

Forestry habitats from Siriu Mountains (Romania)

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Abstract In this paper are presented the main types of forestry habitats that can be found in Siriu Mountains. A number of six habitats according to Natura 2000 Network have been described: 9130 *Asperulo-Fagetum* beech forests, 91V0 Dacian Beech forests (*Symphyto-Fagion*), 9110 *Luzulo-Fagetum* beech forests, 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*), 9180* *Tilio-Acerion* forests of slopes, screes and ravines, 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Key words

habitat, forest, Siriu Mountains, Romania

The Siriu Massif is situated on the right part of the Buzău river, being a morphological and structural unit of the southern group of Oriental Carpathians, known as Curvature Carpathians. This massif is an outlined unit in terms of morphological and structural, between Crasna Valley (in the North-West part), Buzău Valley (at North-East), Big Siriu Valley (at South-West) and Siriu Valley (in the South-East part). Almost, the all massif is constituted by "Siriu sandstone", with a calcareous kind, grey, micaceous at the basis and schistous upwards.

The beech forests have the largest extension in the Siriu Mountains, where vegetate between 600-1300 m altitude. There are pure beech forests (Valea Neagră, Plaiul Crasnei, Fețele Mălăieii) or mixed with fir, spruce and birch. The spruce forests, characteristic of superior mountaineous belt, form a narrow band between 1200-1550 m, and at higher altitudes constitute glades, especially on the northern slopes.

The natural habitats inventory from Siriu Mountains is integrated part of an extensive study, as part of the project "*Conservative and participatory management of the site ROSCI0229 SIRIU*". This project aims the inventory and cartography of the natural habitats and wild species of community interest, the monitoring system of their status conservation.

Material and Methods

The inventory of habitats was made up according to data recorded during the investigation period *in situ* iunie-octombrie 2010 in Siriu Mountains. These habitats were characterized using works of synthesis of some authors and collective of authors [1, 2, 4, 9]. The habitats have been described as follows: code and name, correspondence with Emerald, Corine, Palearctic Habitats, Eunis and Romanian classifications, correspondence with plant associations,

distribution in territory, sites description, community structure, flora composition, conservative value, management and monitoring.

Results and Discussions

This paper presents six forestry habitats according to Natura 2000 Network, which can be found in Siriu Mountains: 9130 *Asperulo-Fagetum* beech forests, 91V0 Dacian Beech forests (*Symphyto-Fagion*), 9110 *Luzulo-Fagetum* beech forests, 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*), 9180* *Tilio-Acerion* forests of slopes, screes and ravines, 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

9130 *Asperulo-Fagetum* beech forests

Correspondence:

Emerald: !41.1 Beech forests

Pal. Hab.: 41.1 D224 Dacian *Dentaria bulbifera* beech forest

R4118 Dacian forest with *Fagus sylvatica*, *Carpinus betulus* and *Dentaria bulbifera*

Plant association: *Carpino-Fagetum* Paucă 1941

Distribution in territory: Valea Neagră, Plaiul Crasnei, Izvorul fără Nume, Izvorul Bradului, Valea Mreața, Muchea Bradului, Cheile Buzăului, Pârâul Urlătoarea Mare, Dealul Șoimului, Valea Siriuului Mare.

Site description: These coenoses are developed on sunny or shaded slopes, at the 300-800 m altitude (Fig. 1). The beech forests from Siriu Mountains vegetate on neutral or acid low soils, with mull humus, characterized by a representation of herbaceous species, such as: *Galium odoratum*, *Cardamine bulbifera*, *Lamium galeobdolon*, *Anemone ranunculoides*, *Poa nemoralis*.

Community structure: The phytocoenoses are edified by European, mesotherms, mesophilous and acid-neutrophilous species. Trees stratum characterized by a coverage of 90%, is dominated by *Fagus sylvatica* and *Carpinus betulus*, with spruce, fir, birch and mountain maple disseminations. The shrubs layer includes a reduced number of species, being represented by regeneration stratum and a few mature specimens of *Rosa canina*, *Crataegus monogyna*, *Sambucus nigra*, *Rubus hirtus*.

Flora composition: Herbaceous layer is formed by characteristic species from *Fagetalia* order and *Quercus-Fagetea* class: *Galium schultesii*, *Geranium robertianum*, *Salvia glutinosa*, *Cardamine bulbifera*, *C. impatiens*, *Lamium galeobdolon*, *Neottia*

nidus-avis, *Poa nemoralis*, *Mycelis muralis*, *Pulmonaria rubra*, *Carex sylvatica*, *C. digitata*, *Euphorbia amygdaloides*, *Platanthera chlorantha*, *Geum urbanum*, *Oxalis acetosella*, *Veronica urticifolia*, *Arum orientale*.

Conservative value: Reduced

Management: Avoiding irrational exploitation of forest and the application of an adequate treatments.

Monitoring: Monitoring the conservation status of habitat, the specific composition and its evolution. Monitoring of pest populations, observance of phytosanitary requirements, protect the populations used in biological control.



Fig. 1. *Asperulo-Fagetum* beech forest on Valea Neagră (Siriu Mountains)

91V0 Dacian Beech forests (*Symphyto-Fagion*)

Correspondence:

Emerald: !41.1 Beech forests

Pal. Hab.: 41.1123 Dacian neutrophile beech fir forest, 41.1D211. Dacian *Dentaria glandulosa* beech forest.

Eunis: G4.6. Mixed-*Abies-Picea-Fagus* woodlands, G1.6D21 Dacian *Symphytum* beech forest.

R4101 South-East Carpathian forests with *Picea abies*, *Fagus sylvatica*, *Abies alba* and *Pulmonaria rubra*, R4109 South-East Carpathian forests with *Fagus sylvatica* and *Symphytum cordatum*.

Plant association: *Pulmonario rubrae-Fagetum sylvaticae* (Soó 1964) Täuber 1987, *Symphyto cordati-Fagetum* Vida 1959

Distribution in territory: Valea Neagră, Plaiul Mreaja, Dealul fără Nume, Valea Crasnei, Gura

Muntelui, Seciul Urlătoarei, Platoul Blaji, Cheile Buzăului.

Site description: The pure beech forests of this habitat are found at altitudes between 654-1203 m, on slopes with variable degree of inclination (20°, 30°, 45°) and acid moderate soils, rich in mull humus (Fig. 2). These plant groupings are mesophilous, micro-mesotherms and acid-neutrophilous, and vegetate on slopes with variable exposition: north, north-east, south, south-east.

Community structure: Trees layer, characterized by a coverage degree varying between 80-90%, is dominated by *Fagus sylvatica*, nearby sporadically appears *Abies alba*, *Picea abies*, *Acer pseudoplatanus*, *Carpinus betulus*, *Betula pendula*, and *Acer platanoides*, *Fraxinus excelsior*, *Tilia cordata* in regenerative stratum. The shrubs stratum is well developed with specimens of *Crataegus monogyna*,

Rosa canina, *R. pendulina*, *Sambucus racemosa*, *S. nigra*, *Rubus hirtus*, *R. idaeus*, *Ribes uva-crispa*, *Daphne mezereum*, *Euonymus europaea*, *Actaea spicata*, *Corylus avellana*.

The herbaceous stratum is closed depending on the degree of shade, being rich in mull flora: *Symphytum cordatum*, *Cardamine glanduligera*, *Pulmonaria rubra*, *Galium odoratum*, *Luzula luzuloides*.

Flora composition: Edifying species: *Fagus sylvatica*, *Picea abies*, *Abies alba*. Characteristic species: *Pulmonaria rubra*, *Symphytum cordatum*, *Cardamine glanduligera*. Other important species: *Cephalanthera longifolia*, *Galium schultesii*, *G. odoratum*, *Geranium robertianum*, *Mycelis muralis*, *Mercurialis perennis*, *Circaea lutetiana*, *Impatiens noli-tangere*, *Salvia glutinosa*, *Athyrium filix-femina*, *Oxalis acetosella*, *Cardamine bulbifera*, *C. impatiens*, *Neottia nidus-avis*, *Isopyrum thalictroides*, *Anemone nemorosa*, *Ranunculus carpaticus*, *Poa nemoralis*, *Carex digitata*, *Listera ovata*, *Scopolia carniolica*,

Platanthera chlorantha, *Asarum europaeum*, *Prenanthes purpurea*, *Euphorbia amygdaloides*, *Epilobium montanum*, *Dryopteris filix-mas*, *Carex sylvatica*, *Veronica urticifolia*, *Arum orientale*, *Gymnocarpium dryopteris*, *Paris quadrifolia*.

Conservative value: The beech forests edifying by *Symphytum cordatum* have a high conservative value, so its proper to mounting explanatory panels with scientific importance of this habitat.

Management: Promoting of a conservative management (natural regeneration), avoiding the chemical treatments and clearcuttings. In some areas edified by *Symphytum cordatum* (Seciul Urlătoarei), is necessary to control the spreading of spruce and fir seedlings in the regeneration period.

Monitoring: Monitoring of conservation status of the habitat, of the specific vegetal composition and the effects of the applied sylvocultural measures, in order to identify the interventions with low impact on biodiversity.



Fig. 2. Dacian Beech forests (*Symphyto-Fagion*) on Valea Neagră (Siriu Mountains)

9110 *Luzulo-Fagetum* beech forests

Correspondence:

Pal. Hab.: 42.1323 Dacian acidophile beech-fir forest

Eunis: G4.6. Mixed-*Abies-Picea-Fagus* woodlands

R4102 South-East Carpathian forests with *Picea abies*, *Fagus sylvatica*, *Abies alba* and *Hieracium rotundatum*.

Plant association: *Hieracio rotundati-Fagetum* (Vida 1963) Täuber 1987

Distribution in territory: Dealul Șoimului, Dealul Milea, Valea Crasnei, Pârâul Urlătoarea Mare, Valea Neagră, Plaiul Mreaja.

Site description: The plant groupings which edified this habitat, grow on slopes with inclination of up to 25°, at altitudes over 700 m, predominantly in northern and north-eastern expositions (Fig. 3). The acid brown soils, poor in humus are the most characteristic.

Community structure: The phytocoenoses are edified by boreal european species, mesophilous, micro-mesotherms and acidophilous. The trees stratum is formed by *Fagus sylvatica*, *Abies alba*, *Picea abies*, with rare specimens of *Betula pendula*, *Acer pseudoplatanus* and *Sorbus aucuparia*. The shrubs stratum is poorly represented by species such *Vaccinium myrtillus*, *V. vitis-idaea*, *Rubus hirtus*. The herbaceous layer is dominated by *Luzula sylvatica*,

beside of this achieved a representative coverage *Calamagrostis arundinacea*, *Hieracium rotundatum* and *Poa nemoralis*.

Flora composition: Edifying species: *Fagus sylvatica*, *Picea abies*, *Abies alba*. Characteristic species: *Hieracium rotundatum*. Other important species: *Euphorbia amygdaloides*, *Cardamine bulbifera*, *C. glanduligera*, *Millium effusum*, *Neottia nidus-avis*, *Galium odoratum*, *Myosotis sylvatica*, *Athyrium filix-femina*, *Oxalis acetosella*, *Veronica officinalis*, *Pulmonaria rubra*, *Mercurialis perennis*,

Salvia glutinosa, *Lamium galeobdolon*, *Epilobium montanum*, *Epipactis helleborine*, *Festuca drymeia*, *Campanula abietina*, *Orthilia secunda*, *Primula veris*.

Conservative value: Moderate.

Management: Avoiding irrational exploitation of forest and the application of an adequate treatments.

Monitoring: Monitoring the conservation status of habitat, the specific composition and its evolution.

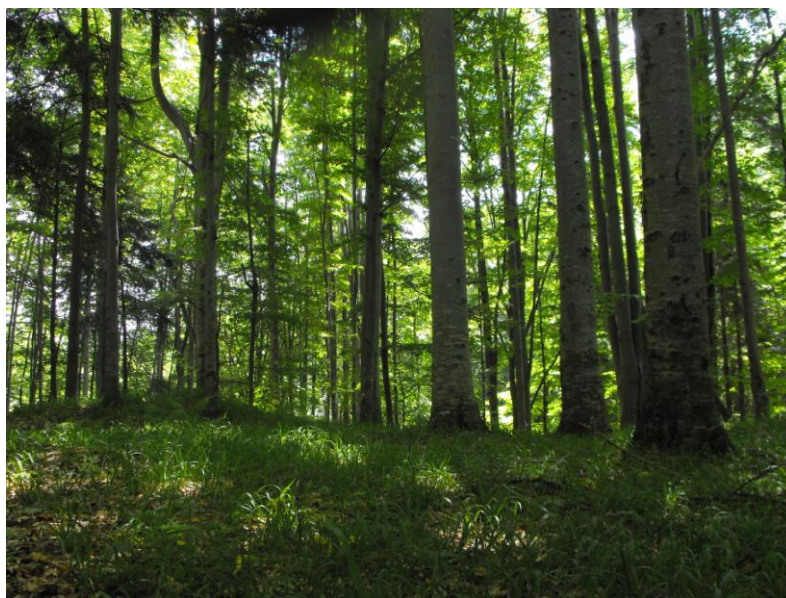


Fig. 3. *Luzulo-Fagetum* beech forest on Valea Crasnei (Siriu Mountains)

9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*)

Correspondence:

Pal. Hab.: 42.21628 Carpathian *Luzula sylvatica* spruce forest

Eunis: G3.1B1 Bilberry spruce forest

R4208 South-East Carpathian forests with *Picea abies* and *Luzula sylvatica*

Plant association: *Hieracio rotundati* – *Piceetum abietis* Pawl. et Br. – Bl. 1939

Distribution in territory: Pârâu Urlătoarea Mare, Plaiul Mreaja, Muntele Siriu, Vâna Mălâiei.

Site description: Phytocoenoses of this habitat vegetate at altitudes over 800 m, on moderately inclined slopes, with southern expositions (Fig. 4). This plant grouping prefers brown and acid yellowish brown soils, with low trophicity and moder humus.

Community structure: The arboretum of this association are edified by Balkan-Carpathian, boreal species, mesophilous, microtherms, with an acid soil reaction. The trees stratum is dominated by *Picea abies*, with a coverage between 90-100%. The shrubs

synusia is less developed, edified by *Sorbus aucuparia*, *Vaccinium myrtillus*, *Rubus hirtus*.

Flora composition: Edifying species: *Picea abies*. Characteristic species: *Luzula sylvatica*, *Hieracium rotundatum*. The chemical peculiarities of the soil are reflected on the vegetal layer, which presents acidophilous species, characteristic to the *Vaccinio-Piceion* alliance and *Piceetalia excelsae* order: *Homogyne alpina*, *Veronica officinalis*, *Soldanella hungarica* ssp. *major*, *Oxalis acetosella*. In their floristic composition appears typical species of the *Fagetalia* order and *Fagion* alliance (*Luzula luzuloides*, *Athyrium filix-femina*, *Dryopteris filix-mas*, *Galium odoratum*, *Geranium robertianum*), when these vegetal formations come into contact with mixed beech and fir forests.

Conservative value: High

Management: Avoiding irrational exploitation of forest and the application of an adequate treatments.

Monitoring: Monitoring the conservation status of habitat, the specific composition and its evolution.

Uncontrolled tourism can be harmful through various activities (planning campsites, lighting the fire, garbage throwing, cutting or injuring of trees, wildlife disturbance, deviation from the allowed routes, using

of ATVs, etc). Promoting of a conservative management (natural regeneration), avoiding the chemical treatments and clearcuttings.



Fig. 4. Acidophilous *Picea* forest on Plaiul Mreaja (Siriu Mountains)

9180* *Tilio-Acerion* forests of slopes, screes and ravines

Correspondence:

Emerald: 31.8 Western Eurasian thickets

Corine: 31.8C Hazel thickets

Pal. Hab.: 31.8C4 Subcontinental hazel thickets

Eunis: F3.174 Subcontinental hazel thickets

R3117 South-East Carpathian bushes with

Corylus avellana and *Spiraea chamaedryfolia*

Plant association: *Spiraeo-Corylletum*

Ujvárosi 1944

Distribution in territory: Cheile Buzăului, Colții Balei, Plaiul Mreaja.

Site description: The bushes of this habitat are settled on shaded valleys and quays, with moderate inclination degrees, at altitudes about 600 m (Fig. 5). These coenoses prefer the moistened and roughed soils, in the process of soil formation.

Community structure: There are primary plant groupings edified by eurasian, mesophilous, mesothermophilous and saxicolous species. The shrubs stratum is well represented, being dominated by *Coryllus avellana*, accompanied by rare specimens of *Tilia cordata*, *Ulmus glabra*, *Ribes uva-crispa*, *Abies alba*, *Fagus sylvatica*, *Clematis vitalba*.



Fig. 5. *Tilio-Acerion* forest in Buzău Quays (Siriu Mountains)

Flora composition: Edifying species: *Corylus avellana*, *Spiraea chamaedryfolia*, *Poa nemoralis*. These coenoses installed on rocky slopes explain the presence of the saxicolous species: *Campanula carpatica*, *Asplenium trichomanes*, *Saxifraga cuneifolia*, *Festuca rupicola* ssp. *saxatilis*. Other important species: *Scopolia carniolica*, *Rosa pendulina*, *Cardamine impatiens*, *Dryopteris filix-mas*, *Veronica urticifolia*, *Gentiana asclepiadea*, *Asplenium scolopendrium*.

Conservative value: Natural habitat of community interest. Limited habitats, with high conservative value, primarily installed on rocky slopes, in the process of soil formation.

Management: This habitat is not threatened with degradation, being located in difficult of access areas. We propose the following measures: promotion of the conservative management (natural regeneration); prohibition/limitation of the exploitations in these areas; prohibition/limitation of the construction of forestry roads; prohibition/limitation of the chemical treatments.

91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Pal. Hab.: 44.214 Eastern Carpathian grey alder galleries

Eunis: G1.1214 Eastern Carpathian grey alder galleries

R4401 South-East Carpathian forests with *Alnus incana* and *Telekia speciosa*

Plant association: *Telekio speciosae-Alnetum incanae* Coldea (1986) 1991

Distribution in territory: Valea Crasnei, Mreaja, Cheile Buzăului, Lunca lui Izmană, Valea Neagră, Izvorul fără nume, Lunca Bradului, Izvorul Bradului, Lunca Băilor, Gura Siriului.

Site description: Coenoses with grey alder vegetate alongside the mountain valleys, on flat or slightly inclined terrains, at altitudes between 800-1100 m (Fig. 6). They prefer superficial, sandy, mesotrophic lithosoils, permanently wet. From the ecological-protective point of view, these forests have an important role in the formation and perpetuation of the river meadow environment, strengthening the alluvial deposits, reducing the water speed, protecting the shores from the erosion. The grey alder forests must be managed rationally, to maintaining and even improving of their protective function.

Community structure: The arboretum is dominated by *Alnus incana* which realizes coverage of 70-80%, mixed with *Fraxinus excelsior*, *Fagus sylvatica*, *Acer pseudoplatanus*, *Ulmus glabra*, *Salix caprea*, *Betula pendula*. The shrubs stratum is represented by: *Corylus avellana*, *Spiraea chamaedryfolia*, *Rubus idaeus*, *R. hirtus*, *Sambucus nigra*, *S. racemosa*, *Daphne mezereum*, *Sorbus aucuparia*. The most representative species from herbaceous layer are: *Telekia speciosa*, *Matteuccia struthiopteris* and *Petasites hybridus*.

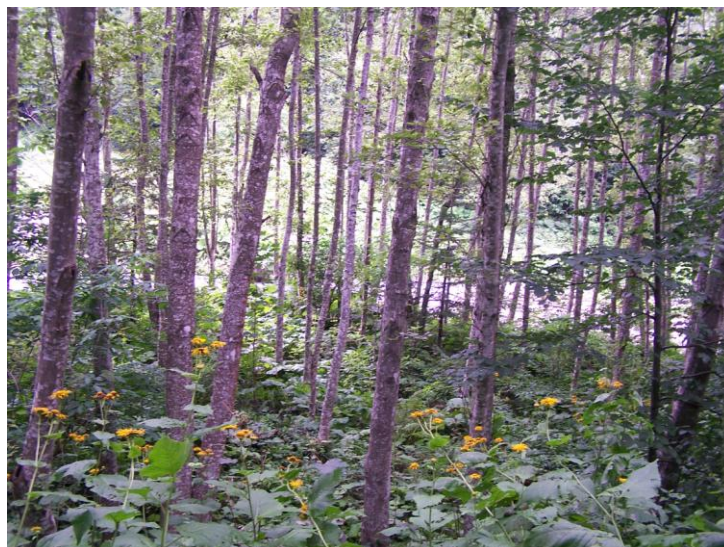


Fig. 6. Alluvial forest with *Alnus incana* on Crasna Valley (Siriu Mountains)

Flora composition: Edifying species: *Alnus incana*. Characteristic species: *Telekia speciosa*. Other important species: *Athyrium distentifolium*, *Leucanthemum waldsteinii*, *Polystichum lobatum*, *Pulmonaria rubra*, *Myosotis sylvatica*, *Galium odoratum*, *Gentiana asclepiadea*, *Brachypodium sylvaticum*, *Geranium robertianum*, *G. sylvaticum*, *Senecio ovatus*, *Anthriscus sylvestris*, *Digitalis grandiflora*, *Salvia glutinosa*, *Cirsium waldsteinii*, *Angelica sylvestris*, *Equisetum telmateia*, *Carex sylvatica*, *Scrophularia nodosa*, *Symphytum cordatum*, *Calamagrostis arundinacea*, *Aegopodium podagraria*, *Alchemilla mollis*, *Rumex alpinus*, *Hypericum maculatum*, *Circaea lutetiana*, *Cardamine impatiens*, *Euphorbia amygdaloides*, *Hieracium rotundatum*, *Impatiens noli-tangere*.

Conservative value: Natural habitat of community interest.

Management: Prohibition the tree cutting and the storage of the domestic waste, building and forestry exploitation materials on the riverbanks. Disposal of the temporary and exploitation roads which cross through the priority habitats. Prohibition of the extraction of building materials from priority habitats. Improper management of forests and pastures in the vicinity of the site by clearcuttings on large areas and excessive grazing has a negative influence on hydrological regime, by producing of floods, erosions, landslides and alluvial deposit. The long-term floods may lead to the change of stationary conditions, affecting the flora and fauna of the priority habitats.

Monitoring: Monitoring the conservation status of habitat, the specific composition and its evolution. Monitoring of the construction works, rehabilitation roads, which can lead to damage of the area in the vicinity.

Conclusions

Our investigation shows the presence of six forestry habitats that can be found in Siriu Mountains. These habitats are mentioned in Natura 2000 Network, two of them are priority habitats with community interest (9180* *Tilio-Acerion* forests of slopes, screes and ravines, 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*). Although present a good status of conservation, for their long-term protection is necessary the monitoring of specific composition and evolution, and promoting of a conservative management (natural regeneration), avoiding the chemical treatments and clearcuttings.

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