

SPATIAL DISTRIBUTION OF THE LĂZĂRENI HILLS VEGETATION

Laura Mariana (LACATOȘ) HERMAN*

University of Oradea, Faculty of Sciences, Biology Department,
PhD Student, Oradea, Romania, e-mail: lauralacatos@yahoo.com

Abstract: Taking into consideration the background of a more and more intensified and pronounced anthropic impact on the environment, this study aims at realizing a quantitative and qualitative analysis of the spatial distribution of the flora and vegetation from the Lăzăreni Hills, Bihor County, Northwestern Romania. The quantitative analysis mainly focuses on the areas occupied by natural vegetation, while the qualitative analysis refers to the structure of the vegetal associations. Both types of analysis were carried out at a spatial level, in close correlation with the determinant factors (relief, climate, hydrography and so on).

Key words: anthropic impact, phytocenological researches, natural vegetation, spatial distribution, deciduous forests, meadows.

* * * * *

INTRODUCTION

The Lăzăreni Hills are located in north-western Romania, in the central-southern part of Bihor County, between Crișul Repede River (at North) and Crișul Negru River (at South). Currently, the studied area comprises a number of 57 localities, of different levels and dimensions, which put some pressure on the existing flora and vegetation by imposing certain changes in their structure and functionality.

The first botanical studies, directly or indirectly concerned with the Lăzăreni Hills, date from the XVIIIth and XIXth centuries and are attributed to authors such as: Kitaibel (1862-1863), Simonkai (1879, 1887, 1890), Kerner (1867-1879) and Borbás (1844-1905). In addition to the above mentioned authors, more recent and modest contributions to the knowledge of the Bihor flora were also brought by other botanists such as Borza (1924, 1929), Diaconeasa (1962), Diaconeasa and Popa (1964), Boșcaiu et al. 1966, Pop (1967, 1968), Pop and Hodișan (1972), Burescu and Cheregi (2002), Burescu and Lacatoș (2010), Lacatoș and Burescu (2010), Lacatoș (Herman) (2010) and Lacatoș (2011).

MATERIALS AND METHODS

The research - documentation of this paper is based on information taken directly from the field and also on information obtained from the specialized literature. Furthermore, the research methodology was based both on classical and modern methods, specific to biology or other sciences. Thus, in order to process and analyze the data, we used, during the field

* Corresponding Author

investigations, informatics and calculation, the GIS methodology, satellite data and aerophotograms but also a rich specialty bibliography.

The study on the Lăzăreni Hills vegetation is based on personal research, observations, descriptions and field measurements conducted between 2008 and 2011. The field trips (in number of 117) were made with the purpose to capture aspects as true as possible to the state of vegetation, in close correlation with environmental factors or with the dynamics of plant groups, in order to explain the steps taken in time and space during the evolution of phytocoenoses. The evolution and succession of the vegetation from the Lăzăreni Hills was also traced based on the information identified in the scientific works of the authors mentioned above. After investigating the vegetation during field trips, according to the classical research method of the Central European School, we noted the species from the relevées into a raw table and then we grouped them into plant associations. In order to achieve the correct spatial distribution of the vegetation, we counted all the relevées made for each association described separately and, through mathematical calculations, we determined the proportion of each association. Using the GIS method, we created the vegetation map (figure 1).

RESULTS

The general appearance of the Lăzăreni Hills vegetation is the result of the interaction between climatic, oro-ecological, animal and anthropic factors that produced major changes in the vegetation composition by placing and expanding human settlements, access roads or forest arrangements and by reducing the territory occupied by the wild flora in favour of agricultural crops and grazing lands.

The general characteristic of the Lăzăreni Hills natural landscape is given by the presence of deciduous forests that consist of oak, hornbeam, holm, Turkey oak, Hungarian oak etc. Because of human interventions made over time, the forests from Lăzăreni Hills vegetate only on an area of 24,262.35 hectares (40.8% of the studied area). Therefore, the Lăzăreni Hills landscape is currently given by an alternation between deciduous forests, grasslands and farmlands. However, much of the natural vegetation of the investigated land has been preserved, the distribution of the main forms of vegetation being correlated with the distribution of the main types of soil.

Deciduous forests currently occupy an area of 24,262.35 hectares, which is equivalent to 40.8% of the total studied area. The associations spread over the largest surfaces are: Turkey oak with holm (*Quercetum petraeae - cerris*) Turkey oak with Hungarian oak (*Quercetum frainetto - dalechampii*), oak with holm (*Quercetum robori - petraeae*), oak with hornbeam (*Querceto petraeae - Cărpinetum*), Turkey oak with hornbeam (*Carpino - Quercetum cerris*), hornbeam with beech (*Carpino - Fagetum*) and alder (*Stellario nemori - Alnetum glutinosae*). In the forests skirts, in forest thinnings, are distributed the phytocoenoses of the associations *Clinopodio - Pteridietum aquilini* and *Calamagrostietum epigei*.

In the meadows studied, we identified the following associations: *Anthoxantho - Agrostietum capillaris*, *Festucetum valesiaco - rupicolae*, *Juncetum effusi*, *Filagini - Vulpietum*, *Lysimachio vulgaris - Filipenduletum ulmariae*, *Holcetum lanati*, *Angelico - Cirsietum cani*, *Bidentetum cernui*, *Cyperetum flavescens*, *Caricetum ripariae*, *Junco inflexi - Menthetum longifoliae*, *Glycerietum fluitantis*, *Lolio - Plantaginetum majoris* etc.

In the deforested lands dominate the cereals crops, alternating with mesophilic meadows composed of *Agrostis capillaris* (grass field) and *Anthoxanthum odoratum* (sweet vernal grass) (*Anthoxantho-Agrostietum capillaris*), mezo-hygrophilous meadows composed of *Festuca pratensis* (Meadow fescue) and *Cirsium canum* (spear thistle) (*Cirsio cups - Festucetum pratensis*).

On dry and sunny soils we find installed xero-mezophilous meadows composed of *Festuca valesiaca* (steppe fescue) and *Medicago minima* (yellow lucerne) (***Medicagini - Festucetum valesiaca***), *Festuca rupicola* (furrowed fescue) and *Festuca valesiaca* (steppe fescue) (*Festucetum valesiaco - rupicolae*), *Filagini - Vulpietum*, which, through degradation, transform into beard-grass meadows (*Botriochloetum ischemic*).

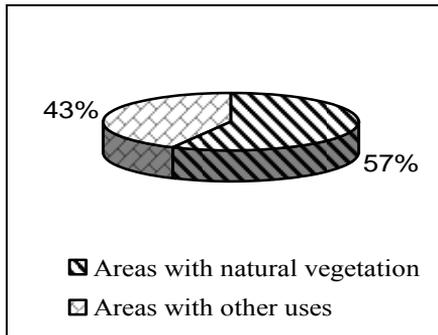


Figure 1. Land use in the Lăzăreni Hills

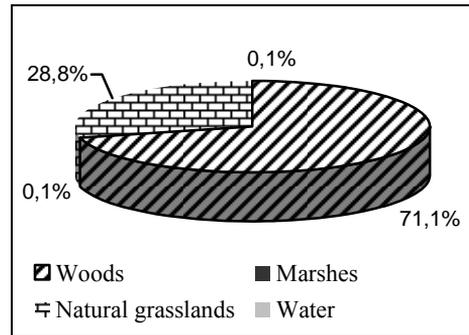


Figure 2. Structure of the terrains covered with natural vegetation in Lăzăreni Hills

The flood plains vegetation covers an area of 25.9 ha, being represented by hydrophilic associations such as *Junco inflexi - Menthetum longifoliae*, *Juncetum effusi*, *Lysimachio vulgaris - Filipenduletum ulmariae*. In what concerns the spatial distribution of the natural vegetation from Lăzăreni Hills, it is more compact in the western part of the Lăzăreni Hills, the rest being spread between the agricultural lands (figure 3).

Consequently, the deciduous forests constitute the most representative natural plant association, being located in compact formations on the territory of the communes Husasău de Tinca, Hidișelul de Sus, Lăzăreni, Tinca, Copăcel, Nojorid and Sânmartin. This means that, from a bioclimatic point of view, the Lăzăreni Hills belong to a forest area. As a result of the human interventions in this area, the natural vegetation occupies only an area of 34,145.2 hectares, respectively 43% of the Lăzăreni Hills, the rest of the areas being used in other purposes (figure 1).

Of the total area of 59,460.7 hectares, the natural vegetation occupies an area of 34,145.2 hectares, of which 24,262.3 ha (71.1%) are represented by deciduous forests, 9,828.5 ha (28.8%) by grasslands, 25.9 ha (0.1%) by flood plains and 28.3 ha (0.1%) by water (figure 2). For a quantitative analysis on the areas from Lăzăreni Hills occupied with vegetation, we used information extracted from the topographic map 1:50.000 and the orthophotoplan for the Lăzăreni Hills and information concerning the use of the terrains extracted from the Corine Land Cover 2000 set.

The qualitative analysis emphasizes the high percentage of the associations *Quercetum petraeae-cerris* and *Anthoxantho - Agrostietum capilaris*, followed by *Quercetum roburi - petraeae*, *Quercu petraeae - Carpinetum*, *Carpino - Quercetum ceris*, *Quercu roburi - Carpinetum*, *Filagini - Vulpietum*, *Juncetum effusi* etc. (figure 2). In all, a number of 56 plant associations unevenly distributed were identified, described and represented. Figure 2 shows a north - south axis, along the valleys Hidișel, Incescu, Hodișel, Gepiș și Șumugiu, an axis defined by a relatively high number of plant associations. In terms of orography, the above mentioned axis coincides with the Betfiei, Drăgești and Lăzăreni Hills.

CONCLUSIONS

Following the phytocenological researches on vegetation, we identified a total of 56 plant associations, 16 facies, 4 sub-alliances, 34 alliances, 27 orders and 17 classes. Out of the 56 associations identified, described and represented on the vegetation map (figure 3), 50 associations are new to the studied region, and a total of 16 associations represent phytocoenoses with populations of rare plants, endemics, relicts and natural monuments subject to a special protection regime and included on the red list.

The associations were analyzed and characterized from a chorological point of view, in terms of floristic composition, biological form, floristic element, ecological indicators, cytogenetics, syndynamics and economic importance.

In conclusion, due to human intervention, the Lăzăreni Hills vegetation experienced a series of changes in structure, number and spatial distribution of flora species, in some cases the natural vegetation being removed entirely and replaced with species from the crop plants category.

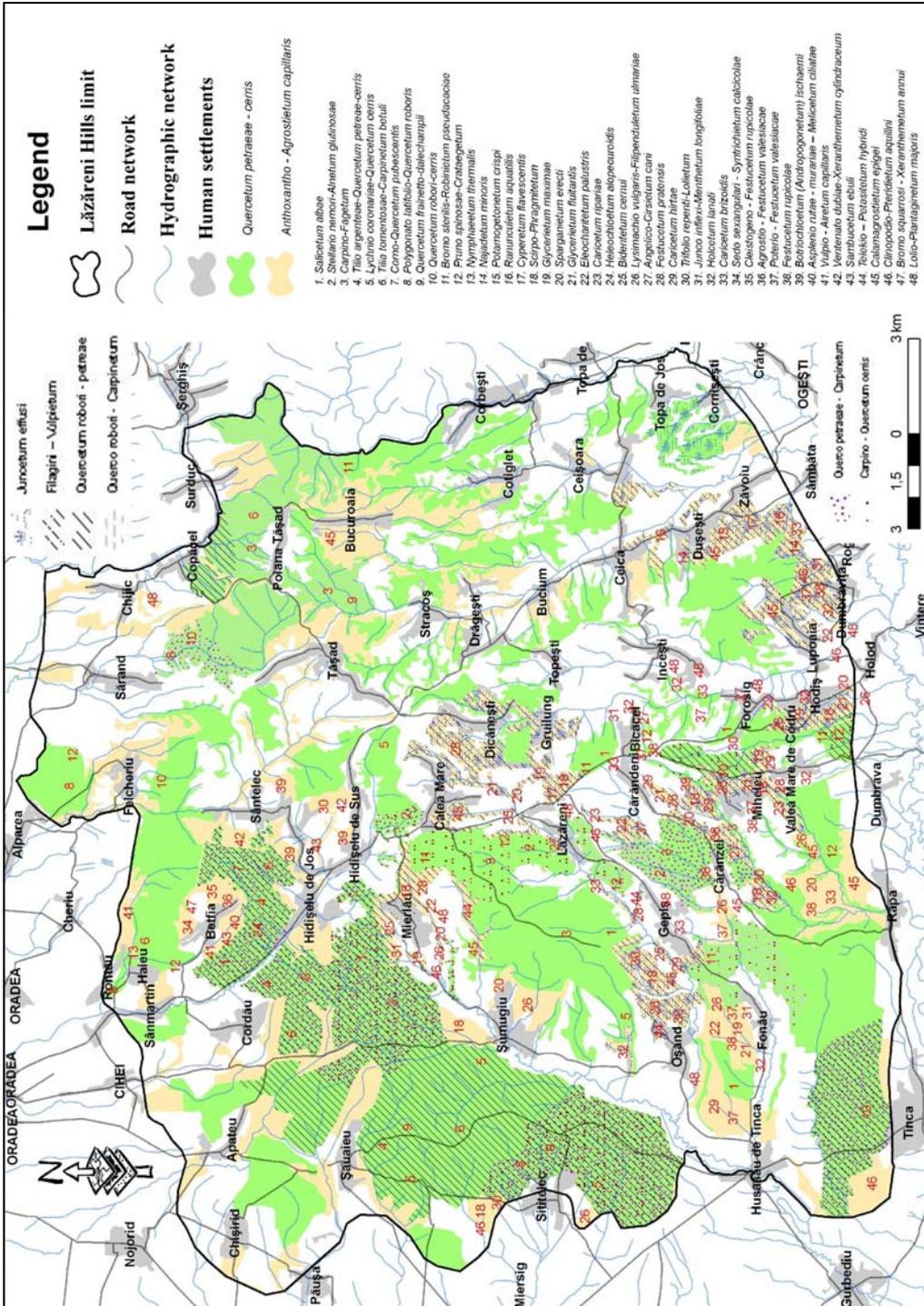


Figure 3. Vegetation map for Lăzăreni Hills (Source: processing after www.geo-spatial.org, Corine Land Cover 2000 set (CLC2000) and field information)

Moreover, it should be pointed out that the installation and expansion of anthropogenic vegetation was detrimental to the natural one. In consequence, a large number of species, some with endemic value (*Dianthus spiculifolius*, *Dentaria glandulosa*) are endangered. The species under protection include: *Ruscus aculeatus*, *Ruscus hypoglossum*, *Ranunculus aquatilis*, *Cephalanthera longifolia*, *Cephalanthera damasonium*, *Plathanthera bifolia*, *Orhis morio*, *Najas minor*, *Dentaria glandulosa* etc.

The significance and the practical value of this study emerges from the fact that research results can serve as a guide for local authorities or as a scientific material for researches in biology, ecology, forestry, environmental protection, regional geography, economic geography, human geography etc.

REFERENCES

- Borbás V. (1844 - 1905), *Közlemények Békés és Bihar vármegyék flórájából* M.O.T.V. XV.
- Borza Al. (1924), *Floarea de Lotus de la Oradea*, Revista Științifică V. Adamachi, Iași, IX, 1.
- Borza Al. (1929), *Vegetația și flora Ardealului. Schiță geobotanică, Transilvania, Banatul, Crișana, Maramureșul*. 1:251-270 Cluj.
- Boșcaiu N., Gergely I., Codreanu V., Rațiu O., Micle F. (1966), *Flora și vegetația rezervației naturale „Defileul Crișului Repede”*, Contribuții Botanice, Cluj-Napoca, 1:167-258.
- Burescu P., Cheregi V. (2002), *Flora pădurilor cu funcție recreativă componentă fundamentală a calității mediului și a vieții din stațiunea balneoclimaterică Băile 1 Mai Oradea*, Analele Universității din Craiova, J:155-159, Editura Eurodidact, Cluj-Napoca.
- Burescu P., Lacatoș Laura (2010), *Contributions to the knowledge of hornbeam and beech forests, from Lăzăreni Hills (NW Romania)*, Analele Universității din Oradea, Fascicula Biologie, No. 1, TOM XVII, Editura Universității din Oradea, Oradea, pp. 55-61.
- Diaconeasa B. (1962), *Analiza de polen din turba captivă de la Băile 1 Mai – Oradea*, Contribuții Botanice, Cluj.
- Diaconeasa B., Popa D. (1964), *Problema relictară a lotusului (Nymphaea lotus v. thermalis (DC) Tuzs. și a lacului termal de la Băile 1 Mai, în lumina analizelor microstratigrafice*, Contribuții Botanice, Cluj.
- Kerner A. (1867-1879), *Die Vegetations-Verhältnisse des mittleren und östlichen Ungarns*, Öst. Bot. Zs. XVII-XXIX.
- Kitaibel P. (1862-1863), *Iter Magnovaradiense*, anno 1798 suspectum. Editura Kanitz.
- Lacatoș (Herman) Laura (2010), *Description of Tilia tomentosae-Carpinetum betuli Association from Lăzăreni Hills (Northwestern Romania)*, Analele Universității din Oradea, Fascicula Protecția Mediului, Vol. XIV, Anul 15, Editura Universității din Oradea, Oradea, pp. 829-836.
- Lacatoș (Herman) Laura (2010), *Phytocoenological Researches on the grasslands of Lăzăreni Hills (Northwestern Romania)*, Analele Universității din Oradea, Fascicula Protecția Mediului, Vol. XIV, Anul 15, Editura Universității din Oradea, Oradea, pp. 837-843.
- Lacatoș Laura Mariana (2011), *Description and presentation of some rare associations from Lăzărenilor Hills (North – West Romania). Study case association Najadetum minoris*, Analele Universității din Oradea, Seria Geografie, No. 1/2011, Tom XXI, Editura Universității din Oradea, Oradea, pp. 76-83.
- Lacatoș Laura, Burescu P. (2010), *Phytocoenological research concerning the grasslands of Lăzăreni Hills (North-Western Romania)*, Analele Universității din Oradea, Fascicula Biologie, No. 1, TOM XVII, Editura Universității din Oradea, Oradea, pp. 122-128.
- Pop I. (1967), *Studiul comparativ asupra ceretelor din Câmpia înaltă a Miersigului și de pe dealurile piemontane Crișene*, Contribuții Botanice, 305-313, Cluj-Napoca.
- Pop I. (1968), *Flora și vegetația Câmpiei Crișurilor, Interfluviul Crișul Negru-Crișul Repede*, Editura Academiei R. S. România, București.
- Pop I., Hodișan I. (1972), *Vegetația Dealului Șomleu-Oradea (jud. Bihor)*, Contribuții Botanice, Cluj-Napoca, 247-258.
- Simonkai L. (1879), *Nagyvárad és Sebeskörös felsővidéke*. Budapest.
- Simonkai L. (1887), *Enumeratio Florae Transsilvanicae Vasculosae Critica*, Kir. Magyar Természettudományi Társulat, Budapest.
- Simonkai L. (1890), *Nagyvárad és vidékének növényvilága*. Nagyvárad.
www.geo-spatial.org, setul Corine Land Cover 2000 (CLC200).