

Information Sheet on Ramsar Wetlands (RIS) – 2006-2008 version

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Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX.22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

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Designation date

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Site Reference Number

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2. Date this sheet was completed/updated:

20 November 2007

3. Country:

Serbia

4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Gornje Podunavlje

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

This RIS is for (tick one box only):

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

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

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
ii) the boundary has been extended ; or
iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
ii) the area has been extended ; or
iii) the area has been reduced**

** **Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a **hard copy** (required for inclusion of site in the Ramsar List): ;
ii) an **electronic format** (e.g. a JPEG or ArcView image) ;
iii) a **GIS file providing geo-referenced site boundary vectors and attribute tables** .

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

Greenwich: **Central 45° 44' 51'' N 18° 56' 53'' E**

West 18° 49' 08'' E

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

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: Gornje Podunavlje is an exceptional example of a specific wetland, a part of the unique transboundary alluvial area, largest in the middle course of the Danube, and very rare and threatened within the relevant biogeographical region, since it is positioned at the conjoining point between the central-European and south-European forest and the steppe. The contact zone of the alluvial area is very specific, with the biota dependent on hydrological regime, as well as the somewhat higher terrain on loess substratum, with the climazonal vegetation. The biota is rich, diverse, specific, and unique.

Criterion 2: Gornje Podunavlje enables the survival of an important number of vulnerable, endangered and critically endangered species and endangered ecosystems, such as (IUCN Red List 2004):

Gymnocephalus schraetser (Threatened: Vulnerable); *Acipenser ruthenus* (Threatened: Vulnerable); *Acipenser nudiventris* (Threatened: Endangered); *Zingel streber* (Threatened: Vulnerable); *Zingel zingel* (Threatened: Vulnerable); *Aythya nyroca* (Lower Risk: Near Threatened); *Haliaeetus albicilla* (Lower Risk: Near Threatened);

According to the criteria for threat levels of the IUCN from 1994, four species, *Eranthis hyemalis*, *Hottonia palustris*, *Hippuris vulgaris*, and *Ranunculus lingua* are treated in the "Red Book of the Flora of Serbia 1 – extinct and critically endangered taxa".

A large number of threatened plants and animals were recorded in Gornje Podunavlje, protected at the national level by the "Decree on Protection of Natural Rarities" (Official Gazette of the Republic of Serbia, No. 53/93 and 93/93).

Criterion 3: Gornje Podunavlje enables survival of valuable populations of plants and animals important for the conservation of biological diversity in the relevant biogeographical region, such as: *Iris spuria*, *Ranunculus ophioglossifolius*, *Acorus calamus*, *Apatura metis*, *Ardeola ralloides*, *Ciconia nigra*, *Ciconia ciconia*, *Anser anser*, *Milvus migrans*, *Lutra lutra*, *Martes martes*, *Felis silvestris*, *Cervus elaphus*. There are four mixed heron colonies in this area. This unique mosaic of aquatic, wetland, and terrestrial ecosystems is an important centre of ecosystem, species, and genetic diversity in this exceptional transboundary alluvial complex along the Danube.

Within the group of plants of the Pannonian origin, the Pannonian endemics – thistle *Cirsium brachycephalum* and Sadler's greater knapweed *Centaurea scabiosa* subsp. *sadleriana* are particularly distinct.

Criterion 4: Gornje Podunavlje is important for the survival of the black stork - *Ciconia nigra*, and the white-tailed eagle – *Haliaeetus albicilla* during the unfavourable periods of their life cycles, enabling a feeding basis during the autumn migrations of the black stork and the wintering of the white-tailed eagle.

Criterion 5: Mixed flocks of waterfowl with more than 20,000 birds regularly stay in Gornje Podunavlje, during both the periods of migration and wintering, belonging to the families Gaviidae, Podicipedidae, Phalacrocoracidae, Ardeidae, Threskiornithidae, Ciconidae, Anatidae, Rallidae, Charadriidae, Scolopacidae, Laridae, Sternidae.

Criterion 6: Gornje Podunavlje regularly provides occurrence of 1% of relevant biogeographical population for many species of waterfowl (shown in the Appendix 1).

Criterion 7: Gornje Podunavlje is an important area for the conservation of the fish fauna diversity. More than 50 species were recorded within the families Petromyzonidae, Acipenseridae, Esocidae, Cyprinidae,

Cobitidae, Balitoridae, Siluridae, Ictaluridae, Anguillidae, Gadidae, Centrarchidae, Percidae, Gobiidae, Cottidae. Regarding the number of present fish species, this is one of the richest areas within the biogeographical region. The list of fish species is provided in the Appendix 2.

Criterion 8: Gornje Podunavlje represents an exceptionally significant area for fish spawning, as well as a migratory route and an overwintering place. The alluvial areas are important natural spawning places for all fish species from this part of the Danube, and they enable food, shelter, and habitat for fishes in all phases of their development.

For their significance, these spawning areas are protected by the Decree on Proclamation of Natural Fish Spawning Places in the Fishing Area “Dunav I” (Official Gazette of the Republic of Serbia, No. 76/94).

“Baračka” – km 1427-1425

“Stari Dunav - Dunavac” – km 1418 - 1416

“Harčaš” - km 1405-1403

“Mišvaldski Dunavac” - km 1398 - 1394

“Staklarski Dunavac” - km 1385 - 1383

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Pannonian Biogeographic region (EEA and EU Habitat Directive)

According to the phytogeographical regionalisation of Serbia, the lowland area of northern Serbia, along with Podunavlje, is positioned in the Pannonian province of the Wallachian-Pontic region, a part of the Pontic floristic-vegetational region.

b) biogeographic regionalisation scheme (include reference citation):

Stevanović, V. (1995): Biogeografska podela Jugoslavije (*Biogeographic 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.

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The altitude of the area is 80-88 m and it decreases from north towards the south. The relief is flat and gently rolling. It is characterised with erosive geomorphological forms – meanders, by-channels, old riverbeds, accumulated geomorphological forms – river islets and ridges. Elongated ridges and swales are interchanging and stretching more or less parallel to the river course and to by-channels, which significantly influences the distribution of flood waters and the ground water level. Such image of the terrain was created by the erosive activity of the River Danube that has created the present look of the relief, by changing its riverbed and meandering. These marshes represent a series of by-channels and remains of the former riverbeds of the Danube, the so-called Dunavci. From the spatial aspect, these marshes are located in the alluvial plane of the Danube. The loess plateau stretches in form of a fragment between Bezdan and Bački Monoštor. It is 3 to 4 m

higher than the alluvial plane. The microrelief and the nannorelief are very distinct, since small altitudinal differences (from several m to few cm) cause changes in vegetation and distribution of small plant communities.

Gornje Podunavlje is the western border of the wide area between the rivers Dunav and Tisa. It is made by Quaternary sediments that represent the roof layer, several tens of meters thick, to the Neogene formations. The higher and the lower terrace of the Danube and the alluvial plane of the Danube can be distinguished according to the distribution of the sediments.

The higher fluvial or river terrace of the Danube, with the absolute elevation of 80 to 88 m, is composed of layered sand in the floor layer, covered by dunes of quicksand and pond and land loess. The lower fluvial terrace of the Danube, with the absolute elevation of 80 to 84 m, is composed of layered Danube sand and silt and of sandy loess. The alluvial plane of the Danube is 6 to 26 km wide, and it is built of recent sediments – sand, pebble, and silt.

The geological structure of the area is represented by Quaternary formations that represent the roof layer, several tens of meters thick, to the Pliocene sediments. The relation between the lithological components in the geological profile indicates a "calm" tectonics.

The pedological cover is formed of several types, subtypes, and varieties of the soil: the alluvial sandy soil, the alluvial clayey soil, the alluvial wet soil, the alluvial soil on marsh chernozem, the carbonate marsh chernozem, the non-carbonate marsh chernozem, the swampy gleyed soil, namely the types of the hydromorphic order. They are followed by brown chernozem and brown chernozem with signs of solod, as soil types of automorphic order.

The Danube is the most important watercourse in the studied area. With numerous meanders, by-channels, oxbows, ponds, and river islets, the river creates a unique hydrographical image. The formation of the present course of the Danube in the Pannonian Plane started at the end of the Diluvium and the beginning of the Alluvium. Since then until today, the river has changed its riverbed, on which some less covered and more visible old by-channels in the marshlands Monoštorski Rit and Apatinski Rit bear witness.

The water regime of the Danube in the studied area is under the influence of the climate regime of the Alps, from which the river receives most of its water by melting of the snow cover. Furthermore, the water regime of the Danube is also influenced by the relief, the geological and pedological structure, the forest size, the density of the river network, as well as the shape of the catchment area. The high water levels occur after long, cold, and snow-rich winters. The snow stays long in that period, and after sudden warming it quickly melts. The melting of the snow coincides with the rainy period, and the rain speeds up its melting, while the wet substrate slows its absorption, which results in high water levels. The rains are heavy, of high intensity, and the water drains quickly into the watercourses.

In the studied area, the Danube has the characteristics of a pluvial – nivational regime. The highest water level occurs at the end of the spring and at the beginning of the summer, in June. It is the consequence of snow melting in the Alps that drains into the Danube through its tributaries. Furthermore, early summer rains also have influence on the maximum water level. The lowest water levels occur at the end of the autumn, in October and November. The highest daily water level was recorded on June 24 and 25, 1965, when near Bezdán it was +776 cm, and near Apatin +825 cm. The lowest water level of –146 cm (Bezdán) and -118 cm (Apatin) was measured on January 7, 1909.

Besides the Danube, there are many by-channels, lakes, meanders, oxbows, and ponds in the studied area, which represent some of the main hydrographical features of the area. They were formed by the process of river meandering and displacement of the riverbed. The Danube has formed its numerous meanders during the high water levels and flooding, when it built a new riverbed, and left the old one. There are several by-channels that are called Dunavci in this area.

After the construction of the levee close to the Danube, most of the marsh area of Monoštorski Rit was cut from the river and in this way it was deprived of regular flooding in the natural water regime of the River Danube.

The Danube retains the contact with marshes through its branches and channels, so that during the low water level the water reaches only the lowest parts of the marsh. During the higher water level, lower ridges are also being flooded, while during the high water level, the entire marshland is covered by water. The flooding can be gradual or sudden. Oscillation of flooding and ground water levels, depending on the water level of the Danube, is characteristic for this area. The water enters the marshes in spring and it stays until the middle of August. The floods are most frequent and longest from April until July.

The climate of Gornje Podunavlje is temperate – continental, namely Pannonian climate of the semi-arid type. The Danube has a great influence on the mesoclimate, and the climate is of the Danube climate type characterised with lower mean July temperatures, mild mean January temperatures, lower temperature oscillations during the year, and the largest quantity of precipitation in Bačka (625 to 724 mm). The forest vegetation, which covers around 49% of the area, also has a great influence on the climate, with effects on insolation, wind speed, evaporation, air moisture, and lowers the temperature amplitude, while the herbaceous vegetation increases the air moisture during the vegetation period. This area, along with the Fruška Gora Mt., is the rainiest area in Vojvodina.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

The Pannonian Plane was formed during the Pleistocene, previously being the Pannonian Sea. The lowland covered with thick layers of marine sediments was formed after the sea was drained, which started to become overlaid by loess and sand during the Pliocene. In Pleistocene, these sediments were covered with layers of loess, through which large rivers have cut their wide valleys, accumulating large layers of alluvial sediments. Marine sediments can be found in layers deeper than 10 meters, and near the surface they are mixed with alluvial deposits.

Vojvodina is characterised with the continental climate, namely the Pannonian climate of the semi-arid type. Such climate is characterised by four seasons. The winters are long and cold, and summers are warm. High temperature oscillations are distinct in the course of a year. The continental climate is enhanced by cold currents from the east coming through the Đerdap gorge, and it is mitigated by the influence of the central-European climate from the northwest, from where it also receives more precipitation, and by the warm influence of the Mediterranean climate from the south and southwest.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The aquatic habitats of Gornje Podunavlje are important for the purification of the Danube waters, which empty into ponds, marshes, and swamps where they are being cleaned. They are an important flood-control factor, although this role was more significant before the levee was constructed. The gradual flooding enables the sedimentation of sand, silt, and organic particles, thus increasing the level of the humus. Due to the presence of vast forest areas and aquatic habitats, the climate in this area and its surroundings is more humid than in other parts of Vojvodina.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

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:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

Xf, M, Tp, O, Ts, 1, 9, W, Sp, Ss

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The Protected Natural Asset "Gornje Podunavlje" represents one of the last oases of the pristine nature of once wide marshes, ponds, and swamps in Podunavlje, which are reduced to narrow belts along the river due to the ameliorative activities and construction of the levee. Complexes of lowland and marshland forests, cut with river branches and channels, as well as marshlands Apatinski Rit and Monoštorski Rit, spread over this lowland area, marked by the River Danube. It makes a natural unity with the right river bank and the inundation area in Baranja, the well-known Kopački Rit. This unique mosaic of aquatic and wetland ecosystems is the important centre of ecosystem, species, and genetic diversity.

The largest part of the natural asset is covered with forests cut with river branches, channels, oxbows, swamps, and ponds, among which the marshlands Apatinski and Monoštorski Rit are particularly distinct, retaining the basic characteristics of marshes as specific biotopes. Such large areas of marsh forests and aquatic and swamp vegetation in their conserved natural condition can rarely be found, both in our country and in Europe. Owing to the small altitudinal distances (79-88 meters), the gently rolling and almost flat relief, and the vicinity of the river, the biota is mostly influenced by flood and ground waters, as well as by the type of the soil in the substratum.

Due to the lowland area, the Danube is gently inclined, it runs slowly and bends. It floods and forms by-channels, meanders, and slow watercourses, and in the alluvial plane marshes were formed, of which only Apatinski and Monoštorski Rit preserved their authenticity. By its erosive activity, the river has changed its riverbed and formed alternating elongated ridges and swales, which greatly influences the distribution of the flood waters and the ground water level. The water regime in the marshland, in swamps and ponds, is directly or indirectly influenced by the river water level. This is most prominent in the late spring, when the water level is the highest. The quantity of precipitation during the year is moderate and does not have great influence on the river water level. The alluvial forests, swales, and ponds in the unprotected part of Apatinski Rit are directly influenced by the river water during the high water level. In Monoštorski Rit, the water level in ponds and swales depends on the level of the ground water. The differences in the vegetation of the protected area and the unprotected area, directly influenced by the river, are evident. The duration and the time of flooding, the permeability of the soil, and the percolation of the surface and ground waters play an important role in this.

Various types of vegetation are developed in Gornje Podunavlje owing to the differences in the microrelief, the vicinity of the river, the pedological substratum, the geographical position, and the historical development of the vegetation. Besides the stands of aquatic and swamp vegetation in the marshland, aquatic and swamp stands in salty swales and ponds were also found, as well as stands of the meadow vegetation, from wet meadows, through fragmented remains of the steppe, to salt-marsh vegetation on the solonetz type substratum, as well as various types of the forest vegetation, from alluvial marshland to lowland forests. The presence of the nitrophilous and grassland vegetation is the consequence of the presence of game animals and the influence of humans. The vegetation of the area, from the phytocoenological aspect, comprises 16 vegetation classes, 27 alliances, 5 suballiances, 14 community groups, 57 plant communities, and 5 subcommunities. So far, 143 various syntaxonomic units were recorded. Communities of the herbaceous type (*herbosa*) dominate (44 communities or 77.2 %), while forest and shrubby formations (*lignosa*), with 13 communities (22.8 %), are less present. Most of the communities are of the primary character, which illustrates the important botanical diversity. The syntaxonomic overview of the plant communities follows (Panjković, *in* Kovačević *et al.* 2000; Panjković *et al.* 2004, Panjković, 2006):

Aquatic and swamp vegetation covers open areas in Gornje Podunavlje. Numerous plant communities of aquatic and swamp vegetation, apart from occupying large areas and determining the specific appearance of the landscape, have an important role in overgrowing and rising of the terrain, and are very important in the vegetation of Gornje Podunavlje. Aquatic areas of shallow ponds, edge parts of oxbows and by-channels, and slow running channels are covered by "water blossom" of duckweed, water ferns, and mosses, as well as bladderworts (*Lemno – Spirodeletum polyrrhizae*, *Lemnetum gibbae*, *Lemno minoris – Ricciocarpetum natantis*, *Lemno minoris – Azolletum filiculoides*, *Spirodelo polyrrhizae – Salviniatum natantis*, (*Lemno minoris*–) *Riccietum fluitantis*, *Lemno minoris – Utricularietum vulgaris*), while immediately under the water surface the community *Lemnetum trisulcae* is developed. It is important to emphasize the presence of the community of duckweed and liverwort (*Lemno minoris – Ricciocarpetum natantis*), for which the winter months represent the optimal period for development in Gornje Podunavlje. The communities of common hornwort (*Ceratophylletum demersi*), grass-leaved pondweed and water milfoil (*Potamogeton graminei*, *Myriophyllo – Potametum*) are developed following the mosaic pattern in channels, ponds, and old by-channels. The community of water violet (*Hottonietum palustris*) is developed in the channel Sirota, representing a rare community in Vojvodina and Serbia. The community of water milfoil and water lily (*Myriophyllo – Numbaretum*, subass.: *nymphaetosum* and subass.: *nymbharetosum*) is frequent in lentic waters and covers wide areas. The largest areas are covered with the communities of yellow floating heart (*Nymphoidetum peltatae*, *Trapo – Nymphoidetum peltatae*, *Hydrochario – Nymphoidetum peltatae*). The shallow waters in Patajina Bara and Lake Srebreničko are decorated with the community of yellow floating heart and mare's tail (*Nymphoidetum – Hippuridetum*), which spends part of the time in water, and another part in the wet silt. The aquatic community of pondweed and fan-leaved water-crowfoot (*Potamo – Ranunculetum circinatis*) is developed in the shallow lentic waters. After the water runs away, the community of needle spikerush (*Eleocharietum acicularis*) develops. During the summer months in deeper ponds dominates the community of water chestnut (*Trapa natantis*). The vegetation of reeds (order *Phragmitetalia*) is developed around the edges of ponds and by-channels, where water partially remains, with the domination of reed (*Phragmitetum communis*), cattail (*Typhaetum angustifoliae*, *Typhaetum latifoliae*) and bulrush (*Scirpetum lacustris*), depending on the water. The community of sedges (*Caricetum elatae*, *Caricetum vesicariae*, *Caricetum gracilis*, *Caricetum ripariae*, *Caricetum rostratae*) give the characteristic appearance to the landscape, covering large areas. The communities *Glycerietum maximae* and *Phalaridetum arundinaceae* are developed in fragments, while the community *Oenanthe – Rorippetum amphibiae* covers the swales in the alluvial part of the marsh during June.

Vegetation of silty banks is represented with the ephemeral community *Dichostylio – Gnaphalietum uliginosi*, the stands of which overgrow wet, silty, and sandy banks of ponds, river branches, channels, and riverbed, when the water runs away. It is mainly built by annual plants with short development time: *Dichostilis micheliana*, *Gnaphalium uliginosum*, *Heleocharis alopecuroides*, *Cyperus fuscus* and other species. Their full development occurs usually in the late summer or in the autumn.

Nitrophilous vegetation is developed along roads and on roads, along shallow ponds, and in places where the influence of humans and game animals is strong, including smaller, narrow areas of very stamped, wet habitats that are silted and humid most of the year. At the end of the vegetation period the habitats become dry, hard, and dense. Most widely spread ruderal communities in wet ruderal habitats of Gornje Podunavlje belong to the communities of the alliance *Bidention tripartiti*. Communities *Polygono – Bidentetum*, *Ranunculetum scelerati* and *Alopecuretum aequalis* are also developed in wet ruderal habitats. The widespread community along roads in Monoštorski and Apatinski Rit is the community *Hordeetum murini*. The community *Lolio – Plantaginetum* is frequent in stamped areas, while the community *Sclerochloa – Polygonetum avicularis* is sporadic. The fragments of the stands of the alliance *Marrubion peregrini* of the ruderal community that is frequent in Vojvodina occur in stamped salty areas.

Meadow vegetation continues after the swamp vegetation, and it is primarily formed by felling and clear-cutting of forests or drying of ponds and swamps. It occupies very small areas, and its communities most frequently occur in fragments. The only mown meadows occur along the levee, ass. *Arrhenatheretum elatioris*, which in the same time serve for grazing of game animals. The meadow-steppe vegetation of continental salty terrains of the class *Festuco – Puccinellietea*, is represented by the alliance *Puccinellion limosae*, the stands of which are developed in the area of Štrbac, occupies inundated salty meadows on solonchak.

The edificatory species is the grass *Puccinellia limosa*, which is frequent on salty terrains, as well as *Camphrosma annua*, *Veronica incana* and other species. All these species are adapted to salty conditions of the habitat and build specific communities of narrow distribution in the Pannonian Plane. The presence of this alliance is conditioned by the high level of ground water in the spring and by drying of the soil in the summer, when the salt accumulates on the surface.

Šibljak vegetation in Gornje Podunavlje is represented by the alliance *Prunion spinosae* and *Corno – ligustrietum croaticum* that grown along the channels and in the protected areas of forests.

Forest vegetation comprises the widest areas of Gornje Podunavlje, and stretches as a belt along the river. In the lowest part, as a fringe community of Danube islets and sandbanks in Apatinski and Monoštorski Rit, a community of the almond leaved willow (*Salicetum triandrae*) is developed. The šibljak of purpleosier willow (*Salicetum purpureae*) comprises almost the lowest parts of the Danube islets and marshes, developing along ponds and swales. Of widest forest communities in the inundation area it comprises forests of the white willow (*Salicetum albae pannonicum*) that grows on river banks, by-channels, and ponds that are under influence of flood waters. Besides the white willow (*Salix alba*), with adventive roots on trunks, by which the tree develops during the floods, the following also occur – *Populus alba*, *Populus nigra*, *Salix cinerea*, *Salix purpurea* and *Salix triandra*, and of herbaceous species, depending on the water level – *Galium palustre*, *Agrostis alba*, *Myosotis scorpioides*, *Iris pseudacorus*, *Leucoium aestivum*, and other species. The community of white willow and black poplar (*Salici – Populetum nigrae*) grows on the somewhat higher terrain, where the floods do not last long, as well as the community of white willow and black poplar with the European dewberry (*Salici – Populetum nigrae rubetosum caesii*). Ash forests are fragmented and represent a rarity (*Leucoio – Fraxinetum angustifoliae*). The stands of alder (*Alnetum glutinosae*, *Alnetum glutinoso – incanae prov.*, *Ulmeto – Alnetum glutinosae*) are also fragmented. The forests of grey sallow (*Salicetum cinereae*) sporadically occur along the edges of the channels in this area. The community of the white and black poplar (*Populetum nigro – albae*) is developed on ridges, higher parts of the Danube terraces, where the floods are frequent but of short duration. Particularly beautiful stands can be found on the islets of Adice (Monoštorski Rit). Along with the species *Populus alba*, *Populus nigra* and *Salix*, the following can be found – *Crataegus nigra*, *Crataegus monogyna*, *Morus alba*, *Cornus sanguinea*, *Prunus spinosa*, *Rubus caesius*, *Lycopus europaeus*, *Galeopsis speciosa*, *Solanum dulcamara*, and other species. The stands of the black poplar today represent a rarity and do not recover naturally. The community of the white poplar and the Hungarian hawthorn (*Crataego nigrae – Populetum albae*) is developed as a fringe community on ridges in the unprotected part of Apatinski Rit, which are rarely flooded. Of tree species, the edificatory species is the white poplar (subass.: *typicum*), and sometimes pedunculate oak prevails. In the sector of the Danube, besides the relic pedunculate oak forests, the shrubby stands of the Hungarian hawthorn are also frequent: *Crataegum nigrae prov.* The forest of white elm and narrow-leaved ash (*Frangulo-Ulmetum effusae*) continues after the poplar stands, with *Quercus robur*, *Populus alba*, *Populus nigra*, *Pirus piraster*, *Acer campestre*, *Alnus glutinosa*, wild grapevine *Vitis silvestris*, *Rubus caesius*, *Viburnum opulus*, *Morus alba*, *Crataegus monogyna*, and other species. Of herbaceous plants the following occur – *Festuca gigantea*, *Cerastium silvaticum*, *Stellaria neglecta*, *Carex caryophylla*, *Carex silvatica*, the species from the family of orchids – *Platantera alba*, and other species. Oak forests grow in the highest areas. The forest of pedunculate oak and dyer's broom (*Genisto elatae – Quercetum roboris*) grows on somewhat lower terrain. In the floodplain of the Danube, on alluvial pararendzines, where the floods are frequent and last longer, the forests of elm and ash with oak are developed (*Ulmeto – Fraxinetum prov.*). Besides the cited oak forests in the Danube sector, the relic communities of pedunculate oak also occur: *Cariceto – Quercetum roboris “relictum”* and *Rubeto – Quercetum roboris “relictum”*. The more arid type of forest is the community of pedunculate oak and hornbeam (*Carpino betuli – Quercetum roboris*), the forest floor of which is enriched by *Epipactis hebeborine*, *Impatiens noli – tangere*, *Brachipodium silvaticum*, *Geranium robertianum*, *Galeopsis speciosa*, *Geum urbanum*, *Poa nemoralis*, *Sanicula europaea*, *Torilis arvensis*, *Carex silvatica*, and other species, which grows in the forest Crna Šuma on Karapandža, on Štrbac, and in the forest Kozara. These stands are relic, and are built of plant species that are threatened due to the loss of habitat.

Anthropogenic forest communities – Since Gornje Podunavlje is primarily a forest area, it has been used by humans for centuries. In the entire area there are almost no stands that are not influenced by man through forestry cultivating measures, such as thinning, felling, and planting of cultures, and unfortunately

clear-cutting. Anthropogenic forest communities in this area occur mainly as planted cultures, and more rarely as degradation stages. The most widespread are planted forests of the white willow (*Salix alba*) cultures, clones of the Euro-American poplars (*Populus euroamericana*), American green ash (*Fraxinus pensylvanica*), American black walnut (*Juglans nigra*), and locust tree (*Robinia pseudacacia*).

According to the EUNIS habitat typology, the following basic levels are distinct:

- C1 – Natural eutrophic lakes with *Magnopotamion* and/or *Hydrocharition* - type vegetation
- C1 – Communities with the domination of bladderworts *Utricularia* spp. “colonies”
- C1 – Communities with the domination of aquatic ferns (*Salvinia*) – floating mats
- C1 – Water crowfoots (*Ranunculus* spp.) communities in shallow water
- C1 – Water violet (*Hottonia palustris*) beds in shallow water
- C1 – Oligotrophic to mesotrophic stagnant waters with the vegetation of *Littorelletea uniflorae* and/or *Isoetes* – *Nanojuncetea*
- C3 – Rivers with silted banks with the vegetation of *Chenopodium rubri* p.p. and *Bidentetion* p.p.
- C3 – Freshwater dwarf spikerush (*Eleocharis*) communities
- C3 – Pannonian river bank dwarf sedge communities (*Carex* sp.)
- E3 – Eutrophic humid meadows (*Juncus*)
- E5 – Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- E6 – Pannonian salt steppes and salt marshes
- G1 – *Salix alba* and *Populus alba* galleries
- G1 – Fluvial mixed woodland of *Quercus robur*, *Ulmus laevis*, *Ulmus minor*, *Fraxinus excelsior*

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

From the floristic aspect, Gornje Podunavlje is one of the richest areas in Serbia. Around 1000 taxa of the vascular flora are present, which makes 28.1% of the determined number in the national flora. In comparison to the flora of the former Serbia and Montenegro, 23% of plant species grow in this part of Podunavlje.

Species of the narrow range of the Pannonian and Pontic-Pannonian floristic character are particularly important for the flora of this area, and specifically Pannonian endemics and subendemics, followed by sub-Atlantic, sub-Mediterranean, and the most numerous central-European and European species, of which many are relic as well, which are preserved in fragile ecosystems, such as aquatic ecosystems, marshes, swamps, wet meadows, salty terrains, and marsh forests.

Pannonian floristic character: Pannonian subendemics *Crataegus nigra* and *Roripa kernerii* are specific for this flora. *Crataegus nigra* is a part of the alluvial forests of willow, poplar, pedunculate oak, and ash. This species builds fringe shrubby communities in Apatinski Rit around oak forests on ridges. *Roripa kernerii* grows on wet salty terrains around ponds on Štrbac, together with *Oenanthe silaifolia*, a Pontic-central-sub-Mediterranean species. *Puccinellia limosa* is a subendemic halophyte that grows on salty terrains on Štrbac.

Pontic-Pannonian floristic character: *Camphorosma annua*, a halophytic species is characteristic. Other specific Pontic-Pannonian species are *Iris variegata*, which inhabits oak forests on Štrbac, and *Salvia austriaca* that adorns meadows along the levee. From the group of the Pannonian floristic character, *Doronicum hungaricum* grows in forests.

A boreal relic is *Adonis vernalis*, whose presence reflects the Pontic influence in the flora, and it grows only on one microlocation.

Of sub-Atlantic species, *Ranunculus ophioglossifolius* and *Blackstonia perfoliata* have also the Mediterranean character, as well as *Orchis purpurea* and *Orchis laxiflora*.

A relic of the subglacial humid period of the subboreal region, *Ranunculus ophioglossifolius*, grows in shallow swales that are dry during the summer. In the spring and at the beginning of the summer, the forest floor of the oak relic forests is adorned by the flowers of *Orchis purpurea*.

A relic species *Iris spuria* of the sub-Mediterranean character grows in small numbers on very salty terrains. The central-European and European floristic elements are the most numerous in the group of relic aquatic plants originating from the warm Tertiary of the northern and central Europe, such as *Nymphaea alba* and *Nuphar luteum*.

The central-European floristic character has *Ranunculus petiveri*, which grows in shallow swales on salty terrains.

European significance has the representative of the relic family of orchids *Dactylorhiza incarnata* that grows together with *Orchis laxiflora* on wet meadows and along the edge of the reeds.

Of cosmopolitan species, specific for the flora are the species that are a part of the aquatic and swamp vegetation: *Lemna minor*, *Lemna gibba*, *Lemna trisulca*, *Spirodela polyrrhiza*, *Najas marina*, *Potamogeton crispus*, *Potamogeton lucens*, *Potamogeton perfoliatus*, *Limosella aquatica*, *Alisma plantago-aquatica*, *Bolboschoenus maritimus*, *Glyceria fluitans*, *Phragmites communis*, *Schoenoplectus lacustris*, *Typha latifolia*, *Heleocharis palustris*, *Lythrum hyssopifolia* and other species.

The presence of adventive species that are a part of the natural vegetation is also important for the flora. Among them, significant are *Acorus calamus*, a rare and legally protected species, *Azolla filiculoides* that builds communities on surfaces of stagnant pond waters, *Valisneria spiralis* and *Elodea canadensis* that build subaquatic meadows in channels and in the rivulet Plazović. In alluvial forests, on the forest floor, significant species for their number and cover are *Impatiens noli-tangere*, *Impatiens parviflora* and *Impatiens glandulifera*. In addition, the presence of invasive species is also significant in this area: *Solidago gigantea*, *Amorpha fruticosa*, *Asclepias syriaca*, *Aster novi-belgii*, *Ailanthus glandulosa*, *Acer negundo*, *Araxinus pensilvanica* that represent a great problem in protection, since they penetrate plant communities and destroy the structure of the natural vegetation.

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Entomofauna

More than 60 species of butterflies exist in this area.

Among the butterflies of Gornje Podunavlje, 32 species are interesting from the aspect of protection. Among them, significant are *Thecla betulae* Linnaeus (fam. Lycaenidae) and *Euphydryas maturna* Linnaeus (fam. Nymphalidae).

In water and in very humid habitats, where the vegetation of aquatic and semiaquatic plants and of swamp meadows occur, specific insect groups are present. Among them significant are the mosquito larvae, mayflies, dragonflies, great diving beetle, silver water beetle, water scorpion, water stick insect, and other species. Of particular interest (faunistic, ecological, commercial, and aesthetic) are the species from the order Odonata - dragonflies. These species have found particularly favourable conditions for development in the habitats of Gornje Podunavlje.

Besides butterflies, the orders Diptera and Coleoptera (Carabidae, Coccinellidae, Dytiscidae...) are significant for the number of individuals and species.

The species of the order Hymenoptera have a significant place in the entomofauna of Gornje Podunavlje, as well.

Ichthyofauna

The Danube is the most important open, lowland fishing water of the cyprinid type. The configuration of the banks of the Danube enables the existence of large alluvial areas overgrown with vegetation. For this reason, the areas of the permanent watercourse actively take part in the fish production, as well as the alluvial zone covered with water, the importance of which depends on the river water level and the duration of the floods.

The list of fishes includes commercial species as well, threatened in the Danube and in the alluvial zone (*Esox lucius*, *Barbus barbus*, *Cyprinus carpio*, *Orthobius barbatulus*, *Anguilla anguilla*, *Lota lota*, *Sander lucioperca* and *S. volgensis*).

The conservation of the species *Carassius carassius* and *Tinca tinca* is very important, since they are characteristic for alluvial areas that are receding, which cause the decrease of the population abundance of these species.

Along with the autochthonous species of our ichthyofauna, the Danube is today inhabited by fishes that are introduced either unintentionally or intentionally from North America, Asia, and Europe. The process of acclimatisation and naturalisation of some species is completed, while for others it is still under way. So far, 8 species of introduced fish were recorded from the families Cyprinidae, Ictaluridae and Centrarchidae (*Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Aristichthys nobilis*, *Carassius auratus gibelio*, *Pseudorasbora parva*, *Ictalurus nebulosus*, *Lepomis gibbosus* and *Micropterus salmoides*). These species, which at the first glance provide good commercial effects in fish ponds, upon reaching open waters, through competition for resources, cause negative effects on the autochthonous ichthyofauna, since their further spreading is impossible to control.

Herpetofauna

Gornje Podunavlje represents one of the last oases of wetlands both in our country and in the entire course of the Danube. As such, among other things, it represents a strong reproductive and diversity centre of the amphibian fauna – Amphibia, and the reptile fauna – Reptilia of the Pannonian Basin. The presence of 19 species of amphibians and reptiles was determined so far, of which 11 amphibians and 8 reptiles.

The fauna of amphibians in this part of Podunavlje includes both groups present in Europe. In the group of tailed amphibians (Caudata) the following were recorded: *Triturus dobrogicus* (Danube crested newt) and *Triturus vulgaris* (smooth newt). In the group of tailless amphibians – frogs (Anura), the following were recorded: *Bombina orientalis* (fire-bellied toad), *Pelobates fuscus* (common spadefoot), *Bufo bufo* (common toad), *Bufo viridis* (green toad), *Hyla arborea* (common tree frog), *Rana dalmatina* (agile frog), *Rana kl. esculenta* (edible frog), *Rana lessonae* (pool frog) and *Rana ridibunda* (marsh frog).

In the fauna of reptiles, one species of turtles, four species of lizards, and four species of snakes were recorded so far. Of turtles, there is *Emys orbicularis* (European pond terrapin), and of lizards, *Anguis fragilis*

(slow worm), *Lacerta viridis* (green lizard), *Lacerta agilis* (sand lizard), and *Podarcis muralis* (common wall lizard). Of snakes, there are *Elaphe longissima* (Aesculapian snake), *Coronella austriaca* (smooth snake), *Natrix natrix* (grass snake), and *Natrix tessellata* (dice snake).

Ornithofauna

Ornithofauna is one of the fundamental natural values of Gornje Podunavlje. The diversity of ecosystems, the specific large forest complexes of marsh forests and ponds, the Danube with its islets and wide alluvial zones, as well as the vicinity of Kopački Rit and the Hungarian national park Dunav-Drava, contribute to the overall ornithological richness and invaluable significance of this region for nesting, migration, and wintering of birds. Gornje Podunavlje has one of the richest and most diverse bird faunas in Serbia. A total of recorded species is 230, while it is estimated that this number is really as large as 280, which makes over 80% of the total bird fauna of Serbia. So far, the determined number of nesting species is 160, while around 145 are nesting in the present time.

The international and national significance of Gornje Podunavlje for the birds is great, both for species that live there most of the year and for species that only stay shortly during the periods of migration and dispersion. For its generally known ornithological values, Gornje Podunavlje, namely the area of 30,000 hectares, is included in the registry of the areas of international importance for birds, according to the IBA project. The ornithological value reflects primarily in the richness of rare and threatened nesting species, and for its significance for migration and wintering as well.

Among the significant species are the following: shoveler (*Anas chapeata*), bluethroat (*Luscinia svecica*), great white egret (*Casmerodius albus*), purple heron (*Ardea purpurea*), and other herons that fly over or possibly occasionally nest. The honey buzzard (*Pernis apivorus*), icterine warbler (*Hippolais icterina*), river warbler (*Locustella fluviatilis*), collared flycatcher (*Ficedula albicollis*), black woodpecker (*Dryocopus martius*), green woodpecker (*Picus viridis*), lesser spotted woodpecker (*Dendrocopos minor*), garganey (*Anas querquedula*), and other species are also present.

Theriofauna

The specific distribution of plant formations, where forests alter over wide areas of steppic character, numerous reeds, swamps, and marshes enable conditions for a large number of animals. In these areas live 51 species of mammals. On the hunting grounds of Gornje Podunavlje, besides the red deer, one can also find roe deer and wild boar to which this area, with its flora and vegetation, offers ideal habitat conditions for development and survival. Among the significant species are *Erinaceus concolor* – eastern hedgehog, *Neomys anomalus* – Miller's water shrew, *Crocidura suaveolens* – lesser white-toothed shrew, *Arvicola terrestris* – water vole, *Ondatra zibethica* – muskrat, *Micromys minutus* – harvest mouse, *Lepus europaeus* – brown hare, *Vulpes vulpes* – red fox, *Nyctereutes procyonoides* – raccoon-dog, *Mustela nivalis* – weasel, *Mustela putorius* – polecat, *Meles meles* – badger, and other species.

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The social and cultural life of the inhabitants in the settlements of Gornje Podunavlje is linked to the ecological character of this area. The life of the people in these areas has always been connected with the Danube, the forests, and the marshland. Extensive fishery is an important commercial activity, along with forest usage, hunting, and commercial fishing. Dug channels are used for irrigation, but have also found their function as habitats of plants and animals, as well as bathing sites in the summer months. The tourism and recreation are best reflected in hunting tourism and sport fishing, although the ecological, nautical, and village tourism are developing ever more. The ethnographical richness has been preserved in surrounding settlements (Bezdan, Bački Monoštor, Kupusina, Sonta, and Prigrevica). Since several nationalities live here, a wide spectrum of folk costumes, characteristic folklore, and customs are present

in this area. Many customs, being a part of the tradition, today have the character of manifestations, such as the Masked Carnival in Kupusina, Šokac Wedding with the "Grape Ball" in Sonta, cherishing the traditional folk songs from the old homeland (Lika and Banija) in Prigrevica, Apatin Fishermen Evenings held every month, the competition in making the fish stew "Golden Kettle", etc. The traditional dishes made from fish (fish stew, fish chowder, fish grilled on forked sticks) and game animals are prepared in this region. Boats and paddles are made from wood in local shops, and other specific things such as clogs and houseware as well. Fishing gear is made manually in the surrounding villages. The local beer made in Apatin is named after the marsh deer ("Jelen Pivo", jelen=deer), the symbol of the nature of this area, and it is consumed throughout Serbia.

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 fishing methods applied in this area enable the sustainable usage of the fish stock. The reed is used for house isolation and roof covers, and the cattail for making bags and mats. The amount of reed and cattail removed from the marshes does not have negative effects on the ecological functioning of these habitats, yet even slow down the successions and overgrowing processes.
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
The first fishermen balls were organised in Apatin in 1773, when the fishermen guild was established. They were held on Sts. Peter and Paul day, on June 29, since they were acclaimed as protectors of the fishermen. The balls were held in the inn "Fuderer", today "Šaran", where apprentices used to take the master's exam and obtained their licences.
- 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:

24. Land tenure/ownership:

a) within the Ramsar site:

The ownership is almost exclusively state-owned (more than 95%). Private enclaves are small and patchily distributed.

b) in the surrounding area:

Private agricultural lots are mainly present in the surrounding area, with a smaller share of state-owned land.

25. Current land (including water) use:

a) within the Ramsar site:

The most widespread type of land use is forestry, which is developed almost throughout the area. The natural asset "Gornje Podunavlje" belongs to the forestry region of north Bačka. According to the forestry allotment, the entire area of forests and forest land belongs to the Public Enterprise for Forest Management "Vojvodinašume" and the Public Enterprise "Vojvodinavode". The entire area of forests and forest land in Gornje Podunavlje covers 14,296.30 ha. The Lumber Camp "Sombor" administers and

manages the forests and forest land of the Public Enterprise “Vojvodinašume”, with two Forest Management Units, the “Apatin” in Apatin and the “Kozara” in Bački Monoštor. The same enterprise manages most of the hunting and fishing grounds. Commercial and sport fishing are both present in Gornje Podunavlje. Hunting is also well developed, particularly of large game animals, red deer, roe deer, and wild boar. Game birds are also hunted, but to a lesser extent. The “Vojvodinašume” manages the waters in this area. The system of channels was dug, and the levees along the Danube were built. The water is used for water supply, the terrain is irrigated or drained when necessary, and waterbodies are used for recreation and sport and commercial fishing as well. There are two extensive fishponds in this area, the “Kolut” and the “Svilojevo”, which are used for rearing of cyprinid fish. The Danube is important for the river traffic in this part of Europe.

The area of Gornje Podunavlje partly covers the area of the unprotected flood belt. These favourable conditions influenced the biota, as well as the commercial aspect of the usage of ground waters, water supply, or any other way of usage of aquifers of this natural asset. From the aspect of ground water natural quality conservation, the belt of the organogenic-pond sediments, oxbows, and places with helocene springs are distinct as very threatened areas. These are sites of direct communication between surface and ground waters. Although present, the first aquifer of phreatic type is not used for water supply, since the root system is developed in its cover zone, which increases its significance for the protection of vegetation. Ameliorative channels and sand borrow pits are also in the category of threatened areas. The ameliorative channels are more than 2 meters deep, which enables the direct surface drainage during the high ground water level, or sinking during the low ground water level. The phreatic aquifer is present over the entire area of the natural asset Gornje Podunavlje, which is partly threatened considering that the protective roof layer does not exist.

b) in the surroundings/catchment:

Agricultural land dominates in the surroundings, primarily cultivated grain fields. Truck farming is also important, and to a lesser extent fruit growing, wine growing, and extensive cattle breeding. Waters are used for irrigation in this area. The most important industry is the brewery in Apatin. There is a shipyard in the channel near Bački Monoštor.

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 prominent threat factor is the ameliorative and hydrotechnical activity, as well as hydrotechnical solutions for regulation of the water quantity in the marshes, which had negative effects on the water regime in Gornje Podunavlje. The construction of the protective levees along the Danube in 1960's prevented the natural regime of flooding of large areas that remained disconnected from the rest, on the other side of the levee. Besides Apatinski and Monoštorski Rit, as the largest marshlands, before the levees were built there were several smaller marshes in northwestern Bačka. Unfortunately, they were drained and turned into arable land. Of the former marshland Sonćanski Rit only the pond Velika Bara is left. The attempts are made to improve the disturbed flooding regime by constructing inflow-outflow systems. The channel network of the hydrosystem DTD (Dunav – Tisa – Dunav), which partly runs through Gornje Podunavlje, also have negative effects on this area, since its purpose is to drain the alluvial plane of the Danube and to lower the ground water level in order to induce long-term changes in the habitat purpose, which directly influences the original hydrological features of the area.

The hindered water flow, sedimentation, siltation, and overgrowing of the existing ponds and channels, and particularly old by-channels, which are crucial for the adequate water inflow and outflow in aquatic and wetland habitats, contribute to the reduction of areas covered by water. The Danube, as a large river, annually carries thousands of tons of sand (7,800,000 t) and particles that are partly sedimented in the flooded area and in Dunavci. In this way, the marsh bed is constantly rising, i.e. the marsh is becoming shallower. The eutrophication is an important threat factor that contributes to the covering of the marshland, since due to

the large organic production the detritus is being formed and deposited, facilitated by sedimentation that occurs during the withdrawal of the water. The sprouting of vegetation is enabled, namely of the reed, goat willow, and other emerged species that favour eutrophication, low water level, or draining.

The loss and fragmentation of the habitat is another ecological problem, particularly of natural forests of pedunculate oak, willow, white and black poplar, wet meadows, and ponds. The influence of humans changed the composition of forests as well. The number of oak forests is decreasing, and the number of forest cultures of Euro-American poplar, willows, and American green ash, which took habitats of alluvial forests, wet meadows, and swamps, increases. Therefore, the forestry today, as an economic sector, represents a great threat factor in Gornje Podunavlje. In the same time, forest monocultures change the normal regime of ground waters, namely decrease it. The level of ground waters in Apatinski Rit is decreased for 12 m, and foresters have to irrigate poplars. Old trees of pedunculate oak are dying as a consequence of the disturbed water regime.

These anthropogenic influences disturbed the spatial distribution and percentage of pond, meadow, and forest ecosystems, to the detriment of wet meadows that are disappearing and are very scarce in the area, as well as ponds, which are being overgrown, and natural forests, in favour of anthropogenic forest cultures that are spreading. Significant degradation and destruction of autochthonous alluvial forests, which reflects in mixed composition, age structure, and timber volume, manifests first of all in removal of old and rotten trees, general rejuvenation, uniformity and fragmentation of stands, etc.

Besides the habitat loss, another great problem are the invasive species of foreign origin, which have such competitive features that lead to changes in the structure of stands of the autochthonous phytocoenoses, and some even destroy communities and habitats, such as: *Amorpha fruticosa*, *Fraxinus pensilvanica*, *Acer negundo*, *Solidago gigantea*.

Grazing of cattle and pigs is not present today, but the rearing of game animals, particularly of wild boar and deer, has a significant influence on the renewal of the forests. Once, the meadows on Štrbac were mown, which prevented the overgrowing process and natural succession, and today these salty terrains are being overgrown with hawthorn and wild pear.

The afforestation of large areas with plantation poplars significantly decreases the flood zone, which during the high water level represents the basic medium for natural spawning of the fish. Fishes are largely threatened by irrational and uncontrolled exploitation through commercial and sport fishing. Usage of illegal fishing gear (electro-fishing, explosives, poisonous substances, illegal nets and other gear) considerably threaten the fish stock, particularly the potential breeding material.

The illegal hunting or wounding of rare and threatened species of birds is also present, especially during migration and wintering. This relates to certain species of ducks and geese, herons, birds of prey, snipes, or songbirds. However, the period of the closed season for some game species is not strictly respected, and cases of collecting or hunters' actions on "extermination of pests" were recorded, which represents a particular problem on fishponds.

The river traffic on the Danube, as well as asphalt, forest, and village roads have negative effects such as pollution, disturbance, or habitat alterations.

Burning of reeds, emptying septic tanks in neighbouring channels and reeds, destruction of vegetation on fishponds, and aerial spraying also have negative effects.

b) in the surrounding area:

The waste waters of the city of Apatin that are directly discharged into the Danube represent a problem, since the filters are not functioning and the special channels were dig through which waste waters enter the river directly, and from there the alluvial areas downstream. Furthermore, the brewery in Apatin and the brick industry "Rapid" discharge their water into the Danube. Other polluters were not documented along the

course of the Danube in the SNR “Gornje Podunavlje”.

Other threat factors are also present, but are less evident. Occasional burning of reed and existing waste depots near Bezdan and Apatin also have negative effects on the natural environment. The application of agrotechnical measures and runoff from the surrounding cultivated fields enter the alluvial zone indirectly by ground waters and channels. It is noticed that septic tanks are being emptied into the surrounding channels and reeds near Bezdan.

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

The protection measures in this area were established for the first time in 1955, when the Monoštorske forests were protected as a habitat of the white-tailed eagle. Then in 1963, 600 hectares of mixed forests of the black poplar (*Populus nigra*), white poplar (*Populus alba*), and white willow (*Salix alba*) were protected in Monoštorski Rit, as a strict nature reserve. In 1978, old alluvial forests were protected (over the area of 74.93 ha), as nature reserves and natural monuments (6.06 ha) in Monoštorski Rit. In the same year, in Apatinski Rit, the swamp ecosystem at the locality Bestrement (89.63 ha) was protected, as a reserve of rare plant and animal species and plant communities. The protection was integrated in 1982 over the area of around 10,000 ha of Apatinski and Monoštorski Rit, as the regional park “Gornje Podunavlje”.

In 2005, this area was nominated as the IPA site (Important Plant Areas) “Gornje Podunavlje”, within the boundaries of the Reserve.

In 2000, Gornje Podunavlje was included in the register of areas of international importance for birds, according to the IBA (Important Bird Areas) project, over the area of 30,000 hectares.

On July 20, 2001, the Government of the Republic of Serbia proclaimed the Special Nature Reserve “Gornje Podunavlje”, with the total area of 19,648 hectares. A three-levelled protection regime was established, over the following areas: protection regime of the 1st level comprises 261.62 hectares, protection regime of the 2nd level comprises 4,843.81 hectares, and the protection regime of the 3rd level comprises 14,542.57 hectares.

Some of the most important protection measures related to the Ramsar site are the following:

In the area of the Special Nature Reserve Gornje Podunavlje, within the regime of the 1st level, the usage of natural assets is banned and all other types of usage of the land and activities other than scientific activities and controlled education are excluded.

In the area of the Special Nature Reserve Gornje Podunavlje, within the regime of the 2nd level, the following is forbidden: clear cutting, substitution of species; cutting of trees with nests of white-tailed eagle and black stork; introduction of allochthonous species of plants and animals, except species of forest trees that are already being managed according to specific management plans; upsetting of birds in the period of reproduction; boating in the area of the old course of the Danube during the period of fish spawning, except for boats of the warden service; blocking of migratory routes.

In the area of the Special Nature Reserve Gornje Podunavlje, within the regime of the 3rd level, the following is forbidden: to build industrial and other objects and realize activities that disturb morphological and hydrological features of the terrain, destroy plants and animals or in any other way disturb the integrity of the landscape, except the construction of solid forest roads made of natural materials, and systems for drainage and irrigation – open channel network for intensive management; to discharge non-purified waste waters; to burn reed; to alter the land usage; to exploit mineral raw materials.

Cutting of overgrown bushes is applied as an active measure on the salty meadows of Monoštorski Rit. The project of water regime improvement is in its initial phase.

b) If appropriate, list the 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?:

The middle-termed protection and development plans are issued for the Special Nature Reserve “Gornje Podunavlje”, from which annual protection and development plans result. The first middle-termed programme ceased during 2006, and the new programme is under way.

d) Describe any other current management practices:

The fishponds “Kolut” and “Svilojevo” are managed in keeping with the acts of the Ministry of Agriculture.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

Gornje Podunavlje is a part of the planned Biosphere Reserve “Drava – Mura”.

The realisation of present projects and plans related to the revitalisation of wetlands, cleaning of salty terrains from hawthorn and wild pear, etc, are planned. Maintenance of the natural dynamics of pond flooding, cleaning and deepening of channels and old river courses – by-channels, are also priority measures. Measures of care and renewal of forest stands as habitats of threatened species are necessary in order to preserve rare species in oak forests, as well as to cease the afforestation with monocultures and changing of natural forests into forest cultures. It is necessary to preserve old forests and old trees, and to ban their cutting.

It is planned to train a warden service for the reserve, as well as to provide it with better equipment, but this has not been yet adequately realised.

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The project of the Habitat Inventory and Mapping in the Special Nature Reserve “Gornje Podunavlje” is realised by the IUCN Office for South-East Europe, the Green Belt – PIN/MATRA, the Institute for Nature Conservation of Serbia, and the PE Vojvodinašume.

The Monitoring of Aquatic and Wetland Vegetation in the Special Nature Reserve “Gornje Podunavlje” is realised by the Institute for Nature Conservation of Serbia, and the PE Vojvodinašume.

The study and mapping of the white-tailed eagle and black stork nests, monitoring and bird banding are realised by the Society for Protection and Study of Birds of Vojvodina, the Institute for Nature Conservation of Serbia, and the PE Vojvodinašume.

The Geographical Research Society from Belgrade and the Scientific Research Society of Biology Students “Josif Pančić” from Novi Sad organised seven summer multidisciplinary research camps in the period from 1995 to 2005.

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

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The Institute for Nature Conservation of Serbia, the PE "Vojvodinašume", and the WWF perform permanent education of the local community, all interested parts, and users of the natural asset, on values and importance of the natural richness of "Gornje Podunavlje". The informative boards are placed in Sombor, Bački Monoštor, and in the Reserve. Printed material is distributed. Workshops are organised in Bački Monoštor, with the topic on local community participation in the improvement of the Reserve protection. The film "Gornje Podunavlje" was recorded and shown several times. The Volunteer Centre of Vojvodina organises international volunteer camps in Bački Monoštor.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Tourism and recreation are best reflected in outing tourism, hunting tourism, and sport fishing, although ecological, nautical, and village tourism are also present. A large number of private weekend cottages are built throughout area. In once exclusive hunting areas Kozara and Apatinski Rit, hunting of large game animals represents a very expensive pleasure, but on these hunting grounds "hunting" can be done with a camera as well. One can have room and board at the hunters' huts "Mesarske livade" and "Štrbac". Boat, carriage, or jeep trips are also organised at the hunting grounds. One can obtain a daily, weekend, or seven-day fishing permit. It is possible to rent a fishing boat at fishermen organisations and at inns that are plentiful. Excellent specialities, with the best wine and tamburitza players, are offered at the inns "Harčas", "Vagoni", "Smuđ", "Zlatna Krana", "Šaran", and other inns. Some of these inns, as well as the motel "Boja", have river strands. Longer stay lodging in Gornje Podunavlje is offered at several high-quality objects in Apatin and surroundings, such as the inn "Zlatna Krana". Boat river trips along the Danube and boat trips to the Reserve are also organised. The project on village tourism development in Bački Monoštor is currently under way. The first festival of music, food, and crafts named "Bodrog Fest" was organised in Bački Monoštor in August, 2005.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

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:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Public Enterprise "Vojvodinašume" Petrovaradin

Lumber Camp "Sombor" Sombor

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34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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