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The main pressures on forest habitats in the Natura 2000 site ROSCI0241 Tinovul Apa Lina - Honcsok

Oliver MERCE[1*]

[1] INCDS Marin Dracea – Station Timișoara, e-mail: oliver_merce@yahoo.com

* Corresponding author: oliver_merce@yahoo.com

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Abstract
Within the Natura 2000 site ROSCI0241 Tinovul Apa Lină - Honcsok, located in the north-east of Covasna county and in the south-east of Harghita county, four forest habitats of Community interest were identified: 91D0* - Bog woodland, 91E0* - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)*, 91V0 – Dacian Beech forests (*Symphyto-Fagion*), 9410 – Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*). The main pressures are: A04.02.05 - Non-intensive mixed animal grazing, B07 - Other forestry activities (forest exploitation), B07 - Other forestry activities (planting of non-native tree species, inappropriate forestry interventions), C01.01 - Sand extraction and gravel, D01.02 - Roads, highways (construction of roads in the forest), E01.03 - Dispersed housing, E03.04 - Other types of storage (manure), E04 - Infrastructures, constructions in the landscape, L07 - Storms, cyclones. The pressures that affect these habitats have a direct or indirect action and an intensity that varies from low to medium.

Keywords: habitats, pressures, 91V0, 91D0*, 91E0*, 9410

Introduction

Natura 2000 is one of the basic pillars in the conservation of biodiversity in the European Union, and forests are of crucial importance, almost 50% of the area occupied by Natura 2000 sites is represented by forests. [7], this network having the role of ensuring the long-term survival of the most valuable and at the same time threatened species and habitats [5].

According to the IUCN, pressure is considered an action/phenomenon that had an effect negative in the last - usually five years - while the threat is an action/ phenomenon that will continue or may appear in the future and with a potential negative effect in the next years [10].

Member States reported over 67,000 cases of pressure from the 203 individual pressures in the period 2013-2018, approximately one third of these reported pressures are considered to be of high importance. Thus, the most commonly reported pressures on habitats and species are associated with agriculture, followed by urban development and recreational activities, then unsustainable forestry activities. Forestry activities represent 11% of the total pressures. The removal of dead wood and old trees, clear cuts, conversion to other types of forest or the introduction of non-native species are just some of the most relevant types of pressures that affect forests [13].

The most frequent threats and pressures found through Corine Land Cover at the level of ROSCIs in Romania are related to forestry, grazing, the extent of the urbanized environment and those related to agriculture [12].

Also, in Romania, the pressures on Natura 2000 sites is manifested, among others, by:

- some of the forest stands included in the Natura 2000 sites are not included in any forest management plans, which makes uncontrollable the human impact on them;
- lack of a unified approach on the problem of bark beetles insect attacks at the level of all protected areas' system;
- illegal logging, especially the forest owners which, having retreat their property, want to valorise it as quick as possible by logging and selling the wood, not considering the measures from the forest management plans [6].

Material and Method

The research was located within the site Natura 2000 ROSCI0241 Tinovul Apa Lina - Honcsok, the geographical coordinates being 46^{0}19'43" North latitude and 26^{0}19'07" East longitude. The natural area is

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located in the North-East of Covasna county (occupying the administrative territory of Estelnic, Mereni and Poian communes) and in the South-East of Harghita county (on the territory of Plaiești de Jos commune), having an area of 7830.1 ha (figure 1) [15].

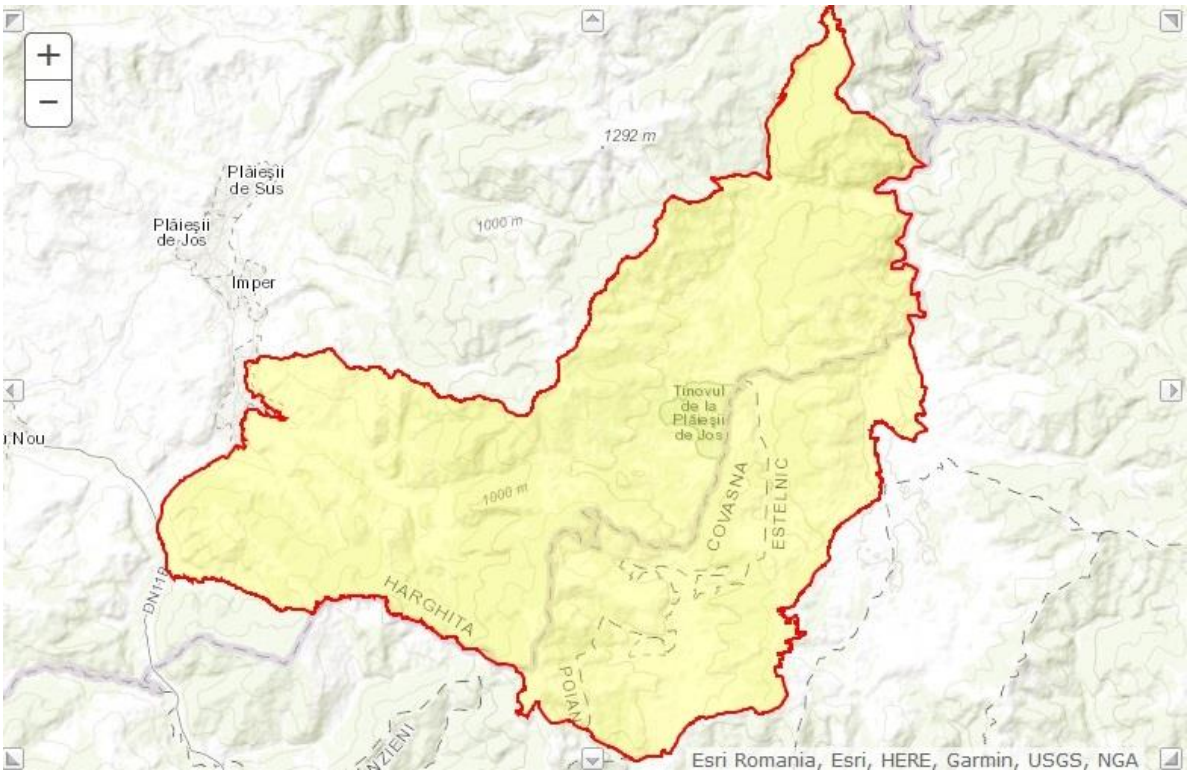

Figure 1. Research location [15]

The research material consists of forest stands found within the studied area. In order to determine the types of Natura 2000 forest habitats, an equivalence has been made between the forest habitats of Community interest with the Romanian habitats and the forest types used in the Romanian forest typology. In this respect, the equivalence of the work "Establishment of management measures for forest habitats of Community interest included in the Natura 2000 sites" - authors Iovu Biriş and Oliver Merce was used. This equivalence is based on a series of scientific papers: "Interpretation Manual of European Habitats", "Handbook for the Interpretation of Natura 2000 Habitats in Romania" - coordinators: Gafta D. and Mountford O. [4], "Habitats of Romania "- authors: Doniță et al. [3], "Types of forest ecosystems in Romania" - coordinators: Doniță N., Chiriţă C., Stănescu V., "Types of forest in Romania" - authors Paşcovchi S. and Leandru V. [8] and "The list of habitats and species of Community interest for which sites of Community importance have been declared" [16].

Subsequent to this equivalence, the correspondence forest type - Natura 2000 forest habitat was checked in the field. During this check, a complex data sheet was acquired, in which the characteristics of the forest stand, shrub layer, seedlings layer and herbaceous flora were recorded (based on these determinations being the book "Flowers in Romania's forests" - authors: Candrea-Bozga, Indreica, Lazar, 2013 [2].

Pressures, as well as their codes, have been assimilated to those outlined in the "Pressures and Threats Nomenclature" in the “Guide to Managing Natural Areas Management Plans” [14].

This nomenclature contains an extended list to indicate impacts on habitats. The pressures are grouped by categories: A – Agriculture, B – Forestry, C - Mining, extraction of materials and energy production, D - Communication networks, E - Urbanization, residential and commercial development, F - Use of biological resources, other than agriculture and forestry, G - Human intrusions and imbalances, H - Pollution, I - Invasive species, other species and gene problems, J - Changes in the natural system, K - Natural biotic and abiotic processes (without catastrophes), L - Geological events , natural disasters, M - Global changes, U - Unknown pressure or threat, XE - Pressures and threats from outside the EU territory, XO - Pressures and threats from outside Romania.

Within each category, a series of activities that can have a negative influence on forest habitats are detailed and codified. If the pressure identified in the field was not found in the list, it was set to a similar

pressure and additional specifications were made. This aspect was mainly encountered within the category B pressures.

For each stress factor / limiting situation encountered the following aspects were observed: the incidence level, the affected habitat area and the intensity of the negative influence (Table 1).

Table 1. The scale of incidence level, the affected habitat area and the intensity of the negative influence [11]

Crt. no.	Name of the characteristic of threat evaluation	Scale of classification
1.	Incidence level	Potential
		Small
		Average
		High
2.	Affected habitat area	Small
		Average
		High
3.	Intensity of the negative influence	Small
		Average
		High

Results and Discussion

Following the field observations, four forest habitats of Community interest were identified: 91D0* - Bog woodland, 91E0* - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)*, 91V0 - Dacian Beech forests (*Symphyto-Fagion*), 9410 - Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

The main pressures identified are:

- **A04.02.05 - Non-intensive grazing in mixed animals** (for habitats 91D0*, 91V0, 9410). Grazing is mainly practiced on the periphery of the habitats, although there are areas where herds cross the forest to new grazing sites. Sheep and cattle graze in the area, this aspect involves the construction of barns in the vicinity of the habitat, which generates the process of grazing. Animals often enter the forest floor (habitats) and can affect the process of natural regeneration of stands. The intensity of the impact is low, the long-term viability of the habitat type, in the respective place, is not significantly affected.

- **B07 – Other forestry activities (forest exploitation)** (for habitats 91D0*, 91E0*, 91V0, 9410). Within and in the vicinity of the habitats, traces of forest exploitations carried out in the past but also in the present can be observed, with a point-like dispersion. Silvotechnical interventions (forest exploitation) affect the structure of phytocenoses by making them vulnerable to abiotic disturbance factors (wind), acting at the same time directly and indirectly. The intensity of the impact varies from low to medium.

- **B07 - Other forestry activities (planting of non-native tree species, non-compliant forestry)** (for habitats 91D0*, 91E0*, 91V0). Pressure occurs on significant surfaces. It manifests itself with an intensity that varies from low to medium, affecting especially the young stands within the habitats, being caused by innapropriate silvicultural practices. Within the habitat, there are excessively dense stands due to the failure to apply tending operations (cleaning, thinning) in time. There are also plantations with non-native species, inconsistent with the fundamental natural type of forest (scots pine, larch), as well as secondary (modified) stands (with a lot of birch).

- **C01.01 - Extraction of sand and gravel** (for habitats 91D0*, 91E0*). Within the protected area, gravel is extracted for the repair of the forest road that crosses some habitats. The surface of the stone quarry is limited and affects the habitats indirectly, the intensity of the impact being low.

- **D01.02 - Roads, highways** (construction of roads in the forest) (for habitats 91D0*, 91E0*, 91V0, 9410). The habitats are crossed by forest roads, some of them being greatly affected by the exploitation/wooden transport machines, which can directly and indirectly affect the water regime, as well as the structure of the stands. The intensity of the impact varies from low to medium.

- **E01.03 - Dispersed habitat** (for habitats 91D0*, 91E0*, 91V0, 9410). - The pressure has an indirect action on the habitats, it manifests itself dispersedly, on their periphery, its intensity being low. There are houses, temporarily inhabited (mainly during the summer), they can become a source of pollution for the habitat. At the same time, there may be a risk that the tenants carry out illegal cutting of wood (with reduced intensities) for the procurement of firewood or other uses.

- **E03.04 - Other types of storage (manure)** (for habitat 91E0*). This pressure is manifested only on remaining surfaces, in the western part of the site. In the present case, it appears punctually in several scattered areas in the vicinity of the habitat. The pressure is of low intensity, affecting the habitat indirectly.

- **E04 - Infrastructures, constructions in the landscape** (for habitat 91V0). This pressure manifests itself in several points and indirectly affects the habitat. There are various constructions in the area, including a mineral water catchment.

- **L07 Storms, cyclones (cause of falls)** (for habitats 91D0* and 91V0). Within the protected area there are trees affected by wind/snow falls. Due to the high density, the trees register very high slenderness coefficients, which makes the stands vulnerable to the harmful action of abiotic factors. These disturbances, of moderate importance for the habitats, as a rule, manifest themselves pointwise, the surface of the habitats being affected with a low intensity.

Conclusions

Nine types of pressures were determined. Forest exploitation has the greatest impact, this pressure having a low to medium intensity, affecting all four types of habitats. Next is the construction of forest roads, as a direct effect of forestry exploitation, also with low to medium intensity, this threat also occurring in the four types of habitats, as well as dispersed housing. This last pressure has a low intensity.

Grazing, even if it is practiced on the periphery of the habitats and has a low intensity, affects three of them (91D0, 91V0 and 9410). Planting of allochthonous tree species and inappropriate silvicultural practices also affect three habitats (91D0, 91E0 and 91V0). In direct correlation to this pressure (inappropriate silvicultural practices), the effects generated by storms are manifested, pressure affecting two habitats (91D0 and 91V0).

Sand and gravel extraction affect habitats 91D0 and 91E0 indirectly and with a low intensity. Manure storage, like construction, indirectly affects one habitat each (91E0, respectively 91V0).

It can be observed that the anthropic impacts predominate, the disturbances produced by abiotic factors may also be a consequence of not applying the tending operations of the young stands in time in the young stands, they develop specimens with high values of slenderness indices.

To increase the resistance of forests to various pressures, a series of management strategies is needed. Even if each pressure requires a specific approach, a systemic and dynamic management approach is desirable through which the benefits can be multiple [9].

Close-to-nature forestry, compatible with the conservation of Natura 2000 habitats and species, can lead to short-term economic losses, but can generate long-term economic benefits by creating forests that are more adaptable and resistant to pressures such as forest fires, storms or at outbreaks of pathogens [1].

Knowing the pressures has an essential role in establishing the conservation status of the habitats and for the subsequent establishment of management measures through which the negative effect of these pressures is tried to be counteracted.

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