

## 1.2. VEGETATION DESCRIPTION OF REPRESENTATIVE HABITAT COMPLEXES ALONG THE MAROS (MURES) RIVER I. THE UPPER SECTION (VASLÁB/VOSLOBENI)

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### 1.2.1. INTRODUCTION

East and Central European rivers and related habitats play an important role in maintaining the biological diversity of the biogeographical regions, not only because of their corridor function, but being rich core areas of ecological networks (Gallé *et al.* 1995, IUCN 1995). European policy toward flood control is being revised, and provides major opportunities toward nature development or restoration (PEBLDS, 1996). Detailed identification and description of still existing natural or semi natural habitat complexes is necessary to planning conservation strategies, or restoration programs of deteriorated riverine habitats.

The Maros River with its 768 km length is the most important tributary of the Tisza River. It crosses several relief features with varying lithological structures and its valley include several various habitat complexes with rich flora, fauna and diverse vegetation. This study is the first piece of a series dealing with the most important natural habitat complexes representing the whole river valley.

Since 1991 Hungarian and Rumanian non-governmental organizations has started interdisciplinary research to assess the common river's environmental condition (Hamar and Sárkány-Kiss, 1995). On the base of this pilot research representative, and highly natural areas has been selected for more detailed scientific investigations. This paper describes the riverine vegetation of the Giurgeu (Gyergyói) basin related to the upper segment of Maros River.

Dragulescu (1995) presents an enumeration of the flora and vegetation of Mures river valley. He refers 1846 taxa of plants, 174 plant associations, and points out, that the Maros valley is now moderately degraded by human activity. The rate of degradation increases from the springs to the river mouth. The peat bogs and swamps on the upper river section (in the Giurgeu (Gyergyói) basin) must be protected and preserved by all means for their floristic,-phytocoenologic and landscape values.

### 1.2.2. GEOGRAPHICAL FEATURES OF THE STUDY AREA

The spring of the river is at 856 m above sea level, than the river steps in a large, poorly drained quaternary subsidence zone, surrounded by a mountain area built of silicate metamorphic rocks on the right valley slope, and volcanic, andesitic rocks on the left slope (Jakab, 1995). A considerable part of the active flood plain is covered by a thick organic matter layer, partly transformed into peat or peaty soil. Their existence is due to a permanent water supply from several left side mountain stream affluents, that maintain a high groundwater level (Jakab, 1995).

### 1.2.3. MATERIALS AND METHODS

The study area is situated south from Vasláb (Voslobeni) village. The Maros is narrow and shallow here, at 12 km from its spring. Some other small streams flows through an (about 6 km<sup>2</sup>) highly natural area, with two peat bog patches, swamps, mown meadows and pastures. The lower edge of the mountain spruce forest is the border of the riverine habitat.

Cenological relevés were made in representative stands of the seven main habitat types. The percent cover of each plant species were recorded in 5x5 m quadrates, altogether 31 such relevés were evaluated and analysed by principal component analysis (SynTax program package by Podani, 1993). The nomenclature and identification of plant associations are according to Borhidi and Sánta (1999) and Sanda *et al.* (1980).

The spatial pattern of habitats were sampled by two transects, 3 km long each, running from the river bank to the foot of the mountain. Along this transect the border of different plant associations were recorded.

Table 1. Spatial arrangement of plant associations along the first transect running from the Maros to the foot of the mountain.

Zone	Plant associations	width (m)	Distance from the Maros (m)
	Maros River		0
Wetland	<i>Salicetum albae - fragilis</i>	5	5
Wetland	<i>Carici flavae - Eriophoretum</i>	100	105
Meadow	<i>Agrostio-Deschampsietum caespitosae</i>	120	225
Wetland	<i>Scirpetum sylvatici</i>	20	245
Wetland	<i>Caricetum rostratae</i>	100	345
Wetland	<i>Molinietum (Trollius europaeus facies)</i>	60	405
Wetland	<i>Salicetum cinereae - Sphagnaetum</i>	90	495
Wetland	<i>Carici rostratae - Sphagnaetum (Picea excelsa)</i>	30	525
Wetland	<i>Piceaetum x Betuletum x Phragmitetum</i>	90	615
Wetland	<i>Caricetum paniculatae (Picea excelsa)</i>	60	675
Wetland	<i>Molinietum (Picea excelsa)</i>	100	775
Wetland	<i>Betulo pubescenti - Sphagnetum</i>	40	815
Wetland	<i>Alnetum incanae</i>	20	835
Wetland	<i>Filipendulo-Geraniatum palustris</i>	30	865
Meadow	<i>Succiso - Molinietum</i>	440	1305
Meadow	<i>Alnetum incanae - spiraeaetosum salicifoliae</i>	3	1308
Meadow	<i>Molinietum coeruleae deschampsietosum</i>	680	1988
Meadow	<i>Agrostio - Deschampsietum festucetosum rubrae</i>	350	2338
Meadow	<i>Juncetum conglomerati - effusii</i>	300	2638
Meadow	<i>Juncetum X Eriophoretum</i>	60	2698
Transitional	<i>Nardo - Festucetum rubrae</i>	40	2738
Transitional	<i>Juncetum conglomerati - effusii</i>	60	2798
Transitional	<i>Nardo - Festucetum rubrae</i>	30	2828
Transitional	<i>Juncetum conglomerati - effusii</i>	50	2878
Transitional	<i>Nardo - Festucetum rubrae</i>	70	2948
Dry pasture	<i>Agrostio - Deschampsietum festucetosum rubrae</i>	50	2998
Dry pasture	<i>Agrostio-Festucetum rubrae</i>	300	3298
Forest	<i>Vaccinio - Piceaetum</i>	~	

## 1.2.4. RESULTS

### 1.2.4.1. Characterisation of main habitat types

#### 1.2.4.1.1. Peat bog (*Carici stellulatae (echinatae)-Sphagnetum*, *Carici rostratae - Sphagnetum*, and *Carici flavae-Eriophoretum*)

There are two, about 60 m diameter peat bog patches on the area. In the central part of the bog the peat moss layer is thick under the sparse spruce tree stand. The percent cover of the peat moss (*Sphagnum recurvum*, *Sph. teres*, *Sph. platyphyllum*) is 70-80%. The habitat is very patchy, the recorded three plant associations form a rather small scale mosaic. In *Carici stellulatae (echinatae)-Sphagnetum*, and *Carici rostratae - Sphagnetum* association the dominant species is the *Carex rostrata*. Other typical species with 5-10% cover are *Betula pendula*, *Betula pubescens*, *Ligularia sibirica*, *Drosera rotundifolia*, *Selinum carvifolia*, *Valeriana simplicifolia*. Here occurs the rare *Pedicularis sceptrum-carolinum*. The central sparse spruce stand is surrounded by *Salix cinerea* and *Alnus incana* shrub. The *Carici flavae-Eriophoretum* association has similar species composition, but the dominant species is *Eriophorum latifolium*.

#### 1.2.4.1.2. Sedge meadow (*Caricetum rostratae*)

The stand is dominated by *Carex* species. Occurrence of trees and shrubs (*Betula pubescens*, *Salix cinerea*, *Salix pentandra*) is typical, sometimes only on the grass layer. The following *Molinion* and *Caricion* species belongs to this habitat: *Ligularia sibirica*, *Polygonum bistorta*, *Trollius europaeus*, *Parnassia palustris*, *Eriophorum latifolium*, *Cirsium rivulare*. The moss layer is rich, *Sphagnum* species occurs as well. *Polemonium coeruleum* population is a particular natural value of the habitat. *Filipendula ulmaria*, and *Geranium palustre* are common with the next habitat.

#### 1.2.4.1.3. Flowery mire (*Filipendulo-Geranium palustris*)

Not very species rich (17-20 species on 5x5 m), but very nice colourful association with colourful (yellow, red, white) flowers. The typical name giving species are *Filipendula ulmaria*, and *Geranium palustre*, *Carex elata* forms big tussocks. Other characteristic species: *Senecio palludosus*, *Lysimachia vulgaris*, *Lythrum salicaria*, *Selinum carvifolia*. Particular value is *Spirea salicifolia*

#### 1.2.4.1.4. Rush meadow (*Caricetum flavae juncosum subnodulosi*)

*Juncus subnodulosus* is the dominant species. Several sedge species are characteristic and codominant as well (*Carex flava*, *C. leporina*, *C. buxbaumii*, *C. panicea*, *C. stellulata (=echinata)*). This stand is rich in *Molinion* element, such as *Trollius europaeus*, *Veratrum album*, *Geum rivale*, *Filipendula ulmaria*, *Achillea ptarmica*, *Gladiolus imbricatus*, *Valeriana dioica*, *Serratula tinctoria*, *Succisa pratensis*, *Selinum carvifolium*.

#### 1.2.4.1.5. Moor meadows (*Molinietum coeruleae*)

This grassland has a great extent in the studied area, their stands are diverse and species rich. *Molinia coerulea* is the dominant grass species, *Succisa pratensis*, *Carex hartmanii*, *C. stellulata*, *C. panicea*, *C. flava*, *Juncus conglomeratus*, *Salix rosmarinifolia*, *Potentilla erecta*, *Genista tinctoria* are the most frequent and characteristic species. Owing

*Potentilla erecta*, *Genista tinctoria* are the most frequent and characteristic species. Owing to higher grazing pressure *Agrostis stolonifera*, *Deschampsia caespitosa*, and *Nardus stricta* may overgrow *Molinia coerulea*. Several *Molinion* element occurs: *Achillea ptarmica*, *Serratula tinctoria*, *Iris sibirica*, *Gladiolus imbricatus*, *Dianthus superbus*, *Dactyloriza majalis*, *Gentiana pneumonanthe*, *Trollius europaeus*, *Veratrum album*.

#### 1.2.4.1.6. Wet pasture (*Agrostio - Deschampsietum caespitosae*)

Perhaps grazing played important role in developing this grassland. The name giving species are dominant, also abundant species are *Potentilla erecta*, *Genista tinctoria*, *Ranunculus acris*. several *Molinion* species survive the grazing pressure: *Carex flava*, *Achillea ptarmica*, *Salix cinerea*, *S. pentandra*, *S. rosmarinifolia*, *Serratula tinctoria*. The species of dryer mountain meadows occurs frequently: *Betonica officinalis*, *Alchemilla vulgaris*, *Briza media*, *Festuca rubra*, *Nardus stricta*. There are different transitional stands to the direction of *Agrostio - Festucetum rubrae*.

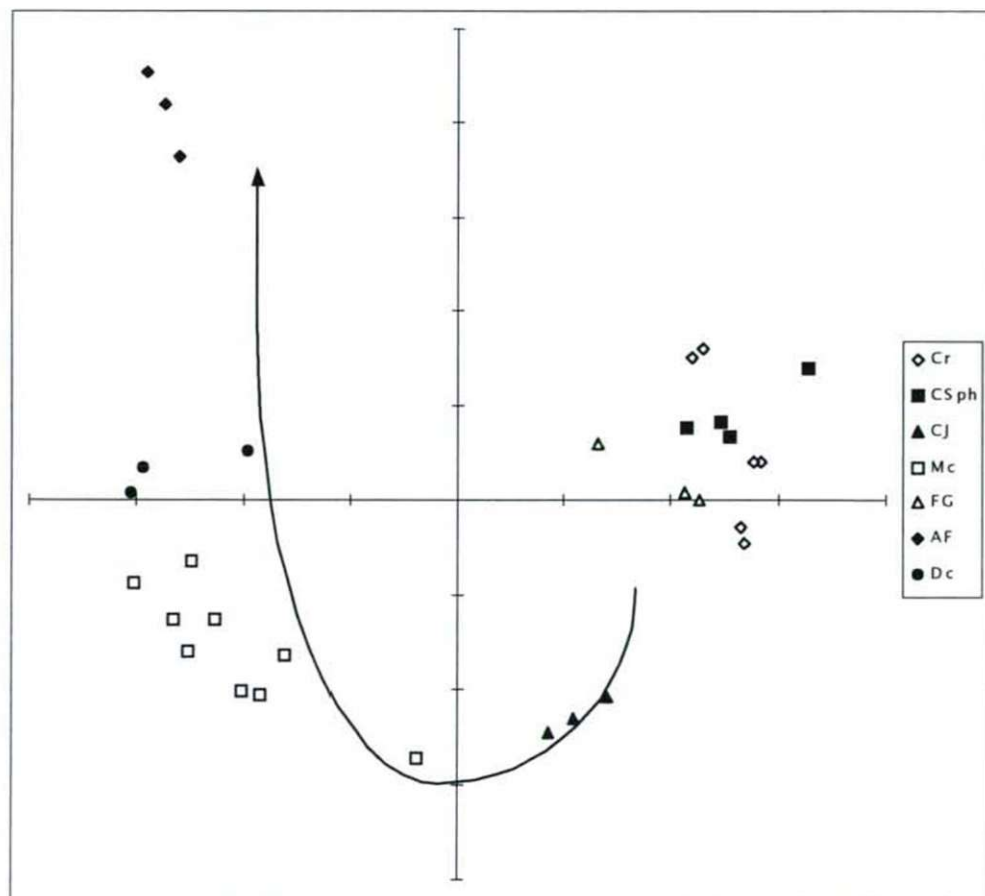


Fig. 1. Principal coordinate analysis of the relevés according to the floristic composition (using Jaccard index). The groups of points, representing the same associations are settled along a line running from wet areas to the

dryer places (see the arrow). Abbreviations: *Carici stellulatae* and *rostratae-Sphagnetum* (Csph), *Caricetum rostratae* (Cr), *Filipendulo-Geranium palustris* (FG), *Caricetum flavae juncosum subnodulosi* (CJ), *Molinietum coeruleae* (Mc), *Agrostio - Deschampsietum caespitosae* (Dc), *Agrostio - Festucetum rubrae* (AF).

#### 1.2.4.1.7. Dry pasture (*Agrostio - Festucetum rubrae*)

This is the most species rich habitat type, 35-37 species are within 5x5 m. Very nice mountain meadow with full of flowers. It occurs at the foot of mountains, under sparse spruce stands and on hills, emerging from the moor meadow zone. *Agrostis tenuis* and *Festuca rubra* are dominants, *Achillea millefolium*, *Briza media*, *Centaurea phrygia*, *C. scabiosa*, *Rhynanthus minor*, *Phleum pratense*, *Leontodon autumnalis* are also frequent and abundant. Such species of the mesophyllous mountain meadows as *Anthoxanthum odoratum*, *Cynosurus cristatus*, *Knautia arvensis*, *Pimpinella saxifraga*, *Gentianella lutescens*, *Campanula patula*, *Helianthemum nummularium*, *Thymus pulegoides*, *Anthyllis vulneraria*, *Trifolium spp.* belong to this habitat type.

#### 1.2.4.2. Similarity analysis of habitat categories (Fig.1.)

The relevés are settled along a line from wetlands to dryer habitats. Three main groups are formed: (1) wetlands, characterised mainly by *Carex* species. *Carici stellulatae* and *rostratae-Sphagnetum* (Csph), *Caricetum rostratae* (Cr), and *Filipendulo-Geranium palustris* (FG) relevés belong to this group, (2) meadows, dominated by purple moor-grass *Molinietum coeruleae* (Mc), and (3) dry pasture *Agrostio - Festucetum rubrae* (AF). *Caricetum flavae juncosum subnodulosi* (CJ) association has in transitional position between the wetland and meadow groups. *Agrostio - Deschampsietum caespitosae* (Dc) relevés are transitional as well between the meadow and dry pasture groups.

#### 1.2.4.3. Spatial pattern of habitat categories

The distance of the centre of the two peat bog patches from the Maros river are 600 and 1000 m. The diameter of the wetland area is about 600 m. Inside this area the vegetation is very diverse, the identified 11 associations form a mosaic like pattern with an average of 50 to 100 m patch diameter. In the meadow zone the patches are larger, cover about 200 to 300 m sections along the transect. Only the *Nardo-Festucetum rubrae* and *Juncetum conglomerati-effusi* patches alternate by 30 to 50 m within this zone. The meadow zone is the widest, 2200 and 1400 m along the first and second transect respectively. It is situated between the wetland patches and the foot of the mountains.

### 1.2.5. DISCUSSION

The studied habitat complex is a special riverine area. The Maros river is not unambiguously the axis of the valley, but together with the other streams a fan shape network develops. The streams provide a permanent water supply for developing of peat bogs and related wetlands. The words bog, fen, moor, swamp, mire indicates different types of special wetlands and meadows, but the scientific classification and public name does not meet unambiguously. Classification of such wetlands is possible according to their origin, morphology, structure, hydrology, nutrient content and vegetation. Lájér (1996) suggested a classification, regarding all of the above considerations. His 1.1.3. topogen,

flood plain fen category fits rather good to the studied habitats, where the water dynamic of the river drive the development of the vegetation. Such type of wetlands are very rare in Hungary, for most of them have been drained, and converted into agricultural fields. This study shows what kind of natural values have been lost because of drainage and river regulation.

The selected seven habitats represents well the whole habitat complex ranging from the peat bog to the dry pasture. The spatial pattern investigation and the multivariate analysis of relevés correlates rather well. The three habitat groups separated by principal component analysis have different spatial locations as well. The most possible background factor of habitat group differences is the water content of the soil, which mainly depends on the micro or meso relief differences.

The vegetation of studied area is very rich and divers. Most of the plant species are natural, very few weeds and disturbance indicator species occurs in this area. The structure and pattern of plant associations seems to be undisturbed as well. The present human use of the grasslands, that is moderate grazing and mowing, do not endanger considerably the natural values.

#### 1.2.6. SUMMARY

Habitat complexes along the river valleys are important elements of ecological networks. Preservation of remained riverine natural habitats deserves special attention. The aim of this study is identification and description of representative habitat complexes along the most important tributary of the Tisza River. The first selected area is in the Giurgeu (Gyergyói) basin. This paper gives cenological description of seven representative habitats of this area, and reveal their spatial pattern by transect method. The several different vegetation types can be grouped into three groups according to their floristic composition and spatial arrangement as well: wetland area (mainly *Carici stellulatae* and *rostratae-Sphagnetum*, *Caricetum rostratae*, *Caricetum flavae juncosum subnodulosi*, and *Filipendulo-Geranium palustris*), meadow zone (*Molinietum coeruleae* and *Agrostio - Deschampsietum caespitosae*), and dry pasture *Agrostio - Festucetum rubrae*.

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