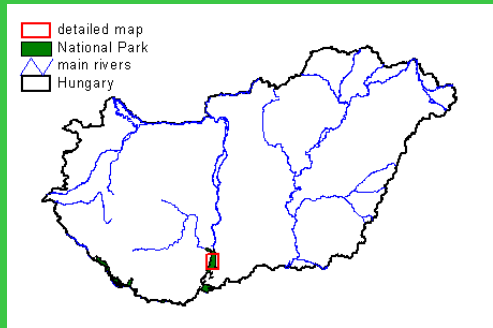


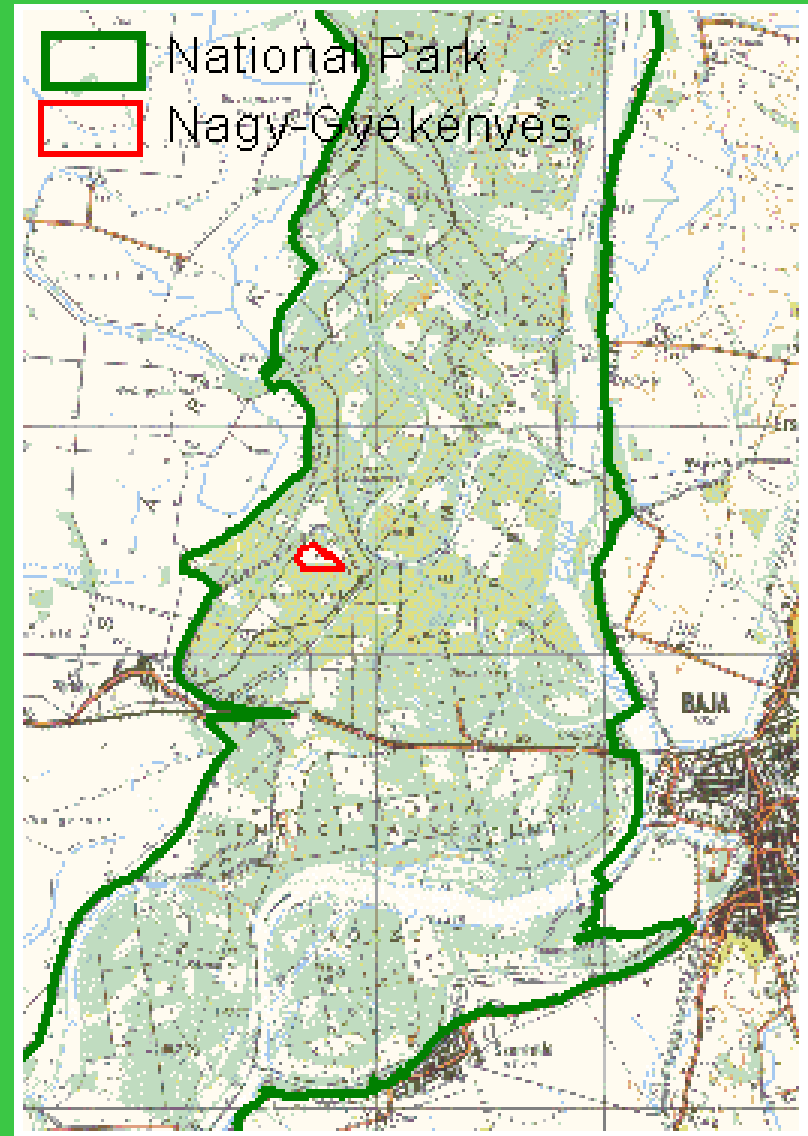
Modification of herbaceous floodland vegetation depending on water regime changes at Gemenc, Middle-Danube-valley, Hungary





The Danube-Drava NP in Hungary

The
examined
plot
at
Gemenc

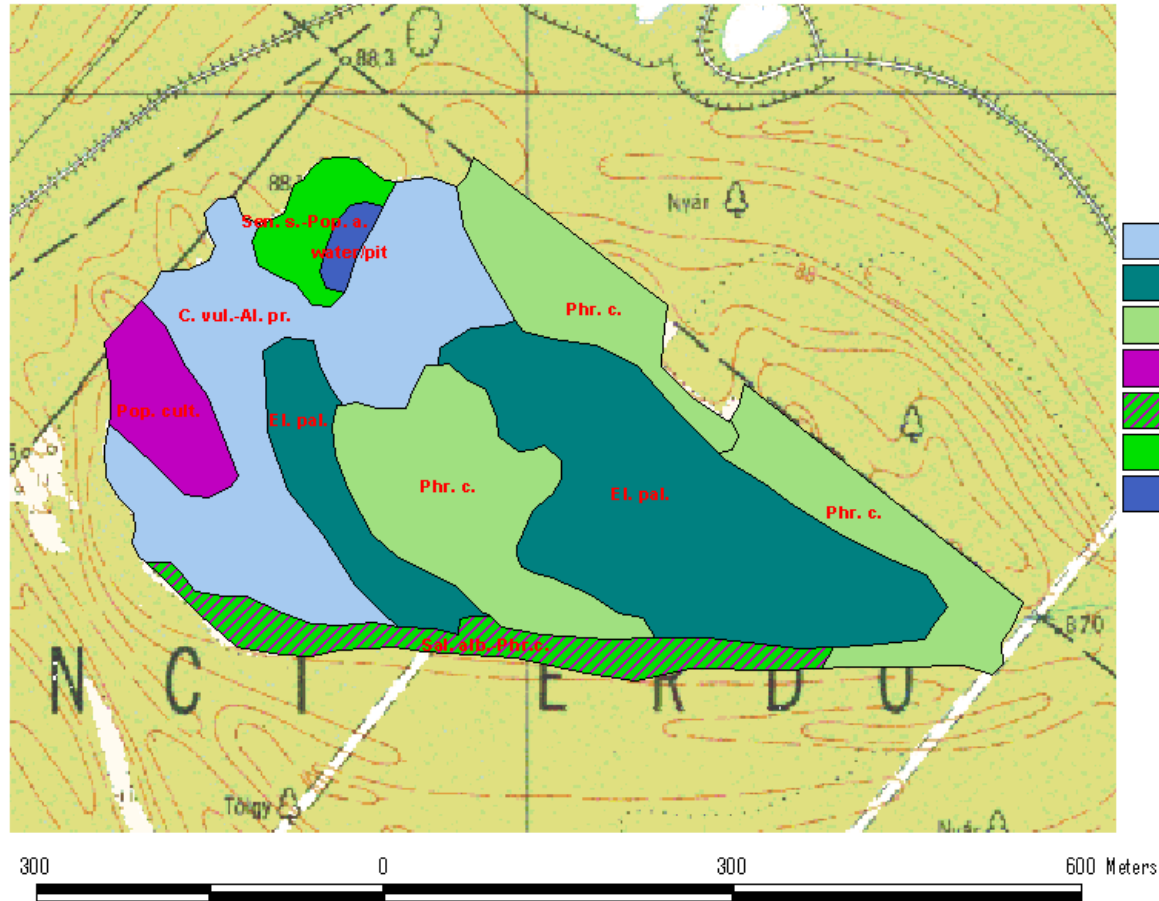


- The Danube-Drava National Park Directorate planned the reconstruction of side-branches, canals and flood area of the Danube at the Gemenc floodland.
- Before the reconstruction work botanical surveys were done to discover the naturalness of the plot and to forecast changes in the habitats.
- Between 2002 and 2004 vegetation mapping and descriptions were made four times at Nagy-Gyékényes.








2002:

- The vegetation types and the species composition showed that the area is regularly under water for shorter or longer periods. This was confirmed by the accidental presence of three aquatic plant species in the non aquatic habitats: *Ranunculus trychophyllus*, *Persicaria amphibia*, *Potamogeton lucens* in the *Carici vulpinae-Alopecuretum pratensis*.
- Three main vegetation types of the area were *Phragmitetum communis*, *Alismato-Eleocharitetum*, *Carici vulpinae-Alopecuretum pratensis*.
- The distribution of these grassland habitats was driven by the microrelief.

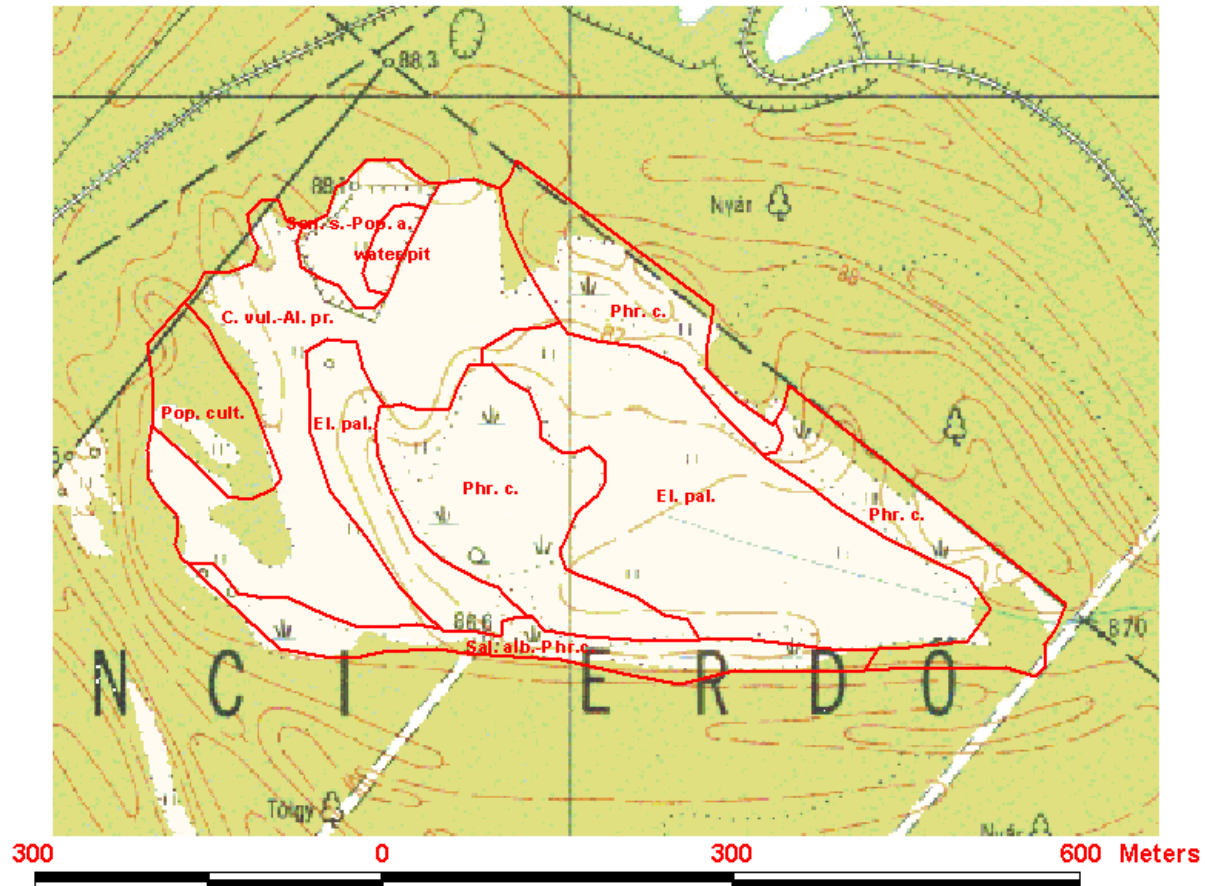
Vegetation map of Gyékényes



Legend

-  Carici vulpinae-Alopecuretum pratensis
-  Alismato-Eleocharitetum
-  Phragmitetum communis
-  Populetum cult.
-  Salicetum albae - Phragmitetum communis
-  Senecioni sarracenici-Populetum albae
-  water/pit

Vegetation map of Gyékényes



The near natural grassland vegetation types of the 2002-stand vegetation map:

Phragmitetum communis: natural reed stands, poor in species.

In the deepest parts under direct water effects – it seems clearly on the ecological water indication values of the species and the presence of water all year.

Carex acutiformis

Carex riparia

Euphorbia palustris

Fraxinus angustifolia ssp. *pannonica*

Lysimachia vulgaris

Phalaris arundinacea

Phragmites australis

Salix alba

Symphytum officinale

Typha latifolia

The near natural grassland vegetation types of the 2002-stand vegetation map:

Alismato-Eleocharitetum: marshy vegetation type at medium or low level surfaces, continuously wet and frequently under water. Loose, two-level herbaceous association in the higher level with monocotyledonous dominance and in the lower level mainly dicotyledonous species, including pond-weed species.

Alisma plantago-aquatica

Carex acutiformis

Carex riparia

Eleocharis palustris

Lysimachia vulgaris

Persicaria amphibia

Phalaris arundinacea

Potamogeton lucens

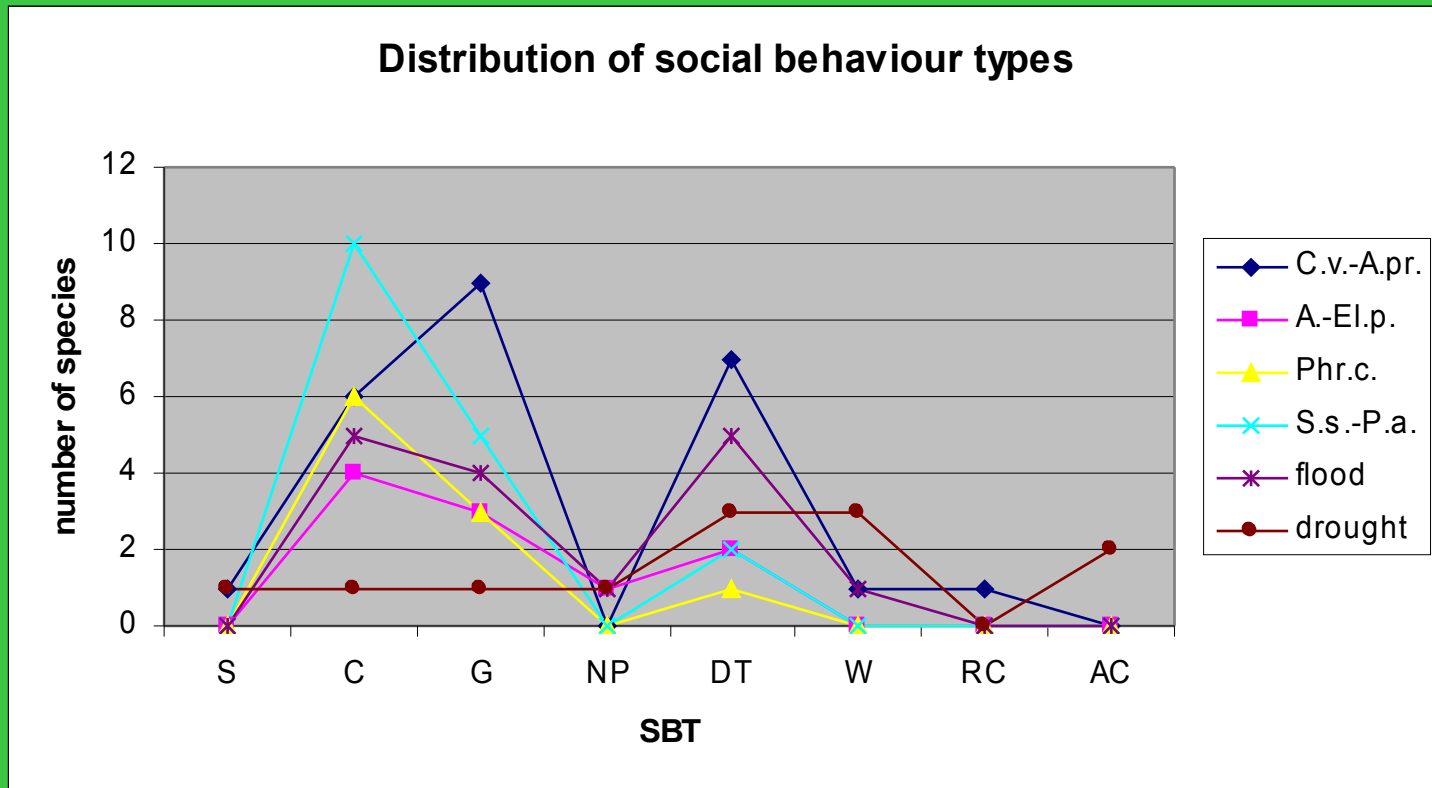
Ranunculus trichophyllus

Symphytum officinale

The near natural grassland vegetation types of the 2002-stand vegetation map:

Carici vulpinae-Alopecuretum pratensis: alluvial meadows on the highest and driest parts. Grass species dominant, the lower level dicotyledonous species colouring the habitat are more frequent. Most of the species are expressly water-demanding, beside these other species have broad ecological range.

Alisma plantago-aquatica	Plantago media
Alopecurus pratensis	Poa palustris
Carex acutiformis	Polygala comosa
Cirsium oleraceum	Potentilla reptans
Eleocharis palustris	Ranunculus repens
Euphorbia palustris	Rumex crispus
Festuca pratensis	Sanguisorba officinalis
Glechoma hederacea	Scirpus lacustris ssp. lacustris
Glyceria maxima	Symphytum officinale
Leucanthemum vulgare ssp. vulgare	Taraxacum officinale
Lychnis flos-cuculi	Thalictrum flavum
Lysimachia vulgaris	Trifolium pratense Vicia angustifolia



The abbreviations of the Social Behaviour Types by Borhidi:

S: specialists

C: competitors

G: generalists

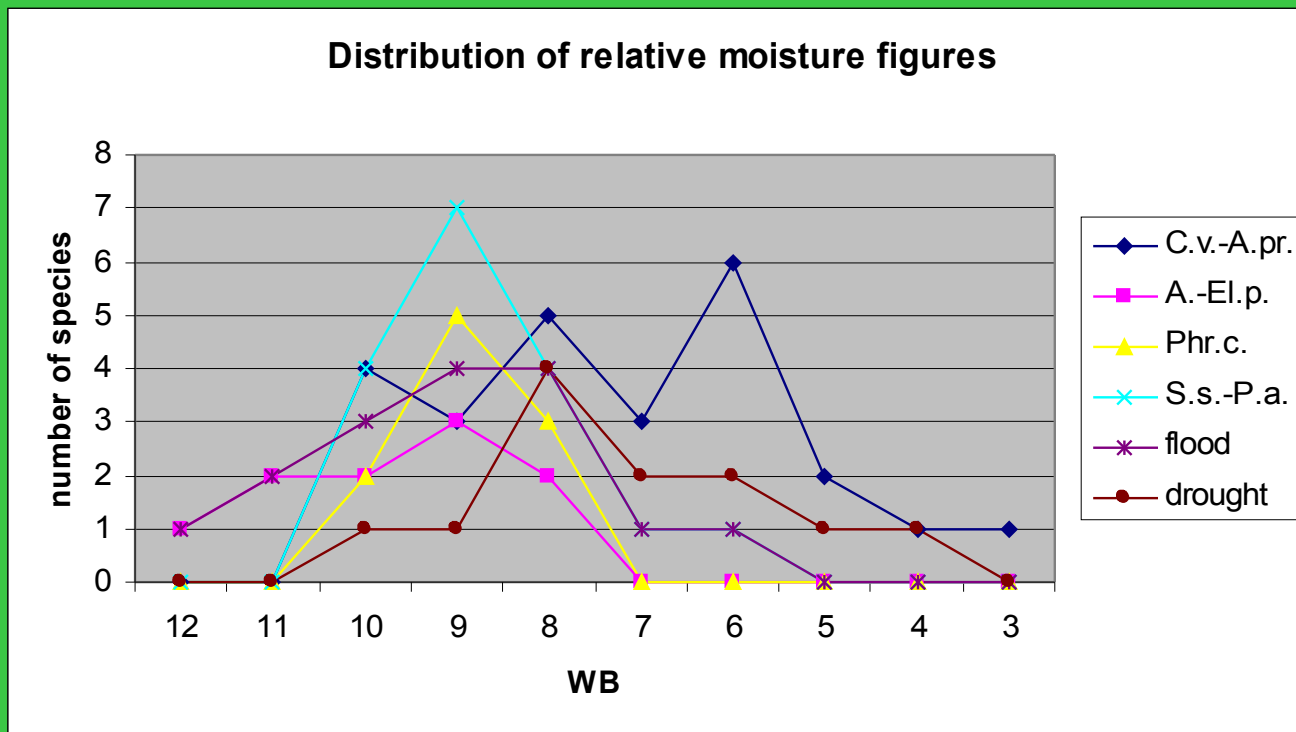
NP: natural pioneers

DT: disturbance-tolerant species

W: weeds

RC: ruderal competitors

AC: alien competitors



The indicator values of relative “moisture figures” by Borhidi:

- 3: Xero-tolerants, but eventually occurring on fresh soils
- 4: Plants of semiarid habitats
- 5: Plants of semihumid habitats, under intermediate conditions
- 6: Plants of fresh soils
- 7: Plants of moist soils not drying out and well aerated
- 8: Plants of moist soils tolerating short floods
- 9: Plants of wet, not well aerated soils
- 10: Plants of frequently flooded soils
- 11: Aquatic plants with floating or partly emergent leaves
- 12: Aquatic plants, most wholly submersed in water

At the end of summer 2002 a long and extraordinarily high-water period occurred. The Nagy-Gyékényes was under water for two months. In this period almost all the meadow changed into a transition state between *Alismato-Eleocharitetum* and pond-weed vegetation of *Potamogeton lucens* and *Ranunculus trychophyllus*. The reed stands and the alluvial meadows of the highest plots stood unchanged. The new dominant species were disturbance-tolerant ones of wet habitats, like *Polygonum lapathifolium*, *Rumex crispus*. Some disturbance-tolerant species which are indifferent to the water regime also became more common, like *Vicia cracca*.

This long flooding state simulated the effects of the aimed reconstruction. It was easy to see that vegetation types will change into a more wet state and species composition will be narrower. Because the main point was to make feeding area for birds and there were no highly valuable plant species, the calculable changes were acceptable.

2003:

Long drought period occurred and gave the idea of renewing the survey.

The loosened marshy vegetation without water cover became enriched in fast spreading, disturbance-tolerant, ephemeral and pioneer species many of them being weeds and invasive species like *Ambrosia elatior*, *Echinochloa crus-galli*, *Potentilla reptans*, *Potentilla supina*, *Vicia cracca*. Over all – except for the persisting alluvial meadow patches of the highest elevations and the reed stands – Nagy-Gyékényes became a homogenous grassland area with considerable weed presence.

2004:

The canal which connects the Nagy-Gyékényes with the Rezéti-Duna was cleaned and opened.

At high water stand it is possible to bleed the water of the Danube to the meadow. After the flooding, drying up needs 2 or more months which term is usually long enough to catch the next high water period. Of course sometimes the area is without water and weed species accrue, but normally it is a splashy place with hygrophilous and aquatic elements in the vegetation.

2005-2006:

In the 2005 and 2006 years extreme high water level occurred two times when all the Nagy-Gyékényes was under water for weeks and after this the deeper levels for months.

For the spring of 2007 the original grassland vegetation were absolutely changed and became homogenous, disturbance-tolerant similar to the flood of the year 2002.

2007:

After all this about one year long low water period was experienced.

-the vegetation started to regenerate

-the herb layer became a bit species poor but more natural like and not so disturbed than earlier

-probably reasons: the starting propagulum composition and the sweep of *Poa trivialis* (which became the absolute dominant grass of the all area and in this role crowded out the weeds).

-next to the rough bluegrass the *Potentilla supina* is very common and at many place codominant.

-both of these species are fast colonising plants of moist soils, the relative moisture figures are 7 and 8. The social behaviour types are: the rough bluegrass is disturbance-tolerant and the spreading cinquefoil is natural pioneer.

-the two mostly dominant species are at the disturbed part of Social Behaviour Types scale and of course both are water demanding

The present homogenous vegetation dominated by *Poa trivialis*



Conclusions

- The drastically different water regime states surround each other, offering a simple way of proving the fast changing character of the floodland grassland vegetation.
- The changes of the species composition were driven directly by the accessible water and the water coverage. It was seen not only on the surface and plant coverage, but was clearly shown by the analysis of ecological indexes and social behaviour types of the plant species.
- In a constant water regime, vegetation pattern is formed by microrelief, but when water level changes fast, the pattern will be present in time.
- Because of the faster reactions the species composition is different from a stable state: it is narrower and enriched in weeds.
- The collected data simply and clearly showed that the herbaceous vegetation of the floodland reacts fast and sensitively to changes of accessible water.

Thanks for your attention!