«Gornje Podunavlje» Special Nature Reserve [1]

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Site location

The region of Apatinski and Monoštorski rit wetland areas together with the attached remnants of wetlands at Karapandža and Štrbac, lies in the flooded area of the Danube, along its upper course through Serbia, in the utmost NW part of Bačka in Vojvodina Province. It spreads over the alluvial deposits of the left bank of the Danube river, immediately from the Hungarian border to Bogojevo with the lenght of 64 km in the south. The total area is about 20000 ha.

Protection

The region has been protected since 1982. The area under the name of "Gornje Podunavlje or Monoštor" was listed for IBA Register (YU 029) in 1989, with the area of 1000 ha. By revising in 1997 new limits of 30000 ha was proposed for the IBA. It was nominated in 2007 for the list of Ramsar sites.

It is included in international projects: "Support to Protected and Transboundary Areas", as a part of the Action Plan "Parks for Life" and EURONATUR for promotion of the Biosphere Reserve of "Drava - Mura".

General characteristics

It is a lowland with the altitude of 78-88 m. The most part of the area is covered with complexes of gallery and marshy forests, intersected by river branches and channels, stagnant tributaries, swamps, and pools. Changing its river-bed, the river has made long isthmuses and depressions that change by turns, which significantly influences the locations of inundated waters and the level of subterrain waters. At high watertable the swampy forests, depressions and pools in the unprotected (from floods) part of Apatinski and Monoštorski rit are directly influenced by water from the river. In the protected part water level in pools and depressions depends on the level of subterrain waters. The difference between vegetation of the protected area and unprotected area is significant. Duration and time of flooding, soil porosity and natural draining of surface and subterrain waters are great importance to flora and fauna.

The marshes of Apatinski and Monoštorski rit together with the attached remnants of wetlands at Karapand`a and Strbac, represent the remnants of formerly widely distributed marshes, pools and swamps of Podunavlje, which by hydromelioration

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works and erection of embankment have been reduced to a narrow belt along the river. The most part of the area is covered with complexes of marshy forests, intersected by river branches and channals, stagnant tributaries, swamps, and pools..

Vegetation

The wildlife of this part of the Pannonian plain is caused by its historic development and ecological factors which are reflected in geographical position, climate, orography, pedologic and biotic factors. According to STEVANOVIĆ (1995) this area is classed into the Pannonian-Danubian subregion of the Pontic-Southsiberian floristic region. According to PARABUĆSKI and JOVANOVIĆ (1978) the natural potential vegetation of this part of Podunavlje represents hydrologically determined vegetation of azonal type of the community of lowland autochthonous forests of willows and poplars (*Salici - Populetum sensu lato*) and English oak (*Genisto – Quercetum roboris*).

Vegetation is hydrologically conditioned that means azonal, developing under the influence of flood and underground waters. Phytocoenological investigations point to high degree of vegetational type diversities. By syntaxonomic survey of phytocoenoses the presence of 51 plant communities, classified into 23 alliances, 18 orders and 14 classes were noted. The total of 156 different syntaxonomic units have been recorded. The communities of herbaceous type are dominant with its 38 communities or 74,5 %, while woody and shruby formations with its 13 communities (25 %) are considerably less frequent. The most of communities are of primary character. Exraordinary distinguished are aquatic and semiaquatic vegetations of classes: *Lemnetea, Potametea, Litorelletea, Phragmitetea* and *Isoeto – Nanojuncetea*, which develop in fragile water, pool, swamp and wet meadow ecosystems. On higher levels the autchthonous stands of the following vegetational classes*: Salicetea purpureae, Alnetea glutinosae and Querco – Fagetea* are developed. Meadow and salt steppe vegetation of classes *Molinio-Arrenatheretea* and *Festuco–Puccinellietalia* are fragmentarily developed. Ruderal vegetation consists of the following classes: *Bidentetea tripatritae, Chenopodietea, Plantaginetea majoris* and *Artemisietea*. The largest part of this region cover communities of the order *Salicetalia purpureae*, *Populetalia albae*, *Phragmitetalia* and *Magnocaricetalia*.

Flora

The floral richness is characterized by the presence of about 1000 plant species (28 % of the total national flora). The flora of this area is significantly characterized by the species of the narrow areal of Pannonian floric features, particularly Pannonian endemics and subendemics, then Subatlantic, Submediterranean and the most distributed Central-European and European species, some of which are of relict character, and as endangered ones have been listed for European and national Red Data Book of flora, and as natural rarities are protected by the law. Such species is

e.g. Pannonian endemic *Cirsium brachycephalum* which is of international significance (STEVANOVIĆ, VASIĆ, 1995) and which has been listed for The Red Data Book of Flora of Europe and Pannonian subendemics *Crataegus nigra*. From Subatlantic species, only at one microhabitat *Ranunculus ophioglossifolius*, a relict of postglacial wet period of subboreal grows. According to IUCN Red List Categories (1994) this plant has been distinquished as species endangered to become an extinct – endangered (E). To the same endangered category belongs SubMediterranian species *Iris spuria* which is of relict significance, and which grows in small numbers around Crna bara (STOJŠIĆ, PANJKOVIĆ, 1998). Central–European and European floral elements are most distributed in the group of relict aquatic plants originated from warm Tertiary period of north and central Europe (SLAVNIĆ, 1956; BUDAK et al.1992; STOJANOVIĆ et al. 1994) such as *Hottonia palustris, Nymphaea alba* and *Numphar luteum*. Central–European feature also has *Eranthis hyemalis*, a rare resident of oak and hornbeam communities in the forest of Kozara. European significance has the representative of relict family of orchids *Dactylorhiza incarnata* which grows together with *Orchis laxiflora* at wet meadows of Apatinski rit. Among the group of plants of wider Subcircumpolar distribution is the species *Hippuris vulgaris*. Its largest populations are in unprotected belt of Apatinski rit, under direct influence of natural flooding of the Danube. The species *Eranthis hyemalis*, *Hottonia palustris* and *Hippuris vulgaris* have been distinguished as critically (CR) endangered species in The Red Data Book of Flora of Serbia (STEVANOVIĆ, 1999).

Syntaxonomic overview

Phytocenological researches of the aquatic vegetation were carried out during the vegetation period from 1996 – 2005 according to the principles of the school Zürich-Montpellier (BRAUN-BLANQUET,1964).
Nomination and syntasconomic review of communities are quoted according to Passarge (1996) and Middle Europe vegetation (OBERDORFER, 1998). Determination of the species and nomenclature was taken according to Flora of Serbia (JOSIFOVIĆ, 1970-1977). Life forms and floral elements are given to Stevanović (in SARIĆ, 1992).

Klasa: *Lemnetea* W. Koch et Tx. 54

Red: *Lemnetalia* W. Koch et Tx. 54

Sveza: *Lemnion minoris* W. Koch Tx ex Ober. 57

Ass. *Lemno – Spirodeletum polyrchizae*

Ass. Lemnetum gibbae

Ass.: *Lemnetum trisulcae* Den Hartog 63

Ass.-gr. *Riccietum fluitantis* Slavnić 56

Ass.: (*Lemno minoris-*) *Riccietum fluitantis* Slav. 56

(*Lemno minoris-*) *Riccietum fluitantis* Slav. 56 subass. *Lemnetosum trisulcae* Müll.& Görs 60

(*Lemno minoris-*) *Riccietum fluitantis* Slav. 56 subass. *Ricciocarpetosum natantis* Tx.74

Ass._gr.: *Ricciocarpetum natantis* Tx.74

Ass.: *Lemno minoris – Ricciocarpetum natantis* Segal 66

Ass.: *Spirodelo polyrhizae - Salvinietum natantis* Slav. 50

Ass.: *Lemno minoris- Azolletum* filiculoides Br. - Bl. 52

Ass. *Lemno minoris – Utricularietum vulgaris* Soo (28) ex. Pass.64

Sveza: *Ceratophyllion* Den Hartog et Segal 1964

Ass.: *Ceratophylletum demersi* (Soo 27) Hild 34

Klasa: *Potametea* Tx. et Prsg. 42

Red: *Potametalia* W. Koch 26

Sveza: *Potamion eurosibiricum* W. Koch 26

Ass.: *Potamogenetum graminei* (W. Koch) Passarge 64

Sveza: *Nymphaeion* Oberd 57

Ass.: *Hottonietum palustris* Tx. 37

Ass.: *Myriophyllo - Numpharetum* W. koch 26

Subass.: *nymphaetosum* (Timar) Karpati

Subass.: *numpharetosum* (Timar) Karpati

Ass.: *Nymphoidetum peltatae* (All. 22) Oberd. et Muller 60

Ass.: *Trapetum natantis* Muller et Gors 60

Ass.: *Trapo – Nymphoidetum peltatae* Oberd 57

Ass.: *Hydrochario – Nymphoidetum peltatae* Sl. 56

Ass.: *Potamo - Ranunculetum circinati* Sauer

Ass.: *Numphoideto - Hippuridetum* Antic et al. 69

Ass.: *Myriophyllo - Potametum*

Red.: *Rupietalia* J. Tx. 60

Sveza: *Rupion maritimae* Br. – Bl. 31

Ass.. *Batrachio (aquatili) – Ranunculetum polyphylli* Soó (33) 61

Klasa: *Litorelletea* Br. - Bl. et Tx. 34

Red: *Littorelletalia* W. Koch 26

Sveza: *Eleocharition acicularis* Pietsch 56 em. Dierssen 75

Ass.: *Eleocharetum acicularis* W. Koch. 26

Klasa: *Phragmitetea* Tx. et Prsg. 42

Red: *Phragmitetalia* W.Koch 26

Sveza: *Phragmition communis* W.Koch 26

Ass.: *Scirpo - Phragmitetum* W.Koch 26

Subass.: *phragmitetosum* Schmalle 39

Subass.: *typhaetosum (angustifoliae – latifoliae)* Soó 73

Subass.: *schoenoplectetosum lacustris* Soó 57
* Ass.: *Phalaridetum arundinaceae* Libbert 31
*Ass.: *Glycerietum maximae* Hueck 31
*Ass.: *Oenantho - Rorippetum amphibiae* Lohm. 50
Red: *Magnocaricetalia* Pign 53
Sveza: *Magnocaricion* W. Koch 26
Ass.: *Caricetum elatae* W. Koch 26
Ass. *Caricetum vesicariae* Br. - Bl. et Denis 26
Ass. *Caricetum gracilis* (Graebn. et Hueck 31) Tx.37
Ass.: *Caricetum acutiformis - ripariae* Soó (27) 69

Klasa: *Isoeto - Nanojuncetea* Br. - Bl. et Tx. 43
Red: Nanoc*yperetalia* Klika 35
Sveza: *Nanocyperion flavescentisW*.Koch 26
Ass.:*Dichostylio – Gnaphalietum uliginosi* Babić 71

Klasa: *Bidentetea tripartitae* Tx., Lohm. et Prsg. 50
Red: *Bidentetalia tripartitae* Br. - Bl. et Tx. 43
Sveza: *Bidention tripartitae* Nordh. 40
Ass.: *Polygono - Bidentetum* (W.Koch 26) Lohm 50
Ass.: *Ranunculetum scelerati* Tx. 50
Ass.: *Alopecuretum aequalis* Burrichter 50

Klasa: *Chenopodietea* Br. - Bl. 51
Red: *Sisymbrietalia* J. Tx. 61
Sveza: *Sisymbrion* Tx., Lohm., Prsg. 40
Ass.: *Descurainietum sophiae* Krek 35
Ass.: *Hordetum murini* Libbert *32*
Red : *Onopordetalia acanthi* Br. Bl. et Tx 43
Sveza: *Onopordion acanthi* Br. - Bl. 26
Ass.: *Echio - Melilotetum* Tx. 42

Klasa: *Plantaginetea majoris* Tx. et Prsg. 50
Red: *Plantaginetalia majoris* Tx. (47) 50
Sveza: *Polygonion avicularis* Br. - Bl. 31
Ass.: *Lolio - Plantaginetum* (Lincola 21) Beger 30
Ass.: *Sclerochloo - Polygonetum avicularis* (Gams 27) Soó 40

Klasa: *Artemisietea* Lohm., Prsg. Et Tx. 50
Sveza: *Arction lappae* Tx. 37 em. Siss. 46
Ass.: *Tanaceto – Artemisietum* Br. – Bl. 47
Ass.: *Sambucetum ebuli* Felfoldy 42

Klasa: *Molinio - Arrhenatheretea* Tx. 37
Red: *Arrhenatheretalia* Pawl. 28
Sveza: *Arrhenatherion elatioris* Br. - Bl. 25
Ass.: *Arrhenatheretum elatioris* Br. - Bl. 19

Klasa: *Festuco – Puccinellietalia* Soó 68
Red: *Puccinellietalia* Soó 40
Sveza: *Puccinellion limosae* (Klika 37) Wendelbg 43
Klasa: *Salicetea purpureae* Moor (58) 60
Red: *Salicetalia purpureae* Moor (58) 60
Sveza: *Salicion triandrae* Malc. 29, Mull. *Et Gors 58 (Br. – Bl. 56)*
Ass.: *Salicetum triandrae* Malc. 29
Ass.: *Salicetum purpureae* Wend. - Zel. 52
Sveza: *Salicion albae* Soó 71
Ass.: *Salicetum albae pannonicum* Parabućski (65) 72
Ass. *Salici - Populetum nigrae* (Tx. 31) Meijer - Drees 36
Klasa: *Alnetea glutinosae* Br. – Bl. Et Tx 43
Red: *Alnetalia glutinosae* Tx. 37
Sveza: *Alnion glutinosae* (Mald. 29) Meier, Dr. 36
Ass.: Ass.: *Leucoio - Fraxinetum angustifoliae* Glav. 59
Sveza: *Salicion cinereae* Mull. Et Gors 58
Ass.: *Salicetum cinereae* Jov. 53
Klasa: *Querco - Fagetea* Br. Bl. et Vlieg. 37
Red: *Populetalia albae*Br. - Bl. 31
Sveza: *Alno – Quercion roboris* Ht 38
Ass.: *Populetum nigro - albae* Slav. 52
Ass.: *Crataego nigrae – Populetum albae* Parabućski (65)72
Subass.. *typicum* Parabu}ski (65) 72
Subass.: *quercetosum* Parabućski (65) 72
Ass.: *Genisto elatae - Quercetum roboris* Ht. 38
Ass.: *Frangulo – Alnetum glutinosae* Rauš 68
Ass.: *Fraxino – Ulmetum effusae* Slav. 52
Red: *Fagetalia sylvaticae* Pawl. 28
Sveza: *Carpinion betuli illyrico – moesiacum* Horvat 56
Ass.: *Carpino betuli – Quercetum roboris* (Anić 59) Rauš 69

Red: *Prunetalia spinosae* Tuxen 52
Sveza: *Prunion spinosae* Soo (30) 40, Klikka 55
Sveza: *Berberidion vulgaris* Br. - Bl. 50
Ass.: *Corno - Ligustrietum croaticum* Ht. 59

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