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## ELEMENTS OF BIO-GEOGRAPHICAL REGIONAL DETERMINATION IN THE SUBCARPATHIANS BETWEEN THE PRAHOVA AND THE DÂMBOVIȚA RIVER

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**ABSTRACT** - Generally, the Subcarpathian area between the Dâmbovița and the Prahova is characterized by very diverse landscapes and an intense human impact. Secondary or derived vegetal associations are also present to a large extent, in relative balance with a certain type and degree of human pressure. Some of these vegetal associations are extremely rich in flora and fauna. The most frequent are the lawn associations used as hayfields and pastures. Orchards are often associated with grassy vegetation used as grazing land or more often as hayfields. There are relatively frequent shrub clusters and they represent isolated vegetation on rocky crests or, quite often, an intermediary stage towards the initial forest vegetation on formerly deforested terrains where there is more or less intense degradation. All these remain stable as long as man uses them rationally. When human impact goes beyond nature's capacity to withstand it, most of the terrains used as grazing land or covered by shrub clusters show significant degradation, which leads to much fewer species with diminished productive potential.

The landscape types of this Subcarpathian area are: the high hill landscape, the low and medium altitude hill landscape and the large corridors and depressions landscape.

**Key words:** the Prahova-Dâmbovița Subcarpathian area, human impact, landscape types

The Subcarpathian sector between the Prahova and the Dâmbovița has been intensely inhabited since very old times. It is characterized by a high level of humanization and also by various degree degradation of the natural environment. The Subcarpathian landscape has an important human imprint, most often with negative consequences on the natural balance of some physico-geographical components.

The Subcarpathian heights are between 200-300 m and 800-900 m high and they follow the horizontal extension of the area: in the north, towards the mountains, a 200 m tectonic-erosive altitude difference which marks the depressions from Puchenii, Moroeni and Comarnic; in the south, a sinuous line unites several settlements (Dragomirești-Târgoviște-Răzvad-Gura Ocniței-Moreni-Măgureni) and marks the contrast between the hills and the plain (the Târgoviște Plain); in the east, the Prahova Subcarpathians, and in the west, the Dâmbovița Valley. This Subcarpathian area can be divided into two great groups: the Inner Subcarpathians and the External Subcarpathians.

*The Inner Subcarpathians* are similar to a Carpathian and Subcarpathian region. Their relief looks like a series of East-West oriented anticlines and synclines, their height decreasing from north to south (800-300m). The synclines have a gradually changing relief, they are more populated, often deforested, there are orchards or pastures. At the contact between the mountainous area and the Subcarpathian area we can notice tectonics and depressions created by erosion. There are hillocks 700-800 m high (the Comani Hill (845 m), the Fata Mare Hill (774 m), the Plaiul Sirnei Hill, etc. and relief energy can reach values of 300-400 m. Towards the south there is a new alignment of synclines: Bezdead, Pucioasa, Voinești, Câmpina.

The river valleys in the Ialomița basin (Ialomicioara, Bizdidel) or in the Prahova basin (Provița) go down by 200 m, their slopes are 10-20 m/km in longitudinal profile. The main watercourses have cut transversal valleys in Palaeocene folded formations. The succession of synclines and anticlines continues southward with Neocene formations on both sides of the Ialomița Valley. Several convergence points of the hydrographic network and intense erosion, followed by relief fragmentation, appear, especially, on the flanks of the synclines.

Towards the south, the syncline areas in the Inner Subcarpathians are the following: Breaza-Bezdead-Buciumeni; Vârfuri-Moțâieni-Vulcana de Sus; Valea Lungă-Pucioasa.

Highly friable rocks favored erosion and massive material carried down on the slopes formed several large valleys, with large water meadows.

*The External Subcarpathians* are made up of Mio-Pliocene deposits and, consequently, the aspect of the relief is influenced by this rock structure.

The interfluvium between the Dâmbovița and the Ialomița is drained mostly towards the Ialomița. The watershed between the two basins is reduced to an intersection crest, with a very abrupt slope towards the Dâmbovița and a gradual inclination towards the Ialomița. In the Dacian (Pliocene) formations of the valley walls there are lignite deposits that are exploited at Sotânga, Doicești, and Mărgineanca. Most of the hills are covered by oak forests, and, in the areas where forests do not exist, erosion is more intense.

The most important massif in the External Subcarpathians is the Spătăreleu-Mitropolia Massif (approximately 700 m). Southward there is Plaiul Mogoi, a flat mountainous region covered with lawns, which partly makes the Căndești rock formations. This is the last extension of the External Subcarpathians, and the southern slopes of this region continue with the Târgoviște Plain (Bugă D., Zăvoianu I., 1974).

The External Subcarpathians between the Ialomița and the Cricov River are represented by two hill summits, Plaiul Curpeniș in the north and Dealul Târgoviștei in the south. In-between them is the Ocnița Depression whose axis, like the axes of these two hills, is on the syncline that continues eastward towards Iedera de Jos. This is the point from where the Cricov Valley widens up to Cocorăștii Calpii, on the Prahova Valley. The highest peaks in this area often reach 500-600 m, sometimes they are higher (Curpeniș Hill – 620 m). The Ocnița Depression is contained between two anticlines. The southern one is Gura Ocniței and the other is Moreni (with oil deposits and a core of plastic rocks that come out of the covering rocks, the last tectonic accident of the External Subcarpathians). On this interfluvium, the highest peaks are in the north, on the Inferior Pliocene or Helvetian formations, and the lowest (less than 500 m) in the south, on Levantine formations.

In this interfluvium, the hydrographic network is oriented towards the Cricov, which has several small tributaries with high erosive action and towards the Ialomița into which two rivulets flow. Both these rivulets are called the Slănic in their inferior course.

Flat mountainous east-west oriented regions covered with lawns, such as Plaiul Măgureni and Plaiul Căpșunei (621m), are also included into the External Subcarpathians on the left of the Cricov. Here, the relief is also influenced by tectonics. The Măgureni Anticline is the axis of the hill which has the same name. In the north, these hills are forested, whereas in the south the forest has become increasingly rare. Oil exploitations, orchards, and even cereal cultures took its place.

Actual geo-morphological processes are also frequent in this Subcarpathian area. The existing clays from the Palaeocene formations generate landslides, which, together with water erosion, make the relief dynamics. Toponyms like: Valea Glodului, Glod, Valea Noroaielor (including the word “mud”) point to these geo-morphological processes. On the other hand, most of the forests have been cut in order to exploit oil, salt, gas, coal, and natural resources. This has led to extensive water erosion relief, for instance erosion valleys which have increased land degradation.

This Subcarpathian area is a natural unit influenced by the action of the most active geo-morphological phenomena, which have led to very important and dangerous land degradation. Almost all this Subcarpathian area is considered to be among the regions with the highest and extremely dynamic erosion and massive landslides. This area also suffers the strong impact of human activities because it is a territory with high demographic density and intense exploitation of its natural potential.

## BIO-GEOGRAPHICAL CHARACTERISTICS

The main features of the flora and fauna in the Subcarpathians between the Dâmbovița and the Prahova Valley are given by the climatic variations given by the geographical location and the relief. We notice a gradual change of the fauna and flora according to altitude. There is also an a-zonal distribution of the flora and the fauna, which is given by local circumstances. The analysis of specialized maps and bibliography, the observations in the open allowed us to identify and characterize the following bio-geographical formations: beech forests, common oak forests, mixed common oak, and other deciduous trees forests, oak forests, hill lawns, and a-zonal vegetation.

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*Beech forests* are located on the higher hills at the contact with the mountains. Their structure is relatively simple: the beech (*Fagus sylvatica*) (most frequent and often associated with the common oak), the sycamore maple, the ash, the trembling poplar, and the hornbeam. Shrubs are represented by the hazelnut tree, the common elder, the clustered elder, the cornel tree, and the hawthorn. The grassy vegetation in these forests depends on the nourishing properties of the soil and on local temperature. The most frequent grassy vegetation is mull flora. The fauna from these forests is: birds (the wren, the wood-pecker, the ring dove, etc.); mammals (the squirrel, the lynx, the fox, the marten, the European wild mouse); invertebrates (the beech nut moth, the beech capricorn beetle, the beech bark bee, the beech mosquito, the beech wood louse, etc.).

In *common oak forests* (*Quercus petraea*) we can also find: the beech, the ash, the cherry-tree, the sycamore maple, the common maple, the lime, and the hornbeam. Shrubs are the hawthorn, the wild rose, the cornel tree, the privet, and the bloody twig. Grasses are mull species and graminaceae. The forest fauna consists of: birds (the turtle dove, the thrush, the blackbird, the wood-pecker, the titmouse, the owl); mammals (the fox, squirrel, the wild cat, the wild boar, the meadow mouse, the deer) and invertebrates (the acorn moth, the oak louse).

*Common oak and other deciduous tree-mixed forests* can be found on the hills whose altitudes range between 350-500 m. In these forests there are numerous hornbeams, lime trees, elm trees, cherry trees, wild apple trees, and wild pear trees. There are also many shrubs: hazelnut trees, hawthorns, cornel trees, privets, bloody twigs, and common elders. The animals from these forests are those mentioned for the common oak forests as well. The extremely favourable life conditions (more varied and nourishing food, longer periods of warm weather) allow the rich development of the fauna.

*Oak* (*Quercus robur*) forests are characteristic of the low hills (300-400 m) at the contact with the Romanian Plain, respectively with the Târgoviște Plain. The species in these forests are: the oak (*Quercus robur*), the ash, the cherry tree, the wild apple tree, and the wild pear tree. Shrubs are usually well represented by: the hazelnut tree, the hawthorn, the privet, the bloody twig, the clustered elder, etc. The fauna characteristic of this vegetal association includes: birds (the turtle dove, the nightingale, birds of prey); mammals (the wild cat, the fox, the wild boar, rodents), and invertebrates (the caterpillar).

*Hill lawns* are mostly on areas of former mixed common oak and other deciduous trees forests at altitudes between 300-700 m. There are *Agrostis tenuis* lawns with both mesophile (*Festuca pratensis*, *Trifolium campestre*) and xeromesophile (*Festuca rupicola*) species. The fauna of these lawns is mostly: birds (the nightingale, the wood-pecker) and reptiles (the lizard).

In the Subcarpathian area between the Prahova and the Dâmbovița there are also a-zonal formations: riverside coppices and halophile flora and fauna.

*Riverside coppices or waterside forests* made up of softwood trees (the poplar tree, the willow, the alder), exist only in the major channel of the rivers, especially in the banks of the Ialomița, the Prahova, and the Dâmbovița. The dominant species are the common elder tree, the alder tree, the white poplar, the willow, the elm tree, etc. Shrubs are well developed and the most frequent are the common elder, the hazelnut tree, and the hawthorn. The fauna of these riverside coppices is: birds (wagtail, stork) and also mammals, and reptiles.

*Halophile vegetation and flora* exist on soils with high salinity (Ocnița, Ochiuri, Gura Ocniței) and it includes such plant species as: *Festuca pseudovina*, *Poa bulbosa*, *Vivipara*, etc.

### MAN-RELATED MODIFICATIONS

In time the increasing human impact has led to increasing xerophile vegetation in the Subcarpathian area where, naturally, mesophile vegetation was predominant. This was the result of dwindling forest vegetation areas and soil degradation because agriculture was practised on sloping lands or excessive grazing, which leads to the soil's diminishing capacity to retain water. This is how the fields of *Festuca Valesiaca* grew in the area.

The less varied natural vegetation and its degradation because of increasing human impact has led to the gradual numerical reduction of flora species. This is the case of hayfields. When they are not mown, they are gradually invaded by shrubs, which turn into forest vegetation in time. On the other hand, because of the over-sowing and over-fertilization of the lawns, the biomass production increases, but at the same time a series of species may be eliminated, which will modify the flora in time.

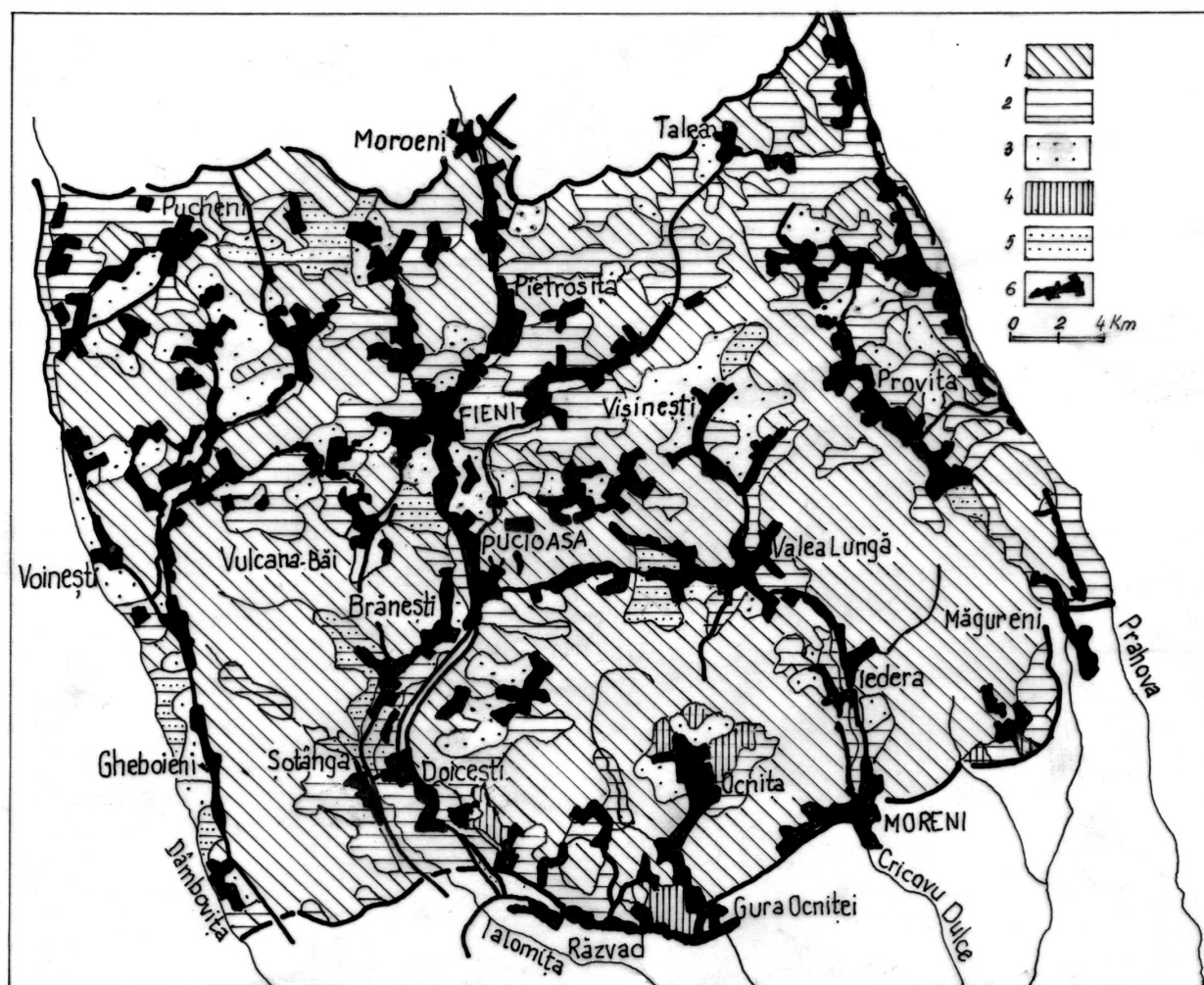


Fig. 1. Land use in the Subcarpathians between the Prahova and the Dâmbovița: 1. forests; 2. natural grazing land and hayfields; 3. orchards; 4. vineyards; 5. arable terrains; 6. settlements

The road and shortcut network on the slopes creates water channels and increases water-produced erosion and contributes to the increase of the solid flow. The existence of these roads and shortcuts deep into the forests and on the shrub-covered slopes or grazing land reduces the protection effect of these formations and sometimes turns them into real torrential organisms. From this point of view, restoring private property has had a general positive effect. At present, there is a strong tendency to cut down the chaotic circulation on these slopes, a lot of shortcuts have been closed and the access of domestic animals has been prevented by means of fences. At the same time, surrounding them with thorn hedges has closed private plots of land. This not only prevents the access of domestic cattle, but also contributes to reducing the speed of water and erosion and to the regularization of drainage, it protects the vegetation.

At present, environmental degradation is influenced by certain tendencies to change the way land is used (fig.1). Thus, in this Subcarpathian area we notice the tendency to extend agricultural lands on the slopes formerly used as hayfields or orchards. These practices can have negative effects on the landscape, because they determine or increase torrential erosion in vulnerable regions where negative consequences can extend on much larger areas because of the slope imbalance, the increase of the solid flow in the rivers and the clogging of retention lakes. At the same time, the tendency to replace the orchards on slopes with grazing land is extremely harmful for the balance of terraced slopes. In case these works stop, erosion is more aggressive than on unarranged slopes, where lawn vegetation and shrubs manage to consolidate the land quite well and slow down water drainage.

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In order to protect the vegetation and the flora it is necessary to re-evaluate their present condition and introduce protection measures. Besides the small sectors where some ecosystems are being protected, it would be very important to find real solutions for the conservation of the environment, the landscape, flora and fauna diversity. Ecological management would be able to maintain the productive potential and also control the erosion, and the solid and liquid flow. In this sense, it is necessary to continue to improve the territorial organization and extend the rational use of natural vegetation.

**LANDSCAPE TYPES**

In the Subcarpathian area between the Dâmbovița and the Prahova we notice several landscape types:

- The *high hill landscape* at altitudes between 500-800m, in the Inner Subcarpathians, at the contact with the Carpathians (the Comani Hill, the Plaiul Sirnei Hill). This landscape is in the area of beech and common oak forests. Its bio-productive potential and land use are highly influenced by the nature of the rock, the degree and the exposure of the slope. Forests, orchards, and natural hayfields are predominant, while tilled lands occupy only small areas and produce little. (fig. 2)

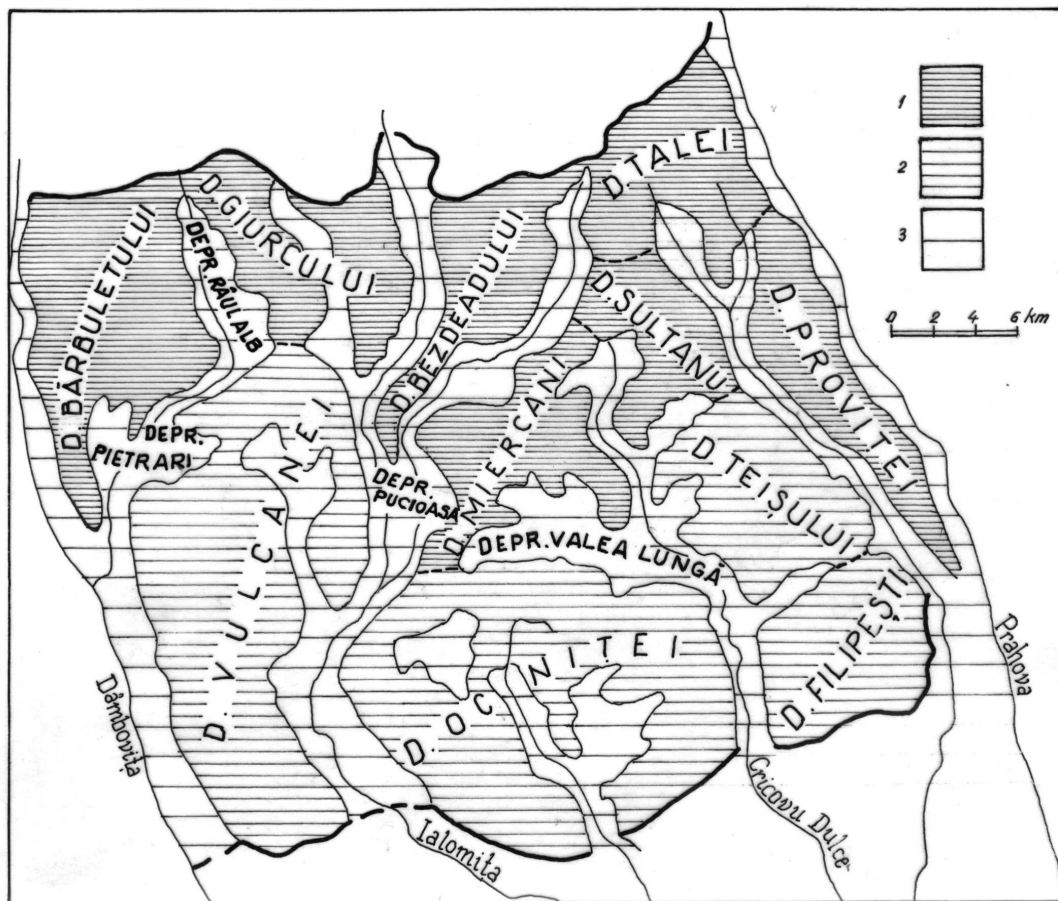


Fig. 2. Landscape types in the Subcarpathians between the Prahova and the Dâmbovița: 1. the high hill landscape; 2. the low and medium hill high lanscape; 3. the large corridor and depressions landscape

Here there are hills with narrow crests and abrupt slopes, mostly covered with beech and hornbeam forests on the shaded slopes and common oak forests on the sunny slopes. These hills suffered less because of human impact and the landscape is less degraded. There are, however, friable rock hills, with a medium or an abrupt slope, which are generally highly affected by erosion and land sliding. In the valleys of the Prahova and the Ialomița there are grazing lands invaded by thorns and wide rocky areas. The degradation in these hills is higher both because of specific natural conditions and intense human impact.

In this anticline succession there appear also synclines with less abrupt often-deforested relief, orchards or grazing land (Râul Alb, Runcu, Moroeni, Adunați, Vârfuri, Bezdead), a dense population who turns to account local natural resources intensely. The landscape suffers human impact and actual geomorphologic processes are very dynamic.

- *The low and medium high hill landscape exists between 300-500m altitudes in the External Subcarpathians: the Spătărelu-Mitropolia Massif, the flat mountainous areas covered with lawns (Plaiul Mogoi and Plaiul Curpeniș).* In this area the climatic potential is favorable for agriculture, especially for orchards and vineyards. On large areas however, there are rocks and very eroded soil because of former deforestation.

The low and medium altitude landscape is hills with narrow crests and very abrupt slopes, covered with beech forests and hills with medium slopes, or low hills with large crests,

where forest plots alternate with orchards and other crops. Between the hills, there are depressions: Ocnîța, Gura Ocnîței, Moreni, Filipeștii de Pădure, Florești. Actual geo-morphological processes are also quite frequent in this area. The clays from the Paleocene structures generate landslides. Torrential erosion and relief changes as well as landslides form torrential organisms whose presence is indicated by such toponyms as Valea Glodului or Valea Noroaielor (“Mud Valley”).

On the other hand, in order to exploit natural resources (oil, natural gas, salt, coal), forests were largely deforested, torrential organisms appeared, which caused intense land degradation. In the external Subcarpathian area there is powerful human impact. The numerous mineral resource exploitations, logging and inadequate land use lead to landscape degradation in large areas.

- *The large corridors and depressions landscape is in the main valleys (the Dâmbovița, the Ialomița, the Prahova) and the many adjoining depression areas (Malu cu Flori, Voinești, Fieni, Valea Lungă, Breaza, Câmpina).* This landscape is characterized by the highest human impact. Population is numerous, lands are used in various ways, resource exploitation is intense, and environmental degradation is obvious. The forest areas have been dwindled a lot in these depressions and the sometimes irrational, agricultural practices have also led to increasing land degradation.

Generally, in the Subcarpathian area between the Dâmbovița Valley and the Prahova Valley human impact has led to a great diversity of the landscape: a mosaic of settlements, agricultural lands, grazing land, forest plantations, shrubs, forests partly or almost totally degraded because of mining or rock exploitations (quarries), rerouting rivers and the creation of retention lakes, industrial units, and roads. Some integrate into the natural landscape, others have created important imbalances whose effect is environmental degradation.

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