highest potential for Brașov County were the truffles (*Tuber* spp.) and the Christmas trees (*Abies alba* saplings), while the less important ones were the dog rose

and St John' wort (Figure 2). The truffles had a low performace only in the case of criterion no. 3 (harvested quantity by one worker in 8 hours).

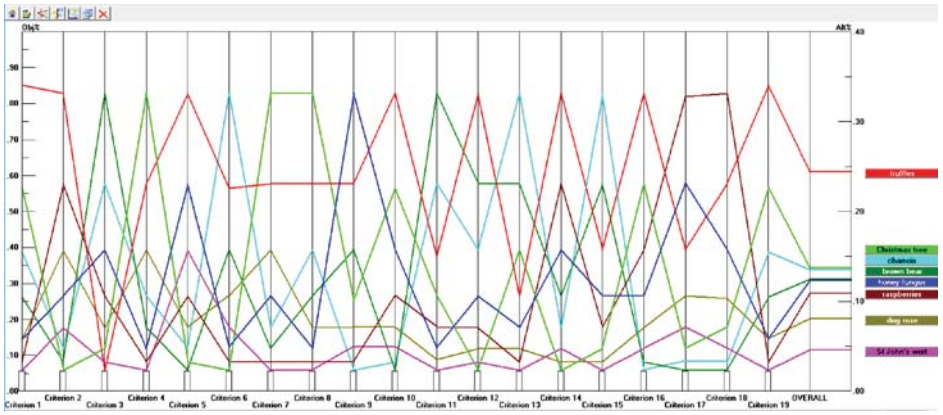

Fig. 2 The ranking of the selected NWFPs

4. Discussion

Even if there is no centralized statistics regarding the annual harvested quantities of truffles at national level, Brașov County represents one of the hotspots, the most well-known regions rich in truffles being Făgăraș, Rupea and Valea Bogății (Dincă and Dincă, 2012). Special attention should be given to the harvesting methodology, that should have a very low impact to the environment. The most common used and environemntal friendly method consists in using trained dogs (Dincă and Dincă, 2012).

By taking into consideration the particularities of Brașov County in terms of ownership status, diversity of forest owners and forest managers, high number of protected areas, but especially its eco-touristic potential (Iacob, 2013; Sălăgean, 2013; Gheorghe and Pârvu, 2016), we believe that the harvesting and marketing of the non-wood forests products should not be an obstacle, but a very important activity integrated in several economic sectors. Moreover, focusing on this type of resourse, the pressure on wood harvesting will decrease.

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ISSN 2537 - 3757, ISSN-L 2537 – 3757

Proceedings of the 4th Edition of the International Conference Integrated Management of Environmental Resources - Suceava, November 3-4th, 2017. Editura Universității „Ștefan cel Mare" Suceava, Romania.

Publisher:

Editura Universităţii „Ştefan cel Mare" din Suceava

Editors (eds.):

Sergiu-Andrei Horodnic, Mihai-Leonard Duduman, Ciprian Palaghianu

All papers in this publication were submitted on-line and have been edited to achieve a uniform format. Authors are responsible for the content of their paper.

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