

---

**Designation date: 08/03/12    Ramsar Site no. 2028**

**REPUBLIC OF SERBIA  
INSTITUTE FOR NATURE CONSERVATION OF SERBIA**

RAMSAR CONVENTION BUREAU  
*Rue Mauvenery 28*  
CH-1196 GLAND  
SWITZERLAND

Subject: **THE NOMINATION OF THE "KOVILJSKO-PETROVARADINSKI RIT"  
AREA FOR A RAMSAR SITE**

**1. Name and address of the nomination study compiler:**

Institute for Nature Conservation of Serbia:

Head Office, Dr Ivana Ribara 91, 11070 Novi Beograd, Serbia; [beograd@zzps.rs](mailto:beograd@zzps.rs)

Department in Novi Sad, Radnička 20a, 21000 Novi Sad; Serbia; [novi.sad@pzzp.rs](mailto:novi.sad@pzzp.rs)

Nikola Stojnić, M.Sc.; Biljana Panjković, Ph.D.; Jelena Stanišić, B.Sc., biologist; Laslo Galamboš, M.Sc.; Nedeljko Kovačev, B.Sc., geographer; Nataša Pil, M.Sc.; Ranko Perić, B.Sc., biologist; Jadranka Delić, B.Sc., biologist; Vladimir Dobretić, B.Sc., biologist; Slobodan Puzović, Ph.D.; Dragan Čalakić, geometer.

\* corresponding coordinator: Nikola Stojnić [nikola.stojnic@pzzp.rs](mailto:nikola.stojnic@pzzp.rs)

**2. Date:**

March 2012

**3. Country:**

Serbia

**4. Name of the Ramsar site:**

"Koviljsko-Petrovaradinski Rit"

---

**5. Designation of new Ramsar site or update of existing site**

---

This Ramsar Information Sheet (RIS) is for:

- a) Designation of a new Ramsar site
- b) Updated information on an existing Ramsar site

**6. For RIS updates only, changes to the site since its designation or earlier update:**

---

**7. Map of site:**

---

- a) The map of the nominated area with the appropriate scales is included in the Appendix.
- b) The Ramsar site is somewhat larger than the same-named Special Nature Reserve, which is, now by the new Decree with widened protection borders. Boundary of the site delineates alluvial area with well preserved wetland habitats on both sides of the Danube. The Ramsar site is somewhat smaller than the IBA site "Koviljski Rit", which encompasses loess hills on the right river bank of the Danube.

**8. Geographical coordinates:**

---

Greenwich: Central	45° 10' 40" N
	20° 04' 10" E
West	19° 54' 00" E
South	45° 09' 40" N
East	20° 14' 37" E
North	45° 15' 19" N

Gauss-Krieger: Central	5004.115
	7426.875
West	7413.665
South	5002.131
East	7440.543
North	5012.870

---

## 9. General location:

The "Koviljsko-Petrovaradinski Rit" is positioned in northern Serbia, Vojvodina Province, in southwestern Bačka, in the alluvial zone of the Danube, along its middle course in Serbia (river km 1219-1250), downstream from Novi Sad.

This area lies adjacent to the cities of Novi Sad, Kovilj, and Gardinovci along the left river bank, and Petrovaradin and Sremski Karlovci along the right river bank.

## 10. Elevation:

From 72 to 82 meters.

## 11. Area:

8291,7 hectares

## 12. General overview of the site:

The wide alluvial area on both sides of the Danube includes several units: Koviljski Rit, Petrovaradinsko-Karlovački Rit, Krčedinska Ada, Ločka Ada and Velika Ada. A mosaic of river arms, ridges, meanders, channels, ponds, reeds, wet meadows, pastures and forests was created by deposition of alluvium, with greatest floods occurring in June, as well as by the succession of vegetation and by human activities. Natural forests are dominated by the willow, white poplar and ash. The Pennsylvania ash tree and tree of heaven are also present to a large extent, as well as plantations of *Populus x euramericana* hybrids.

The Special Nature Reserve "Koviljsko-Petrovaradinski Rit", proclaimed in 1997, spreads over the area of 5895 ha..

The area of Koviljsko-Petrovaradinski Rit is inhabited by numerous rare plant species, among which water violet (*Hottonia palustris*), floating watermoss (*Salvinia natans*), four-leaved clover (*Marsilea quadrifolia*) and prostrate false pimpernel (*Lindernia procumbens*) stand out.

Some of the rare animal species are the sterlet (*Acipenser ruthenus*), great crested newt (*Triturus cristatus*), European pond turtle (*Emys orbicularis*), white-tailed eagle (*Haliaeetus albicilla*), black stork (*Ciconia nigra*), Eurasian spoonbill (*Platalea leucorodia*), ferruginous duck (*Aythya nyroca*) and otter (*Lutra lutra*).

Aimed at preserving the autochthonous cattle races, horses, donkeys, and cows are bred on the open pasture of the Krčedinska Ada islet. Preserved pristine landscapes, authentic settlements and csárda-type taverns, traditional fishing and cattle breeding, as well as cultural-historic monuments, all make Koviljsko-Petrovaradinski Rit an important tourist centre.

## 13. Ramsar Criteria:

1 •	2 •	3 •	4 •	5 •	6 •	7 •	8 •	9
X	X	X	X		X		X	

---

#### 14. Justification for the application of each Criterion listed in 13 above:

Criterion 1: Koviljsko-Petrovaradinski Rit is an exceptional example of a specific wetland with very rare and endangered habitats in the corresponding biogeographical region. It represents a preserved part of once rich and wide alluvial area of the Danube in the surroundings of the city of Novi Sad. A mosaic of river arms, ridges, meanders, channels, ponds, reeds, wet meadows, pastures and forests provides habitat for rich, diverse, specific and unique biota. Krčedinska Ada is biggest islet in Serbia, with preserved natural habitats.

Criterion 2: Koviljsko-Petrovaradinski Rit offers survival for vulnerable, endangered, and critically endangered species and threatened ecological communities, such as those from the IUCN Red List (2010):

*Acipenser ruthenus* (Threatened: Vulnerable) - spawning, migration

*Aythya nyroca* (Near Threatened) - breeding, spring and autumn migration

The water violet (*Hottonia palustris*) is, according to "The Red Data Book of Flora of Serbia 1 – Extinct and Critically Endangered Taxa", placed in the category of critically endangered species.

Koviljsko-Petrovaradinski Rit is the habitat of a large number of threatened plants and animals, protected at the national level.

Important threatened plant communities in site are *Marsilio-Heleocharetum palustris* and *Eleocharitetum acicularis*.

Criterion 3: Koviljsko-Petrovaradinski Rit is the area of great importance for the conservation of biodiversity in the corresponding biogeographical region, which provides survival for worthy populations of plants and animals: sweet flag (*Acorus calamus*), floating watermoss (*Salvinia natans*), four-leaved clover (*Marsilea quadrifolia*), prostrate false pimpernel (*Lindernia procumbens*), dragonflies (*Anax imperator*, *Crocothemis erythaea*, *Stylurus flavipes*), white-tailed eagle (*Haliaeetus albicilla*), Eurasian spoonbill (*Platalea leucorodia*), and otter (*Lutra lutra*). This unique mosaic of aquatic, swamp, and terrestrial ecosystems is an important biodiversity centre in the region.

The hoverfly *Cheilosia griseifacies* (Diptera, Syrphidae), a new species for the science, was discovered and described in Petrovaradinsko-Karlovački Rit. The distribution range of this species is limited to a small number of localities at the rim of the Pannonian Plain and the peri-Pannonian mountains.

Criterion 4: The area is significant for the survival of the black stork (*Ciconia nigra*) and the white-tailed eagle (*Haliaeetus albicilla*) in the unfavourable periods of their life cycles, providing a dietary basis during the autumn migration for the black stork and during overwintering for the white-tailed eagle.

This area is also a very important migratory station for herons and cormorants, and its significance exceeds the local level. The suitable water level in ponds within the Krčedinska Ada islet, Kozjak and Petrovaradinski Rit, and great quantity of easily accessible food are preconditions for large concentration of waterbirds in this area, particularly during the autumn migrations.

---

Criterion 6: Koviljsko-Petrovaradinski Rit has a regular presence of 1% of the C, E Europe biogeographical population of the black stork (*Ciconia nigra*).

- I - number of nesting pairs
- II - number of individuals during the autumn migration

Species	I	II	1% level
<i>Ciconia nigra</i>	7-10	250	250

Criterion 8: Koviljsko-Petrovaradinski Rit is an exceptional area for fish spawning. Periodically flooded ponds are excellent natural spawning grounds for all fish species from this part of the Danube, providing in the same time food, shelter and habitat in all phases of their life cycles.

Most important fish species, are the Eurasian ruffe (*Gymnocephalus cernuus*), weather loach (*Misgurnus fossilis*) and bitterling (*Rhodeus sericeus amarus*).

For its importance, this spawning ground is protected by the Decree on proclamation of natural fish spawning grounds, Official Gazette of the Republic of Serbia No. 76/94, under the name "Koviljsko-Petrovaradinski Rit", and it comprises the river course from river km 1245 to river km 1236.

## 15. Biogeography:

### a) Biogeographical region:

1. This area belongs to the Pannonian province in scope of the Pannonian-Wallachian subregion, precisely the Pontic – south-Siberian floristic vegetation region, which is characterized by the vegetation of the forest-steppe zone (the alliance *Festucion rupicolae* Soó 1940, or *Aceri tatarico-Quercion* ZÓLY ET JAKUCS, 1957) (STEVANOVIĆ ET AL., 1999: 17).
2. Pannonian

### b) Biogeographical regionalisation scheme (reference citation):

1. Stevanović, V. (1995): Biogeografska podela Jugoslavije (*Biogeographical regionalisation of Yugoslavia*) - In: Stevanović, V., Vasić, V. (eds): Biodiverzitet Jugoslavije sa pregledom vrsta od međunarodnog značaja (*Biodiversity of Yugoslavia with a review of internationally significant species*) – Faculty of Biology, Belgrade, and Ecolibri, Belgrade.

Stevanović, V. (1999): Crvena knjiga flore Srbije 1 – iščezli i krajnje ugroženi taksoni (*The Red Data Book of Flora of Serbia 1 – Extinct and Critically Endangered Taxa*). Ministry of Environmental Protection, Faculty of Biology of the University of Novi Sad, and Institute for Nature Conservation of Serbia, Belgrade.

2. Biogeographical regions, Europe 2005; European Environment Agency - <http://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-europe-2005-with-national-boundaries>

---

## 16. Physical features of the site:

---

### Geomorphological characteristics

Koviljsko-Petrovaradinski Rit is positioned in the lowest geomorphological unit – the alluvial plain of the Danube. The mainstream of the Danube erodes the left river bank starting from the Petrovaradin rock, while the water accumulates on the right river bank. The Petrovaradinski Rit marsh is positioned along the right river bank in the inundation plain of the Danube. The fluvial-erosive and accumulation processes occur due to the frequent flooding of the Danube. During the Holocene, the meandering of the Danube was more intensive, and for this reason the inundation plain is wider along the left bank. The Koviljski Rit marsh is therefore wide around 5 km at some places. The geomorphological forms on the inundation plain are recent. There are two groups of geomorphological forms on the inundation plain, erosive and accumulative. The erosive forms include meanders, and river arms, i.e. old river courses, and accumulative forms include shallow areas, river islets and bank ridges. All these forms of the microrelief are permanently changing, due to the continuous changes of the dynamic features of the Danube. The river islets of this area were formed in three different ways: by erosion of the Danube, by accumulation of sediments, and by landslide. Besides these morphological units, the Krčedinska Ada islet is also significant. The area of this islet is intersected with elongated arched swales separated by higher ridges. The swales represent shallow river arms, mainly covered with the material accumulated by the Danube during the flooding of the islet. Some swales are filled with water during the whole year, while others are mostly dry. The inundation plain in which Koviljsko-Petrovaradinski Rit lays is mostly positioned at the altitude of 72-76 m. From the geological aspect, the entire alluvial plain is covered with recent sand and silt deposited by the Danube during its flooding and draining. The largest part of the morphological units, including the Krčedinska Ada islet, was formed in the Late Holocene. In the widened valley, formed during the Atlantic (5100 – 2800 BC) and Subboreal (2800 – 600 BC) climate, the fluvial material, sand and silt, accumulated over the inundation plain of the Danube during the Subatlantic period (600 BC – 1450 AD). In such wide and flattened inundation plain, filled with soft sediments, the Danube has formed numerous meanders due to its slow flow, frequently leaving parts of its riverbed and flowing through the new ones.

### Hydrological characteristics

Koviljsko-Petrovaradinski Rit and the Krčedinska Ada islet lay in the inundation plain of the Danube, and as such, they are subjected to the heavy impact of its flood waters and groundwaters, which are correlated with the water level fluctuation of the Danube surface waters. The flood waters of the Danube are most recurrent in late spring, as a consequence of snow melting and frequent rainfall. Another period of floods occurs during the autumn, as a consequence of the autumn rainfall. Waters that drain from the Danube riverbed and flood the lower terrains occur almost every year. Highest ridges are rarely flooded. In some years, due to the occurrence of high waters, the entire marsh is covered with water. The flood waters of the Danube enter the marsh at lower water levels through river arms and artificial channels, and at high water levels, they flood it directly. The terrain of Koviljski Rit is dry at water levels below 150 cm. At water levels of 300-350 cm, water fills pools and ponds and floods lower ridges in the marsh, while at water levels above 500 cm, the entire marsh is covered with water. In the period when the flood water level decreases, the surface waters gradually drain, remaining for the longest period in pools, ponds, and river arms. A part of Koviljski Rit from Kovilj to Gardinovci represents a system of meanders that are not separated by levees from the river, so that the fluvial-erosive and accumulation processes are active in the marsh. Due to the frequent filling of the river, the largest number of old river arms are connected with the Danube only during the period of high water levels. Recent or former islets, among which the largest are Jamina, Kozjak,

---

Rljak and Krčedinska Ada, are scattered among numerous river arms. Their surfaces are also undulated, and the old riverbeds on them are turned into ponds or lakes. Narrow and deep channels are frequent in these terrains. Flood waters enter the marsh of Petrovaradinski Rit during the low water levels through the Karlovački Dunavac river arm, after which the ponds are filled. During the high water levels of the Danube, the marsh is filled directly from the river. Besides the flood waters of the Danube, the groundwaters also have a great influence upon the marsh. There is a large number of water holes, ponds, pits and channels in Petrovaradinski Rit. Hydrological features are of the greatest significance for the biota of the marsh. The occurrence of certain plant communities, their composition, richness, and other characteristics, as well as the conditions for fish spawning, depend on the regime of flood waters, related to the altitude of the terrain and the relief.

#### Climate characteristics

Meteorological data from the nearby climatological station Sremski Karlovci (130 m.a.s.l.), during the period 1996-2007, are used to describe the climate parameters. The average annual air temperature for the cited period is 12.4°C. The average annual relative humidity is 70%. The average rainfall in the cited period is 676.2 mm. Most often, the largest monthly quantity of the rainfall occurs in the summer months, while the spring and autumn months have the least quantity of the rainfall. Koviljsko-Petrovaradinski Rit belongs to the temperate climate zone, with distinct continental climate features.

#### Pedological characteristics

Koviljsko-Petrovaradinski Rit is almost entirely under the constant influence of flood and groundwaters. The geological substrate of the marsh is the alluvial deposit. The soil on this substrate is genetically undeveloped, due to the permanent influence of the groundwaters of the Danube, which by occasional alternate deposition and removal of the substrate enables the pedogenetic processes. The recent alluvial deposits are of various mechanical composition. As a rule, sand prevail on higher inshore terrains along the riverbed of the Danube, and silt on lower offshore terrains. Between these two there are alternate deposits of sand and silt in various proportions. The initial stages of pedogenetic processes can be observed on high ridges, where the deposition and removal of the soil substrate is minimal. Chemical properties of the recent alluvium are favourable for the development of vegetation. These soils are mainly carbonate, with neutral to mildly alkaline reaction. The conditions of humidification and mineralization are favourable, except in swamp terrains, which implies that the mineral supply of plants is good. Permanent deposition of new fertile layers over the impoverished ones makes this soil suitable for the development of rich marsh vegetation, particularly of marsh forests. By all its characteristics, the soil of Koviljsko-Petrovaradinski Rit is typical for alluvial areas of the middle course of the Danube.

### **17. Physical features of the catchment area:**

---

The Pannonian Plain, which was the Pannonian Sea in the past, was formed during the Pleistocene. After the sea has drained away, a depression was formed, covered with thick deposits of sea sediments, which were then covered with loess and sand in the Pliocene. In the Pleistocene, these sediments were covered with loess deposits, through which large rivers cut their wide valleys, accumulating large deposits of alluvial sediments. Marine sediments can be found in layers deeper than 10 meters, and closer to the surface they are mixed with alluvial deposits.

---

The region of Šajkaška, where Koviljsko-Petrovaradinski Rit is positioned, is a lowland territory, with absolute heights of 70 to 130 meters. Three units can be distinguished within these altitudes: Titelski Breg, loess terraces, and alluvial plains. Previous geological research proved that there are massive Tertiary deposits below the present Quaternary cover. The substrate of these Tertiary deposits are built of Mesozoic formations, magmatic rocks and very old Palaeozoic crystal shale. The present geological structure of the terrain in Šajkaška provides the presence for the following accumulation of the groundwaters: phreatic aquifers; waters from subartesian and artesian horizons; tempered, poorly mineralized waters; and hot, heavily mineralized waters. The soil of Šajkaška is made of chernozem, alluvial soils and diluvium, marsh chernozems, eutric vertisols (smonica), and mineral-swamp soil and salty soil.

Vojvodina is characterized by the continental climate, namely the Pannonian climate of the semiarid type. Such climate is characterized by four annual seasons. The winters are long and cold, and the summers are warm. Great temperature fluctuations are present during the year. The continental features of the climate are enhanced by cold currents coming from the east through the Iron Gate gorge, and mitigated by the influence of the central-European climate from the north-west, from where it receives more rainfall, as well by the warm influence of the Mediterranean climate from the south and south-west. Intensive movements of air masses are the consequence of unequal barometric pressure between the Eurasian mainland and northern Europe on one side, and the Atlantic and the Mediterranean Sea on the other side.

---

#### **18. Hydrological values:**

---

Waters of the Danube flood ponds, river arms and reeds of Koviljsko-Petrovaradinski Rit and are purified owing to the rich emergent, floating and submersed vegetation.

Gradual flooding enables sedimentation of sand, silt and organic particles, thus increasing the quantity of humus.

Koviljsko-Petrovaradinski Rit is the largest flood area of the Danube in Serbia, for which it represents an important flood control factor.

---

#### **19. Wetland Types:**

---

**a) presence:**

**Marine/coastal:**

A • B • C • D • E • F • G • H • I • J • K • Zk(a)

**Inland:**

L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

**Human-made:**

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

**b) dominance:**

Xf, M, Tp, Ts, O, W, 9

---

## 20. General ecological features:

---

Koviljski Rit and Petrovaradinski Rit, along with the Krčedinska Ada islet and the remains of the Karlovački Rit and Gardinovački Rit, form a natural unit that is entirely connected with the inundation plain of the Danube. This implies that their vegetation cover belongs to the hydrologically conditioned vegetation type. The water regime of the habitat has the primary influence on its development, namely the high level of groundwaters, as well as the surface waters that regularly flood the area, along with the important, direct or indirect influence of the more or less stabilized sandy substrate. Therefore, the lowland forest associations of local willows and poplars (Ass. *Salici-Populetum sensu lato*) and the associations of the common oak (Ass. *Genisto-Quercetum roboris* Horv.1938) represent a potential natural vegetation of this part of the alluvial terrain of Podunavlje (Parabučki et Janković, 1978). While willows and poplars are linked to recent soils, in which water stays for longer periods and where the average groundwater level is around 150 cm, the limited oases of Ass. *Genisto-Quercetum roboris* stands develop on older, stabilized or genetically developed alluvial soil.

Under the influence of various and ever more intensive anthropogenic factors, the indigenous vegetation of Koviljsko-Petrovaradinski Rit suffers significant changes. Cutting of autochthonous forests, in not so distant past, had the consequence of secondary development and widening of flood meadows, particularly in habitats of oak-ash forests, and indirectly, by rising the level of groundwaters, of reed spreading in swales. Construction of industrial objects, widening of arable land, and particularly the intensive growth of large plantations of Euramerican hybrid poplars in recent past, have now completely suppressed the flood meadows from areas where they used to dominate. This spatial-ecological unit, as a particular landscape type, is distinguished by regular ecological series of plant communities, where, starting from the centre of the water body towards the land, aquatic pond vegetation is replaced with semiaquatic swamp vegetation and stands of hygrophilous forests, or meadow communities and critically degraded fragments of intermittently flooded oak forests on ridges. Besides numerous common features and significant similarities, some specific features are also present.

The vegetation of Koviljsko-Petrovaradinski Rit, from the phytocoenological aspect, comprises 14 vegetation classes, 16 orders, 23 alliances, 4 sub-alliances, 9 association groups, 39 plant associations, and 20 sub-associations. So far, 125 syntaxonomic units were noted. The herbaceous communities (herbosa) dominate with 86%, while forest and shrub communities are less present (14 %). By their presence, forests and plantations of forest cultures dominate over the terrain, while the herbaceous vegetation types are fragmentary distributed. Most of the plant communities are of primary character, which is an indication of a significant botanical diversity. Syntaxonomic review of plant communities is presented after Pasarž (1996) and "Prodromus of vegetation of Vojvodina" (Parabučki, S. et. al., 1986), or "*Prodromus phytocoenosum Jugoslaviae*" (Jovanović, B. et. al., 1986).

Forest vegetation – The natural potential vegetation on loose sand and clay soils of alluvial type along the Danube is represented by hydrologically conditioned forests of willow and poplar (alliance *Salicion triandrae* and *Salicion albae*), and partly by oak-ash forest alliances *Alno-Quercion roboris*. These marsh forests are inconstant. In keeping with the dynamics and duration of floods and with the micro- and meso-configuration of the terrain, the stands from the association of the almond willow (Ass: *Salicetum triandrae* Malcuit 1929) develop on the lowest parts of river sandbanks, from which water withdraws most lately. Due to the sedimentation of the new layers, in a prograding succession, this association in time shifts into the white willow association, with which it is usually in spatial

---

and ecological contact. The white willow association (Ass. *Salicetum albae pannonicum* Parabućski (1965) 1972) also represents a pioneering forest association, which occurs on banks of ponds and river arms. The white- and black poplar association (*Salici-Populetum nigrae* Parabućski (1965) 1972) is developed on banks of the Danube, on islets, and on banks of river arms. It represents a pioneering association on sand deposits, which, due to the intensive covering and sedimentation of large quantities of deposits, quickly rises above the regular reach of flood waters. The white poplar and Hungarian hawthorn association is developed on ridges, the direction of which corresponds with that of river arms, as well as on elevated areas of the terrain in swales overgrown with swamp vegetation. The basic physiognomic feature of the stands from this association is the white poplar - *Populus alba*. However, the greatest significance as the differential species has the Hungarian hawthorn - *Crataegus nigra*, a Pannonian sub-endemic species that is in the same time the characteristic species of this association. This association is specific for hydrophilous, marsh forests of Podunavlje and Posavina. The common elm association (Ass. *Ulmetum campestre* Parabućski (1965) 1972) is developed on high ridges, which are built of alluvium with a large content of sand. The distribution range of its stands is small. Floristically, the common elm dominates, followed by, in order of significance, white poplar, common oak, black poplar, white willow, narrow-leaved ash etc. The common elm also occurs in the bush layer, along with the viburnum, black poplar, desert false indigo, common dogwood, blackthorn etc. This is the association that has the narrowest amplitude in relation to flooding in the area of Koviljski Rit.

Anthropogenous forest communities – Large areas in Koviljski Rit are occupied by planted forests of Euramerican hybrid poplars. They were planted on various places, from lowest to highest ridges, and, related to that, the soil humidity and other ecological factors vary in their intensity. Being careless about this, man has, in his effort to build trees that grow quickly in short time, planted the same species in different habitats. These were mainly *Populus euramericana* and *Fraxinus americana*. Only the forests of white poplar were planted on proper habitats (low and wet places), and they do not differ in any aspect of species or habitat characteristics from natural forests.

Aquatic and swamp vegetation – Submersed and floating stands represent the aquatic vegetation of the analysed area, and they belong to different more or less complex associations from several alliances and orders in scope of the classes *Lemnetea*, *Utricularietea intermedio – minoris*, *Ceratophylletea*, *Ruppiales*, *Potamogetonetea*, and *Nymphaeetea*.

Surfaces of shallow ponds, inshore areas of oxbows and river arms, and slow-flowing channels are covered with associations of lesser duckweed, water ferns and mosses, as well as of the common bladderwort (*Lemno minoris-Spirodeletum polyrrhizae*, *Lemnetum minori – gibbae*, *Salvinio-Spirodeletum polyrrhizae*, *Lemno minoris-Azolletum filiculoides*).

Different from these floating associations, the stands *Lemnetum trisulcae* *Lemno minoris - Riccietum fluitantisi* and *Lemno-Utricularietum vulgaris* are associated with shallow waters overgrown with dense stands of tall emerged species *Phragmites communis* (reed). The association of hornwort, pondweed and spiked water-milfoil (*Potamogetono – Ceratophylletum demersi*, *Myriophyllo-Potametum*, *Najado – Potametum acutifolii*, *Potametum lucentis*, *Hottonietum palustris*), which are species of submersed aquatic vegetation type, is associated with calm, deep, and relatively warm water such as the water in river arms and ponds. A specific phase in the process of natural overgrowing of ponds and river arms that have lost their permanent connection with the mainstream is the association of frogbit and water-lily – *Hydrochari-Nymphoidetum peltatae*. The association of spiked water-milfoil and pond-lily (*Myriophyllo – Numpharetum*) is frequent in standing waters, and it decorates the ponds with large white water lily and yellow pond lily - *Nymphaea alba* and *Nuphar luteum*. The association *Trapetum natantis* in Koviljsko-Petrovaradinski Rit has a smaller distribution range. The association of submersed small pondweed was found not only in Karlovački Dunavac, but in the following ponds: Sarka,

---

Carinova, and Svinjaruša. It is marked by the characteristic edicator species – the shining pondweed, after which the entire association is named *Potametum lucentis*.

Swamp stands from higher syntaxonomic categories in scope of the class *Phragmitetea* are of the tall, emerged vegetation type. Reed association habitats are related to low terrains of the former Danube river arms, as well as of the river arms that are being intensively covered, and where the soil is of the pond alluvium type. Stands in which reed and sedge dominate occupy smaller areas in this marsh, and, depending on how long the water stays, either the reed (*Phragmitetum communis*), cattail (*Typhaetum latifoliae*, *Typhaetum angustifoliae*) or bulrush (*Scirpetum lacustris*) dominate. A special feature of the reeds in Petrovaradinski Rit are the stands distinguished by the species *Tanacetum serotinum* (syn: *Chrysanthemum serotinum*; *Chrysanthemum uliginosum*). The associations of tall sedges give the characteristic look to ponds, covering their surfaces (*Caricetum gracilis*, *Caricetum elatae*). The association *Glicerietum maximae* is developed in fragments.

Vegetation of silty banks – It is represented by the class *Isoeto-Nanojuncetea*, order *Nanocyperetalia*, and alliance *Nanocyperion flavescentis*, and it includes semi-aquatic associations that inhabit silty banks of ponds and river arms, namely the habitats from which the previously dominating aquatic vegetation has retreated. These are ephemeral phytocoenoses since their development lasts shortly, from the end of the summer until the middle of the autumn, which is associated with the medium and low water levels of the Danube. The following associations were described: *Dichostylidi-Gnaphalietum uliginosi*, which is characterised by species of small growth and short vegetation period, *Marsilio-Heleocharetum palustris* and *Heleocharetum acicularis*. The association *Marsileo-Heleocharetum palustris* (the association of the four-leaved clover and common spikerush) occurs after the water has withdrawn from the Krčedinska Ada islet, and *Marsilea quadrifolia* on such places builds a dense cover resembling a green carpet. On the banks of river arms, where the covering is intensive and the quantity of sand deposits large, the stands of the needle spikerush association were found - *Heleocharetum acicularis*. The characteristic and, in the same time, the most important species of this association is *Heleocharis acicularis* (needle spikerush).

Meadow vegetation – It occurs on clayed-sandy soil, in the zone of periodically flooded banks of ponds and river arms. It is conditioned by fluctuations of ground- and flood waters in the beginning of the vegetation period, when the substrate is very moist, as well as by the fact that the soil is completely dried until the autumn when it becomes compact. The natural potential vegetation of these habitats is represented by occasionally flooded forests. The space for the new secondary vegetation, whose stands belong to the associations of the class *Molinio-Arrhenateretea*, is created by their cutting. In scope of this class, only degradation stages of meadows from the order *Agrostietalia stoloniferae* and the alliance *Agropyro-Rumicion crispis* are developed. A particular association is that of the quackgrass and narrow-leaved meadow-grass - *Agropyro-Poaetum angustifoliae*.

The vegetation of flood meadows is also represented by spatially limited stands of slender tufted-sedge and fowl bluegrass associations (Ass. *Carex gracilis* - *Poa palustris*, Ilijanić, 1967 – from the alliance *Molinion caeruleae* W. Koch, 1926). Its floristically rich stands are developed in fragments on wet habitats of low ridges, which are exposed to floods shortly during spring, and which are in immediate contact with reeds and swales or forest stands on higher ridges. The stands of wet meadows are from the order *Deschampsietalia*, alliance *Deschampsion caespitosae*.

Nitrophilous vegetation - It includes weeds on arable lands, vegetation around human habitats, near stables and watering places, and along roads and levees, vegetation of pastures overgrown with weeds and vegetation on pond banks. Nitrophilous vegetation on pond banks belongs to the central-European type, i.e. to associations from the alliance *Bidention tripartiti*, order *Bidentetalia tripartiti*, and class *Bidentetea tripartiti*. This is the

---

vegetation of heavily trampled, wet habitats, which are silty and humid during most of the year, and they desiccate at the end of the vegetation period, becoming dry, hard, and dense. The association *Agrostideto-Polygonetum hydropiperi* (the association of the common sundew and marshpepper knotweed) is found on the banks of river arms that are filled with river water already during the medium water levels of the Danube. At typical swampy places around standing waters (ponds), and not around running waters (river arms), the alliance from the association of the three-lobed beggarticks and common silverweed *Bidenteto-Potentilletum anserinae* has found conditions for its development. It occurs on elevated terrains, in contact with meadows. The vegetation of sands on high ridges is closest to the weed vegetation of grains from the class *Secalietea*. It belongs to the order *Eragrostietalia* and alliance *Consolido-Eragrostion poidis*. The specific association of this type of vegetation is the association *Cynodonto-Erodietum cicutariae*.

## 21. Noteworthy flora:

A total of 443 taxa, at the level of species and subspecies, of higher plants are recorded in the area of Koviljsko-Petrovaradinski Rit (432 species and 11 subspecies), pertaining to 245 genera, 85 families, 66 orders, 15 subclasses, 6 classes, and 4 divisions (Marchantiophyta, Bryophyta, Pteridophyta, Magnoliophyta).

It is possible to distinguish 30 floral elements, among which the most valuable taxa, from the aspect of phytogeographical and conservation significance, are those with narrow distribution ranges: sub-Pannonian, Pontic-Pannonian or sub-Pontic – sub-Pannonian, Pontic-central Asian, Atlantic-Mediterranean (central European), and sub-Atlantic – sub-Mediterranean.

Regarding the ecological requirements, among species that are important for conservation of aquatic habitats are *Callitriche palustris*, *Nuphar lutea*, *Nymphaea alba*, *Trapa natans* and *Utricularia australis*, for semi-aquatic and silty habitats *Cyperus glomeratus*, *Limosella aquatica* and *Scirpus triqueter*, for wet meadows in flood forests *Anacamptis pyramidalis*, *Blackstonia perfoliata* subsp. *perfoliata* and subsp. *serotina*, *Equisetum fluviatile*, *Iris sibirica*, *Orchis laxiflora* subsp. *palustris* and *Gentiana pneumonanthe*, and for forests and forest clearings *Crataegus nigra*, *Leucojum aestivum* and *Platanthera bifolia*.

A total of 20 species and subspecies of invasive plants were recorded as well. The most frequent were the woody species: desert false indigo (*Amorpha fruticosa*), green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*) and honey locust (*Gleditsia triacanthos*), particularly along river arms and around larger ponds. The common hackberry (*Celtis occidentalis*) was found at few localities. Frequent foreign species are also *Vitis longii* and *Vitis sp. (riparia)*, sometimes in the form of dense beds over treetops, several tens of meters long. The western waterweed (*Elodea nuttallii*) is massively developed at some places in ponds and river arms, yet only Canadian waterweed (*Elodea canadensis*) is mentioned for the area of Petrovaradinski Rit.

The phytoplankton analysis has revealed the presence of 72 taxa from the following groups: Bacillariophyta, Euglenophyta, Chlorococcales, Conjugales, Cyanophyta and Volvocales.

## 22. Noteworthy fauna:

### Invertebrates

A total of 158 species of zooplankton were recorded in Koviljski Rit, of which 25 species of Protozoa, 104 species of Rotatoria, 18 species of Cladocera and 11 species of Copepoda.

---

The bottom fauna (Oligochaeta) comprised 12 species from 8 genera and 2 families.

The mosquito larvae (Diptera, Culicidae) are present in water and in extremely wet habitats, as well as mayfly (Ephemeroptera), dragonfly and damselfly (Odonata) larvae, water beetles (Coleoptera: Dytiscidae, Gyrinidae, Hydrophilidae, Hydraenidae, etc.), e.g. great diving beetle and water scavenger beetle, aquatic Hemiptera (Notonectidae, Nepidae, Corixidae, Gerridae, Veliidae), e.g. water scorpion and water stick-insect etc. Among hoverflies of swampy meadows there are rare species such as *Epistrophe melanostoma* and *Neoascia interrupta*.

## **Vertebrates**

### Ichthyofauna

Among the most important fish species, from the aspect of fish conservation, are the Eurasian ruffe (*Gymnocephalus cernuus*), weather loach (*Misgurnus fossilis*) and bitterling (*Rhodeus sericeus amarus*).

Of allochthonous species, the following are present in this area: the crucian carp (*Carassius auratus gibelio*), topmouth gudgeon (*Pseudorasbora parva*), brown bullhead (*Ictalurus nebulosus*) and pumpkinseed (*Lepomis gibbosus*).

### Herpetofauna

A total of 11 species of amphibians (class Amphibia) were recorded in Koviljsko-Petrovaradinski Rit. The most frequent components of the batrachofauna are three species from the family *Ranidae*: *Rana kl. esculenta* (green frog), *Rana lessonae* (pool frog) and *Rana ridibunda* (marsh frog), which are also the most important species in the food webs of pond-swamp habitats. Newts (*Triturus vulgaris* and *Triturus cristatus*) are present among tailed amphibians.

Seven species of reptiles (class Reptilia) were recorded: the European pond turtle (*Emys orbicularis*), grass snake (*Natrix natrix*), dice snake (*Natrix tessellata*), lizards (*Lacerta agilis*, *Lacerta viridis*, and *Podarcis muralis*) and Aesculapian snake (*Zamenis longissima*).

### Ornithofauna

The universal asset of the ornithofauna of Koviljsko-Petrovaradinski Rit comprise 206 species of birds. Of this number, 94 species are recent nesting species, and others are transient species, winter guests and irregular and possible visitors. Among important species are the black kite (*Milvus migrans*) and ferruginous duck (*Aythya nyroca*). Three mixed colonies of herons and cormorants are currently known within the protected area, in Kozjak, at the rim of the Krčedinska Ada islet, and in Petrovaradinski Rit (Karlovačka Bara). The colony in Kozjak is old, and the following species have nested there depending upon the research period: the spoonbill, grey heron, little egret, and great cormorant. The colony at the western rim of the Krčedinska Ada islet was formed during the year 2000, and around 60 pairs of the great cormorant are nesting there. In the colony in Karlovačka Bara, the night heron (*Nycticorax nycticorax*) is nesting.

### Theriofauna

The diversity of natural conditions necessary for the survival of mammals is preserved in this area, particularly of those associated with aquatic and swamp habitats, reeds and marsh forest, such as the Miller's water shrew (*Neomys anomalus*), European wildcat (*Felis silvestris*), stoat (*Mustela erminea*) and martens (*Martes martes*, *M. foina*).

---

## 23. Social and cultural values:

### a) Overview

The social and cultural life of the local inhabitants in the surrounding settlements is greatly associated with the wetlands. This association reflects mainly through fishing, usage of forests and cattle breeding. The everyday activities of many inhabitants of Kovilj, Gardinovci, Petrovaradin and Sremski Karlovci are even today still linked with the wetlands. Most numerous among them are fishermen, who also come from the wider surroundings. Some commercial fishermen occasionally live in huts in the wetland. The significance of the marsh for cattle breeding is particularly noticeable in Kovilj, where there is even an association of cattle breeders. The Krčedinska Ada islet is the most important cattle breeding stronghold since it does not have a connection with the mainland, and the majority of the cattle is kept there, wandering around freely. Frequent changes of the ownership, along with the several centuries long usage of the marsh by local inhabitants, even today have the consequence of frequent cases of forest theft, and fish and game poaching.

The most important historical event associated with this area is the Battle of Petrovaradin, also known as the Battle on Vezirac, which happened in 1716 at the edge of Petrovaradinski Rit. This was one of the important battles in Austrian-Turkish wars, in which the Austrian-Hungarian army under the command of Prince Eugene of Savoy defeated the Turkish army led by Damad Ali Pasha. In honour of the victory, the Church of Snowy Mary was built on the lookout above the marsh. There is a legend that a huge Turkish treasure lies sunken at the bottom of the marsh.

In immediate vicinity of the marsh is the settlement of Sremski Karlovci, the seat of the Serbian Archbishopric in the 18<sup>th</sup> century, which today represents an important cultural-historical complex.

At the left river bank, near the marsh, is the Monastery of Kovilj, which is protected by the State as a cultural monument.

**b)** Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box  and describe this importance under one or more of the following categories:

- i) Sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

Traditional pasturing and cattle breeding, particularly of horses and donkeys, as a several centuries long way of usage of this area, provides the maintenance of grasslands near Kovilj and on the Krčedinska Ada islet. The reed used for roof isolation is taken from Petrovaradinski Rit, which does not affect the ecological functioning of the habitat, and even slows down the succession and eutrophication.

- ii) Sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

- iii) Sites where the ecological character of the wetland depends on the interaction

---

with local communities or indigenous peoples:

- iv) Sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

An old oak tree, on which there is a nest of the white stork, leans on the Chapel of Saint Petka in the village of Kovilj. This three-member structure represents a strong symbol that unites folklore, religion and nature.

---

#### **24. Land tenure/ownership:**

---

- a) within the Ramsar site:

Land was almost exclusively state owned until recently, while today a significant portion of 1,094 ha was returned to the Serbian Orthodox Church. Smaller enclaves are privately owned.

- b) in the surrounding area:

Private agricultural lots prevail in the wider surroundings, with a small share of state owned land.

---

#### **25. Current land (including water) use:**

---

- a) within the Ramsar site:

The forestry represents the most widespread way of land use, while cattle breeding and fishing are present to a lesser extent.

Koviljski Rit is positioned in the immediate vicinity of the village of Kovilj; thus, the natural vegetation, particularly the forest vegetation, has been the subject of multiple exploitation by man. The man has been thinning and clear-cutting the forests on one hand, and also planting trees on the other hand. Waste land is occupied by plantations of Euramerican hybrid poplars. The principal user of the forests is the Public Enterprise "Vojvodinašume", and more recently the Church, over the area of around 1,000 ha.

Most numerous animals on the pasture of the Krčedinska Ada islet are horses and donkeys, but there are also cows and pigs, a total of around 1,000 heads. The cattle regularly grazes on a smaller pasture near Kovilj as well, and pigs and sheep are occasionally allowed to enter the forest complexes.

Commercial and sport fishing are also significantly present over the entire area.

A controlled reed cutting is done in Petrovaradinski Rit, as the reed is used as building material.

The roe deer, wild boar, and to a smaller extent ducks, are hunted in Koviljsko-Petrovaradinski Rit.

The Danube represents an important international waterway.

- b) in the surroundings/catchment:

The arable land dominate in the surroundings, and it is predominantly used for grain cultivation. Vegetable and fruit cultivation and intensive cattle farming are present to a lesser extent.

---

**26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**

---

a) within the Ramsar site:

The most important threat factors are the poplar plantations built on natural habitats, for the purpose of which old stands and individual old trees are being cut, as well as the spreading of invasive plant species. The disappearance of river arms and ponds is notable due to overgrowing and sedimentation processes, as well as the loss of pastures and wet meadows due to the vegetation succession and the absence of traditional ways of use (pasturing, mowing). The great problem represents the disturbed regime of surface- and groundwaters, as well as the seasonal rhythm of flooding of the alluvial plain, sedimentation and rising of river arms and swales, along with the constant inflow of unrefined waters rich in organic substance and other harmful components. The disturbance of the biota due to the uncoordinated hunting and fishing is particularly present on the Danube, on larger ponds, and on river arms. Fish poaching is very frequent. The peripheral parts are threatened by building of objects and infrastructure. The reed burns almost every season in Petrovaradinski Rit.

b) in the surrounding area:

In the first half of the 19<sup>th</sup> century, before the levees along the Danube and the Tisa were built, and the channels and drainage facilities completed, one third of Bačka was covered with marshes and swamps overgrown with their characteristic vegetation. The construction of the levees along the Danube and the Tisa in Vojvodina, which started in the second half of the 19<sup>th</sup> century and was aimed at taking new areas of fertile arable land and at protection of settlements, has triggered a successive loss of many marshes and swamps. The Novosadski Rit marsh, which represented an ecological unit with the present Koviljski Rit marsh, disappeared almost entirely until the middle of the 20<sup>th</sup> century.

The spreading of the urban zone, industry and infrastructure are important factors in the wider surroundings, as well as the loss of natural habitats due to the intensified agricultural activities.

---

**27. Conservation measures taken:**

---

a) National and international category and legal status of protected areas:

The first data on attempts to protect Koviljski Rit date from 1970, when the Municipality Assembly of Novi Sad issued a Decree on putting a part of Koviljski Rit under protection as a scientific research reserve "Kozjak", over the area of 43.66 ha (Decree No. 03-633/5-69).

Having in mind the fundamental values of this area and the necessity to protect both the entire area of Podunavlje and the significant swamp habitats in general, following an initiative of the city of Novi Sad, the Institute for Nature Conservation of Serbia has issued a Decree on preliminary conservation of Koviljsko-Petrovaradinski Rit ("Official Gazette of the Republic of Serbia", No. 53/92). The Special Nature Reserve "Koviljsko-Petrovaradinski Rit" was proclaimed in 1997, over the area of 4,860 ha, with a three-level protection regime.

---

Among the most important conservation measures related to the Ramsar Site are the following:

- restriction of commercial fishing, building, and hydrotechnical activities, restriction of Euramerican poplar planting, ban of untreated wastewater spilling, reed burning and garbage disposal;

This area was nominated for an IPA (Important Plant Areas) site named "Koviljsko-Petrovaradinski Rit" in 2005.

Koviljsko-Petrovaradinski Rit was included into the registry of IBA (Important Bird Areas) under the name "Koviljski Rit" in 2009, over the area of 9,594 hectares, as was planned in the project.

For the purpose of the Emerald Project and the planned ecological network of Serbia, 61 areas of particular importance for conservation of wild flora and fauna and their habitats were processed, including Koviljsko-Petrovaradinski Rit.

**b)** IUCN (1994) protected areas category/ies, which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

**c)** Does an officially approved management plan exist; and is it being implemented?:

Ten year middle-termed management plans are issued for the Special Nature Reserve "Koviljsko-Petrovaradinski Rit", from which annual plans are derived. The plans include a wide range of activities on conservation, promotion, improvement, and revitalization of natural assets of the area.

In order to improve the hydrotechnical conditions, the river arms near Burmanski Vok, Stari Dunav, Balvanski Vok, and Okruglica were treated in 2003-2005. Ponds and wet meadows on the Kurjak ridge (Agla and Patrijaršijska Tonja) were revitalized.

**d)** Describe any other current management practices:

## **28. Conservation measures proposed but not yet implemented:**

The process of revision of the Reserve is currently under way, with the main purpose to widen the boundaries over the Krčedinska Ada islet and to improve the conservation measures and regimes.

Existing old forest stands should be preserved (Kozjak, Krčedinska Ada). It is particularly important to conserve and rehabilitate the remaining shallow ponds, wet meadows and pastures on Kozjak, Krčedinska Ada and Velika Ada, maintaining in the same time the optimal number of cattle.

---

### **29. Current scientific research and facilities:**

The vicinity of Novi Sad, which represents an administrative and university centre, is an important reason for which this area is one of the most extensively studied wetlands in Serbia. Natural assets and biota of Koviljski Rit were the subject of many scientific and expert studies, as well as bachelor and master theses. Particularly numerous were the studies of the flora and vegetation, as well as of the zooplankton, ichthyofauna and ornithofauna. The period of the most intensive research was in the second half of the 20<sup>th</sup> century. Recently, the extent of research has decreased, but the effects of mosquito control products on biota, first of all fishes, amphibians and birds, are regularly monitored.

### **30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:**

The Institute for Nature Conservation of Serbia and the Management Authority, the Public Enterprise "Vojvodinašume", permanently inform the local community, all interested parties and users of the natural asset on values and importance of conserving "Koviljsko-Petrovaradinski Rit". Information boards are placed within the Reserve near Kovilj and Petrovaradin. Workshops are organized in Kovilj and Sremski Karlovci, as well as free public lectures, with topics on the conservation improvement of the Reserve and on the influence of invasive species.

### **31. Current recreation and tourism:**

Tourist routes and lookouts were traced during the period 2005-2008, and information boards were placed. The recreational fishing is the main purpose of visits to this area. It is present on all waterbodies, and the visitors are both from the places around the wetland and from the wider surroundings. A significant number of sport fishermen stay camping for a longer periods in the marsh during the summer. A part of the marsh named Šlajz, near Kovilj, is used during the summer as a local swimming place. The entire area is famous for its csárda-type taverns, tambura players, and fish soup. The most famous is the csárda tavern "Na kraj sveta" (*At the end of the world*), whose onetime owner, Pera Varenika, became the world champion of fish soup cooking in a competition in Vienna in 1986.

### **32. Jurisdiction:**

Depending on the authority and the degree of management and usage, this area is managed and cared at several levels of jurisdiction:

- a) The Government of the Republic of Serbia, with competent ministries and autonomous region offices,
- b) The Institute for Nature Conservation of Serbia.

---

### 33. Management authority:

Public Enterprise "Vojvodinašume" Petrovaradin  
Forest Management Agency "Novi Sad"  
Aleksandra Vujasinović, B.Sc., biologist  
Vojvode Putnika 3, 21000 Novi Sad  
Phone +38121/ 557-412; 542-713; +38162/8005257  
E-mail: simvaliks@sbb.rs; vsgns@sbb.rs  
www.vojvodinasume.rs

### 34. Bibliographical references:

- Babić, N. (1971): Močvarna i livadska vegetacija Koviljskog rita (*Swamp and meadow vegetation of Koviljski Rit*). Zbornik za prirodne nauke, Matica srpska, Vol. 41: 19-87, Novi Sad.
- Budakov, L.J., Pujin, V., Maletin, S., Mučenski, V. (1983): Prilog poznavanju ihtiofaune Koviljskog rita (*A contribution to the knowledge of the ichthyofauna of Koviljski Rit*). Biosistematika, Vol. 9, No. 1: 51-59, Beograd.
- Bukurov, B. (1953): Geomorfološke crte južne Bačke (*Geomorphological features of south Bačka*). Zbornik radova Geografskog instituta, SANU, XXVI, Beograd.
- Čapaković, J. (1978): Stanje i potreba zaštite Petrovaradinskog rita (*Status and requirements for conservation of Petrovaradinski Rit*). Priroda Vojvodine IV: 47, Novi Sad.
- Đukić, N. (1985): Sastav i dinamika faune Oligochaeta u Koviljskom ritu (*Composition and dynamics of the fauna of oligochaetes (Oligochaeta) in Koviljski Rit*). Zbornik radova Prirodno-matematičkog fakulteta Univerziteta u Novom Sadu, Ser. Biol., No. 15: 35-38, Novi Sad.
- Garovnikov, B. (1980): Program uređenja naučnoistraživačkog rezervata "Kozjak" kod Kovilja (*The management programme for the scientific research reserve "Kozjak" near Kovilj*). Pokrajinski zavod za zaštitu prirode i Institut za topolarstvo, elaborat, 12-15, Novi Sad.
- Gavrilović, S. (1953): Novosadski rit - o jednom svetu koji nestaje (*Novosadski Rit – about a disappearing world*). Vojvođanski lovac, 74-75: 25-26, Novi Sad.
- Institute for Nature Conservation of Serbia (1979): Koviljski rit - prostor posebne prirodne vrednosti (valorizacija) (*Koviljski Rit – an area of particular natural value (validation)*). Novi Sad.
- Institute for Nature Conservation of Serbia (1995): Predlog za zaštitu prirodnog dobra "Koviljsko-petrovaradinski rit" kao specijalnog rezervata prirode (*Proposition for protection of the natural asset "Koviljsko-Petrovaradinski Rit" as a special nature reserve*). Elaborat. Novi Sad.
- Institute for Nature Conservation of Serbia (2008): PPPPN SRP "Koviljsko-petrovaradinski rit" (*Spatial plan for the area of special purpose the SNR "Koviljsko-Petrovaradinski Rit"*). Zaštita i uređenje prirodnih vrednosti. Novi Sad.
- IUCN (2007): 2007 IUCN Red List of Threatened Species. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

- 
- Milutinović, Đ. (1982): Koviljski rit prostor posebne prirodne vrednosti (*Koviljski Rit – an area of specific natural value*). Priroda Vojvodine, VIII: 11-20, Novi Sad.
- Popović, J. (1957): Koviljski rit i njegov ptičiji svet (*Koviljski Rit and its bird fauna*). Zaštita prirode, 11: 29-31, Beograd.
- Pujin, V., Đukić, N., Maletin, S., Kostić, D., Miljanović, B. (1990): Zoocenološke karakteristike Koviljskog rita (*Zoocoenological characteristics of Koviljski Rit*). Bilten Društva ekologa Bosne i Hercegovine. Naučni skupovi i savetovanja, 5b: 195-203, Sarajevo.
- Pujin, V., Ratajac, R., Rajković, D. (1985): Sastav i dinamika zooplanktona Koviljskog rita (*Composition and dynamics of the zooplankton of Koviljski Rit*). Zbornik radova Prirodno-Matematičkog fakulteta Univerziteta u Novom Sadu, Ser. biol., No. 15: 27-34, Novi Sad.
- Puzović, S., Sekulić, G., Stojnić, N., Grubač, B., Tucakov, M. (2009): Značajna područja za ptice u Srbiji (*Important Bird Areas in Serbia*). Ministarstvo životne sredine i prostornog planiranja, Zavod za zaštitu prirode Srbije, Pokrajinski sekretarijat za zaštitu životne sredine i održivi razvoj.
- Stevanović, V. (2005): Serbia and Montenegro. In: Anderson, S., Kušik, E. and Redford, E. (eds): Important Plant Areas in central and Eastern Europe, Priority Areas for Plant Conservation. PlantLife International.
- Šoti, J. (1973): Ekološke karakteristike ptica u Koviljskom ritu (*Ecological characteristics of birds in Koviljski Rit*). Zbornik rad. Prirod. mat. fak. Univ. u Novom Sadu, No. 3: 109-127, Novi Sad.
- Vučković, M., Parabućki, S., Pekanović, V., Stojanović, S., Crnčević, S. (1992): Ekološke karakteristike higrofilnih fitocenoza Koviljskog rita (*Ecological characteristics of hygrophilous phytocoenoses of Koviljski Rit*). Zbornik radova PMF, ser. biol. 22: 39-47, Novi Sad.
- Vujić, A. (1994): *Cheilosia griseifacies*, eine neue Fliegen-Art aus Mitteleuropa (Diptera, Syrphidae). *Entomofauna*, Band 15, Heft 29: 337-344, München.
- Vukoje, M. (1979): Vodena vegetacija Petrovaradinskog rita (*Aquatic vegetation of Petrovaradinski Rit*). II Kongres ekologa Jugoslavije, Vol. II: 1987-1998, Zagreb.