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THE TYPOLOGY OF THE LANDSCAPES FROM THE NORTHERN PART OF CLUJ-NAPOCA CITY

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Abstract: The protected site Dealurile Clujului-Est is located in the Transylvanian Depression subunit known as Somes Plateau, in the northern part of Cluj-Napoca. The presence of a plateau units characterized by an alternation of valley corridors and interfluves was able to dictate the existence of a variety of types of landscapes. Along with relief, which is characterized by altitude, slope, exposition and dynamic geomorphologic processes, the land use has been taken into account. The last three centuries Dealurile Clujului suffered a considerable human impact, despite seeming insignificant anthropogenic pressures and villages with low prevalence. Therefore we can say that the natural landscapes (characterized by state of climax or *biostazie*) are often insignificant compared to the spatial expansion of the territorial unit analyzed. The landscape is characterized by a rural lifestyle, clearly expressed, with forest vegetation positioned at higher parts of that territory, followed by traditional crops, the vast pasture and meadow, with the dominant category of small and very small villages, located along the valleys and the river origins. By applying the criteria mentioned and GIS techniques, we distinguished 14 types of landscapes and related subtypes, both natural and built.

1. The landscapes' classification

This paper presents the process for establishing the types of landscape in the protected site Dealurile Clujului Est (Cluj Hills East), laid north, north-east of the city of Cluj-Napoca. It is located in the Transylvanian Depression subunit known as

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Somes Plateau. Dealurile Clujului Est is fully overlapped to Dealurile Clujului și Dejului (Cluj and Dej Hills).

Landscape issues will be approached from both natural and anthropogenic systemic variables, in order to emphasize the causal relationships between them (considered environmental factors) and communities of beings. Achieving this goal can only be in line with the classical definition of landscape science, namely the science of all complex interrelationships between communities of beings and environmental factors. Therefore, the landscape can be: the image of a whole composed of dynamic elements, each with its own expression and its role in the overall context; visual projection of psychological relationships that people have with the territory in which they live; territory and the act of perceiving it; all terrain characteristics revealed for vision (perception action of a territory or observing the features that characterize it; action to highlight the territorial identity).

In this context, the European Landscape Convention states the following:

- The landscape designates a part of a territory, as perceived by people, whose character is the result of the action and interaction between natural and/or human factors;
- Landscape quality objective designates a wording by the competent public authorities, for a specific landscape, the aspirations of the public regarding to the landscape features of their surroundings;
- Landscape protection includes actions to preserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or human intervention;
- Landscape management includes actions that aim landscape maintenance in order to guide and harmonize changes which are brought by social, economic and environmental evolution;
- Landscape planning is the perspective action that aims to enhance, restore or create landscapes.

Also, the European Landscape Convention stipulates, in relation to the assessment and identification of landscapes:

- Identification of landscapes within a proposed territory; analyze their characteristics, dynamics and disturbing factors; observing the changes into the landscapes and assessment of the identified landscapes, taking into account the particular values (identity) assigned to them by the interested decision makers and concerned population.
- The landscape is, therefore, characterized by: high level of complexity; differentiation in space and time; strong links between the components; a hierarchical

order realized by the nature and intensity of the structural factors within the landscape.

- Decoding the structure of the landscape, its dynamics and identifying typological units starts from the premise that the landscape is an entity to be analyzed from the following perspectives: dimensionally; conceptual; functional; typological; dynamic; chorological.

2. The methodology used

A specific methodology was used for lab and terrain activities in order to identify and mapping the main landscape's elements within the protected site.

Topographic maps analysis method involved delimitation of the *Dealurile Clujului Est* Site, starting with the existing topographic maps and plans (we used mainly topographic maps scale 1:25,000, in 1970 stereographic projection).

The method of aerial photo interpretation of remote sensing images had as a starting point to identify the type of vegetation. There were mainly used orthophotoplans provided from the flights in the years 2005, 2008, 2009 and 2012. In this context, the information collected from the field was overlapped orthophotoplans to check their variation.

Land use map analyze method has proved useful in determining the most types of landscapes. Morphometric analyze method permits the setting of the exposition of the hilly slopes and delimitation of the landscapes.

Geomorphological mapping method allowed locating on topographic maps and orthophotoplans of landscapes types and states that characterize them. Geomorphological mapping is accompanied by a written part, which are noted aspects of landscape condition. After applying of this method, the map of landscape types of *Dealurile Clujului Est* Site resulted.

GIS method consisted of applying several GIS functions with the aim of extracting desired information from existing database, composed both from vector various elements of the landscape and land use from topographical maps and orthophotoplans and after collecting information on the terrain, especially with GPS and GPS track method.

3. Detailing the types and subtypes of the landscapes (landscape units map)

The presence of a plateau unit, characterized by alternating small valley corridors and interfluves was able to dictate the existence of a variety of types of landscapes.

Along with the relief, required by the elevation, slope types, exposition and dynamic of the geomorphological processes, the land use have been taken into account, too.

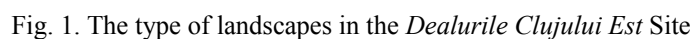


Fig. 1. The type of landscapes in the *Dealurile Clujului Est* Site

By applying the criteria mentioned above, we distinguished 14 types of landscapes and related subtypes (fig. 1). Of these, two are the interfluvial landscapes (considered unexposed to sunlight due to reduced declivity), eight are slope landscapes (with various expositions to the sunlight), one river terrace (considered unexposed), two riparian landscapes (considered unexposed) and one built area.

1. **Nemoral forest landscape on interfluvial.** The main species are: *Quercus petraea* and *Carpinus betulus*, besides *Fagus sylvatica*, creating association *Carpino-Fagetum*, occupying an area of 1,136.9 Ha (6% of Dealurile Clujului Est Site - Fig.2). The landscapes are in biostatic state (steady state), in compact areas, but reduced in extension on interfluvials.

2. **Agricultural landscape on interfluvial.** The landscapes are in rhexistatic state, occupying an area of 3,504.1 Ha (18.5%). The pastures and meadows prevail, with weights of over 85%, while arable land occupies small areas.

3. **Nemoral forest landscape on sunny slopes.** It covers 395.1 Ha, which represent 2% of the Site's area. The characteristic species are *Quercus petraea* and *Carpinus betulus*, in a mixture with *Fagus sylvatica*, lying on the slopes with southern and south-eastern exposition. They belong to the landscapes in biostatic. Also in this category, there are noted anti-erosion plantations, made on the left side of the Feiurdeni Valley.

4. **Nemoral forest landscape on partially sunny slopes** represents only 341.8 Ha, or 1.8% of the site's area. The landscapes in biostatic are characteristic.

5. **Nemoral forest landscape on shadowy slopes.** It is a landscape in biostatic, relatively well represented over the site, covering an area of 753.3 Ha (4% of the site). The predominant species are oaks.

6. **Nemoral forest landscape on partially shadowy slopes.** It is less representative, holding only 286.8 Ha, or 1.5% of the site. The predominant species are oaks, too. These landscapes are in biostatic state.

7. **Agricultural landscape on sunny slopes.** The landscape is well represented in the site with 3,040.5 Ha (16%). The predominant land use categories are pastures and hayfields, with cropland in secondary stands. Pastures are affected by overgrazing, as negative anthropogenic process, giving a specific rhexistatic landscape. The gradual transition from the cattle grazing to sheep grazing after the Second World War led to accelerated degradation of grassland sites, which still preserved steppe associations, especially on sunny slopes. Xeric associations of *Stipetum lessingianae* and *St. pulcherrimae*, who dominated the upper third of the sunny slopes, due to heightened sensitivity to grazing were removed and replaced by the association *Festuca sulcata* - *Carex humilis*.

Also in this category, it is noted the nature reserve Fnaele Clujului. As a national heritage reserve, it offers the possibility of maintaining a balance between the ecological potential and biological exploitation.

8. **Agricultural landscape on partially sunny slopes.** It holds a significant share, about 11.5%. The predominant land use categories are pastures and hay lands, with small areas of arable lands, partially on agro terraces. Agro terraces fell into the category of abandoned land, or derived from the original anti-erosion purpose.

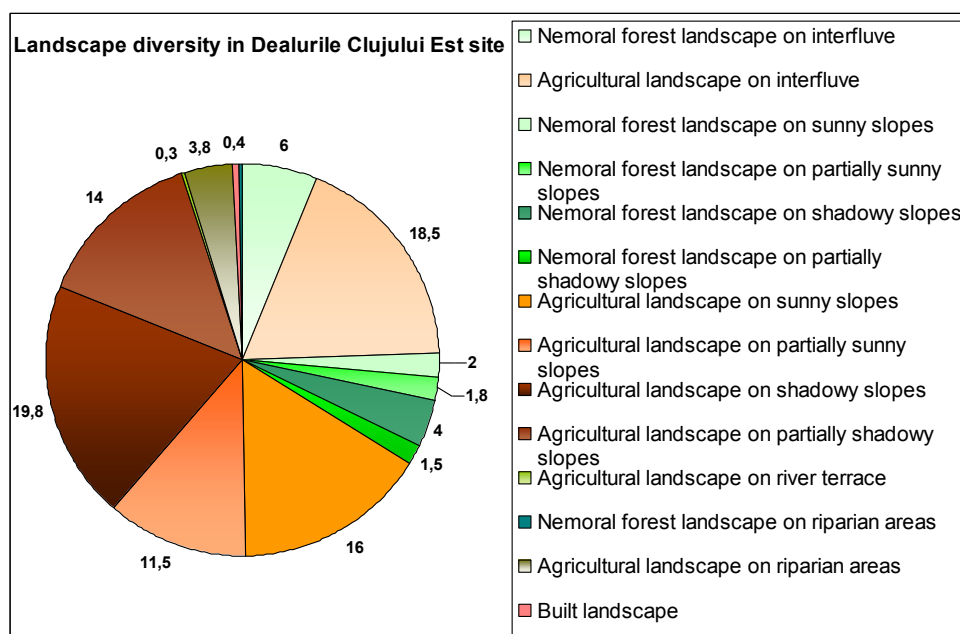


Fig. 2. Percentage of the landscapes in the *Dealurile Clujului Est* site (figures are percentages, see text)

9. **Agricultural landscape on shadowy slopes.** This landscape has the largest share of the site (19.8%), with an area of 3,470.5 Ha. The agricultural lands are occupied mainly by pastures and meadows, and sometimes of arable lands on small areas. Pastures, given the conditions of use, are invaded by shrub vegetation represented by the following species: *Corylus avellana*, *Crataegus monogyna*, *Prunus spinosa*, *Ligustrum vulgare*, *Cornus sanguinea*, *Cornus mas*, *Rosa canina*.

10. **Agricultural landscape on partially shadowy slopes.** As in the previous case, this landscape has a relatively large area of 2,634.8 Ha (14%). This land is mainly occupied by pastures and meadows, and sometimes, on small areas, of arable land. The grasslands are invaded by shrub species (such as those mentioned above).

11. ***Agricultural landscape on river terrace.*** This category covers a very small area of 66.9 Ha, which represents only 0.3% of the site. The arable land is occupied by grain crops, with reduced slope inclination and lack of geomorphologic processes. The landscape is in equilibrium, although in this case, the determining factor was the man.

12. ***Nemoral forest landscape on riparian areas.*** It covers the smallest area of the site: 2.9 Ha (0.01%). The area is located on the western part of Mcicau village. The forest consists of oaks and the landscape is in biostazic state.

13. ***Agricultural landscape on riparian areas.*** It has a surface area of 726 Ha (3.8%). It is mainly arable land, secondary meadows and pastures, exposed to the floods. It is an unstable landscape, suitable to crop-rotation, in rhexistazic state.

14. ***Built landscape.*** This type of landscape occupies an area of 80.5 Ha (0.4% of the site). The villages are in decline due to rural isolation, *demographic export*, infrastructural state, drink water of poor quality.

Conclusion

It can be concluded that in the last three centuries this hilly area suffered a considerable human impact, despite the presence of the villages with low density and population. Therefore we can say that the biostazic landscapes are often insignificant compared to the spatial expansion of the territorial unit analyzed, due to the agricultural practices, lack of crop rotation, economic autarchy (households congestion, their aesthetics and hygiene), overgrazing, aging. It also noted the presence of three variables that had decisive role in determining the types of landscapes: hilly terrain, local climate and land use.

In terms of relief, the interfluves in alternation with small valley corridors represent the main characteristics.

Speaking about local climates, we distinguish: sunny slopes climate (140-167 kcal/cm²/year solar radiation, suitable for xeric and meso-xeric herbaceous vegetation), shadowy slopes climate (45-100 kcal/cm²/year solar radiation, suitable for mesophile arbustive vegetation) and the small valley corridors' climate (1.5-2.0⁰ C lower temperature than on the slope sectors).

The specific characteristics of the slopes, their orientation, arable land dimensioning and the types of cultures define the land use specific of our site. There were significant changes in land use, starting with historical deforestations, and replacing the forest or pasture area with arable land. Last decades reveal the abandon of agricultural land and a natural replacing of pastures or meadows.

Landscapes associated with animal breeding are rhexistazic, heavily unbalanced, with sunny and partially sunny slopes affected by landslide

phenomena and gully erosion. Regional and local decision makers require measures to remedy these unbalanced states.

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