THE VASCULAR FLORA ANALYSIS OF "STRUNGILE MARI" RESERVE (BUCEGI MASSIF)

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Abstract
Almost all states in special European states show a real concern, about irrational utilization of biodiversity components and a big general lack of information about this; also the small number of legal and special institutions is able to provide the basic information about environmental degradation phenomena at continental and national level. The International Union for Conservation of Nature (IUCN) will solve this global problem. IUCN tends to support and makes all profile organizations from all over the world to conduct their business in order to preserve the integrity and diversity of nature, also to make sure that all natural resources are used in a fair way and take into consideration sustainability. The special landscape layout and the wilderness relief join the conservative floristic fund with an endemic value; those elements which offer originality to "Strungile Mari" Reserve are *unique and show a real scientific interest. The aim of this paper is to highlight the scientific importance of the studied area by analyzing the floristic composition through the taxonomic point of view, bioforms, geoelements and ecological indices analysis.*

Keywords: biodiversity, vascular flora, analysis, conservation

1. INTRODUCTION

Biodiversity invoked more often nowadays, is not just related to a big number of species per unit area, but also to keeping the natural ratio between their populations. Vegetal species are growing usually in communities (phytocenosis), rarely solitary. Some species are common or frequent and others for some reasons are occasional or rare. Rare species have always attracted the attention and the specialists interest, either they are endemic or not, those are more liable to extinction by the anthropogenic or natural causes.

The west part of Bucegi Mountain runs on an area of 80 km^2, detaching it from Omu Peak, then is headed west to Doamnele Peak (2404 m) and Batrana Peak (2240 m); northern slope is Gutanu Mountain, which loops to south to the mountain Strungile Mari (1041m).

The aim of this work is to emphasize the scientific importance of this area, being complex by the diversity of flora species.

2. MATERIAL AND METHOD

The studied area is located in Natural Park Bucegi, from *Tataru* canyon to *Horoabei* Valley, covering *Strunga* and *Batrana* peak. Substrate is mostly limestone with a high biodiversity, being moderately leaning.

Floristic inventory was made after the theoretical study of the next references: *Flora si vegetatia Muntiilor Bucegi* (Beldie Al. 1967) and *Flora si vegetatia Muntilor Leaota si a sectorului vestic al Muntilor Bucegi* (Monica Neblea, 2006), followed by the identification of taxa in land from June 2010 to August 2012 period, using *Plantele din Muntii Bucegi. Determinator* (Beldie, Al., 1972).

Systematic classification was made according to *Categorii sozologice din cormoflora judetului Arges* (Alexiu V., 2011) and *Les associations vegetales de Roumanie* (Coldea Gh., 1997). Species Nomenclature is according to Flora Europaea database.

For flora species monitoring were used classical and specific methods. The classical methods include: permanently square (observations in stationary, well defined area, significant for all general assembly which is periodical studied) and control square (the area that is not subject of any intervention). Specific methods include transect, periodic mapping (that is made at intervals which

depends on the type of vegetation: about 5 years for herbaceous vegetation, 10-15 years for woody vegetation) and photography always in the same place and at the same angle.
The cormoflora from Strungile Mari Reserve was characterized taken into consideration the next factors: bioforms, geoelements, and ecological indices after *Cormoflora judetului Arges* (Alexiu V., 2008).

3. RESULTS AND DISSCUSSIONS

The vascular flora analysis of "Strungile Mari" Reserve (Bucegi Massif)

1. Taxonomic analysis

Floral inventory of cormophytes from research territory contains 424 taxa, divided in 217 genus and 65 families. Floral summary demonstrates that the biggest percentage is hold by the next families: *Asteraceae* (15%), *Poaceae* (9%), *Brassicaceae* (6%), *Caryophyllaceae* (6%), *Rosaceae* (6%), *Ranunculaceae* (6%), *Scrophulariaceae* (5%), *Fabaceae* (4%), *Campanulaceae* (3%), *Gentianaceae* (3%), *Lamiaceae* (3%), *Apiaceae* (3%); the rest of the families are represent by 18% from the total (Figure 1.).

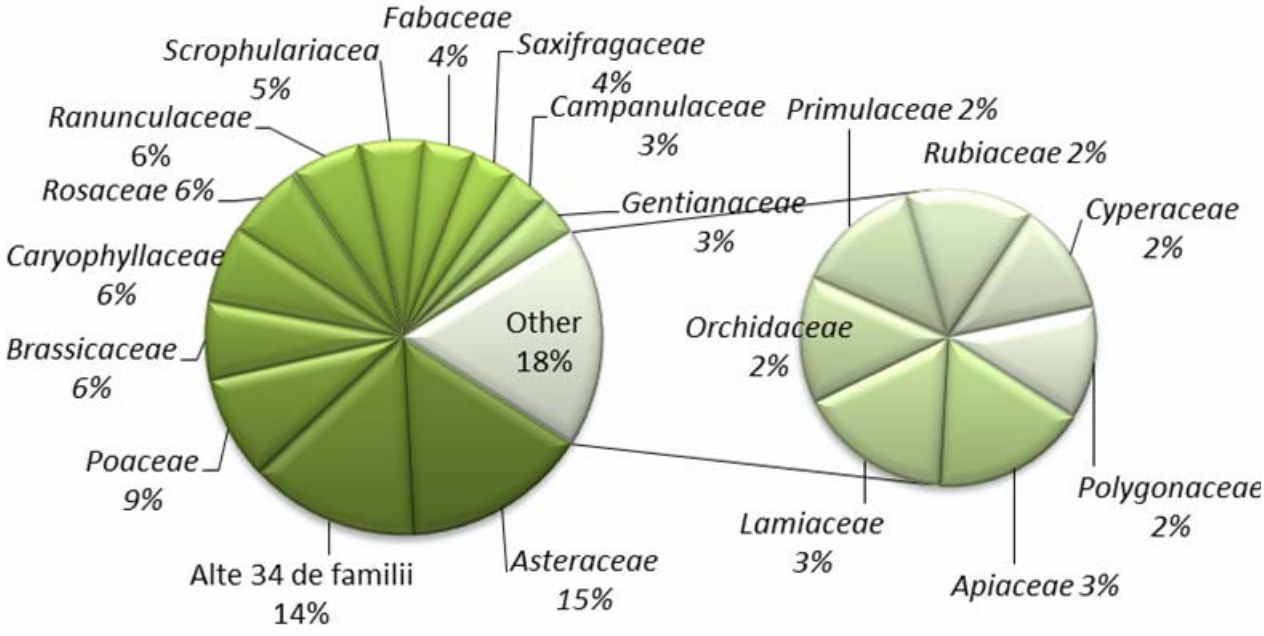


Figure 1. The best represented families in the investigated area

2. Bioforms analysis

From spectrum bioforms analysis (Figure 2.), can be observed the high percentage of hemicryptophytes (66%) - the main edificatory of herbaceous layer of forests, alpine and subalpine meadows and also of saxicole vegetation. The camephytes hold a significant percentage (10%) retrieved especially in subalpine level and geophytes (9%) are represented by ephemeral species.
From total categories of biological forms, annual and biennial therophytes have 8% frequency, this large proportion revealed the existence of a high pressure exercised by anthropogenic factor over cormoflora analyzed territory.
Forest vegetation, represented by phanerophytes (7%), is diversified (mega-, mezo- and nanophanerophytes), occupying a large part of the investigated area.
It was noticed that with increasing altitude, the hemicripthophytes percentage increases and therophytes percentage decreases. Based on identified bioforms categories was calculated the altitudinal index by Pop and Drăgulescu (1983), modified in 1995 by Dragulescu, with chamephytes addition, which also are increasing together with the altitude. At high altitudes, it has

values close to zero and at lower altitudes, above 100. This index gives information of altitude, climate and also about anthropogenic pressure intensity.

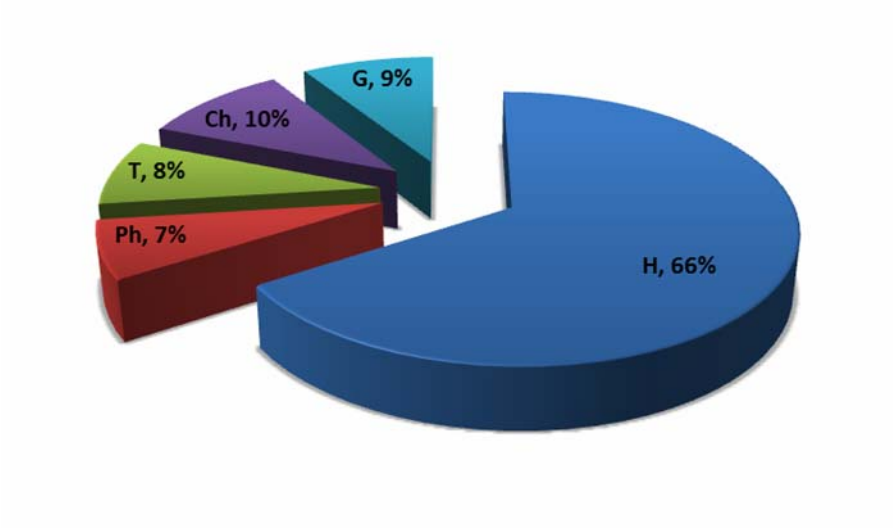


Figure 2. Bioforms spectrum for „Strungile Mari" Reserve

By calculating the altitudinal index, 11.32 for "*Strungile Mari*" Reserve, was revealed the researched territory location at the upper limit of mountain level, with some important characteristics like a climate with moderate anthropogenic influences, and in contact with subalpine level, a cool climate with low anthropogenic influences.

3. Geographical area analysis

Phytogeographical structure of the vegetation, in the studied territory emphasizes the presence of 36 categories of floral elements. Their basic fund is made by Eurasian species (22%), which include different subtypes: continental, mediterranean, boreal, alpine, arctic-alpine and mountain (figure 3).
Along with these, in investigated area were identified European elements (19%), Circumpolar (17%), Central-European (10%) elements which are very diverse. The presence of these categories with Eurasian categories indicate the cormoflora membership at Central-European region.
Manny autochthonous elements, with special phytogeographical importance, gives to studied region a specific character, as Carpathian-Balkan ones: *Draba lasiocarpa, Doronicum carpaticum, Alyssum repens, Hieracium rotundatum, Rhododendron myrtifolium, Erysimum witmannii, Linum extraaxillare, Senecio carpaticus, Bruckenthalia spiculifolia, Carduus kerneri, Campanula patula* subsp. *abietina, Sesleria rigida, Aconitum toxicum* etc.
The Carpathian-Endemic elements are represented by the next species: *Dianthus glacialis* subsp. *glacialis, Eritrichium nanum, Campanula carpatica, Leucanthemum waldsteinii, Hesperis nivea, Hesperis oblongifolia, Saxifraga mutata* subsp. *demissa, Oxytropis carpatica, Aquilegia transsilvanica, Thlaspi dacicum, Thymus pulcherrimus, Onobrychis montana, Dianthus spiculifolius, Dianthus tenuifolius, Sesleria heuflerana, Thymus comosus, Centaurea pinnatifida, Achillea schurii, Ranunculus carpaticus, Cerastium transsilvanicum, Erigeron nanus, Heracleum transsilvanicum, Dentaria glandulosa, Aconitum vulparia, Campanula serrata* etc.
Thermophilic elements of Ponto-Mediterranean or Mediterranean origin are represented by species such as: *Ornithogalum orthophyllum, Scrophularia scopolii, Sedum hispanicum, Secale montanum, Primula veris, Primula elatior, Carex pendula.*

The presence of Pontic (*Erysimum odoratum*), Ponto-Balkan (*Potentilla chrysantha*) and Ponto-Pannono-Balkan elements (*Minuartia setacea*) show the strong florogenetical links between this Balkan region and the steppes flora that surrounds Black Sea along with Pannonian Plain.

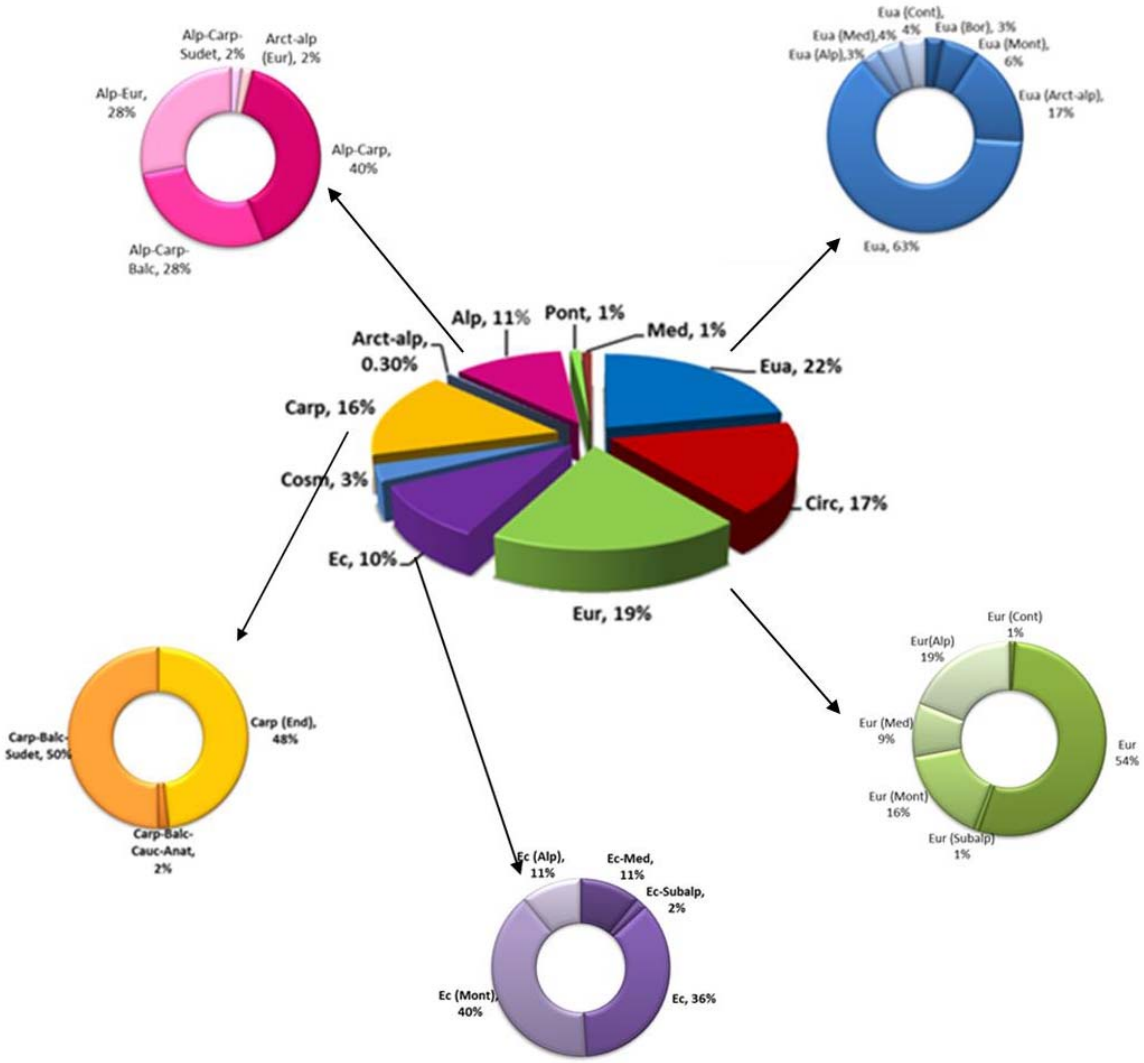


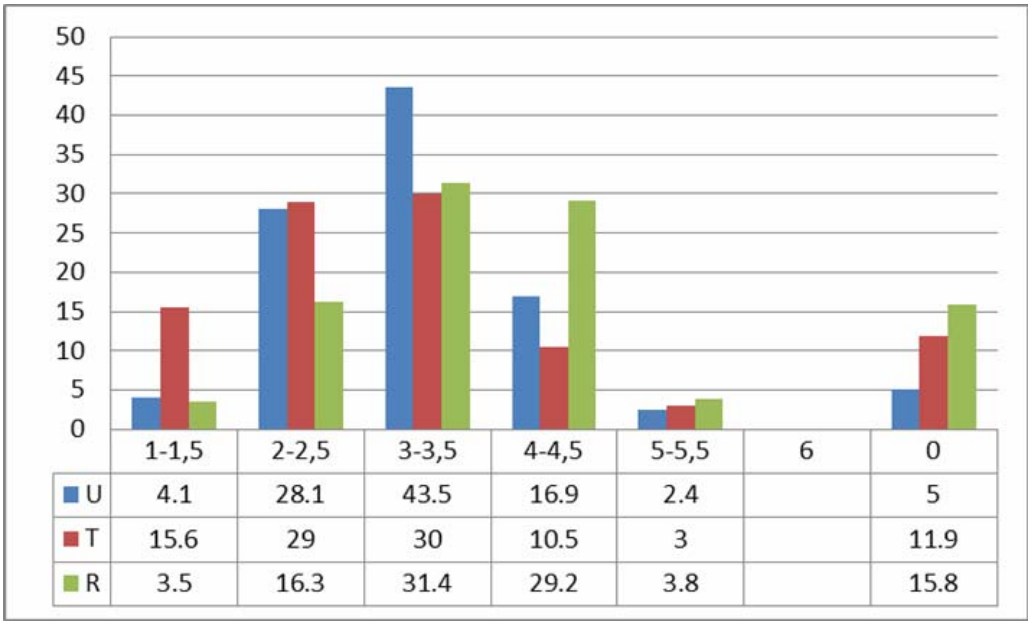
Figure 3. Floristic elements of "Strungile Mari" Reserve

4. Analysis of ecological indicators

Ecological characterization of the flora of a region is really important for understanding the adaptive and evolutionary phenomenon of species and plant communities in the establishment of their relationships with environmental factors; is also an indicator of the anthropization. Highlighting the cormoflora ecological peculiarities of the investigated area was performed taking into account the behavior of the species to major environmental factors: humidity, temperature and soil reaction represented by percentage (Figure 4.).

Humidity factors shows a higher share of mesophilic species ($U_{3\text{-}3,5}$ = 43,5%), accompanied by xero-mesophilic species ($U_{2\text{-}2,5}$= 28,1%), which illustrates the presence of stationary conditions with favorable moisture, and also installation of suitable habitats for meadows. Mesohygrophilic species ($U_{4\text{-}4,5}$ = 16,9%) and hygrophilic species ($U_{5\text{-}5,5}$ = 2,4%), are signs of moisture excess areas, which allow the settlement of a vegetation layer, characteristic for the upper mountain and subalpine streams.

Regarding the temperature factor, mesotherms ($T_{3-3,5}$ = 30%), and microtherms ($T_{2-2,5}$ = 29%) make up 59% of all species, which highlights the existence of a moderate temperate climate.
Cryophilic species ($T_{1-1,5}$ = 15,6%) have no significant number of specific species to a cold climate and high altitude; they are characteristic of subalpine and alpine vegetation level.
Compared to soil reaction, most species are acid-neutrophilous, (R_3 = 31,4%) and low-acid neutrophilous (R_4 = 29,2%), reflecting the existence of favorable conditions for plant growth. In strong territorial leachates with acid substrate are growing the acidophilus species (R_2 = 16,3%).



	1-1,5	2-2,5	3-3,5	4-4,5	5-5,5	6	0
U	4.1	28.1	43.5	16.9	2.4		5
T	15.6	29	30	10.5	3		11.9
R	3.5	16.3	31.4	29.2	3.8		15.8

Figure 4. Spectrum of ecological indicators for studied cormoflora region

4. CONCLUSIONS

Biodiversity conservation is essential for the IUCN's mission, therefore must be demonstrate how biodiversity is fundamental to solve some of the biggest world challenges: climate change, achieving sustainable development, improving human welfare and build a green economy.
Qualitative and quantitative structure of biocenosis is shown in the following: this area contains numerous plant species included in the Global Red List (IUCN), 1997: *Aconitum napellus, Draba haynaldii, Hesperis oblongifolia;* Habitats Directive 92/43/CEE: *Artemisia eriantha*, *Campanula serrata, Ligularia sibirica*; Red List of superior plants in Romania, 1994: *Centaurea pinnatifida, Sesleria rigida, Eritrichium nanum, Hesperis matronalis* subsp *moniliformis, Aquilegia transsilvanica, Dianthus spiculifolius, Dianthus tenuifolius, Koeleria macrantha* subsp *transsilvanica, Onobrychis montana* subsp. *transsilvanica, Cerastium transsilvanicum, Trisetum macrotrichum.*
According NATURA 2000, Bucegi Mountains represent a community interest ROSCI0013, were the studied cormoflora is included in the next types of habitats: 3220 - Herbaceous vegetation on mountain riverbanks; 4070 – Scrubs with *Pinus mugo* and *Rhododendron myrtifolium (Mugo-Rhododendretum hirsuti*); 4080 – Scrubs with sub-arctic species of *Salix* spp.; 6170 – Alpine and subalpine calcify meadows; 8120 – Limestone scree and limestone schist from mountain and alpine levels (*Thlaspietea rotundifolii*); 8210 - Chasmophytic vegetated rocky slopes on limestone rocks.
The presence of multiple complex categories of geographical elements, with different florogenetical origins in varied proportions, had resulted after the phytogeographic analysis. By analyzing the proportion of different types of geoelements, was obtained specific data about phytogeographical interferences caused by migration of plant species over the time.

To emphasize ecological specificity of species of the investigated territory, there were conducted the ecological categories analysis, which allows the determination of ecological vegetation in accordance with the complexity of local pedo-climatic factors.
Ecological spectrum prepared through analytical method and the values figuration of all the three indices, highlights the habitats mosaic in the studied territory
The special landscapes, the wild relief that join floristic conservation fund, the endemic value sometimes even unique, are elements that gives originality to "*Strungile Mari*" Reserve and shows a real scientific interest.

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