

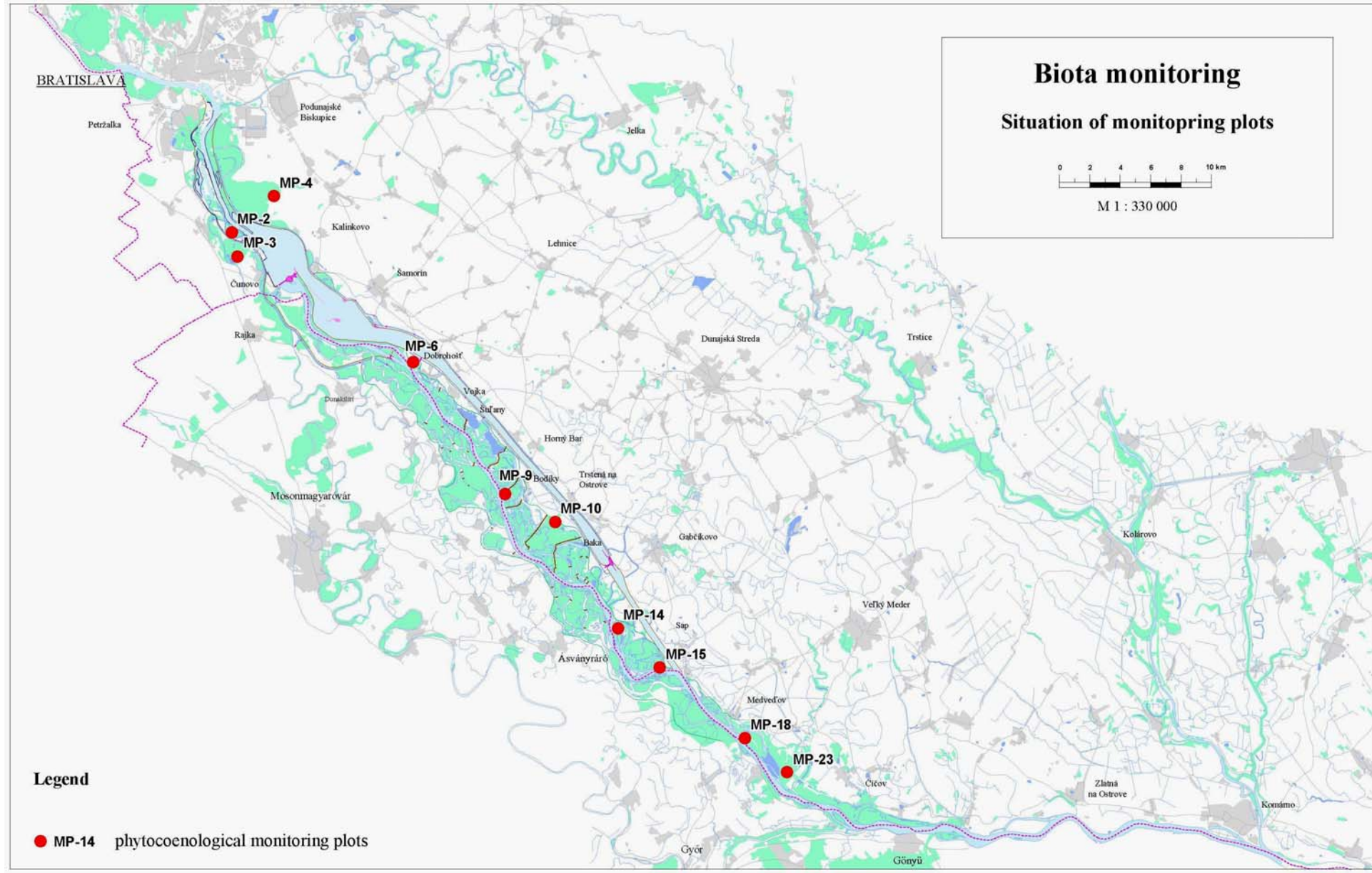
Flora and forest vegetation monitoring

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V.2.9. Flora and forest vegetation in the area of the Gabčíkovo project





Monitoring Plots

determined according to the expected impact of the Gabčíkovo structures on the biota:

- areas with expected ground water level increase:
 - MP 2A Rusovské ostrovy – Bratislava, Rusovce
 - MP 3A Ostrovné lúčky – Bratislava, Čunovo
 - MP 4A Topoľové hony – Bratislava, Podunajské Biskupice

- areas with expected ground water level decrease:
 - MP 6 Dunajské kriviny – Dobrohošť
 - MP 9 Bodícka brána – Bodíky
 - MP 10 Kráľovská lúka – Bodíky
 - MP 14 Istragov – Gabčíkovo
 - MP 15 Erčed – Palkovičovo

- areas no or minimal impact expected - reference localities:
 - MP 18 Sporná sihot' – Klúčovec
 - MP 23 Starý les – Klúčovec-Čičov

Methods

Vegetation sampling

- repetitive phytocoenological relevés (marked area 400 m²)
- coverage of individual layers (tree, shrub, herb)
- species abundance and dominance (5 degree Braun-Blanquet scala)
- periodicity 2 x yearly: spring and summer sampling

Evaluations

- changes in layers coverage
- species diversity – total number of species and diversity in E3, E2 and E1 layer
- between-years similarity of stands in two consecutive years – Jaccard index
- ecological structure by indices of light, temperature, continentality, soil humidity, soil reaction and soil nitrogen (according Ellenberg's principle)
- life form change analysis

Inventory of flora

- occurrence of individual species of vascular plants
- endangered species and invasions of alien taxa

Sampling – in the year 2002 (Institute of Botany SAS)
– 10 monitoring plots

Results

MP in the upstream part of the territory

MP 2B Rusovské ostrovy - Bratislava, Rusovce

- from the viewpoint of preserving natural habitats of aquatic and wetland vegetation - valuable locality
- from the floristic viewpoint relatively well preserved
- generally stabilized *Fraxino-Populetum* forest stand
- considerable fluctuation of species number: spring 16 (1998) to 26 (2003, 2005)
summer 6 (2002) to 24 (1995, 2005)
- between-years similarity fluctuated: spring 60% (1996/1997) to 81% (2004/2005)
summer 47% (2001/2002) to 83% (1999/2000)
- values of ecological indices changed insignificantly
- forest supplied with floodwater from the Danube at higher water levels

MP 3A Ostrovné lúčky – Bratislava, Čunovo

- influenced by the Čunovo reservoir
- fluctuation of ground water levels → stabilized on a higher level than before
- two different types of biotops: softwood floodplain forest and xerothermic habitat
- more ruderal and weed species, along the roads and paths, penetrating into disturbed opened microhabitats, number of invasive species increased twice
- negative impact of recreation
- the most dynamic development - degraded willow stand *Salici-Populetum* with *Urtica dioica*
- permanently drowned since 1996
- plant community changed into the waterlogged type (with *Lemna minor*, *Riccia fluitans*)
- perspective: transformation of a forest community into a wetland community



MP 4 Topoľové hony – Bratislava, Podunajské Biskupice

- nature reserve - a set of habitats from willow-poplar floodplain forests to the mezohygrophilous with a transition to the shrub and xerothermophilous stands
- large number of total taxa 329 in year 2002
- the driest type of forest stand *Ulmo-Quercetum convallarietosum*
- relatively high between-years similarity 60% (summer 1996/97) to 85% (spring 2003/04)
- tree layer (*Quercus robur*, *Acer campestre*) tend to crown opening and disintegration
- vegetation depends on precipitation water



MP in central part of the territory

(in the stretch between Dobrohošť and Gabčíkovo)

- decrease in ground water level → the negative impact on vegetation

MP 6 Dunajské kriviny – Dobrohošť

- drying of old willows and poplars in a large area
- total number of taxa of vascular plants decreased (130 in 2002; 190 in 1990)
- decline of hydrophytic species
- stand of white poplars and willows *Salici-Populetum* var. *Cornus sanguinea* monitored
- dynamic internal changes – fluctuating diversity (33 - 41 species)
- change in ecological spectrum present species (increased proportion of nitratophilous species)
- low between-years similarity (53%; 1997/1998) increased (71%; 2004/2005)
- crown thinning, languishing and gradual disintegration of the tree layer

MP 9A, 9B Bodícka brána - Bodíky

- floristic structure poorer at present (100 taxa of vascular plants; in 1990 - 146)

9A:

- stand of poplar cultivar *Populus x canadensis*
- clear-cut in 1997 → reforested
- other type of development began
- onset of heliophilous, synanthropic and weed species
- changes in all parameters monitored – coverage, species composition, diversity, decreased between-years similarity
- Six years after clear-cut: the situation returns to the state from 1990:
 - formed a tree layer
 - herb layer develops in mosaic patches
 - retreat of heliophilous, synatropic and strongly nitrophilous species

9B:

- willow stand on a sandy deposit near old Danube river
- drain effect – willow vitality decreased
- damaged by tree cutting on MP 9A, tree layer disintegrated – grow on the plot periphery
- supplementary community – in herb layer dominant nitrophilous and synanthropic species (*Urtica dioica*, *Cirsium arvense*, *Arctium lappa*) as well as invasion *Aster lanceolatus*, stable high coverage

MP 14 Istragov – Gabčíkovo

- Danube arms and their denuded bottoms – relatively preserved and floristically rich
- great part of Istragov Island – reed stand in relatively good state from the floristic viewpoint
- strong synanthropisation and penetrating of invasive species affected – the drier forest habitats
- floristic inventory: 109 taxa – 8 rare and endangered, 5 invasive (1990/91: 275 taxa)
- softwood forest subass. *Salici-Populetum myosotidetosum* with poplar cultivar
- gradual dying off of all willows on permanent plot
- change in species composition: decreasing number of hydrophilous species
ruderalization – increasing of nitrophilous species
- between-years similarity strongly fluctuates 43% (1996/1997) to 79% (2000/2001)
- assimilation apparatus of poplar cultivar worsened (decreased leaf area)





MP in central part of the territory → small impact on vegetation

MP 10A, 10B Kráľovská lúka – Bodíky

- floristically valuable parts – oxbow and reed stand; total number of taxa 91: 11 rare and endangered, 5 invasive (1990 the number of taxa lower - 85)

10A: in moderate terrain depression

- waterlogged type with species requiring large humidity, presence of the
- indicative, rare, protected species *Leucojum aestivum*

10B: on relatively elevated part

- covered by a monoculture of tall-trunk willows with undergrowth of nitrophilous, little hygrophilous species and neophytic *Aster lanceolatus*
- development in both localities influenced by ground water level, contacting rhizosphere of herbs and woody plants
- development considered as stabile
- indicator of adequate habitat conditions – good vitality of the local population of *Leucojum aestivum*





MP 15 Erčed – Palkovičovo

- softwood floodplain forest and growths of hygrophilous and wetland species on bottom shallow Danubian arm
- floristic inventory: 101 taxa of vascular plants recorded (2002); 6 rare and endangered, 5 invasive species – *Aster lanceolatus*, *Solidago gigantea* especially intensive
- abundance of some nitrophilous species (*Urtica dioica*, *Galium aparine*, *Glechoma hederacea*) increased
- monitored willow stand of *Salici-Populetum myosotidetosum* with occurrence of rare and protected *Leucojum aestivum*
- site - was the second most humid type of the monitored localities
- ground water level ascends into the soil upper horizons during a major part of the year, floods occur regularly (once or twice) a year, except for 2003 and 2004
- proportion of hydrophytes shows a declined trend
- values of the between-years similarity vary considerably: spring 48% - 72%, summer 43% - 71%, the largest change in 2000/2001
- elimination of original wetland species by the neophyte – *Aster lanceolatus* is striking



MP with no or minimal impact expected – reference localities

- humidity regime depends on water levels in the Danube
- flooded every year (in rich water years even twice a vegetation season)
- oscillations in coverage of herb layer, diversity and the between-years similarity of stands

MP 18 Sporná sihot' – Klúčovec

- rich variety of plant communities: open water surfaces, ephemeral terrestrial com., high sedges, reed, shrubs, meadows to the floodplain forest
- floristically represented by 105 taxa: 6 are rare and endangered, 7 invasive (*Aster lanceolatus*)
- natural floodplain forests are damaged by economic activities
- homogeneous, even-aged stand of grey poplar assoc. *Fraxino-Populetum* monitored
- relative low ground water level
- species number fluctuated strongly: spring 13 (2002) to 26 (1995)
summer 17 (1997, 2005) to 29 (2003)
- ecological indices – significantly changed only soil nitrogen (max 1995, min 2002)
- predominated species of fresh humid to humid soils
- between-years similarity of the stand: 57% (2001/2002) to 81% (2002/2003)
- two last years – a relative stabilizing of species composition





MP 23 Starý les – Klúčovec-Čičov

- valuable localities of natural habitats, aquatic and wetland vegetation
- floristic inventory in 2002: 122 taxa of vascular plants - 9 rare and endangered, 7 invasive
- softwood floodplain forest subassoc. *Salici-Populetum phragmito-caricetosum* monitored
- dynamics of the hydrological regime – reflected in the dynamics of the herb layer
- herb layer with high coverage 90 - 100% reduced by floodwater/ by water stagnation
- diversity fluctuates: spring 9 (2003) – 19 species (1997, 2000, 2004)
summer 11 (1997) – 21 species (2002)
- predominate species of humid to moist soils
- proportion of geophytes is high – due to presence of *Leucojum aestivum*
- between - years similarity fluctuate: spring 56% (1995/1996) to 88% (2001/2002)
summer 57% (2001/2002) to 85% (2000/2001)
- changes at the species level – natural rhythm of floods



Monitoring plot	Total number of species		Endangered + protected species		Invasive plant species	
	1990/91	2002	1990/91	2002	1990/91	2002
MP 2B Rusovské ostrovy	168	116	2	1	10	9
MP 3A Ostrovné lúčky	113	351	18	15	4	14
MP 4A Topoľové hony	408	329	35	3	8	7
MP 6 Dunajské kriviny	190	130	9	2	9	7
MP 9 Bodícka brána	146	100	19	2	7	7
MP 10 Kraľovská lúka	85	91	11	11	3	5
MP 14 Istragov	275	109	10	8	13	5
MP 15 Erčed	86	101	1	6	5	5
MP 18 Sporná sihoť	133	105	11	6	6	7
MP 23 Starý les	108	122	11	9	7	7

A photograph of a garden scene. In the foreground, there are several tall, green, sword-shaped leaves, likely from an iris plant. Some of these plants have bright yellow flowers. The background is filled with a dense thicket of green foliage, including various leafy plants and some small white flowers. The overall lighting is bright, suggesting a sunny day.

Thank you

for your attention!