

THE WOODY VEGETATION IN THE MIDDLE STREAM OF THE NIRAJ VALLEY (ROMANIA, MUREȘ COUNTY)

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Abstract: In this paperwork we presented a phytocoenologic study on the woody vegetation of the middle stream of the Niraj valley, part of Natura 2000 Special Protection Area from Romania. The territory is very important in terms of bird species conservation. The study provides a description of the woody vegetation on habitat types. Plant community of six associations was attributed to *Salicetum triandrae*, *Salici-Populetum*, *Carpino-Fagetum*, *Carpino-Quercetum petraeae*, *Genisto tinctoriae-Quercetum petraeae* subass. *melicetosum uniflorae* and *Pruno spinosae-Crataegietum*. One of the six habitat types are of Community Interests and requires designation of Special Areas of Conservation, according to the Habitats Directive.

Keywords: biocoenology, protected area, species conservation, syntaxonomy.

Introduction

The middle stream of the Niraj valley (N46.27117, E24.45289) is part of the Special Protection Area (from Natura 2000 network) named Târnavelor Hills-Niraj Valley and covers an area of 120 km². The territory is situated in the Transylvanian Plateau, in central part of Romania and includes the localities: Acățari, Văleni, Găiești, Suveica, Murgești, Roteni, Gălățeni, Pășăreni, Bolintineni, Troița, Bedeni, Gălești, Adrianu Mic and Adrianu Mare [ORBÁN, 1991] (Fig. 1). The landscape is specific to an intra-Carpathian depression with tectonic nature and plateau features. Altitude varies between 320 and 600 m. The average slope inclination is of 18°, but slow or moderate inclinations are dominating. The depression was filled with marl, argil, sand, intercalation of tuff and sandstone, all arranged in domes and wide cuvettes. The most common rocks are loam and argil. In the river meadow, at the base it can be found gravel and boulder trapped in a sandy mass while in the upper layer sand and mud. The soils are represented by various types. The predominating one is the luvisol, followed by regosol and faeziom. The meadow part of the Niraj valley presents aluviosol and hydromorphic soil [MAC, 1972, JOSAN, 1979, BLAGA & al. 2005]. The study area belongs to the temperate continental climate. The average annual temperature is 8.5 °C. The average annual rainfall is 600 mm. River Niraj rises from the altitude of 1300 m from the volcanic mountains of Gurghiu. Natural course length is 79 km. It flows into the River Mureș near the locality called Ungheni [ÚJVÁRI, 1972]. Settlements in the study area are located on the right side of the River Niraj, and in the valley of the Lucion and Dorman rivulets. Deciduous forests (about 2809 ha) are stationed on the left side of the Niraj river and belong to the Forest Departments from Târgu-Mureș and Ghindari. Floodplain vegetation, which was once represented by

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floodplain forests, is characterized by narrow strips of shrubs and coppices. On the shaded slopes there are present scrubs composed mainly of the formerly forests shrub layer [CSÚRÖS, 1963]. Meadows are used as pastures and hayfields.

The aim of the present study was the identification and characterization of the woody associations, for a better knowledge of the habitats that play an important role in sustaining a large number of endangered bird species. This is the first step in the long-term conservation of these species and their habitats. The study provides a description of the woody vegetation on habitat types, one of the objectives of our doctoral thesis.

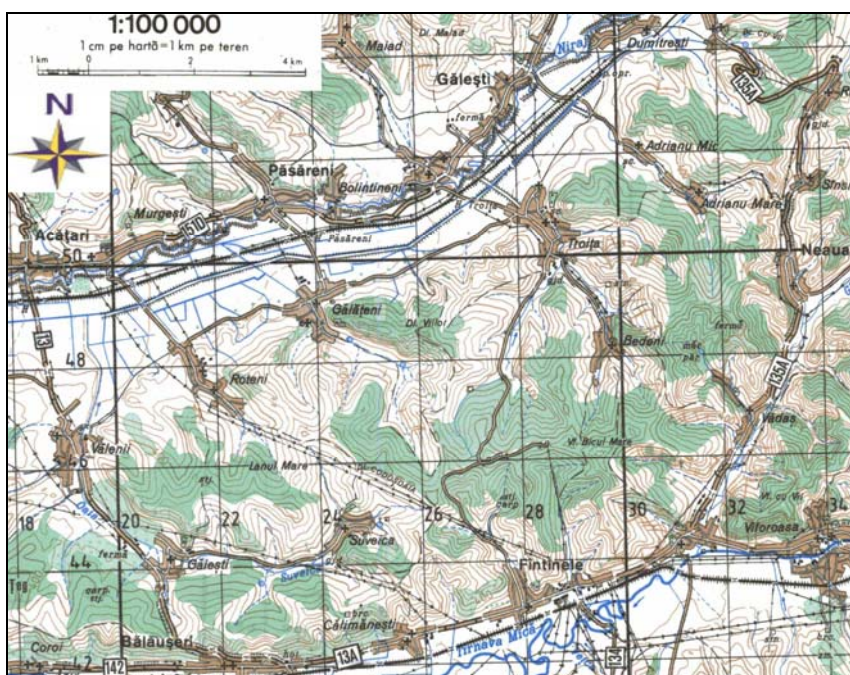


Fig. 1. The middle stream of the Niraj valley-Romania, Mureș County (Military Topographic Directorate, 1997).

Materials and methods

In this study of the woody vegetation, for describing plant communities, we used the phytosociological research method of Central European School, based on the principles and methodology developed by BRAUN-BLANQUET (1964) and adapted by BORZA & BOȘCAIU (1965) to the features of vegetation cover in our country. Phytocoenologic relevés including floristic and physiognomic homogeneous sample surfaces were chosen in the woody vegetation [CRISTEA & al. 2004]. In this sense we conducted field trips during 2011-2012. For the nomenclature of the taxa *Flora ilustrată a României-Pteridophyta et Spermatophyta* [CIOCÂRLAN, 2009] was used. Habitat classification was made according to DONIȚĂ & al. (2005) and GAFTA & MOUNTFORD (2008).

Results

The associations presented in this work have been included in the following phytocoeno-system according to SANDA (2002) and SANDA & al. (2008):

Salicetea purpureae Moor 1958
Salicetalia purpureae Moor 1958
Salicion triandrae Th. Müller et Görs 1958
Salicetum triandrae Malcuit 1929
Salicion albae Soó 1930 em. Th. Müller et Görs 1958
Salici-Populetum Meijer-Drees 1936
Quercus-Fagetum Braun-Blanquet et Vlieger in Vlieger 1937 em. Borhidi 1996
Fagetalia sylvaticae Pawlowski in Pawlowski et al. 1928
Symphyto cordati-Fagion Vida 1959
Lathyro hallersteinii-Carpinenion Boşcaiu et al. 1982
Carpino-Fagetum Paucă 1941
Carpino-Quercetum petraeae Borza 1941
Quercetalia roboris R. Tüxen 1931
Genisto germanicae-Quercion Neuhäusl et Neuhäuslová-Novotná 1964
Genisto tinctoriae-Quercetum petraeae Klika 1932 subass. *melicetosum uniflorae* (Gergely 1962) Sanda et Popescu 1999
Rhamno-Prunetea Rivas Goday et Borja Carbonell 1961
Prunetalia spinosae R. Tüxen 1952
Prunion spinosae Soó 1951
Pruno spinosae-Crataegetum (Soó 1927) Hueck 1931

***Salicetum triandrae* Malcuit 1929**

The association grows in form of a continuous strip along the River Niraj, just above the flowing water or on higher places of the riverbanks. In the *Salicetum triandrae* association 50 vascular plant species were found (Tab. 1). The bush layer has a height of 2 to 8 m. The *Salicetum triandrae* association forms the habitat type: Thickets of willow (*Salix triandra*) (code: R4416), corresponding to Emerald-!44.1 Riparian willow formations, Corine-44.121 Almond willow-osier scrub, Palearctic Habitats 1999-44.121 Almond willow-osier scrub, Eunis-F9.121 Almond willow-osier scrub.

***Salici-Populetum* Meijer-Drees 1936**

This association appears in the form of a narrow band accompanying the upper part of water courses. It forms a dense riverside coppice. Centuries ago vast floodplain forests were instead, edified by *Salix alba*, *S. fragilis*, *Alnus glutinosa*, *Populus alba* and *P. nigra* in the trees level. In the *Salici-Populetum* association 98 vascular plant species were identified (Tab. 1). Trees diameter vary between 30-80 cm and have a height of 18-23 m. The association *Salici-Populetum* Meijer-Drees 1936 (Syn.: *Salicetum albae* Issler 1924 s.l.=*Salicetum albae-fragilis* R. Tüxen 1937) forms the habitat type: Danube forests of White Willow (*Salix alba*) with *Rubus caesius* (code: R4407), corresponding to Natura 2000-92A0 *Salix alba* and *Populus alba* galleries Emerald-!44.66 Ponto-Sarmatic mixed poplar riverine forest, Palearctic Habitats-44162 Pontic willow galleries, Eunis-G1.1142 Ponto-sarmatic steppe willow galleries.

***Carpino-Fagetum* Paucă 1941**

Hornbeam-beech forests from the study area inhabit restricted areas (less than 5% from the study area), the depths of streams and narrow valleys on luvisol. In the *Carpino-Fagetum* association 59 vascular plants were identified (Tab. 2). Age of these forests is between 65 and 110 years. Beech diameter is between 10 and 65 cm, height between 10 and 28 m. Hornbeam diameter is between 20 and 40 cm and height between 15 and 22 m. The association forms the following habitat type: Dacian forests of beech (*Fagus sylvatica*) and hornbeam (*Carpinus betulus*) with *Carex pilosa* (code-R4119). We noted the correspondence with other habitat classification systems: Natura 2000-9130 *Asperulo-Fagetum* beech forests, Emerald-141.2 Beech forests, Corine-, Palearctic Habitats-41.1D22 Dacian hairy sedge beech-hornbeam forests, Eunis-G1.6D22 Dacian hairy sedge beech/hornbeam.

***Carpino-Quercetum petraeae* Borza 1941 (Syn.: *Quercus petraeae-Carpinetum* Soó et Pócs 1957)**

This association evolved from oak forests as a result of oak deforestation. Oak-hornbeam forests from the study area inhabit especially less or moderately inclined slopes on weak acid luvisol. The associations occupy the largest area (about 80%) of the deciduous forest habitats in the middle stream of the Niraj valley. In the sloped valleys or at higher altitudes beech appears which abundance-dominance values can reach from 1 to 3. In the *Carpino-Quercetum petraeae* association 118 vascular plants were identified (Tab. 2). Oak diameter is between 15 and 100 cm and height between 15 and 30 m. Hornbeam diameter is between 5 and 40 cm and height between 5 and 25 m. Age of the oak and hornbeam forests varies between 20 and 135 years. The association *Quercus petraeae-Carpinetum* Soó et Pócs 1957 forms the following habitat type: Dacian forests of sessile oak (*Quercus petraea*), beech (*Fagus sylvatica*) and hornbeam (*Carpinus betulus*) with *Lathyrus hallersteinii* (code: R4124), corresponding to Natura 2000-91 Y0 Dacian oak-hornbeam forests, Emerald-141.2 Oak-hornbeam forests, Corine-, Palearctic Habitats-41.2C12 Dacian *Lathyrus hallersteinii* oak-hornbeam forests, Eunis-G1.A1C1 Dacian oak-hornbeam forests.

***Genisto tinctoriae-Quercetum petraeae* Klika 1932 subass. *melicetosum uniflorae* (Gergely 1962) Sanda et Popescu 1999 (Syn.: *Melico uniflorae-Querceto petraeae* Gergely 1962)**

This subassociation is installed on the crest of the hills or on the upper part of the slopes on luvisol. It is representing about 8% of the deciduous forest habitats from the study area. In the sessile oak forests 75 vascular plants were identified (Tab. 3). Age of these forests is between 95 and 110 years. Sessile oak diameter is between 20 and 70 cm and height between 22 and 28 m. The association *Genisto tinctoriae-Quercetum petraeae* Klika 1932 (Syn.: *Luzulo albidae-Quercetum petraeae* (Hillitzer 1932) Passarge 1953 em. R. et Z. Neuhausl 1967) forms the habitat type: Dacian forests of oak (*Quercus petraea*) and beech (*Fagus sylvatica*) with *Festuca drymeia* (code: R4129), corresponding to Emerald-141.2 Oak-hornbeam forests, Palearctic Habitats-41.7A151. Getic pre-Carpathic *Festuca drymeia* oak forest, Eunis-G1.8713. Pre-Carpathian beech sessile oak forest.

***Pruno spinosae-Crataegetum* (Soó 1927) Hueck 1931**

Prunus spinosa and *Crataegus monogyna* bushes are encountered at the edge of woods, on cleared sites or sunny coasts. In the association 112 species were identified. According to DONIȚĂ & al. (2005) the association forms the habitat type: Ponto Pannonic scrubs of blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*) (Code: R3122), corresponding to Natura 2000-40A0* Subcontinental peri-Pannonic scrub, Emerald-31.8B1 Pannonic and sub-Pannonic thickets, Corine-31.8B3 South-eastern sub-Mediterranean deciduous thickets, Palearctic Habitats-31.8B131 Peri-Pannonic hawthorn-blackthorn scrub, Eunis-F3.241 Central European subcontinental thickets. According to other authors [GAFTA & MOUNTFORD, 2008] the association is not indicated in this habitat type, because the distribution of the association exceeds the Peri-Pannonic area.

Tab. 1. A - *Salicetum triandrae* Malcuit 1929; B - *Salici-Populetum* Meijer-Drees 1936

	A	B	
Number relevés	4	7	
Altitude (m)	320-330	330-350	
Cover tree layer (%)	-	30-60	
Cover shrub layer (%)	95-100	20-70	
Cover herb layer (%)	50-70	30-70	
Surface (m²)	100	400	
	AD	AD	K
<i>Salicion, Salicetalia et Salicetea purpureae</i>			
<i>Salix alba</i>	+1	1-3	V
<i>Salix x rubens</i>	-	+1	V
<i>Populus nigra</i>	-	1-3	V
<i>Salix fragilis</i>	+	1-3	V
<i>Salix triandra</i>	1-5	+1	IV
<i>Salix viminalis</i>	+3	+1	IV
<i>Symphytum officinale</i>	+	+	IV
<i>Populus alba</i>	-	+1	III
<i>Salix purpurea</i> ssp. <i>lambertiana</i>	1	+1	III
<i>Calystegia sepium</i>	+	+	III
<i>Cucubalus baccifer</i>	+	+	III
<i>Saponaria officinalis</i>	+	+	III
<i>Polygonum hydropiper</i>	+	+	I
<i>Alnion glutinosae</i>			
<i>Alnus glutinosa</i>	+	+1	V
<i>Humulus lupulus</i>	+1	1-2	V
<i>Eupatorium cannabinum</i>	+1	+1	IV
<i>Prunion, Prunetalia et Rhamno-Prunetea</i>			
<i>Sambucus nigra</i>	+	+	IV
<i>Corylus avellana</i>	-	+	III
<i>Cornus sanguinea</i>	+	+1	III
<i>Euonymus europaea</i>	-	+	III
<i>Prunus spinosa</i>	-	+	III
<i>Clematis vitalba</i>	+	+1	III
<i>Ligustrum vulgare</i>	-	+	II

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Phragmiti-Magnocaricetea			
<i>Phragmites australis</i>	1-2	1-3	V
<i>Lythrum salicaria</i>	+	+	II
Arrhenatheretalia et Molinio-Arrhenatheretea			
<i>Angelica sylvestris</i>	+	+1	IV
<i>Achillea millefolium</i>	+	+	III
<i>Galium mollugo</i>	-	+	III
<i>Prunella vulgaris</i>	-	+	II
<i>Vicia cracca</i>	+	+	II
<i>Lotus corniculatus</i>	-	+	II
<i>Agrostis stolonifera</i> ssp. <i>stolonifera</i>	+1	-	-
<i>Sonchus arvensis</i> ssp. <i>uliginosus</i>	+	-	-
Festuco-Brometea			
<i>Euphorbia salicifolia</i>	+	+	V
<i>Salvia pratensis</i>	-	+	II
<i>Bromus inermis</i>	+	-	-
Stellarietea mediae			
<i>Galeopsis tetrahit</i>	-	+1	III
<i>Brassica nigra</i>	+	+	III
<i>Capsella bursa-pastoris</i>	-	+	II
Galio-Urticetea			
<i>Urtica dioica</i>	1	+1	IV
<i>Galium aparine</i>	+1	+1	III
<i>Rubus caesius</i>	1-3	2-3	III
<i>Myosoton aquaticum</i>	+	+	I
Artemisietea			
<i>Tanacetum vulgare</i>	+1	+	III
<i>Artemisia vulgaris</i>	+1	+	II
<i>Silene latifolia</i> ssp. <i>alba</i>	+	+	I
Variae syntaxa			
<i>Petasites hybridus</i>	1	+2	V
<i>Echynocystis lobata</i>	+3	1-2	V
<i>Brachypodium sylvaticum</i>	-	+	III
<i>Erigeron acris</i>	-	+	III
<i>Parthenocissus quinquefolia</i>	+	+	III
<i>Fallopia baldschuanica</i>	-	1	II
<i>Carex hirta</i>	-	+	II
<i>Oenothera parviflora</i>	-	+	II
<i>Equisetum telmateia</i>	+	+	II
<i>Dactylis polygama</i>	-	+	II
<i>Aegopodium podagraria</i>	-	+	II
<i>Robinia pseudacacia</i>	+	+	II
<i>Echinochloa crus-galli</i>	-	+1	II
<i>Lamium album</i>	-	+	II
<i>Chelidonium majus</i>	-	+	II
<i>Senecio ovatus</i>	+	+	I
<i>Galeopsis speciosa</i>	+	-	-

Species found in a single relevé:

A. *Xanthium italicum* (4, +), *Mentha longifolia* (4, +), *Mentha arvensis* ssp. *arvensis* (4, +), *Rumex crispus* (4, +), *Elymus repens* (4, +), *Daucus carota* (1, +), *Erigeron annuus* (4, +), *Centaurea nigrescens* (4, +), *Polygonum amphybium* f. *terrestre* (4, +), *Sonchus arvensis* ssp. *arvensis* (4, +).

Place of relevés: 1, 2: Păsăreni; 3, 4: Murgești.

B. *Crataegus monogyna* (4, +), *Acer negundo* (5, +), *Scrophularia scopolii* (1, +), *Actaea spicata* (4, +), *Stellaria nemorum* (4, +), *Ranunculus repens* (1, +), *Cnidium dubium* (4, +), *Carex riparia* (6, +), *Veronica chamaedrys* (1, +), *Taraxacum officinale* (1, +), *Cirsium palustre* (5, +), *Filipendula vulgaris* (5, +), *Lysimachia vulgaris* (5, +), *Arrhenatherum elatius* ssp. *elatius* (5, +), *Centaurea indurata* (5, +), *Senecio doria* (4, +), *Lysimachia nummularia* (7, +), *Mentha aquatica* (7, +), *Chenopodium album* (4, +), *Papaver rhoeas* (5, +), *Glechoma hederacea* (2, +), *Carduus crispus* (4, +), *Barbarea vulgaris* ssp. *vulgaris* (1, +), *Alliaria petiolata* (1, +), *Lapsana communis* (4, +), *Solidago canadensis* (4, +), *Chaerophyllum aromaticum* (5, +), *Solanum nigrum* (6, +), *Carduus acanthoides* (4, +), *Tussilago farfara* (4, +), *Conium maculatum* (4, +), *Ballota nigra* ssp. *nigra* (6, +), *Malva sylvestris* ssp. *sylvestris* (6, +), *Oxalis fontana* (5, +), *Sonchus oleraceus* (5, +), *Rudbeckia laciniata* (5, +), *Fallopia japonica* (5, +), *Rumex sanguineus* (5, +), *Agrimonia eupatoria* (5, +). **Place of relevés:** 1, 3: between Murgești and Păsăreni; 2, 4: between Păsăreni and Bolintineni; 5: near Găleşti; 6, 7: near Dumitrești.

Tab. 2. A - *Carpino-Fagetum* Paucă 1941; **B** - *Carpino-Quercetum petraeae* Borza 1941

Number relevés	A		B	
	AD	K	AD	K
Number relevés	11		88	
Altitude (m)	400-480		420-600	
Exposition	SE; SV		N; NV; NE	
Slope (°)	5-20		5-30	
Cover tree layer (%)	80-90		60-90	
Cover herb layer (%)	5-80		5-90	
Surface (m ²)	400		400	
Lathyro-Carpinion				
<i>Carpinus betulus</i>	+4	V	+4	V
<i>Carex pilosa</i>	+2	V	+3	III
<i>Tilia cordata</i>	-	-	+1	II
<i>Stellaria holostea</i>	+1	II	+3	II
<i>Cerasus avium</i>	-	-	+2	I
<i>Erythronium dens-canis</i>	+	II	+	I
<i>Scilla bifolia</i>	+	II	+1	I
<i>Dactylis polygama</i>	+	I	+2	I
<i>Vinca minor</i>	-	-	+2	I
<i>Dentaria glandulosa</i>	-	-	+2	I
<i>Lathyrus laevigatus</i>	-	-	+	I
Fagetalia				
<i>Fagus sylvatica</i>	3-5	V	+3	II
<i>Dentaria bulbifera</i>	+2	IV	+4	IV
<i>Galeobdolon luteum</i>	+2	V	+3	IV
<i>Pulmonaria officinalis</i>	+	V	+2	III
<i>Euphorbia amygdaloides</i>	+1	IV	+1	III
<i>Galium odoratum</i>	+1	IV	+3	III

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<i>Carex sylvatica</i>	+1	IV	+1	II
<i>Asarum europaeum</i>	+3	IV	+2	II
<i>Rubus caesius</i>	+	III	+1	II
<i>Lathyrus vernus</i>	+	III	+	I
<i>Polygonatum multiflorum</i>	+	II	+1	II
<i>Acer pseudoplatanus</i>	+1	II	+	I
<i>Anemone nemorosa</i>	+1	I	+3	IV
<i>Dryopteris filix-mas</i>	+	I	+1	II
<i>Athyrium filix-femina</i>	+	I	+	II
<i>Sanicula europaea</i>	+	I	+	I
<i>Maianthemum bifolium</i>	+	I	+	I
<i>Salvia glutinosa</i>	+	I	+1	I
<i>Stachys sylvatica</i>	+	I	+1	I
<i>Fragaria vesca</i>	+	I	+	I
<i>Geranium robertianum</i>	+	I	+1	I
<i>Alliaria petiolata</i>	+	I	+1	I
<i>Circaea lutetiana</i>	-	-	+	II
<i>Anemone ranunculoides</i>	-	-	+1	II
<i>Scrophularia nodosa</i>	-	-	+1	II
<i>Helleborus purpurascens</i>	-	-	+	I
<i>Isopyrum thalictroides</i>	-	-	+	I
<i>Lilium martagon</i>	-	-	+	I
<i>Carex divulsa</i>	-	-	+	I
<i>Rubus hirtus</i>	-	-	+	I
<i>Arum maculatum</i>	-	-	+1	I
<i>Cystopteris fragilis</i>	-	-	+	I
Quercus-Fagetea				
<i>Quercus petraea</i>	+1	IV	+4	V
<i>Viola reichenbachiana</i>	+	V	+2	V
<i>Geum urbanum</i>	+	III	+	II
<i>Mycelis muralis</i>	+	I	+	II
<i>Brachypodium sylvaticum</i>	+1	III	+1	II
<i>Sambucus nigra</i>	+	I	+	II
<i>Rosa canina</i>	+	III	+	II
<i>Convallaria majalis</i>	+	I	+1	II
<i>Populus tremula</i>	-	-	+2	I
<i>Acer campestre</i>	-	-	+2	I
<i>Quercus robur</i>	-	-	+1	I
<i>Crataegus monogyna</i>	-	-	+1	I
<i>Corylus avellana</i>	+	I	+1	I
<i>Clematis vitalba</i>	+	II	+	I
<i>Ligustrum vulgare</i>	-	-	+	I
<i>Polygonatum latifolium</i>	+1	III	+1	I
<i>Ulmus minor</i>	-	-	+	I
<i>Galium schultesii</i>	+	I	+	I
<i>Hedera helix</i>	+	I	+	I
<i>Neottia nidus-avis</i>	+	II	+	I

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<i>Lapsana communis</i>	+	I	+	I
<i>Euonymus europaea</i>	-	-	+	I
<i>Poa nemoralis</i>	-	-	+	I
<i>Hypericum perforatum</i>	-	-	+	I
<i>Aegopodium podagraria</i>	+	II	+1	I
<i>Prunus spinosa</i>	-	-	+	I
<i>Melica nutans</i>	-	-	+	I
<i>Euonymus verrucosa</i>	+	I	+	I
<i>Ranunculus ficaria</i>	-	-	+3	I
<i>Lathyrus niger</i>	+	I	+	I
<i>Vicia dumetorum</i>	-	-	+	I
<i>Ranunculus auricomus</i>	+	I	+	I
<i>Staphylea pinnata</i>	+	I	+	I
<i>Symphytum tuberosum</i>	+	I	+	I
<i>Campanula rapunculoides</i>	+	I	+	I
<i>Acer pseudoplatanus</i>	1	I	-	-
Quercion, Quercetalia et Quercetea pubescentis				
<i>Melica uniflora</i>	+	I	+2	II
<i>Sorbus torminalis</i>	-	-	+	I
<i>Melittis melisophyllum</i>	+	I	+	I
<i>Cephalanthera damasonium</i>	-	-	+	I
<i>Polygonatum odoratum</i>	-	-	+	I
<i>Vincetoxicum hirundinaria</i>	-	-	+	I
<i>Tanacetum corymbosum</i>	-	-	+	I
<i>Carex montana</i>	-	-	+	I
Arrhenatheretalia et Molinio-Arrhenatheretea				
<i>Ajuga reptans</i>	+1	V	+1	III
<i>Prunella vulgaris</i>	-	-	+	I
<i>Lysimachia nummularia</i>	+	I	+	I
<i>Campanula patula</i>	-	-	+	I
<i>Veronica chamaedrys</i>	+	I	+	I
<i>Anthriscus sylvestris</i>	-	-	+	I
Variae syntaxa				
<i>Galeopsis bifida</i>	-	-	+2	II
<i>Fallopia dumetorum</i>	-	-	+	II
<i>Juncus effusus</i>	-	-	+	I
<i>Erigeron acris</i>	-	-	+	I
<i>Urtica dioica</i>	-	-	+	I
<i>Galium aparine</i>	-	-	+	I
<i>Stellaria alsine</i>	-	-	+	I
<i>Chelidonium majus</i>	-	-	+	I
<i>Oxalis fontana</i>	-	-	+	I
<i>Torilis japonica</i>	-	-	+	I
<i>Veronica officinalis</i>	-	-	+	I

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Species found in a single relevé:

A. *Campanula trachelium* (11, +), *Holcus lanatus* (11, +). **Place of relevés:** 1-3, 5-11: Fântânele; 4-Capu Fagului-Fântânele.

B., *Lathyrus hallersteinii* (8, +), *Milium effusum* (10, +), *Crocus vernus* (16, +), *Mercurialis perennis* (11, 2), *Paris quadrifolia* (12, +), *Campanula persicifolia* (14, +), *Viola odorata* (16, +), *Platanthera bifolia* (17, +), *Atropa bella-donna* (18, +), *Myosoton aquaticum* (19, +), *Robinia pseudacacia* (20, +), *Chenopodium album* (21, +), *Galinsoga parviflora* (22, +), *Juglans regia* (23, +), *Leucanthemum vulgare* (24, +). **Place of relevés:** 1-3: Păsăreni; 4, 75-79: Bedeni; 5, 8, 10-18: Roteni; 6-9: Văleni; 19-39, 82-88: La Săgeata-Adrianu Mare; 40-45: Găiești; 46, 47: Șanț-Suveica; 48-59, 80, 81: Troița; 60-63: Dumitreștilor-Adrianu Mic; 64: Neaua; 65-74: Fântânele.

Tab. 3. A - *Genisto tinctoriae-Quercetum petraeae* Klika 1932 subass. *melicetosum uniflorae* (Gergely 1962) Sanda et Popescu 1999; **B** - *Pruno spinosae-Crataegetum* (Soó 1927) Hueck 1931

	A		B	
Number relevés	12		14	
Altitude (m)	459-550		387-480	
Exposition	N; NE		N; NV	
Slope (°)	5-20		5-30	
Cover tree layer (%)	60-70		-	
Cover shrub layer (%)	0-0,5		60-90	
Cover herb layer (%)	40-90		5-40	
Surface (m²)	400		50	
	AD	K	AD	K
Genisto germanicae-Quercion				
<i>Lathyrus niger</i>	+1	V	-	-
<i>Trifolium medium</i> ssp. <i>medium</i>	+	II	+	II
Lathyro-Carpinion				
<i>Carpinus betulus</i>	+1	V	+	I
<i>Stellaria holostea</i>	+2	V	-	-
<i>Carex pilosa</i>	+1	IV	+	II
<i>Dactylis polygama</i>	+	II		
<i>Cerasus avium</i>	+	I	+	II
Fagetalia				
<i>Euphorbia amygdaloides</i>	+	V	+	I
<i>Galeobdolon luteum</i>	+2	V	-	-
<i>Galium odoratum</i>	+	IV	-	-
<i>Ajuga reptans</i>	+	IV	-	-
<i>Alliaria petiolata</i>	+	IV	+	I
<i>Dentaria bulbifera</i>	+1	III	-	-
<i>Lathyrus vernus</i>	+	III	+	I
<i>Pulmonaria officinalis</i>	+	III	+	I
<i>Carex sylvatica</i>	+	III	-	-
<i>Circaea lutetiana</i>	+	II	-	-
<i>Anemone nemorosa</i>	+	II	-	-
<i>Stachys sylvatica</i>	+	II	-	-
<i>Geranium robertianum</i>	+	II	+	I

Quercus-Fagetea				
<i>Viola reichenbachiana</i>	+1	V	+	II
<i>Convallaria majalis</i>	+1	IV	-	-
<i>Acer campestre</i>	+	III	+	II
<i>Galium schultesii</i>	+2	III	-	-
<i>Polygonatum latifolium</i>	+	III	+	I
<i>Brachypodium sylvaticum</i>	+1	III	+2	IV
<i>Mycelis muralis</i>	+	III	-	-
<i>Rosa canina</i>	+	II	+2	V
<i>Geum urbanum</i>	+	II	-	-
<i>Campanula rapunculoides</i>	+	I	+	II
<i>Sedum maximum</i>	+	I	-	-
<i>Quercus robur</i>	+	I	+	I
Quercetalia et Quercetea pubescentis				
<i>Melica uniflora</i>	2-4	V	-	-
<i>Quercus petraea</i>	4	V	+	I
<i>Melittis melissophyllum</i>	+	II	-	-
<i>Vincetoxicum hirundinaceum</i>	+	II	-	-
<i>Pyrus pyraster</i>	+	I	+	II
<i>Coronilla varia</i>	+	I	+	I
Prunion, Prunetalia, Rhamno-Prunetea				
<i>Crataegus monogyna</i>	+	I	2-4	V
<i>Prunus spinosa</i>	+	I	1-4	V
<i>Ligustrum vulgare</i>	+	II	+1	IV
<i>Cornus sanguinea</i>	+	I	+2	IV
<i>Clematis vitalba</i>	+	III	+1	IV
<i>Glechoma hederacea</i>	-	-	+	III
<i>Origanum vulgare</i>	-	-	+1	III
<i>Rubus caesius</i>	+1	III	+1	III
<i>Fragaria vesca</i>	+	I	+	III
<i>Viburnum opulus</i>	-	-	+	II
<i>Sambucus nigra</i>	+	I	+	II
<i>Hypericum perforatum</i>	+	I	+	II
<i>Euonymus europaea</i>	+	II	+	II
<i>Euonymus verrucosa</i>	-	-	+2	II
<i>Astragalus glycyphyllos</i>	+	I	+	I
Festuco-Brometea				
<i>Agrimonia eupatoria</i>	+	I	+	IV
<i>Euphorbia cyparissias</i>	+	I	+1	III
<i>Dorycnium herbaceum</i>	-	-	+1	III
<i>Galium verum</i>	-	-	+1	II
<i>Filipendula vulgaris</i>	-	-	+1	II
<i>Salvia pratensis</i>	-	-	+	II
<i>Scabiosa ochroleuca</i>	-	-	+	II
<i>Euphorbia salicifolia</i>	-	-	+	II
<i>Pimpinella saxifraga</i>	-	-	+	I

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<i>Salvia verticillata</i>	-	-	+	I
Arrhenatheretalia et Molinio-Arrhenatheretea				
<i>Achillea millefolium</i>	-	-	+1	III
<i>Prunella vulgaris</i>	+	I	+	III
<i>Agrostis capillaris</i>	-	-	+	II
<i>Mentha longifolia</i>	-	-	+	II
<i>Galium mollugo</i>	-	-	+	II
<i>Leucanthemum vulgare</i>	-	-	+	II
<i>Knautia arvensis</i>	-	-	+	I
<i>Juncus effusus</i>	-	-	+	I
<i>Stellaria graminea</i>	-	-	+	I
<i>Campanula patula</i>	-	-	+	I
<i>Briza media</i>	-	-	+	I
<i>Dactylis glomerata</i>	-	-	+1	I
Artemisietea vulgaris				
<i>Dipsacus laciniatus</i>	-	-	+1	I
<i>Tanacetum vulgare</i>	-	-	+	I
<i>Galium aparine</i>	+	I	-	-
Stellarietea mediae				
<i>Equisetum arvense</i>	-	-	+	I
<i>Mentha arvensis</i>	-	-	+	I
Variae syntaxa				
<i>Galeopsis bifida</i>	+1	IV	-	-
<i>Fallopia dumetorum</i>	+	IV	-	-
<i>Torilis japonica</i>	+	II	-	-
<i>Erigeron acris</i>	+	I	+	I
<i>Aegopodium podagraria</i>	-	-	+	II
<i>Pulicaria dysenterica</i>	-	-	+	I
<i>Bupleurum falcatum</i> var. <i>falcatum</i>	-	-	+	II
<i>Centaurea stenolepis</i> ssp. <i>stenolepis</i>	-	-	+	I

Species found in a single relevé:

A. *Tilia cordata* (4, +), *Polygonatum multiflorum* (6, +), *Salvia glutinosa* (5, +), *Rubus idaeus* (3, +), *Milium effusum* (8, +), *Dryopteris filix-mas* (4, +), *Carex divulsa* ssp. *chabertii* (6, +), *Lapsana communis* (4, +), *Acer pseudoplatanus* (4, +), *Sorbus torminalis* (3, +), *Scrophularia nodosa* (5, +), *Poa nemoralis* (6, +), *Polygonatum odoratum* (3, +), *Lithospermum purpureocaeruleum* (2, +), *Lathyrus laevigatus* (3, +), *Stellaria nemorum* (10, +), *Anthriscus sylvestris* (10, +), *Inula britannica* (9, +). **Place of relevés:** 1, 2, 5-7, 9, 10, 12: Troița; 3, 11: Dealu de Mijloc-Troița; 4, 8: Fântânele.

B. *Malus sylvestris* (2, +), *Acer platanoides* (11, +), *Fagus sylvatica* (8, +), *Ranunculus auricomus* (8, +), *Festuca rupicola* ssp. *rupicola* (8, +), *Eryngium campestre* (14, +), *Carlina vulgaris* (14, +), *Fragaria viridis* (3, +), *Medicago falcata* (11, +), *Potentilla recta* (2, +) *Potentilla argentea* ssp. *argentea* (2, +), *Thymus glabrescens* (2, 1), *Helianthemum canum* (2, +), *Hieracium pilosella* (2, +), *Bromus erectus* ssp. *erectus* (10, +), *Cerinthe minor* ssp. *minor* (3, +), *Cytisus nigricans* (8, +), *Poa pratensis* (14, +), *Ononis arvensis* (14, +), *Colchicum autumnale* (13, 1), *Leontodon hispidus* (14, +), *Pastinaca sativa* ssp. *sylvatica* (13, +), *Lychnis flos-cuculi* (2, +), *Veronica chamaedrys* (2, +), *Stachys officinalis* (3, +), *Lysimachia nummularia* (3, +), *Rumex crispus* (12, +), *Carex tomentosa* (8, +), *Holcus lanatus* (14, +), *Tragopogon orientalis* (7, +), *Calamagrostis epigejos* (8, +), *Carduus acanthoides* (2, +), *Elymus repens* (10, +), *Linaria vulgaris* (12, +), *Cirsium arvense* (13, +), *Adonis*

aestivalis (2, +), *Anagallis arvensis* (3, +), *Lathyrus aphaca* (3, +), *Sambucus ebulus* (11, +), *Daucus carota* (4, +), *Scabiosa argentea* (12, +), *Mentha pulegium* (14, +), *Myosotis arvensis* (3, +), *Eryngium planum* (8, +), *Verbascum nigrum* ssp. *nigrum* (8, +), *Clinopodium vulgare* (10, +), *Veronica officinalis* (10, +). **Place of relevés:** 1, 2, 13, 14: Dealul Tolugheț-Bedeni; 3-between Găiești and Suveica; 4-Dealul Ou-Găiești; 5-between Bălăușeri and Suveica; 6-8: Dealul Gorjat-Gălățeni; 9-near Fântânele; 10-Capu Fagului-Fântânele.

Discussions

In the middle stream of the Niraj valley one of the six encountered habitat types is of Community Interest, the conservation of which requires the designation of Special Areas of Conservation, according to the Habitats Directive: R4407-Danube forests of white willow (*Salix alba*) with *Rubus caesius*. Regarding the capacity of sustaining the avifauna, the deciduous forest habitats are the most important from the studied habitats. Unfortunately forests had suffered serious damages in the past decades till 2008. Because of intensive grazing in the forest, deforestation and exploitation of timber, hornbeam proliferated in these forests excessively. The studied habitats give shelter for a considerably number of jeopardized, rare and vulnerable species: *Dentaria glandulosa* (Carpathian Endemism); species registered on the Romanian Red List [OLTEAN & al. 1994] – *Neottia nidus-avis*, *Platanthera bifolia* (rare), *Cephalanthera damasonium* (not threatened), *Lilium martagon* (rare); species with peculiar areal of distribution – *Lathyrus hallersteinii*, *Crocus vernus* (Carpathian-Balkan), *Helleborus purpurascens* (Daco-Balkan), *Centaurea indurata* (Dacic); species in the category of threat for entire Carpathians [WITKOWSKI & al. 2003] with vulnerable status-*Erythronium dens-canis*, *Adonis aestivalis*; IUCN Red List of Threatened Species – *Alnus glutinosa*. From this reason they must be protected from any exploitation. The blackthorn and hawthorn scrubs together with agricultural lands are important bird feeding habitats and nesting habitats. All of the studied associations contribute to habitat heterogeneity and promote species diversity.

Conclusions

In the middle stream of the Niraj valley six forestry associations were revealed: *Salicetum triandrae* Malcuit 1929, *Salici-Populetum* Meijer-Drees 1936, *Carpino-Fagetum* Paucă 1941, *Carpino-Quercetum petraeae* Borza 1941, *Genisto tinctoriae-Quercetum petraeae* subass. *melicetosum uniflorae* (Gergely 1962) Sanda et Popescu 1999 and *Pruno spinosae-Crataegetum* (Soó 1927) Hueck 1931. The description of the forestry vegetation was made on habitat types, based on the latest international regulations. The studied habitats give shelter for a considerably number of jeopardized, rare and vulnerable plant species. The results provide us information in establishing a viable and applicable management plan for the existing Special Protection Area.

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