

## The world of old oxbowlakes, ancient riverine forests and drained mires in the Tisza river basin

(International excursion to Eastern Hungary and Transcarpathia, Ukraine 31.08. – 04.09.2002)

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**Abstract:** The vegetation of 16 sites along the Tisza river and its tributaries from western Hungary and adjacent Ukraine are reported. Beside the forest and freshwater types from the river banks and the oxbow lakes, the vegetation of the drainage channels from the Transcarpathian basin is treated in detail. *Quercus hartwissiana*, a species of Transcaucasian origin, is reported from Transcarpathia for the first time.

**Zusammenfassung:** Die Auenvegetation von 16 Lokalitäten entlang der Theiß und ihrer Nebenflüsse in E-Ungarn und der angrenzenden Ukraine wird beschrieben. Neben der Wald- und Süßwasservegetation der Flußufer und Altarme wird die Wasservegetation der Entwässerungskanäle speziell berücksichtigt. *Quercus hartwissiana*, eine Art aus dem Transkaukasus-Gebiet, wird erstmals für Transkarpatien genannt.

### Introduction

Starting in the XIX century, the original wilderness of the floodplains of the Tisza and its tributaries has been deeply transformed through significant changes in landuse policy in Hungary and the adjacent countries. Since that time and especially after the Second World War, no clear benefit to industry was perceived from these wetlands, and the impetus was to replace them with an intensive agriculture landscape. The establishment of several hundred kilometres of flood-control dykes, logging of floodplain forests and drainage of wetlands took place throughout the last two centuries. Now, only a small percentage of the original floodplain forest stands remain, and the habitat has become critically endangered all over Europe. Indeed, these forest types were described as the: "Most diverse, structurally, floristically and faunistically, of all

European ecosystems ..., the great fluvial forests of Europe are reduced to a few highly vulnerable examples" (MOSS et al. 1991).

The aim of our first international excursion was to produce a preliminary inventory of vegetation and make a conservation survey in the study area and adjacent territories defined within the objectives of the Project "Transcarpathian Riverine Forests, Ukraine", UK006702P, supported by WWF-UK.

### Methodological background

The Braun-Blanquet vegetation survey methodology (BRAUN-BLANQUET 1964) was used, and all surveyed sites (see fig. 1) were located using a Global Positioning System (GPS). The indicator species approach of ELLENBERG et al. (1991) for vascular plants was also tested.

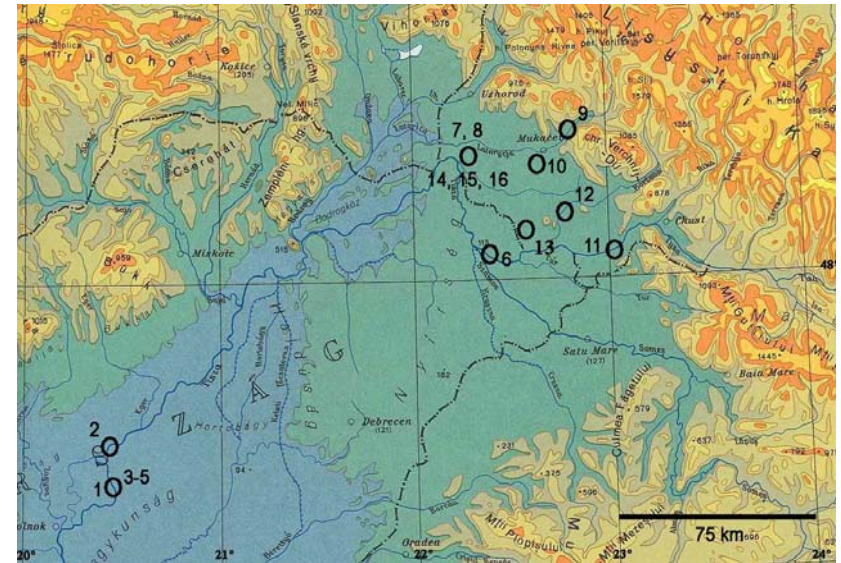


Fig. 1: Northeastern part of the Pannonian Plain and adjacent area with marked visited sites.

The nomenclature is based on TUTIN et al. (1968, 1972, 1976, 1980 and 1993) with the exception of the following species:

*Betonica officinalis*, *Bolboschoenus maritimus*, *Fallopia dumetorum*, *Fallopia japonica*, *Fraxinus angustifolia* subsp. *danubialis*, *Gnaphalium uliginosum*, *Lamiales montanum*, *Rosa blanda*, *Schoenoplectus lacustris*, and *Tragopogon orientalis*.

## Itinerary and vegetation observed

### Saturday, August 31<sup>st</sup> 2002

The research group began its itinerary at "Budapest-Keleti" railway station and drove first to Szolnok in eastern Hungary.

**SITE 1:** HUNGARY, County Jász-Nagykun-Szolnok, "Csatloi" oxbow lake about 4 km directly N of Kótelek, on the orographic right bank of the Tisza river; 47°21.433'N/20°24.524'E; at 100 m altitude.

**Site type:** floodplain inside the outermost dyke, focussing on an oxbow lake that had been cut off from the main Tisza river channel approximately 100 years previously.

**Tree layer:** *Fraxinus americana*, *Populus ×canescens*, *Salix alba × fragilis*

**Shrub layer:** *Amorpha fruticosa*

a) Flat riverbanks and adjacent shallow water (dominant species in bold letters):

<i>Bidens tripartita</i>	<i>Bolboschoenus maritimus</i>
<i>Carex acuta</i>	<i>Ceratophyllum demersum</i>
<i>Echinochloa crus-galli</i>	<i>Galium rubioides</i>
<b><i>Hydrocharis morsus-ranae</i></b>	<i>Iris pseudacorus</i>
<i>Leersia oryzoides</i>	<i>Leucojum aestivum</i>
<i>Lycopus europaeus</i>	<i>Lythrum salicaria</i>
<i>Mentha arvensis</i>	<i>Nymphaea alba</i>
<i>Oenanthe aquatica</i>	<i>Rubus caesius</i>
<i>Sagittaria sagittifolia</i>	<i>Salvinia natans</i>
<i>Sium latifolium</i>	<i>Solanum dulcamara</i>
<i>Sparganium erectum</i>	<i>Stachys palustris</i>
<i>Trapa natans</i>	<i>Typha latifolia</i>
<i>Xanthium strumarium</i>	

b) About 1.5 to 2 m above actual water level:

**Shrub layer:** *Sambucus nigra*, *Salix fragilis*

**Field layer:**

<i>Althaea officinalis</i>	<i>Aristolochia clematidis</i>
<i>Echinocystis lobata</i>	<i>Lycopus europaeus</i>

c) Gallery forest along the oxbow lake outside the old river dyke along old Tisza

**Relevé area:** 10×15 m, heights of B1: 18 m, B2: 12 m

**Upper tree layer:** cover 70%

3 <i>Populus xcanescens</i>	2b <i>Fraxinus pennsylvanica</i>
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**Lower tree layer:** cover 1%

+ <i>Morus alba</i>	+ <i>Fraxinus pennsylvanica</i>
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**Shrub layer:** cover 40%

2b <i>Fraxinus pennsylvanica</i>	2a <i>Amorpha fruticosa</i>
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**Field layer:** cover 15%

2m <i>Fraxinus pennsylvanica</i>	1 <i>Amorpha fruticosa</i>
+ <i>Solanum dulcamara</i>	+ <i>Rubus caesius</i>
+ <i>Quercus robur</i>	+ <i>Euphorbia lucida</i>
+ <i>Aristolochia clematidis</i>	r <i>Asparagus officinalis</i>

Amongst other species present in this woodland were *Populus nigra* (s. str), *Euphorbia esula* (s.str) and *Lysimachia nummularia*.

**SITE 2A:** HUNGARY, County Heves, "Kanyari" oxbow lake about 1 km directly SW of Kisköre, on the orographic right bank of the Tisza river; 47°29.539'N/20°28.266'E; at 102 m altitude.

**Site type:** floodplain inside the oldest Tisza dyke. Closer to the present river course a new dyke has been constructed, which means that no flooding occurs in this area and there is consequently a low sedimentation rate. The oxbow lake has been cut off from flooding by the Tisza for about 120 years.

**Shrub layer:** *Salix alba × fragilis*

Flat river banks and adjacent oxbow:

<i>Calystegia sepium</i>	<i>Echinocystis lobata</i>
<i>Hydrocharis morsus-ranae</i>	<i>Lycopus europaeus</i>
<i>Oenanthe aquatica</i>	<i>Phragmites australis</i>
<i>Polygonum amphibium</i>	<i>Rubus caesius</i>
<i>Typha cf. latifolia</i>	

**In shallow water:**

<i>Ceratophyllum demersum</i>	<i>Lemna trisulca</i>
<i>Myriophyllum spicatum</i>	

On the dyke along the road to the adjacent arable fields:

<i>Artemisia vulgaris</i>	<i>Atriplex oblongifolia</i>
<i>Bromus inermis</i>	<i>Chenopodium album</i>
<i>Chenopodium glaucum</i>	<i>Cuscuta campestris</i> on <i>P. aviculare</i> s.str.
<i>Fallopia dumetorum</i>	<i>Lactuca viminea</i>
<i>Lolium perenne</i>	<i>Polygonum aviculare</i> s.str.
<i>Rosa canina</i> agg.	<i>Sambucus ebulus</i>

**SITE 2B:** HUNGARY, County Heves, "Kanyari" oxbow lake (the central part of it is situated 3 km directly SW of Kisköre) on the orographic right bank of the Tisza at 102 m altitude.

**Site type:** floodplain inside the oldest Tisza dyke. As with Site 2A, a newer dyke separates the oxbow from the present river course, meaning that no flooding usually occurs in this area and that sedimentation rates are very low. The oxbow lake has been cut off from the river for about 120 years.

Inner (deposition) bank of the oxbow lake, together with adjacent arable fields (*Cucurbita pepo*) and an abandoned area with scattered trees (*Salix alba × fragilis*, *Populus alba*, *Populus ×canescens*, *Juglans regia* u.a.) as well as *Phragmites australis*, *Calystegia sepium* and *Lycopus europaeus*.

**Shallow water:** *Ceratophyllum cf. submersum*

Arable fields and adjacent abandoned areas:

<i>Arctium cf. nemorosum</i>	<i>Artemisia vulgaris</i>
<i>Atriplex oblongifolia</i>	<i>Bromus inermis</i>
<i>Calamagrostis epigejos</i>	<i>Cichorium intybus</i>
<i>Cirsium arvense</i>	<i>Daucus carota</i>
<i>Falcaria vulgaris</i>	<i>Glycyrrhiza echinata</i>
<i>Lathyrus tuberosus</i>	<i>Lolium perenne</i>
<i>Pastinaca sativa</i>	<i>Polygonum aviculare s.str.</i>
<i>Rubus caesius</i>	<i>Setaria pumila</i>
<i>Setaria viridis</i>	<i>Tanacetum vulgare</i>
<i>Xanthium strumarium</i>	

### Sunday, September 1<sup>st</sup> 2002

Driving from our overnight stay at Kisköre, we journeyed to Tiszaroff and from there went along the dyke about 2.5 km in a southerly direction to a point west along a forestry track from the 121.8 km distance marker on the dyke.

**SITE 3:** HUNGARY, County Jász-Nagykun-Szolnok, about 2 km directly south of Tiszaroff on the orographic left bank of the Tisza river; 47°21.785'N/20°27.113'E; at 105 m above sea level.

**Site type:** floodplain within the main Tisza dykes.

**Relevé area:** 20×30 m, vegetation cover: 85%, tree layer height: 25 m

**Tree layer:** cover 30%

3 *Populus ×canadensis*

**Shrub layer:** cover 50%

3 *Amorpha fruticosa*  
1 *Vitis vinifera* subsp. *vinifera*  
+ *Calystegia sepium*

2b *Fraxinus pennsylvanica*  
+ *Humulus lupulus*

**Field layer:** cover 20%

2a *Rubus caesius*  
2m *Scutellaria galericulata*  
1 *Vitis vinifera* subsp. *vinifera*  
1 *Stachys palustris*  
1 *Lycium europaeum*  
1 *Aristolochia clematitis*  
+ *Populus ×canadensis*  
+ *Calystegia sepium*  
r *Humulus lupulus*

2a *Fraxinus pennsylvanica*  
2m *Amorpha fruticosa*  
1 *Urtica dioica*  
1 *Lysimachia vulgaris*  
1 *Leucosium aestivum*  
+ *Symphytum officinale*  
+ *Galium elongatum*  
r *Urtica galeopsifolia*  
r *Equisetum arvense*

On the forest edge:

*Asclepias syriaca*  
*Buglossoides purpureoerulea*  
*Inula britannica*  
*Lythrum salicaria*  
*Verbena officinalis*

*Ballota nigra*  
*Carex riparia*  
*Leucanthemella serotina*  
*Scrophularia nodosa*

Degraded wet meadow and track margins:

<i>Althaea officinalis</i>	<i>Amaranthus retroflexus</i>
<i>Ambrosia artemisiifolia</i>	<i>Bidens tripartita</i>
<i>Chenopodium album</i>	<i>Chenopodium hybridum</i>
<i>Chenopodium polyspermum</i>	<i>Conyza canadensis</i>
<i>Echinochloa crus-galli</i>	<i>Echinocystis lobata</i>
<i>Glyceria maxima</i>	<i>Gnaphalium uliginosum</i>
<i>Hibiscus trionum</i>	<i>Lycopus europaeus</i>
<i>Myosoton aquaticum</i>	<i>Oxalis europaea</i>
<i>Polygonum lapathifolium</i>	<i>Portulaca oleracea</i>
<i>Scutellaria galericulata</i>	<i>Setaria pumila</i>
<i>Sonchus arvensis</i>	<i>Xanthium strumarium</i>

**SITE 4:** HUNGARY, County Jász-Nagykun-Szolnok, "Gói-tó" oxbow lake about 3.5 km directly south of Tiszaroff, on the orographic left bank of the Tisza river; 47°21.610'N/20°28.023'E; at 100 m alt. Surveyed site was located west of the 120.7 km distance marker on the dyke.

**Site type:** outer (eroding) bank of the oxbow lake.

**Tree layer:** *Fraxinus americana*, *Salix alba* × *fragilis* and poplar plantations along both river banks.

Within the forest stands:

<i>Ambrosia artemisiifolia</i>	<i>Amorpha fruticosa</i>
<i>Carex brizoides</i>	<i>Carex hirta</i>
<i>Carex sylvatica</i>	<i>Conyza canadensis</i>
<i>Echinochloa crus-galli</i>	<i>Juncus tenuis</i> (on path)
<i>Lythrum salicaria</i>	<i>Plantago major</i>
<i>Poa annua</i>	<i>Rubus caesius</i>

Adjacent shallow water:

**Relevé area:** 2 m<sup>2</sup>; total cover 95 %

4 *Hydrocharis morsus-ranae*  
1 *Ceratophyllum demersum*

2a *Salvinia natans*  
r *Trapa natans*

A very narrow fringe of lakeshore vegetation occurred, comprising the following species locally. In most parts of the oxbow, shade from the *Fraxinus americana* extended over the water.

<i>Bidens tripartita</i>	<i>Scutellaria galericulata</i>
<i>Carex acuta</i>	<i>Lycopus europaeus</i>
<i>Inula britannica</i>	<i>Lysimachia vulgaris</i>
<i>Plantago major</i>	

**SITE 5:** HUNGARY, County Jász-Nagykun-Szolnok, about 3.5 km directly south of Tiszaroff, on the orographic left bank of the Tisza river outside the main dyke and thus no longer flooded; at 47°22.386'N/20°27.883'E and 100 m altitude. The site lay immediately east of the 122.2 km distance marker on the dyke.

**Site type:** Oak-(Ash) plantation

**Relevé area:** 10×25 m, vegetation cover: 90%, height: 18 m of B1 layer.

**Tree layer:** cover 60%

4 *Quercus robur* 2a *Fraxinus angustifolia* subsp. *danubialis*

**Shrub layer:** cover 30%

2a *Fraxinus angustifolia* subsp. *pannonica* 1 *Ulmus minor*  
1 *Ulmus laevis* 1 *Amorpha fruticosa*

**Field layer:**

2m *Fraxinus pennsylvanica* 2m *Fraxinus angustifolia* subsp. *danubialis*  
2m *Calamagrostis epigejos* 1 *Vitis vinifera* subsp. *Vinifera*  
1 *Ulmus minor* 1 *Rubus caesius*  
1 *Quercus robur* 1 *Festuca rubra*  
+ *Rosa blanda* + *Prunus spinosa*  
+ *Cephalanthera longifolia* + *Epipactis atrorubens*  
+ *Astragalus glycyphyllos* + *Arrhenatherum elatius*  
r *Vicia cracca* r *Taraxacum* sp.  
r *Juglans regia* r *Euphorbia* sp.

The dyke bank separating this oak-ash plantation from the floodplain had some areas of steppic grassland, marked out from the more mesotrophic swards by:

*Thalictrum lucidum* *Euphorbia esula* s.str.  
*Galium boreale* *Dichanthium ischaemum*  
*Eryngium planum* *Salvia nemorosa*  
*Scabiosa ochroleuca* *Eryngium campestre*  
*Artemisia pontica*

From here, we drove to Nyiregyháza, observing the following alien trees planted on the roadside:

*Acer saccharinum* *Pinus nigra*  
*Robinia pseudacacia* *Sophora japonica*

The last stage of our itinerary for the day took us via Vásárosnemény to Gulács, where we examined oxbow lakes of the Tisza river WSW of the village.

**SITE 6A:** HUNGARY, County Szabolcs-Szatmár-Bereg, about 3 km West of Gulács, on the orographic right bank of the Tisza river. Here we examined two oxbow lakes within the highest lying flood dyke at "Holt Tisza" (110 m altitude). The largest oxbow lay closer to the present course of the Tisza, and was separated from the second smaller oxbow by arable fields and a *Juglans regia* plantation. This inner larger lake had a characteristic zonation:

On the steep slopes of the river banks:

**Tree layer:**

*Fraxinus pennsylvanica* *Robinia pseudacacia* (with *Viscum album*)  
*Ulmus laevis*

**Shrub layer:**

*Acer negundo* *Cornus sanguinea*  
*Euonymus europaea* *Humulus lupulus*  
*Morus alba* *Sambucus nigra*

**Field layer:**

*Arctium tomentosum* *Aristolochia clematitis*  
*Chaerophyllum aureum* *Echinochloa crus-galli*  
*Filipendula ulmaria* *Phragmites australis*  
*Rubus caesius* *Sambucus ebulus*  
*Urtica dioica*

**Site type:** inner (deposition) slope and adjacent shallow water zone.

**Relevé area:** 10×5 m, vegetation cover: ≤ 90%:

5 *Trapa natans* 1 *Stachys palustris*  
1 *Sparganium erectum* 1 *Sagittaria sagittifolia*  
+ *Urtica dioica* + *Scutellaria galericulata*  
+ *Polygonum amphibium* + *Equisetum fluviatile*  
r *Iris pseudacorus*

**Relevé area:** 1×15 m, vegetation cover: ≤ 85%

5 *Glyceria maxima* 2a *Calystegia sepium*  
2m *Lycopus europaeus* 1 *Rubus caesius*  
1 *Polygonum hydropiper* 1 *Bidens tripartita*  
+ *Echinocystis lobata* r *Oenanthe aquatica*

**Relevé area:** 1×6 m, vegetation cover: ≤ 75%

5 *Glyceria maxima* 2b *Schoenoplectus lacustris*  
1 *Lycopus europaeus* 1 *Bidens cernua*  
+ *Trapa natans* + *Equisetum fluviatile*

Amongst the aquatic and marginal vegetation outside these sample relevés were

*Nymphaea candida* *Ceratophyllum demersum*  
*Angelica sylvestris* *Sagittaria sagittifolia*  
*Echinochloa crus-galli*

**SITE 6B:** The small oxbow lake near the dyke.

**Tree layer:**

*Fraxinus angustifolia* subsp. *danubialis* *Salix fragilis*  
*Acer campestre*

**Shrub layer:**

*Acer negundo* *Calystegia sepium*  
*Fraxinus angustifolia* subsp. *danubialis* *Fraxinus pennsylvanica*  
*Salix fragilis* *Solanum dulcamara*

**Field layer:**

<i>Bidens cernua</i>	<i>Bidens tripartita</i>
<i>Calystegia sepium</i>	<i>Carex riparia</i>
<i>Glyceria maxima</i>	<i>Iris pseudacorus</i>
<i>Lycopus europaeus</i>	<i>Lysimachia vulgaris</i>
<i>Mentha arvensis</i>	<i>Polygonum hydropiper</i>
<i>Ranunculus repens</i>	<i>Rubus caesius</i>
<i>Rumex cf. sanguineus</i>	<i>Typha angustifolia</i>
<i>Typha latifolia</i>	<i>Urtica dioica</i>
<i>Vitis vinifera</i>	<i>Xanthium strumarium</i>

Forest fringe to the dyke: *Chenopodium polyspermum*

We took our overnight stay in the Hotel Tara in Nyíregyháza-Sóstó.

**Monday, September 2nd 2002**

Starting in Nyíregyháza at 9:30, we drove to Zahony/Chop and crossed the border into Ukraine between 12:00–12:45

**SITE 7:** UKRAINE, Transcarpathia, Uzhgorod Rayon [county], Chervone: Drainage channel near road bridge; 48°25.206'N/22°17.727'E; 115 m altitude.

The Transcarpathian Plain (a former area of peat-bogs) has been heavily drained with the construction of surface-water channels starting in the XIX century and continuing to the present day. In the last century alone, about 20,000 ha of wetlands (mainly peat-bog) were destroyed and the hydrological system of the plain has been partly damaged as a result of intensive drainage effort. However, within these drainage channels all over the plain, a large number of aquatic plants occur that are included in the Ukrainian Red List. Our first stop near a small bridge across such a channel near the village of Chervone revealed:

<i>Bidens tripartita</i>	<i>Butomus umbellatus</i>
<i>Calystegia sepium</i>	<i>Glyceria maxima</i>
<i>Hydrocharis morsus-ranae</i>	<i>Iris pseudacorus</i>
<i>Lysimachia vulgaris</i>	<i>Lythrum salicaria</i>
<i>Myriophyllum spicatum</i>	<i>Nuphar lutea</i>
<i>Nymphaea alba</i>	<i>Nymphaea candida</i>
<i>Phalaris arundinacea</i>	<i>Potamogeton lucens</i>
<i>Salvinia natans</i>	<i>Schoenoplectus lacustris</i>
<i>Sparganium erectum</i>	<i>Stratiotes aloides</i>
<i>Trapa natans</i>	<i>Typha angustifolia</i>
<i>Typha latifolia</i>	

On slopes of the dyke (including damp gullies) occurred:

<i>Agrimonia eupatoria</i>	<i>Althaea officinalis</i> (gully)
<i>Carex hirta</i>	<i>Carex riparia</i> (gully)
<i>Cirsium canum</i>	<i>Dipsacus laciniatus</i>
<i>Eryngium planum</i>	<i>Festuca rupicola</i>
<i>Festuca valesiaca</i>	<i>Galega officinalis</i>
<i>Inula britannica</i>	<i>Juncus effusus</i> (gully)
<i>Potentilla neglecta</i>	<i>Tanacetum vulgare</i>
<i>Tragopogon orientalis</i>	



Fig. 2a (left): Drainage channel in the Trancarpathian Plain near the village of Chervone (site no 7). - 2b (right): *Trapaetum natantis* in the drainage channel near Chervone village.

**SITE 8:** UKRAINE, Transcarpathia, Uzhgorod Rayon [county]: Chomonyn forest; 48°25.182'N/ 22°25.430'E; about 115 m a.s.l.

The fragmented areas of surviving wetland (about 15,000 ha), mainly comprise oak-ash flooded/damp forests, but also include wet meadows, swamps, small lakes and ponds. These are located within the limits of the Tysa (Tisza), Latorytsya, Borzhava and other river basins (close to the Hungarian, Romanian and Slovakian borders) and are the main biodiversity centres in the area.

One example of damp forest (outside the dyke and thus now never flooded) consisted of *Fraxino-pannonicae-Ulmetum* Soó 1960 with the composition listed below:

**Relevé area:** 20×30 m, vegetation cover: ≤ 70%.

**Upper tree layer:** height 28 m, cover: 50%

3 <i>Quercus robur</i>	1 <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>
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**Lower tree layer:** height: 15 m, cover: 25%

2b <i>Fraxinus angustifolia</i> subsp. <i>pannonica</i>	1 <i>Quercus robur</i>
1 <i>Carpinus betulus</i>	1 <i>Acer campestre</i>
+ <i>Acer negundo</i>	

**Shrub layer:** height: 1-8 m, cover: 25 %

2b <i>Cornus sanguinea</i>	1 <i>Ulmus laevis</i>
1 <i>Crataegus laevigata</i>	1 <i>Acer negundo</i>
1 <i>Acer campestre</i>	+ <i>Ligustrum vulgare</i>
+ <i>Humulus lupulus</i>	+ <i>Fraxinus angustifolia</i> subsp. <i>pannonica</i>
+ <i>Frangula alnus</i>	+ <i>Euonymus europaea</i>
r <i>Sambucus nigra</i>	

**Field layer:** up to 1 m height, cover: 25%

2a <i>Rubus caesius</i>	2a <i>Cornus sanguinea</i>
2m <i>Viola reichenbachiana</i>	2m <i>Quercus robur</i>
2m <i>Galium odoratum</i>	2m <i>Galium aparine</i>
2m <i>Fraxinus angustifolia</i> subsp. <i>pannonica</i>	2m <i>Circaea lutetiana</i>
2m <i>Brachypodium sylvaticum</i>	1 <i>Urtica dioica</i>
1 <i>Ulmus laevis</i>	1 <i>Torilis japonica</i>
1 <i>Stellaria nemorum</i>	1 <i>Prunus spinosa</i>
1 <i>Prunus avium</i>	1 <i>Moehringia trinervia</i>
1 <i>Lysimachia nummularia</i>	1 <i>Geranium robertianum</i>
1 <i>Galium elongatum</i>	1 <i>Galeopsis speciosa</i>
1 <i>Euonymus europaea</i>	1 <i>Carex brizoides</i>
1 <i>Asarum europaeum</i>	1 <i>Ajuga reptans</i>
1 <i>Acer campestre</i>	+ <i>Viburnum opulus</i>
+ <i>Veronica chamaedrys</i>	+ <i>Pulmonaria officinalis</i>
+ <i>Polygonatum multiflorum</i>	+ <i>Ligustrum vulgare</i>
+ <i>Geum urbanum</i>	+ <i>Fallopia dumetorum</i>
+ <i>Dryopteris filix-mas</i>	+ <i>Deschampsia cespitosa</i>
+ <i>Crataegus laevigata</i>	+ <i>Alliaria petiolata</i>
r <i>Ranunculus auricomus</i> s.l.	r <i>Pyrus pyraeaster</i>

Other species noted in the forest, but outside the sample relevé were

<i>Acer tataricum</i>	<i>Bidens tripartita</i>
<i>Corylus avellana</i>	<i>Lycopus europaeus</i>
<i>Oenanthe aquatica</i>	<i>Polygonum hydropiper</i>
<i>Salix cinerea</i>	<i>Betonica officinalis</i>
<i>Tilia cordata</i>	

One of the most important findings of our excursion was *Quercus hartwissiana* Stev., which was observed just outside the relevé described above. We believe that this oak was probably planted using Transcaucasian seeds following the Second World War, and became successfully naturalised. The size of the present population (or populations) in Transcarpathia needs to be assessed.

Information note:

*Quercus hartwissiana* Stev. 1857, Bull. Soc. Nat. Mosc. 30:387. - *Q. armeniaca* Kotschy, 1862, Die Eichen: tab.25. - *Q. stranjensis* Turill, 1928, Mitt. Bulg. Bot. Gesellsch. 2: 62. Locus classicus: [Western Georgia] "Sylvae Mingreliae et Imeretiae" (MENITSKIY, 1984). Spread in Europe: Bulgaria, European Turkey. Distributed in Asia: Anatolia, Kolkhida, north-western Caucasus. It occurs as a component of floodplain and hilly forest types. Mesophilic, it needs a long growing season for normal development, and prefers extreme wetness (*i.e.* standing, flooding water, even bogs). *Q. hartwissiana* has a fast growing character: 1.2–1.3 times faster than *Q. robur* and 1.5–1.8 times faster than *Q. petraea*; (MENITSKIY 1984). This attribute of *Q. hartwissiana* was one of the reasons for the introduction of this species and could also be an advantage in its continuing spread.

**SITE 9:** UKRAINE, Transcarpathia, Svalyava Rayon [county], Suskovo: Gravel river bed of Latorytsya river; 48°32.550'N/22°55.810'E; 172 m a.s.l.

The south-western slopes of the Ukrainian Carpathians are drained by many rivers, most of which have a high degree of naturalness. However, signs of human impact are seen often, such as rubbish dumping or agricultural patches near the river, which although officially illegal are often tolerated by local authorities. For example, where the Latorytsya passes close to Mukachevo city, the banks and much adjacent disturbed ground are infested with the neophyte *Reynoutria ×bohemica* (hybrid of *R. japonica* and *R. sachalinensis*). Away from this pervading urban influence, in the Carpathian foothills, *Salix* shrub communities are extensive on riverine gravels and play an important role in holding back the water during the flash floods within the river.

**Shrub layer:** (dominants in bold)

<b><i>Alnus glutinosa</i></b>	<i>Crataegus monogyna</i>
<i>Humulus lupulus</i>	<i>Salix fragilis</i>
<b><i>Salix purpurea</i></b>	

**Field layer:**

<i>Cynodon dactylon</i>	<i>Equisetum telmateia</i>
<i>Euphorbia cyparissias</i>	<i>Galeopsis tetrahit</i>
<i>Galinsoga ciliata</i>	<i>Heracleum sosnowski</i>
<i>Impatiens parviflora</i>	<i>Mentha longifolia</i>
<i>Myosoton aquaticum</i>	<i>Salvia glutinosa</i>
<i>Salvia verticillata</i>	<i>Verbascum nigrum</i>
<i>Verbena officinalis</i>	

In moist hollows:

<i>Alisma plantago-aquatica</i>	<i>Bidens cernua</i>
<i>Cyperus fuscus</i>	<i>Eleocharis palustris</i>
<i>Equisetum palustre</i>	<i>Glyceria spec.</i>
<i>Juncus inflexus</i>	<i>Lythrum hyssopifolia</i>
<i>Odontites vernus</i>	<i>Polygonum hydropiper</i>
<i>Polygonum mite</i>	<i>Pulicaria vulgaris</i>
<i>Rorippa palustris</i>	<i>Senecio aquaticus</i> subsp. <i>barbareifolius</i>
<i>Xanthium strumarium</i>	

On gravel banks by the river:

<i>Acer negundo</i>	<i>Agrostis stolonifera</i>
<i>Amaranthus cruentus</i>	<i>Bidens tripartita</i>
<i>Callistephus chinensis</i> (garden escape)	<i>Chenopodium polyspermum</i>
<i>Echinochloa crus-galli</i>	<i>Elsholtzia ciliata</i>
<i>Epilobium hirsutum</i>	<i>Eupatorium cannabinum</i>
<i>Galeopsis pubescens</i>	<i>Galium album</i> subsp. <i>pyncnotrichum</i>
<i>Veronica opaca</i>	<i>Pentstemon</i> sp. (garden escape)
<i>Polygonum hydropiper</i>	<i>Polygonum lapathifolium</i>
<i>Polygonum mite</i>	<i>Salix fragilis</i>
<i>Salix purpurea</i>	





plays an essential role as a anti-erosion tree along gravel river banks, and its elimination could stimulate renewed erosion:

**Upper tree layer:**

<i>Alnus glutinosa</i>	<i>Populus xcanescens</i>
<i>Populus alba</i> ,	<i>Populus nigra</i>
<i>Salix alba</i> x <i>fragilis</i>	

**Lower tree layer:**

<i>Fraxinus pennsylvanica</i>	<i>Pyrus pyraeaster</i>
<i>Fraxinus excelsior</i> x <i>angustifolia</i> subsp. <i>danubialis</i>	

**Shrub layer:**

<i>Acer negundo</i>	<i>Alnus incana</i>
<i>Cornus sanguinea</i>	<i>Crataegus monogyna</i>
<i>Fraxinus pennsylvanica</i>	<i>Juglans regia</i>
<i>Prunus spinosa</i>	<i>Salix purpurea</i>
<i>Salix triandra</i> (rare)	

**Field layer:**

<i>Achillea millefolium</i> agg.	<i>Ambrosia artemisifolia</i>
<i>Anchusa officinalis</i>	<i>Arctium</i> cf. <i>lappa</i>
<i>Aristolochia clematidis</i>	<i>Artemisia absinthium</i>
<i>Centaurea arenaria</i> subsp. <i>borysthonica</i>	<i>Xanthium strumarium</i>
<i>Centaurea jacea</i> agg.	<i>Chaenarrhinum minus</i>
<i>Chenopodium album</i>	<i>Chenopodium botrys</i>
<i>Chenopodium schraderanum</i>	<i>Cirsium arvense</i>
<i>Clematis vitalba</i>	<i>Cynoglossum officinale</i>
<i>Daucus carota</i>	<i>Digitaria ischaemum</i>
<i>Dipascus fullonum</i>	<i>Echinochloa crus-galli</i>
<i>Elsholtzia ciliata</i>	<i>Erigeron annuus</i>
<i>Erodium cicutarium</i>	<i>Eryngium planum</i>
<i>Eupatorium cannabinum</i>	<i>Euphorbia cyparissias</i>
<i>Helianthus tuberosus</i>	<i>Leontodon hispidus</i>
<i>Lepidium ruderale</i>	<i>Lythrum salicaria</i>
<i>Medicago sativa</i> agg.	<i>Mentha longifolia</i>
<i>Odontites vernus</i>	<i>Ononis spinosa</i>
<i>Plantago lanceolata</i>	<i>Populus nigra</i> (seedlings)
<i>Prunella vulgaris</i>	<i>Fallopia japonica</i>
<i>Rosa canina</i> agg.	<i>Rubus caesius</i>
<i>Sambucus ebulus</i>	<i>Setaria pumila</i>
<i>Solidago gigantea</i>	<i>Tanacetum vulgare</i>
<i>Tussilago farfara</i>	<i>Urtica dioica</i>
<i>Verbascum phlomoides</i>	<i>Verbena officinalis</i>



Fig. 6: Heavily grazed *Populus nigra* stands in the floodplain of Tisza river near the town of Vinogradiv (site no 11).

**SITE 12:** UKRAINE, Transcarpathia, Beregovo Rayon [county], 3 km directly E of Velyki Berehy, "Atak" Local Nature Reserve; [48°14.062'N/22°48.078' outside the forest]; 132 m a.s.l.

Vegetation type: Riverine forest along Borshava river. This is probably one of the oldest remnants of ancient riverine forests in Central Europe. Here was observed another example of the Fraxino pannonicae-Ulmetum Soó. However the community here is of a drier variant than the s.str. type, and was located on a high river bank with sandy sedimentation in the upper layers of the soil, with only a short period of a standing water during floods.

**Relevé area:** 20×30 m, vegetation cover ≤ 85%, ash and oak with BHD: 40-65 cm.

**Upper tree layer:** height: 35-40 m, cover: 35%

2b <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>	2b <i>Quercus robur</i>
2m <i>Hedera helix</i>	

**Lower tree layer:** height: 20-25 m, cover: 60%

3 <i>Carpinus betulus</i>	2b <i>Acer campestre</i>
2a <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>	2m <i>Hedera helix</i>
1 <i>Quercus robur</i>	



Fig. 7: Riverine forest dominated by *Fraxinus angustifolia* and *Quercus robur* along Borshava river near the village of Kvasovo.

**Shrub layer:** height: 1-10 (12) m, cover: 20 %

2a <i>Carpinus betulus</i>	2m <i>Hedera helix</i>
2m <i>Cornus sanguinea</i>	2m <i>Acer campestre</i>
1 <i>Ulmus minor</i>	1 <i>Sambucus nigra</i>
1 <i>Crataegus laevigata</i>	

**Field layer:** height: up to 1 m, cover: 50-55%

2m <i>Acer campestre</i>	3 <i>Aegopodium podagraria</i>
r <i>Ajuga reptans</i>	1 <i>Brachypodium sylvaticum</i>
+ <i>Carex remota</i>	1 <i>Carex sylvatica</i>
+ <i>Circaea lutetiana</i>	1 <i>Convallaria majalis</i>
1 <i>Cornus sanguinea</i>	+ <i>Crataegus laevigata</i>
2m <i>Euonymus europaea</i>	1 <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>
+ <i>Geum urbanum</i>	3 <i>Hedera helix</i>
2m <i>Lamiasstrum montanum</i>	1 <i>Milium effusum</i>
+ <i>Polygonatum multiflorum</i>	+ <i>Pulmonaria officinalis</i>
1 <i>Rubus caesius</i>	1 <i>Sambucus nigra</i>
+ <i>Ulmus minor</i>	1 <i>Urtica galeopsifolia</i>
+ <i>Viburnum opulus</i>	+ <i>Viola reichenbachiana</i>

The forest flora here was especially rich, and other species found outside the sample relevé were:

<i>Acer tataricum</i>	<i>Asarum europaeum</i>
<i>Athyrium filix-femina</i>	<i>Bromus benekenii</i>
<i>Cerastium sylvaticum</i>	<i>Dactylis glomerata</i>
<i>Dryopteris filix-mas</i>	<i>Epipactis albensis</i>
<i>Galium odoratum</i>	<i>Glechoma hederacea</i>
<i>Lathyrus vernus</i>	<i>Lysimachia nummularia</i>
<i>Maianthemum bifolium</i>	<i>Mercurialis perennis</i>
<i>Neottia nidus-avis</i>	<i>Paris quadrifolia</i>
<i>Platanthera bifolia</i>	<i>Prunella vulgaris</i>
<i>Scrophularia nodosa</i>	<i>Stellaria nemorum</i>
<i>Tilia cordata</i>	<i>Vincetoxicum hirundaria</i>

The age of the forest stands is more than 170 years old. Flood frequency is usually with up to six floods in a year, though our visit was at the end of an exceptionally dry summer. A full relevé was not conducted but the following species were noted.

**Species of the ancient riverine forest** – including frequently and rarely flooded areas

<i>Acer campestre</i>	<i>Aegopodium podagraria</i>
<i>Allium ursinum</i>	<i>Bidens tripartita</i>
<i>Cardamine amara</i>	<i>Cardamine impatiens</i>
<i>Carex remota</i>	<i>Carex strigosa</i>
<i>Carex sylvatica</i>	<i>Cephalanthera longifolia</i>
<i>Cerastium sylvaticum</i>	<i>Circaea lutetiana</i>
<i>Convallaria majalis</i>	<i>Fagus sylvatica</i>
<i>Festuca gigantea</i>	<i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>
<i>Galium odoratum</i>	<i>Glechoma hederacea</i>
<i>Hedera helix</i>	<i>Lathyrus vernus</i>
<i>Lysimachia vulgaris</i>	<i>Maianthemum bifolium</i>
<i>Malus sylvestris</i>	<i>Matteuccia struthiopteris</i>
<i>Milium effusum</i>	<i>Polygonatum multiflorum</i>
<i>Polygonum hydropiper</i>	<i>Populus xcanescens</i>
<i>Ranunculus auricomus</i>	<i>Rubus caesius</i>
<i>Stellaria nemorum</i>	<i>Urtica galeopsifolia</i>
<i>Viola reichenbachiana</i>	

**Species of the forest margins** – especially more disturbed and wet areas

<i>Althaea officinalis</i>	<i>Ambrosia artemisiifolia</i>
<i>Bidens pilosa</i>	<i>Cuscuta europaea</i>
<i>Echinocystis lobata</i>	<i>Epilobium hirsutum</i>
<i>Galinsoga ciliata</i>	<i>Lythrum virgatum</i>
<i>Phalaris arundinacea</i>	<i>Rorippa sylvestris</i>
<i>Salix triandra</i>	<i>Scrophularia nodosa</i>



Fig. 8: The old growth forest of the 'Atak' Local Forest Reserve near the village of Velyki Berehy (site no 12). The authors together with local forester and volunteer.

**SITE 13: UKRAINE**, Transcarpathia, Beregovo Rayon [county], 2 km linear distance W of Dyida; 48°12.941'N/22°32.559'; 128 m a.s.l.

**Vegetation type:** The mire that formerly occurred here has been drained and changed into a large pond. In 2001 a local nature reserve was established here to prevent any further ecosystem transformation. Ten types of aquatic and marginal vegetation (A-J) present here are summarised below. The lagoon was prone to drawdown, exposing large areas of wet mud.

**A. Hydrochari-Stratiotetum Westhoff 1942 (two relevés):**

**Relevé area:** 4×15 m, vegetation cover 95%

5 <i>Stratiotes aloides</i>	2b <i>Ceratophyllum demersum</i>
2m <i>Utricularia australis</i>	2m <i>Salvinia natans</i>
1 <i>Lemna trisulca</i>	1 <i>Lemna minor</i>
1 <i>Hydrocharis morsus-ranae</i>	

**Relevé area:** 2×3 m, vegetation cover 70%

3 <i>Hydrocharis morsus-ranae</i>	3 <i>Ceratophyllum demersum</i>
2a <i>Stratiotes aloides</i>	2a <i>Salvinia natans</i>
2a <i>Polygonum amphibium</i>	2m <i>Utricularia australis</i>
+ <i>Lemna trisulca</i>	+ <i>Lemna minor</i>
r <i>Glyceria maxima</i>	

**B. Potamogeton pectinatus-Myriophyllum spicatum community with a substantial proportion of Najas marina:**

**Relevé area:** 2×2.5 m, vegetation cover 80%

4 <i>Najas marina</i>	2a <i>Myriophyllum spicatum</i>
1 <i>Potamogeton pectinatus</i>	1 <i>Ceratophyllum demersum</i>
+ <i>Potamogeton crispus</i>	

**C. An example of Ceratophylletum demersi (Soó) Hild 1956:**

**Relevé area:** 1×2 m, vegetation cover 60%

3 <i>Ceratophyllum demersum</i>	2b <i>Myriophyllum spicatum</i>
1 <i>Potamogeton pectinatus</i>	1 <i>Potamogeton crispus</i>
+ <i>Hydrocharis morsus-ranae</i>	+ <i>Glyceria maxima</i>

**D. The edge of the water supported a wide variety of habitat types, including a community with *Carex bohemica* in its single known locality in Transcarpathia:**

**Relevé area:** 2×10 m, vegetation cover 50%, stones 30%

2b <i>Oenanthe aquatica</i>	2a <i>Carex bohemica</i>
2a <i>Bidens cernua</i>	2a <i>Alisma plantago-aquatica</i>
2m <i>Echinochloa crus-galli</i>	2m <i>Bidens tripartita</i>
1 <i>Stachys palustris</i>	1 <i>Rorippa amphibia</i>
1 <i>Lycopus europaeus</i>	1 <i>Butomus umbellatus</i>
+ <i>Polygonum persicaria</i>	+ <i>Phalaris arundinacea</i>
+ <i>Lythrum salicaria</i>	+ <i>Lysimachia nummularia</i>

**E. Phragmitetum vulgaris Soó 1927:**

**Relevé area:** 4×5 m, vegetation cover 90%

5 <i>Phragmites australis</i>	2a <i>Ceratophyllum demersum</i>
1 <i>Salix purpurea</i>	1 <i>Polygonum amphibium</i>
1 <i>Myriophyllum spicatum</i>	+ <i>Rorippa amphibia</i>
+ <i>Lythrum salicaria</i>	

**F. A community referable to the Potamion, probably a particular association.**

**Relevé area:** 2×3 m, vegetation cover 70%

3 <i>Potamogeton crispus</i>	2b <i>Myriophyllum spicatum</i>
2b <i>Ceratophyllum demersum</i>	1 <i>Najas marina</i>
1 <i>Lythrum salicaria</i>	r <i>Alisma plantago-aquatica</i>

**G. An example of Glycerietum maximae Hueck 1931**

**Relevé area:** 4×4 m, vegetation cover 90%, the stand is situated in 25-30 cm water

5 <i>Glyceria maxima</i>	2a <i>Polygonum amphibium</i>
2m <i>Najas minor</i>	1 <i>Oenanthe aquatica</i>
1 <i>Lemna trisulca</i>	1 <i>Lemna minor</i>
1 <i>Ceratophyllum demersum</i>	+ <i>Salix cinerea</i>
+ <i>Lythrum salicaria</i>	+ <i>Lycopus europaeus</i>
+ <i>Hydrocharis morsus-ranae</i>	r <i>Rorippa palustris</i>
r <i>Alisma plantago-aquatica</i>	

H. A community of the Phragmitetea was dominated by *Butomus umbellatus*

**Relevé area:** 4×4 m, vegetation cover: 60-70%, the stand is situated in 25-30 cm water

4 <i>Butomus umbellatus</i>	2a <i>Salvinia natans</i>
2m <i>Utricularia australis</i>	1 <i>Phragmites australis</i>
1 <i>Lemna minor</i>	+ <i>Salix purpurea</i>
+ <i>Lythrum salicaria</i>	

I. The weedy grass *Echinochloa crus-galli* was especially prominent along the edge of the water, where it is well adapted to a highly variable water regime with floods and drawdown.

**Relevé area:** 5×10 m, vegetation cover: 90%

5 <i>Echinochloa crus-galli</i>	2m <i>Polygonum amphibium</i>
2m <i>Bidens tripartita</i>	1 <i>Salix triandra</i>
1 <i>Salix purpurea</i>	1 <i>Oenanthe aquatica</i>
1 <i>Alisma plantago-aquatica</i>	+ <i>Lythrum salicaria</i>
+ <i>Inula britannica</i>	

K. Agrostion stoloniferae Soó (1933) 1971 with *Carex bohemica*

**Relevé area:** 2×8 m, vegetation cover: 70%

3 <i>Agrostis stolonifera</i>	2m <i>Rorippa brachycarpa</i>
2m <i>Plantago major</i>	2m <i>Oenanthe aquatica</i>
2m <i>Echinochloa crus-galli</i>	2m <i>Alopecurus geniculatus</i>
1 <i>Salix purpurea</i>	1 <i>Rorippa palustris</i>
1 <i>Polygonum persicaria</i>	1 <i>Polygonum amphibium</i>
1 <i>Mentha arvensis</i>	1 <i>Lythrum salicaria</i>
1 <i>Gnaphalium uliginosum</i>	1 <i>Carex bohemica</i>
1 <i>Bidens tripartita</i>	1 <i>Alisma plantago-aquatica</i>
+ <i>Salix triandra</i>	+ <i>Salix fragilis</i>
+ <i>Lycopus europaeus</i>	+ <i>Iris pseudacorus</i>
+ <i>Inula britannica</i>	+ <i>Glyceria maxima</i>
+ <i>Eleocharis ovata</i>	r <i>Rumex maritimus</i>
R <i>Juncus effusus</i>	r <i>Butomus umbellatus</i>



Fig. 9a (left): *Carex bohemica* in the pond near the village of Dyida (site no 13). - 9b (right): *Utricularia australis* in the pond near Dyida

### Wednesday, September 4th 2002

We started at 6.00 in the direction of Chop and the border with Hungary, making stops on the way between Mukachevo and the Tisza.

**SITE 14: UKRAINE:** we stopped 2 km west from the village of Bakosh, between Bakosh and Solovka, near the bridge over the canalised Charonda river. Here we examined the aquatic vegetation (four relevés), which comprised floating-leaved and emergent associations, as well as some areas of forest outside the floodbank.

Associations referable to the Nymphaeion Oberd. 1956 emend. Neuhäusl 1959 are common here:

**Relevé area:** 5×10 m, vegetation cover: 85%

3 <i>Nymphaea candida</i>	3 <i>Nuphar lutea</i>
2a <i>Hydrocharis morsus-ranae</i>	2m <i>Salvinia natans</i>
2m <i>Lemna trisulca</i>	1 <i>Stratiotes aloides</i>
1 <i>Sparganium erectum</i>	1 <i>Glyceria maxima</i>
1 <i>Ceratophyllum demersum</i>	+ <i>Potamogeton lucens</i>

The Glycerietum maximae Hueck 1931 is well represented here, with the full floristic structure of the described community, rather than the monocultural variant so prevalent generally

**Relevé area:** 3×10 m, vegetation cover: 100%

4 <i>Glyceria maxima</i>	2b <i>Typha latifolia</i>
2m <i>Lemna trisulca</i>	1 <i>Typha angustifolia</i>
1 <i>Salvinia natans</i>	1 <i>Hydrocharis morsus-ranae</i>
1 <i>Calystegia sepium</i>	+ <i>Stratiotes aloides</i>
+ <i>Sparganium erectum</i>	+ <i>Rumex hydrolapathum</i>
+ <i>Potamogeton lucens</i>	r <i>Butomus umbellatus</i>

Other emergent vegetation included *Schoenoplectetum lacustris* Egger 1933 near the edge of the channel:

**Relevé area:** 3×5 m, vegetation cover: 90%

4 <i>Schoenoplectus lacustris</i>	2b <i>Glyceria maxima</i>
2a <i>Lycopus europaeus</i>	2a <i>Calystegia sepium</i>
1 <i>Scutellaria galericulata</i>	1 <i>Lysimachia vulgaris</i>
+ <i>Typha latifolia</i>	+ <i>Lysimachia nummularia</i>

Stands of *Hydrochari-Stratiotetum* Westhoff 1942 are very common and occupy a large area:

**Relevé area:** 5×5 m, vegetation cover: 90%

5 <i>Stratiotes aloides</i>	3 <i>Ceratophyllum submersum</i>
2b <i>Hydrocharis morsus-ranae</i>	2m <i>Salvinia natans</i>
1 <i>Lemna minor</i>	

The ash-oak stand outside of the dyke is another example of *Fraxino-pannonicae-Ulmetum* Soó 1960

**Relevé area:** 20×20 m, vegetation cover 60-70%

**Upper tree layer:** height: 16-20 (25) m, cover: 35-40%

3 <i>Quercus robur</i>	2a <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>
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**Lower tree layer:** height: 8-10 m, cover: 30%

2a <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>	2a <i>Quercus robur</i>
+ <i>Pyrus pyraeaster</i>	

**Shrub layer:** height: 1-5 m, cover: 65%

2b <i>Acer tataricum</i>	2b <i>Acer campestre</i>
2a <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>	1 <i>Quercus robur</i>
1 <i>Prunus padus</i>	1 <i>Crataegus laevigata</i>
1 <i>Cornus sanguinea</i>	1 <i>Acer negundo</i>
+ <i>Prunus spinosa</i>	+ <i>Carpinus betulus</i>
r <i>Rosa canina</i>	

**Field layer:** up to 1 m high, vegetation cover: 40%

2a <i>Lysimachia nummularia</i>	2m <i>Quercus robur</i>
2m <i>Prunus spinosa</i>	2m <i>Maianthemum bifolium</i>
2m <i>Fraxinus angustifolia</i> subsp. <i>danubialis</i>	2m <i>Cornus sanguinea</i>
2m <i>Acer tataricum</i>	1 <i>Prunus padus</i>
1 <i>Prunella vulgaris</i>	1 <i>Ligustrum vulgare</i>
1 <i>Geum urbanum</i>	1 <i>Galium elongatum</i>
1 <i>Crataegus laevigata</i>	1 <i>Circaea lutetiana</i>
1 <i>Carpinus betulus</i>	1 <i>Carex spicata</i>
1 <i>Brachypodium sylvaticum</i>	1 <i>Agrostis stolonifera</i>
+ <i>Moehringia trinervia</i>	+ <i>Fragaria vesca</i>
+ <i>Filipendula vulgaris</i>	+ <i>Daucus carota</i>
+ <i>Carex brizoides</i>	+ <i>Acer negundo</i>
r <i>Ribes uva-crispa</i> subsp. <i>grossularia</i>	

**SITE 15: UKRAINE:** 0.5 km south from the village of Chomonyn, on the road to the village of Serne. Here again we focussed on the aquatic vegetation within the drainage channel (4 relevés). The associations of *Hydrocharition* Rübél 1933, *Lemnion minoris* W. Koch et Tx. ex Oberd. 1957 and *Glycerio-Sparganion* Br.-Bl. et Sissing ex Boer 1942 represent this site:

**Relevé area:** 3x4 m, vegetation cover: 95%

5 <i>Hydrocharis morsus-ranae</i>	2a <i>Spirodela polyrhiza</i>
2a <i>Salvinia natans</i>	2m <i>Lemna trisulca</i>
2m <i>Lemna minor</i>	1 <i>Glyceria maxima</i>
1 <i>Elodea canadensis</i>	

**Relevé area:** 2×2 m, vegetation cover: 80%

4 <i>Spirodela polyrhiza</i>	2a <i>Lemna minor</i>
2a <i>Hydrocharis morsus-ranae</i>	2m <i>Lemna trisulca</i>

**Relevé area:** 1.5×1.5 m, vegetation cover: 95%

4 <i>Sparganium erectum</i>	3 <i>Spirodela polyrhiza</i>
2b <i>Lemna minor</i>	1 <i>Lycopus europaeus</i>
1 <i>Lemna trisulca</i>	1 <i>Bidens frondosa</i>

**Relevé area:** 2×5 m, vegetation cover: 95%

4 <i>Lemna minor</i>	2b <i>Spirodela polyrhiza</i>
2a <i>Lemna trisulca</i>	1 <i>Salvinia natans</i>
1 <i>Elodea canadensis</i>	1 <i>Ceratophyllum demersum</i>
+ <i>Hydrocharis morsus-ranae</i>	

**SITE 16: UKRAINE.** Our final site stop was along the road between the villages of Serne and Batevo, where the emergent vegetation in the drainage channel comprised two associations, separated mainly by the relative dominance of two *Typha* species:

*Typhetum angustifoliae* (All. 1922) Pign.

**Relevé area:** 2.5×20 m, vegetation cover: 95%

5 <i>Typha angustifolia</i>	1 <i>Typha latifolia</i>
1 <i>Lycopus europaeus</i>	+ <i>Lysimachia nummularia</i>
+ <i>Galium palustre</i>	

*Typhetum latifoliae* Soó 1927.

**Relevé area:** 2.5×20 m, vegetation cover: 90%

5 <i>Typha latifolia</i>	2m <i>Lysimachia vulgaris</i>
2m <i>Lycopus europaeus</i>	1 <i>Galium palustre</i>
1 <i>Carex riparia</i>	

Our excursion finished at Chop where the group dispersed at 12-12.30 p.m., some remaining in Ukraine, some travelling on to Austria, and others driving back to the UK via România and intervening countries.

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