

Information Sheet on Ramsar Wetlands (RIS) – 2006 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

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 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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2. Date this sheet was completed/updated:

November 2006

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.

“Labudovo okno”

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 X; 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): X;
ii) an electronic format (e.g. a JPEG or ArcView image) X;
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.

Boundary follows a boundary of wetland habitats, mostly inside Special Nature Reserve "Deliblato sands".

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	44° 48' 22" N
		21° 18' 26" E
	West	21° 10' 32" E
	South	44° 45' 39" N
	East	21° 22' 11" E
	North	44° 51' 21" N

Gauss-Krieger: Central	4962,450
	7524,325
West	7513,900
South	4957,375
East	7529,225
North	4967,975

9. General location:

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The area named "Labudovo okno" is located in Serbia, with most of its part positioned in the Autonomous Region of Vojvodina, in south-eastern Banat, near the villages of Dubovac, Ram and Banatska Palanka, while its lesser part reaches the right riverbank of the Danube on the territory of central Serbia. The eastern part of the area extends to the Nera River and the borderline with Rumania. The major settlements in the region are Kostolac on the right riverbank, and Bela Crkva and Kovin on the left riverbank. The number of inhabitants in these centres ranges from 15,000 to 30,000. It is 70 km far from Belgrade, 55 km from Pančevo, and 150 km from Novi Sad.

10. Elevation: (in metres: average and/or maximum & minimum)

Ranges from 68 m to 78 m above mean sea level.

11. Area: (in hectares)

3733.39 hectares

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The area of the Danube along the southern margin of the Pannonian Plain in Banat, between the large Deliblatska peščara Sands in the north and the Ramsko Sands in the south, encompasses one of the most distinctive and representative areas both from national and regional aspects. The Deliblatska peščara Sands, being the largest of European continental sands, together with their immediate surroundings along the Danube, represent a unique geomorphological phenomenon.

The construction of the reservoir in the Đerdap gorge caused the elevation of the water level and slowing down of the river flow, which further provoked flooding of many river islets, lower coastal parts and lagoons along the southern part of the Deliblatska peščara Sands, creating new aquatic habitats with rich and diverse biota in this way.

Since 2001, parts of the Deliblatska peščara Sands directly stretching to the Danube, as well as the river itself with its islets and branches: Dubovački rit, Labudovo okno, Ada Čibuklija, Ada Žilava, river mouth of the Karaš River, are encompassed within the boundaries of the Nature Special Reserve "Deliblatska peščara". Valuable aquatic ecosystems of this region are also integrated as a part of the nominated Ramsar site, such as the river mouth of the Nera River, river islet Ada Zavojska, the "Dunavci" channels, and the section of the right riverbank of the Danube.

Main wetland types are permanent rivers and permanent freshwater marshes. Various plant communities are encountered in the area of Labudovo okno, from dominating aquatic and wetland communities to wet meadows and steppe pastures along the riverbanks as outlying edges of the Deliblatska peščara Sands.

This area represents one of the specific, unique and preserved aquatic and wetland habitats in the lower course of the Danube in Vojvodina and Serbia, whose primordial swamp/marsh habitats were for the most part destroyed. The area of Dubovački rit and the shallow waters of the Danube represent an ideal spawning area for many fish species. This area also represents an important gathering place of waterbirds, a nesting place for globally endangered species, a feeding place for numerous rare and endangered species and the most important migratory station of aquatic avifauna in Serbia.

Since 1989, the area of the Deliblatska peščara Sands with its boundaries along the Danube is included in the list of the important bird areas in Europe – IBA (N° 038 and N°39). Following the revision in 2000, two IBA areas were set apart: IBA "Deliblatska peščara" with 38,000 ha – IBA code 016 and IBA "Dubovac-Ram" with 12,000 ha – IBA code 033.

In 1997 it was proposed to the Federal Ministry of Foreign Affairs (Commission for Collaboration with UNESCO and the Commission for the Man and Biosphere Programme) that this nature asset should be designated as a Biosphere Reserve (UNESCO MAB Programme).

13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1	•	2	•	3	•	4	•	5	•	6	•	7	•	8	•	9
X		X		X		X		X		X		X		X		<input type="checkbox"/>

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: "Labudovo okno" is an excellent example of a specific wetland habitat located at the edges of the large sands, and extremely rare and endangered in corresponding biogeographic region.

Criterion 2: "Labudovo okno" provides survival for a significant number of vulnerable, endangered and extremely endangered species and endangered ecosystems (**IUCN RED LIST 2004**), such as:

Gymnocephalus schraetser (Threatened: Vulnerable); *Acipenser ruthenus* (Threatened: Vulnerable); *Zingel streber* (Threatened: Vulnerable); *Zingel zingel* (Threatened: Vulnerable); *Phalacrocorax pygmaeus* (Lower Risk: Near Threatened); *Anser erythropus* (Threatened: Vulnerable); *Aythya nyroca* (Lower Risk: Near Threatened); *Aquila clanga* (Threatened: Vulnerable); *Aquila heliaca* (Threatened: Vulnerable); *Haliaeetus albicilla* (Lower Risk: Near Threatened), *Falco cherrug* (Endangered); *Crex crex* (Lower Risk: Near Threatened); *Spalax leucodon* (Threatened: Vulnerable); *Spermophilus citellus* (Threatened: Vulnerable).

The Deliblatska peščara Sands represents one of the three remaining places in Vojvodina where lesser mole rat (*Spalax leucodon*), a globally endangered species, can be found. European souslik (*Spermophilus citellus*), another globally endangered species. Lesser mole rat and European souslik are both included in the Red List of Threatened Species, under the category "vulnerable species".

Criterion 3: "Labudovo okno" provides survival for valuable populations of plants and animals significant for conservation of biodiversity in corresponding biogeographic region, such as: *Stratiotes aloides*, *Gentiana pneumonanthe*, *Salix rosmarinifolia*, *Acorus calamus*, *Cyperus longus*, *Cyperus serotinus*, *Scirpus triqueter*, *Phalacrocorax pygmaeus*, *Plegadis falcinellus*, *Ardeola ralloides*, *Ardea purpurea*, *Ciconia nigra*, *Ciconia ciconia*, *Lutra lutra*, *Canis lupus* etc.

The following plant taxa are included in the preliminary "**Red List of Flora of Serbia**" with estimated threat categories (STEVANOVIĆ *et al.*, 1995): *Salix rosmarinifolia* EN, *Scirpus triqueter* CR, *Ophrys sphaegodes*, VU, *Adonis vernalis* VU, *Gentiana pneumonanthe* VU, *Stratiotes aloides* VU, *Crataegus nigra* VU, *Sonchus palustris* VU, *Leucoium aestivum* VU, *Cyperus longus* NT-LC, *Cyperus serotinus* NT-LC, *Cyperus glomeratus* NT-LC).

The orchid species *Ophrys sphaegodes* is also included in the **CITES** Convention (ANNEX B).

The "**Decree on Protection of Natural Rarities**" (Official Register of the Republic of Serbia, No 53/93 and 93/93) includes the following plant taxa: *Nymphaea alba*, *Nuphar luteum*, *Stratiotes aloides*, *Gentiana pneumonanthe*, *Salix rosmarinifolia*, *Acorus calamus*, *Ophrys sphaegodes*, *Adonis vernalis*, *Cyperus longus*, and *Cyperus serotinus*.

Criterion 4: "Labudovo okno" provides survival during unfavourable periods in the life cycles for several species of geese, particularly greylag goose *Anser anser* and white-fronted goose *Anser albifrons*, and it also has a special significance for overwintering of several species of ducks, particularly common goldeneye *Bucephala clangula* and smew *Mergus albellus*. The area also represents an important habitat for overwintering of birds of prey, white-tailed eagle *Haliaeetus albicilla* and greater spotted eagle *Aquila clanga*. It is essentially significant for overwintering and reproduction of pygmy cormorant *Phalacrocorax pygmaeus*, and it is also the only place of regular nesting for glossy ibis *Plegadis falcinellus* in Serbia.

Criterion 5: "Labudovo okno" each year regularly provides survival for more than 20,000 of waterbirds, both during the period of migration and period of reproduction for bird families Podicipedidae, Phalacrocoracidae, Ardeidae, Ciconiidae, Anatidae, Rallidae, Charadriidae, Scolopacidae, Laridae, and Sternidae. Very often just in one single day more than 30,000 waterbirds, sometimes even more than 40,000, can be found in this area.

Criterion 6: "Labudovo okno" provides occurrence of 1% of relevant biogeographic population for many species of waterbirds, first of all during periods of migration and overwintering. The species are pygmy cormorant *Phalacrocorax pygmaeus*, little egret *Egretta garzetta*, white-fronted goose *Anser albifrons*, greylag goose *Anser anser*, pochard *Aythya ferina*, common goldeneye *Bucephala clangula* and smew *Mergus albellus*.

Criterion 7: "Labudovo okno" represents an exceptionally significant area for protection of the fish fauna diversity. Around 50 species of fishes were recorded, from the families Petromyzonidae, Acipenseridae, Esocidae, Cyprinidae, Cobitidae, Balitoridae, Siluridae, Ictaluridae, Anguillidae, Gadidae,

Centrarchidae, Percidae, Gobiidae, and Cottidae. Regarding the number of present fish species, this is one of the richest areas in this biogeographic region.

Criterion 8: "Labudovo okno" represents an exceptionally significant area for fish spawning, as well as a migratory route and an overwintering place. Before the construction of the "Iron Gate" dams, this part of the Danube was an important migratory route for fish species of the family Acipenseridae. Flooded areas, formed by slowing down of the water flow after the construction of the reservoir, represent outstanding natural spawning places for all fish species inhabiting this part of the Danube, providing in the same time food, shelter and habitat for fishes in all stages of their life cycle.

Due to their significance, these spawning places are protected by the Resolution on Designation of Natural Fish Spawning Places in Fishing Areas "Official Register of the Republic of Serbia" N° 76/94, for parts of the left riverbank of the Danube, from km 1091 to km 1077, named "Ada Žilava", "Ada Čibuklija" and "Labudovo okno".

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:

The area of the southern Banat, where "Labudovo okno" is located, belongs to the Pontic biogeographic region, the Pannonian-Wallachian subregion and the Pannonian province (STEVANOVIĆ, 1995).

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, 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 length of the area from the most upstream to the most downstream point is 14.2 km, from km 1093 to km 1074 of the river course. The maximum width of the Ramsar site (4.5 km) is observed in the east, between the DTD Channel and the village of Ram. The maximum width of the Danube surface (2.1 km) is between the locality Stevanove ravnice and the village of Ram. The maximum width of the main riverbed of the Danube is approx. 1.4 km, with usual width being approx. 1 km.

In geological sense, the area of Labudovo okno belongs to the Pannonian Basin. The Pre-Tertiary formations are covered with a thick Miocene and Pliocene sequence. This sequence is followed by polygenetic layers of Quaternary age, among which sediment of the fluvial sequence dominate.

Sediments of the fluvial sequence are represented with the stagnant water facies, inundation facies and riverbed facies. All these sediments are distinguished by their lithological and granulometric composition.

Sediments of the stagnant water facies (am) were formed in the zone of a former meander of the Danube. They are made of aleuritic sands and aleuritic clays, and in their upper parts of loamy sand and sandy loam. The thickness of these formations is 5-10 m.

Inundation facies (ap) is represented with sediments formed by flooding of the terrain along the Danube. Silt sands, aleuritic clays, and, more rarely, clayey pebbles were formed in this way. They are characterised by distinct variation of thickness, ranging from one to five meters.

Sediments of the riverbed facies (a) are frequent along the Danube, the Nera River and smaller water currents, and are represented with sands, sandy clays and, more rarely, pebbles. Pebbles and clay sediments are most frequently in the form of lentils, with sudden lateral and vertical shifts. Their thickness varies from one to five meters.

The layers of the alluvial terrace (t) of the Danube are spread in the southern part of the area, and they are made of sandy pebbles and sands with lentils of sandy clays. Redeposited loess clays with carbonate concretions can be found in their upper part. The thickness of these sediments ranges from three to ten meters.

In the zone of the Ramsar area there is a total of 3 larger river islets on the Danube. The largest one is the islet Ada Čibuklija, which has been flooded for most of its part after the construction of the Iron Gate dams and formation of the reservoir. The length of Ada Čibuklija is 3.5 km, and its maximum width is 770 m. Second largest is the islet Ada Žilava, which is the most upstream islet, with length of 1.8 km and maximum width of 560 m. The smallest islet, Ada Zavojska, is located near the right riverbank, with length of 1.5 km, and maximum width of 510 m. All river islets are mainly flooded for most time of the year, they have wide flooded areas in their central and downstream parts, and dense stands of willow and poplar trees growing at their edges.

The soil in the area of Labudovo okno at the Danube riverbank is made of black and yellow coloured sand. The thickness of the drifting sand reaches around 30 m at some points. This layer is made of the fine yellow sand, the finest in the whole Europe. It consists of quartz and sand grains, it is full of dust, mica platelets and small stones, the surface of which shows that they have not been moved far away, i.e. they are located near the place of their origin. Under the sand is the layer of yellow sandy clay, followed with a layer of bright yellow sand. This material dates from Pleistocene. The lowest belt is made of drifting sand and it is ten meters higher than the inundating terrain of the Danube. Coarse grained sand and round pebbles of a size of a bean can be found in the south-eastern part of the Deliblatska peščara, in the area of Labudovo okno. Alluvial soils can be found on younger alluvia. They are stratified and have a heterogeneous mechanical composition, which is the consequence of the presence of specific characteristics of some alluvia and specific conditions of their sedimentation. Stratification is apparent in the coastal zone and the layers are distinguished from one another by their colour and their mechanical composition. The heterogeneous mechanical composition and pedogenetic processes, influenced mainly by topogenic factors, are the cause for division of alluvial soils into subtypes and varieties. The variety *alluvial marshy/swampy soil* is characteristic for this locality, distinguished with its lumpy structure.

The nominated Ramsar site "Labudovo okno" is situated in the Danube catchment area, in the middle course of the river. Besides the Danube, there are several tributaries and channels near or within the Ramsar site, such as the Velika Morava River, the DTD Channel, the Karaš River and the Nera River. There are no springs or surface streams. Only at the locality Niski pesak, situated in the alluvial plain of the Danube, at the far south-eastern part of the Deliblatska peščara and altitudes of up to 100 m, the groundwater comes to the surface and forms permanent pools (Popina bara and Zamfirova bara).

The hydrological regime of the Danube in the zone of the Ramsar site is significantly modified in comparison to the past times. Before the construction of the Iron Gate dams and formation of the reservoir, at the section from Kovin to Ram the Danube was narrower, its waterflow was more rapid and yearly fluctuations of the water level were higher. The average waterflow of the Danube is approx. 5000 m³/s. Oscillations of the average monthly waterflow ranges from 7793 m³/s (in April) to 3637 m³/s (in October). In the past times water level fluctuated more than 6 meters. After the construction of the Đerdap reservoir, the oscillations were reduced to a maximum of 2 m, depending mostly on the operational regime of the hydroelectric power plant, and not on the influx of seasonal waters. The water quality is in the 3rd to 2nd class and it does not satisfy the prescribed level. Increased concentrations of some elements of the nitrogen triad, copper, nickel and mineral oils are often found in water. The level of BOD₅ is often higher than allowed. Sometimes, low concentrations of phenols can also be found. A relatively dense population of phytoplankton and high values of saprobity indices point to a high level of nutrients and to existence of eutrophication processes.

Data from the nearest meteorological station in Bela Crkva were used for overviewing of climatic conditions. According to the climate diagram after Walter (for the period 1965-2002), the average annual temperature is 11.3°C. Average monthly temperatures oscillate between 0.0°C in January to 21.0°C in July, with the overall amplitude of 21.0°C. The warmest months are July (21.0°C), August (20.6°C) and June (19.3°C), while the coldest months are January (0.0°C), December (1.8°C) and February (20.0°C). The absolute temperature maximum of 40.2°C was recorded on July 4th, 2000, and the absolute temperature minimum of -22.8°C was recorded on January 25th, 2000.

The average annual level of rainfall is 681.3 mm. The maximum level was recorded in June (101.2 mm) and May (78.8 mm), and the minimum in October (38.7 mm) and March (38.9 mm). The analysis of the climatic diagram revealed that the period of drought lasts from July to October.

Regarding the average monthly air humidity (Table 1), the maximum values were recorded in December (86.5%) and January (84.8%), and the minimal values in April (68.9%) and May (69.9%).

The predominant south-eastern wind Košava has a great influence on the survival of the biota. It blows in gusts of great magnitude, particularly during winter and spring, and sometimes lasts up to 6-8 weeks.

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 geological formation of the wider area belongs to the Pannonian Basin and it is mainly built by Neogene and later sediments. The area of the Deliblatska peščara Sands represents a distinct picture of geological processes that occurred during Pleistocene. Near the margins of the Pannonian Plain, after the water retreated, first the loess layer was sedimented, followed by quicksand, which was previously deposited by large rivers into the lagoons of the former Pannonian Sea, and later of the Danube that inherited the riverbed of the once largest incising river in Europe through which the sea was drained out. While the loess dates from Pleistocene, i.e. it is of glacial age, the sand, as a younger stratigraphic element, was deposited later. The sand layers, partly sedimented by the Danube at its entrance into the Đerdap gorge, and partly brought by Carpathian rivers, the Karaš, the Nera and the Moravica, were airborne by winds, creating in such a way a specific dune relief. Apart from these, sediments of the fluvial sequence of all facia – stagnant water facies, inundated facies and riverbed facies can also be found.

The landscapes of Podunavlje in the zone of the Deliblatska peščara Sands, from the river mouth of the Velika Morava to Ram and the river mouth of the Nera, which are by their most part included in the protected area of the Special Nature Reserve “Deliblatska peščara”, comprise various spaces and form a relatively preserved landscape unit, composed of landscape elements from the rich spectrum, from typically aquatic (the Danube) with river islets, followed by swamps/marshes (Dubovac), various types of open grassland (sands vegetation, steppe vegetation, pastures), to already assembled, closed landscapes with forest communities (natural/autochthonous forest, human-made forest cultures). Aeolian landforms are particularly distinct along the Danube. In the first, lowest belt various landforms can be found (barchans, blowouts and deposits).

The pedological substrate on powerful layers of aeolian sand, made by a developmental series from initial soils on yellow sands to pararendzinas of chernozem type and forest sand soils in the eutric cambisole phase, distinct dune relief, hydrographic and climatological conditions, all caused specific biological processes in the Deliblatska peščara Sands and the Danube hinterland. The Danubian part, mostly covering the Ramsar site, is made of alluvia.

This area has a temperate-continental climate (autumn warmer than spring, temperature transition from winter to summer is sharper than from summer to winter), with certain particularities in some parts. Mountain massifs that surround this area (the Carpathians from the east, the Alps from the west and the Dinaric Mountains from the southwest) have a great influence on formation of climate characteristics. Greater opening to the north and west causes stronger influence of air currents and weather changes from these directions. Therefore, these features, together with great annual air temperature oscillations, give the area of Vojvodina more temperate climate characteristics than it should have by its general geographic position.

Prevailing types of land use in this area are agriculture, cattle breeding and forestry.

18. Hydrological values:

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

Oscillations of the Danube water level, natural or caused by the presence of the Đerdap reservoir, dictates the ecological conditions of surrounding marshes, flooded meadows and pastures. Life cycles of plant and animal species in these habitats, as well as human activities closely connected with nature, are under the influence of these seasonal oscillations. Rich vegetation in the flooded areas of the Danube, where organic matter is deposited, purifies the river water.

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.

M, Tp, O, Ts, 9

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.

Aquatic and swamp types of ecosystems dominate in the area of Labudovo okno. Steppe vegetation occurs in fragments around riverbanks. Areas under pasture are the final degradation stages of sands and steppe vegetation along the margins of the Deliblatska peščara Sands.

Ten distinct associations and four subassociations, classified into three classes, four orders and six alliances, were found through phytocoenological research of aquatic and semiaquatic vegetation (POLIĆ, 2005).

Class *HYDROCHARI-LEMNETEA* Oberd. 1967 includes associations:

Lemno-Spirodeletum W. Koch 1954

Salvinio-Spirodeletum polyrrhizae Slavnić 1956

Lemno minoris-Azollatum filiculoides Br.-Bl. 1952

Ceratophylletum demersi (Soó 27) Hild 1956

Class *POTAMETEA* Tx. Et Prsg. 1942 includes three associations:

Myriophyllo-Potametum Soó 1934

Nymphaetum albo-luteae Nowinski 1928 subass. *nupharetosum* Soó, 1973

Trapaetum natantis Müller et Görs 1960

Class *PHRAGMITETEA* Tx. Et Prsg. 1942 includes associations:

Scirpo-Phragmitetum W. Koch 1926 subass. *phragmitetosum* Schmale 1939

Scirpo-Phragmitetum W. Koch 1926 subass. *schoenoplectetosum lacustris* Soó 1957

Scirpo-Phragmitetum W. Koch 1926 subass. *typhetosum* Soó 1973

Acoro-Glycerietum aquaticae Slavnić 1956

Eleocharitetum palustris Sennikov 1919

Small valleys of Niski pesak in the south-western part of the Deliblatska pešćara Sands are overgrown with a specific vegetation of swamp type. Two communities with limited distribution are encountered in this area. In places where groundwater is close to the surface, a hygrophilous scrub association *Salicetum rosmarinifoliae* can be found. In more wet depressions, in the southernmost part of the area, communities of hygrophilous meadows - *Molinietum caerulae* W. Koch 1926 can be found. Some species are also part of the floristic composition: marsh gentian *Gentiana pneumonanthe*, devil's-bit scabious *Succisa pratensis* and grass of Parnassus *Parnassia palustris*.

At wet riverbanks of the channelled part of the Karaš River, near its river mouth into the Danube, and particularly in parts where the channel crosses former meanders of the natural river course, truly rare specific ephemeral communities of muddy riverbanks from the class *Isöet-Nanojuncetea* can be found. The development of this vegetation lasts very shortly, after the retreat of the flooding waters and before the soil is completely dried. Significant relic sedge families (Cyperaceae) are a part of this type of vegetation, the alliance Nanocyperion, such as: *Cyperus longus*, *Cyperus serotinus* and *Cyperus glomeratus*.

Dominant role in the vegetation cover of the high riverbanks of the Danube, at the locality Stevanove ravnice, have stands of the meadow-steppe character from the association *Festuceto-Potentilletum arenariae*. These are widespread pasture communities of the Deliblatska pešćara Sands, representing a final degradation stadium of the primary steppe phytocoenose *Chrysopogonetum panonicum*, from the sands of the southern Banat. They are significant because they include several protected and endangered steppe plant species such as pheasant's eye *Adonis vernalis*, platinum blue *Echinops ruthenicus* var. *tenuifolius*, yellow onion *Allium flavum* and other.

Pasture type vegetation *Trifolio-Agrostietum stoloniferae*, having a secondary character as a result of intensive cattle grazing, is developed at lower terrains of Stevanove ravnice, at the foot of the lowest dunes.

Pools and marshes occupy the area of 495 ha, coastal shallow waters occupy 608 ha, and the Danube occupies the largest part of 1,003 ha, while the rest of the area is covered with pastures.

The hygrophilous forests can be found at the south-eastern part of the Deliblatska pešćara Sands. The entire area is characterised with single trees and smaller groups of white poplar (*Populus alba*), black poplar (*P. nigra*), grey poplar (*P. canescens*), and rarely birch (*Betula verrucosa*).

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.*

Low, marshy sand is the habitat of some rare species, such as sweet flag (*Acorus calamus*). This species, originating from Asia, was cultivated in the past and hence it spontaneously spread into natural vegetation. It is nowadays in regression. Wet habitats of the Deliblatska pešćara Sands are characterised with more rare species with wider distribution range, present in sand depressions of Central Europe, and in Vojvodina they can be found only at several localities: marsh gentian (*Gentiana pneumonanthe*), Siberian iris (*Iris sibirica*), orchid (*Ophrys sphaegodes*) and rosemary-leaved willow (*Salix rosmarinifolia*).

A rare Pannonian subendemic shrubby plant, Hungarian hawthorn *Crataegus nigra*, grows on the river islets on the Danube (Žilava), and today it is in intensive regression from the river islets in the Pannonian Plain.

Wetland species *Sonchus palustris*, *Cyperus serotinus*, *Cyperus glomeratus* and *Scirpus triquetus*, included in the national Red List of Flora, are also present in this area.

Wetland flora include a large number of floatant species, such as white water lily *Nymphaea alba* and yellow pond lily *Nuphar luteum*, and rare specimens of water-soldier *Stratiotes aloides* can be found in Dubovački rit.

Floatant and submerse representatives of pondweed (*Potamogeton*), with nine species: *P. crispus*, *P. fluitans*, *P. natans*, *P. lucens*, *P. gramineus*, *P. perfoliatus*, *P. pusillus*, *P. žižy* (hybrid) are very numerous, including the rarest species *P. pectinatus*, whose populations are largest in this part of the area of Podunavlje (POLIĆ, 2005). Pondweed species are present in both slow and fast flowing waters; hence their high densities and coverage reflect synecological conditions of pools directly influenced by open waters of the Danube. These conditions favoured the development of specific aquatic communities with pondweed, unique in the lower part of the Danube in our country. They grow in deep waters, so that the pondweed belt can reach depths of 6 meters, and the belt of underwater meadows can reach even 17 meters. They can be found in "Dunavci" channels, oxbow lakes and permanent pools that never dry out due to their direct connection with the Danube. These are in the same time the largest fish spawning places in this part of the Danube. Rich underwater forests of pondweed are particularly interesting on river islets Ada Žilava, Ada Zavojska and Ada Čibuklija, where farthest downstream parts covered with sand are slowing down the river flow.

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.*

Mammals: The significance of the terrestrial fauna as a component of the overall ecosystem functioning, through existing trophic relations, in the Deliblatska pešćara Sands and the area of Podunavlje, puts this group into priorities of nature protection, since some of its components are specific for this region, as well as surrounding areas within the biome of forest-steppes of the Pannonian Plain.

The terrestrial fauna of the Deliblatska pešćara Sands consists of a total of 39 species, which points to the significance of this area as one of the most important mammal diversity centres in our country. Most significant species are those that belong to the steppe and forest-steppe, with a smaller number of exclusively forest species. The most important rare and endangered mammal species can be found among the representatives of the steppe, such as southern birch mouse (*Sicista subtilis*), which was found only here regarding the entire area of the former Yugoslavia.

The Deliblatska pešćara Sands represents one of the three remaining places in Vojvodina where lesser mole rat (*Spalax leucodon*), a globally endangered species, can be found. In the same time, regarding the high population abundance, this area is the most important reproductive centre of this species in the Pannonian Plain. This species inhabits all types of grassland communities, from sands to steppe, and its population abundance and density are directly influenced by the present grassland cover – the diversity of existing plant species, as well as by density and structure of the herbaceous vegetation. As a species of grassland habitat, it inhabits the localities of Dubovački pašnjaci and Stevanove ravnice in the area of Labudovo okno.

European souslik (*Spermophilus citellus*), another globally endangered species, whose populations are very scarce in former habitats in the Pannonian Plain, is almost disappearing from the area of Deliblatska pešćara Sands as well, first of all due to the change of the habitat caused by the exclusion of grazing throughout the protected nature area. Among once numerous colonies on pastures both in the central part and, even more, on the outskirts of the Deliblatska pešćara Sands, the colony in the area of Dubovački pašnjaci, immediately along the Danube, where sheep and cattle are still grazing, is very significant.

Lesser mole rat and European souslik are both included in the Red List of Threatened Species, under the category "vulnerable species".

Particular significance in the mammalian fauna of the Deliblatska peščara Sands have different species of bats (*Chiroptera*), endangered throughout Europe. Species linked to aquatic and wetland habitats owing to their feeding habits are particularly characteristic for the area of Labudovo okno.

The Deliblatska peščara Sands represent the only remaining habitat of wolf (*Canis lupus*) in the Pannonian Plain. This species, permanently present in the area of the Deliblatska peščara Sands, is included in the European Red List and is protected in the area of Vojvodina, as a natural rarity. It is a species at the top of the trophic pyramid (top predator in food webs) in the ecosystems of the Deliblatska peščara Sands, and also a special attraction of this area. It can be found as far as the riverbank of the Danube.

The latest data indicate a possible presence of Eurasian lynx (*Lynx lynx*) in the area of the Deliblatska peščara Sands. This rare and in the whole Europe protected species most probably reached this area by crossing the Danube from the area of the National Park Đerdap.

The swamp/marsh ecosystems in the area of Labudovo okno is also inhabited by a permanent micropopulation of Eurasian otter (*Lutra lutra*), and recently expansion of coypu (*Myocastor coypus*) was also noticed. Since the process of reintroduction of the beaver in Vojvodina is underway, the presence of this species should also be expected in the near future.

Birds: The area of the Danube River leaning to the Deliblatska peščara Sands, with marshes (Dubovački rit, Belopalanački rit, DTD Channel, the Nera River) and river islets (Čibuklija, Žilava, etc.), represents one of the most important nesting sites for waterbirds in Serbia, as well as their most important overwintering place in the area of the Pannonian Plain and most of the Balkans. This region is rightfully proclaimed as one of the important bird areas in Europe, since it fulfils two basic functions in the complex life cycles of birds, reproduction and overwintering, and in the same time it is a bird fauna diversity centre with more than 250 recorded species.

Wide and slow waters of the Danube at the entrance into the Đerdap gorge and the Carpathian rim, together with broad fields around the river, offer ideal conditions for nesting, passing and overwintering for hundreds thousands of birds. The entire area is particularly favourable for waterbird species.

The natural values of Dubovački rit came into focus at the beginning of 1980, due to progressive processes that were caused by the increased water level after the construction of the Iron Gate dams. Today it represents a unique swampy oasis. In this relatively small area of 130 ha, as much as 55 bird species are nesting, the majority of which is included in the list of natural rarities of Serbia (HAM, 1990).

The steep riverbanks of the Danube near Dubovac, between km 1082 and km 1085 of the river course, represent the nesting place of probably the largest colony of sand martin, *Riparia riparia*, in Europe, with approx. 15,000 pairs (HAM, 1989, 1990).

The bird fauna is a basic nature asset of the wider region of the southern Banat. Great diversity of ecosystems, specific sands and steppe landscapes, the Danube River with its river islets and wide alluvial zones, together with the vicinity of the Đerdap gorge and the Carpathian massif, contribute to the overall ornithological richness and invaluable importance of this region for nesting, migrating and overwintering of birds.

International verification of ornithological assets was carried out in 1989 after the designation of the Deliblatska peščara Sands and the area of Donje Podunavlje as important bird area in Europe (IBA: N^o-038 and N^o-039), covering a surface of 41,300 ha. International experts agreed that this area represents a unique and probably the most important bird area in the former Yugoslavia, at the European level, and that it consequently requires urgent and adequate protection in order to preserve autochthonous habitats and their ornithofauna (GRIMMETT & JONES, 1989). During 1997, a revision of IBA areas in Europe was done, this time with more strict criteria. The IBA "Deliblatska peščara", with the surface of 38,000 ha, is again nominated, now under the code YU16SE, and the former IBA area of Donje Podunavlje, with 300 ha, is now nominated as IBA "Ram-Dubovac", with the surface of 12,000, under the code YU34SE (PUZOVIĆ & GRUBAČ, 1997).

The regional value of the ornithofauna of this area was confirmed in the summary results of the “Atlas of nesting birds of the former Yugoslavia” - UTM 50x50 km. The grid cell that includes the Deliblatska peščara Sands and the course of the Danube is assigned as one of the richest and most valuable areas, with more than 150 species of recent nesting bird species. According to the most recent analysis of nesting bird diversity in Serbia (UTM 50x50 km), the grid cell that includes the Deliblatska peščara Sands ranks as the first in Serbia for its significance, with 171 species of nesting birds (PUZOVIĆ, 1997).

Fishes: Fifty species of fish from 13 families were recorded in the aquatic ecosystems of Labudovo okno. In comparison with the previous composition, the fish fauna is to a certain degree changed and impoverished. Biological balance was disturbed as a result of changed environmental conditions, effects of ecological factors, introduction of allochthonous species and strong anthropogenic influence.

Of commercially important fish species the following species are present: *Cyprinus carpio*, *Esox lucius*, *Silurus glanis*, *Stizostedion lucioperca* and *Acipenser ruthenus*.

Although for most of these species the Danube itself represents a natural spawning place, spawning occurs mainly in the coastal area of flood zones, created after the construction of the hydroelectric powerplant “Iron Gate” (Dubovački rit, Labudovo okno, Ada Čibuklija, Ada Žilava, river mouth of the Karaš River). These areas represent potential spawning places, first of all for carp and pike. Anthropogenic factors greatly influence the structure of the fish fauna and the abundance of populations, among others inadequate stocking of open waters. The presence of allochthonous species represents a particular problem, especially the presence of the so-called Chinese complex (*Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Aristichthys nobilis*, *Carassius auratus gibelio*, *Pseudorasbora parva*), and the species *Ictalurus nebulosus* and *Lepomis gibbosus*, which are equally threatening the aquatic biota.

Amphibians and reptiles: The Deliblatska peščara Sands, with 24 recorded species of amphibians and reptiles, represent a faunistically very rich, and in the same time, unique area in Europe, owing to the biogeographic characteristics of its herpetofauna. The significance of the Deliblatska peščara Sands as a distinctive reproductive centre of amphibians and reptiles is far beyond the local scale. Regarding the population size of Ponto-Caspian and East-Mediterranean elements, it represents the most significant diversity centres of this fauna in Europe. The area of Labudovo okno, due to its ecological conditions, is the most important area for this fauna.

Ponto-Caspian and East-Mediterranean elements can be found in this area, as well as wider Mediterranean taxa (*Pelobates syriacus*, *Bombina bombina*, *Bufo viridis*, *Podarcis taurica*, *Lacerta viridis*, *Ablepharus kitaibelii*, *Coluber caspius*, *Natrix tessellata*), *Pelobates fuscus*, *Triturus cristatus*, and the *Rana esculenta* complex (*R. lessonae*, *R. ridibunda*, *R. kl. esculenta*).

Insects: Owing to the number of species and individuals (qualitatively and quantitatively) insects represent an important component of the ecosystems of the Deliblatska peščara Sands. Around 1200 species were recorded in the fauna of Arthropoda, the majority of which are insects.

The diversity of vegetation and specific edaphic conditions enabled the existence and survival of a large number of insect species. On a relatively small area, depending on the phase of natural succession or the level and type of plant culture, Central-European, Pontic and Mediterranean insect species, as well as a number of endemic species, and even species and genera that are normally found in North-African deserts. A particularly large number of specific species can be found among forms living on sandy substrate, i.e. psammophilic diggers – fossorial life forms. Therefore, digger wasps from the family *Psammocharidae*, *Sphexidae*, *Scolitidae*, and *Mutillidae*, then fossorial bugs from the family *Cynidae*, a huge number of coleopterans from the family *Scarabaeidae*, as well as a large number of semi-desert and desert coleopterans from the family *Tenebrionidae* and family *Cicindellidae* are all characteristic for the area of the Deliblatska peščara Sands. Among them there is also *Tentyria frywaldtszkei*, an endemic species for the Deliblatska peščara Sands.

Species from steppe pastures, marshes, swamps and wet meadows dominate in the area of Labudovo okno.

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:

Labudovo okno and the entire area of the Deliblatska peščara Sands offer exquisite possibilities for satisfaction of social and cultural necessities of inhabitants. Comparative advantages for development of various activities, which are not opposed to prescribed regimes and measures of protection, are still not entirely utilized.

Owing to its specific nature assets, this area offers possibilities for development of tourism, particularly ecological tourism – bird watching during their migration, familiarization with rare plants and their communities, etc. The area of the Danube, the Nera and the Karaš are ideal for nautical tourism and sport fishing, while surrounding meadows and pastures are suitable for long walks through nature, bicycle and horse riding and other types of open space recreation. To develop such activities it would be necessary to animate local population and to promote rural tourism, as well as to establish adequate infrastructure.

Both Labudovo okno and Deliblatska peščara Sands attract scientist from different scientific disciplines (biologists, ecologists, geographers, hydrologists, forester etc.) for a very long time. More than 600 published bibliographical units represent the result of the previous research. This area is used for field courses for students of biological and geographic disciplines and forestry, as well as for the realisation of various research and voluntary work camps. Ecological programmes from the NGO sector, as well as international voluntary camps should be intensified in the area of Labudovo okno.

In regard to agriculture, this area provides ideal conditions for production of healthy food, for which there are certain initiatives, but this activity is still not functional. Education of the local population has not been carried out systematically and it was limited to work with some local residents that were directly involved in usage or protection of the area of Podunavlje. Fishery is certainly the most developed activity, but there are some problems regarding the control of illegal fishing. Cattle grazing and usage of grass are primarily developed in open areas near the localities Dubovački rit and Stevanove ravnice towards the east, but nowadays their intensity is far below the capacity of the existing pastures. These activities are of essential importance for conservation of specific habitats significant for the survival of rare and endangered species of mammals (lesser mole rat, European souslik), birds (birds of prey, waterbirds) and other groups of animals and plants.

Neither ecological programmes from the NGO sector nor international voluntary camps have not been ever carried out in this part of the Special Nature Reserve "Deliblatska peščara".

Following a trial excavation, an archaeological find was discovered at the location Stevanove ravnice, in scope of the Ramsar area, and its further research is under way.

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:
- 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:

24. Land tenure/ownership:

- a) within the Ramsar site:

More than 95% of the land is state owned. Private enclaves exist in the northern part of the area, mostly on the outskirts of the Ramsar area or out of it.

- b) in the surrounding area:

More than 80% is state or public owned, since the whole hinterland along the Danube lays within the boundaries of the Special Nature Reserve "Deliblatska peščara". Private enclaves exist mostly around settlements, in the western and eastern parts of the area, where cultivated land is present.

25. Current land (including water) use:

- a) within the Ramsar site:

The life of the man in the area of Labudovo okno is mostly linked to the Danube and surrounding marsh habitats. Hence, the fishery was and still is one of the basic types of the usage of this area. Nowadays, besides the commercial fishery, which has limited capacity within the boundaries of the protected nature reserve, sport fishing is also present, having a far better possibilities than currently exploited. In the interest of harmonisation of the development with the needs for nature protection and strengthening of ecological tourism, it is necessary to stimulate traditional ways of fishing.

The abundance of aquatic game birds provides the basis for hunting in the area of Labudovo okno, and its usage is restricted by protection measures in the reserve. In the future, the existing richness and diversity of the waterfowl should be used for the development of bird watching and photography. It is also necessary to reduce hunting of migratory species on account of waterfowl breeding farms, which should be located outside of the protected area.

Agricultural activities in the area are based on cattle and sheep grazing, for which natural conditions exist, along with the necessity to preserve specific nature assets. The breeding oriented towards old, autochthonous breeds (bovine "podolian", sheep "vitoroga" and "cigaja") should in the future represent a basis for production of healthy food, as well as a tourist attraction. Farming is present on small lots, and is primarily based on extensive cultivation of grain.

Forestry is present mainly on river islets, and it is restricted by protection measures.

The Danube and the rim of the Deliblatska peščara Sands offer favourable possibilities for the development of tourism (bird watching and photography, experience of spring and autumn migration of waterbirds, hunting and fishing, nautical tourism). Investment into tourist equipment, with adequate promotion, should contribute to the assignment of this activity as one of the basic activities of the future development, coordinated with the protection of nature assets.

For maintenance of the navigable route gravel is exploited from the riverbed of the Danube, but with constraints prescribed through the protection regime.

Groundwaters are exploited for water supply, and there is also a network of amelioration channels.

Weekend settlements are also built in the area, but their expansion within the protected area is prevented through the protection regime.

The area of Labudovo okno is used for scientific research (flora and vegetation, ornithofauna and herpetofauna, water quality), as well as for education purposes for the students of geography and biology.

b) in the surroundings/catchment:

Regarding the history of human activities in this area, forestry still represents one of the basic activities, primarily the cultivation of locust trees, Scots pine and black pine. Old stands of autochthonous deciduous trees, mainly of oak and linden trees, are preserved only in fragments in the protected area and partly around Labudovo okno near the Danube, which is of particular interest for nature protection. Therefore, it is necessary to preserve them through special protection measures, as well as through planning of the prolonged rotation periods.

One of the important ways of using this area is hunting. The natural conditions supplemented with interventions like supplying water to game animals, offer possibilities for survival of attractive game species, among which the most important is certainly red deer (*Cervus elaphus*), to whom the Deliblatska peščara Sands provides a favourable habitat. Fenced hunting ground for large game animals spreads to the Danube in the zone of Labudovo okno. The population size is estimated at approx. 500 specimens. Besides red deer, valuable game animals in this area are roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*). The area along the Danube represents an attractive hunting ground for aquatic game birds, although the general opinion is that in the future the hunt for migratory species should be reduced on account of waterfowl breeding farms that should be located in the area outside of the protected area. The existing hunting and breeding centre for large game animals "Dragičev hat", also has a significant potential for future development of hunting. The tourist offer should be complemented with a photo safari, or "hunting with a camera", which also represents a significant opportunity for this outstanding area.

Many centuries long influence of man on nature of the area of the present Special Nature Reserve is forever weaved in history, present times and future times of the Deliblatska peščara Sands and this part of the Danube course.

Cattle breeding represents an old activity in the area of the Deliblatska peščara Sands and its surroundings, including the riverbanks of the Danube. The traditional cattle grazing is today restricted only to pastures on the outskirts of the area.

Beekeeping is appreciated and useful activity for the future development of the protected area, hence the regime and measures of protection allow it in most parts of the area, under one condition that the so-called "house rules" are respected.

Regarding the agricultural land usage on the outskirts of the Deliblatska peščara Sands, it is necessary to emphasize that once present winegrowing, characteristic for the whole region, almost disappeared, and it is now being replaced with farming.

In order to make the area of the Deliblatska peščara Sands uniquely attractive for tourism, it is necessary to activate the so much needed cattle grazing, with introduction of autochthonous breeds of cattle, as well as to renovate traditional shepherd settlements and manufacture of dairy products. Picturesque villages on the outskirts of the protected area that on first encounter leave the impression of being "out of time in this area" add value to the development of tourism.

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:

Changes in the qualitative and quantitative structure of the environment of the Deliblatska peščara Sands, caused by in essence positive efforts of man to prevent or at least limit the aeolian erosion, today have negative effects on natural ecosystems.

In functional connection with the previous statement is to recognize the lack of grazing as one of the most important hazardous factors for the most valuable attributes of the protected area. The "banishment" of the cattle from the former pastures within the Special Nature Reserve in the past caused overgrowing of the steppe pastures with shrubby vegetation and, in some areas, irreversible loss of habitats of natural rarities. Within the complex functioning of the existing ecosystems, the loss of the steppe is

followed by habitat reduction for particular plant species, as well as animals, from invertebrates to European souslik and imperial eagle.

The existing roads, apart from their positive role in connecting surrounding settlements, represent an important hazardous factor for nature assets, regarding that they run across habitats of terrestrial fauna and "tear" the natural unity of the Deliblatska peščara Sands.

Poaching, traditionally present in this area, also represents one of the hazardous factors, both regarding game and breeding species and species that are natural rarities, not only existing but potential as well – the first recorded specimen of lynx in recent times in the Deliblatska peščara Sands has become a victim of illegal hunting. Illegal hunting of waterbirds and illegal fishing represent another problem. Uncontrolled collecting of medicinal plants is also present nowadays.

The number of uncontrolled waste depots is rising, not only on the outskirts of the Deliblatska peščara Sands, but along the asphalt road as well, which represents a hazardous factor both for landscapes and for the indigenous flora and fauna. Uncontrolled borrow pits of sand and loess, more significantly than mere unattractive appearance also have negative effects on important loess profiles – open pages of the geological history book of this area. Apart from taking measures of providing information (in form of tables), control and penalization, it is necessary to provide adequate education and advertising as well.

Unregulated building represents one of the major hazardous factors in this area, not only through degradation of landscapes and habitats of species that are natural rarities, but through increased threat of poaching, formation of uncontrolled waste depots and fire breakouts as well. Building has particularly negative effects on the endangered area of the Ramsar site in vicinity of Dubovački rit, since the line of weekend houses completely encircles the flood zone of the swamp and disconnects it from the main current of the Danube.

Although tourism and recreation are not intensive activities in the area of the Deliblatska peščara Sands at present, with the exception of the Danube and Devojački bunar complex, they may be put at risk if they are not planned and realised as a function of the projected conservation and development of the entire protected area and in a manner that is directed through prescribed regimes and measures. Present insufficient tourist-recreational usage of the area and deficient planning of this important developmental activity, offer possibilities for adequate planning and realisation of future actions.

The research of the water-bearing layers along the Danube is currently under way, but the general opinion is that the construction of extraction water wells and commercial exploitation of water from phreatic, i.e. first aquifer, should be prohibited.

b) in the surrounding area:

Main factors influencing ecological character in surrounding area are agriculture, irrigation, forestry, illegal hunting, water pollution, infrastructure and inappropriate management of grasslands.

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 Special Nature Reserve "Deliblatska peščara" is a nature asset of outstanding significance of Category I in Serbia, according to the Book of Regulations on Categorisation of Nature Assets ("Official Register of the Republic of Serbia", N° 30/92).

Planned protection of nature assets commenced with first more intensive forestry activities and the First Commerce Plan in 1912.

After that, the Assembly of SR Serbia issued a specific Law on Protection of the Deliblatska pešćara Sands in 1965, according to which the borders of the protected area were determined, surrounding a total surface of 36,568.65 ha.

With the Law on Forests in 1975, the Deliblatska pešćara Sand was proclaimed an asset of particular interest.

In 1977 the Assembly of SAP Vojvodina issued the Law on the Deliblatska pešćara Sands and designated this area as a Special Nature Reserve, as "... an area that includes various particular nature assets, has characteristic flora and fauna, and holds a special scientific, educational, historic and other cultural significance". A surface of 29,639.59 ha is included within the boundaries of the Special Nature Reserve "Deliblatska pešćara".

Since 1996, in scope of activities on revision of the decree on protected nature assets in Serbia, the procedure of determining borders, categories and protection regimes of this nature asset commenced, in keeping with the Law on Environmental Protection and the international categorization of the natural heritage.

During 2001, the Special Nature Reserve "Deliblatska pešćara" was proclaimed, comprising an area of more than 34,000 hectares. The Reserve is divided into three grades of protection. Grade 1 protection regime includes areas that are most valuable in scope of environmental protection, which should be preserved as such, with minimal measures taken. They comprise 6.76% of the Reserve. The major part of Dubovački rit, Labudovo okno (in the strict sense), a part of Ada Čibuklija and entire Ada Žilava benefit the Grade 1 protection regime in the area of Labudovo okno. Grade 2 protection regime includes areas that represent sources of nature assets, comprising a surface of 23.6% of the Reserve, where it is necessary to introduce specific improvement measures (prevention of overgrowing of grasslands, intensification of grazing, etc.). In the area included within the boundaries of Labudovo okno, Grade 2 is assigned to pastures, the river mouth of the Karaš River and parts of Labudovo okno and Ada Čibuklija. Grade 3 protection regime comprises 69.65% of the Reserve.

Protection and development of the nature asset are based on multiannual and annual programmes.

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?:

In 2002, the Protected Area Management Authority issued a medium-termed Protection and Development Programme for Special Nature Reserve for the period 2003-2008.

Management plans (forestry and hunting basis) are coordinated through the act on protection and cited programmes, and the allowed usage of other resources and works conducted within protected area are carried out in agreement with conditions for protection of nature.

The area is managed from two levels of jurisdiction: a) Protected area management authority; b) The Government of the Republic of Serbia, with competent ministries, autonomous region offices and the specialised Institute for Nature Conservation of Serbia.

The following measures, significant for conservation of the Ramsar site, are also proscribed within the protection study for this area:

- ban of relief modelling;
- restriction of forming deeper soil works in sediments, without previously issued conditions for protection of nature and environment;
- ban of opening borrow pits of sand without previously issued conditions for protection of nature and environment;
- ban of depot forming;

- ban of uncontrolled discharge of waste and polluted waters.

d) Describe any other current management practices:

28. Conservation measures proposed but not yet implemented:

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

Basic orientation in protection and usage activities in this area is to conserve this nature asset of outstanding national and international significance, which includes conservation of existing ecosystems and traditional way of living of inhabitants that should be in every aspect stimulated and encouraged. To conserve the protected area with its surroundings, it is necessary to conduct permanent scientific research and monitoring, as well as to prepare an adequate management programme and to instruct managing authority for these tasks.

Measures for regulation of mineral resources (sand, gravel) usage from the Danube riverbed are already taken, but the methods for their exploitation are still not worked out, and the question of fees for their usage as well as the question of the influence of different types of vessels on biota and their role in disturbing birds are not resolved yet.

It was suggested that hunting should be reduced in the area of the Danube, and confined to isolated enclaves along the river course and at water widenings under the Grade 3 protection regime, but this has still not been achieved.

It was also planned to train and equip a service of reserve keepers, but this activity has not been realised adequately as well.

The river mouth of the Nera River and residues of the Karaš River course, that remained outside of the boundaries of the protected area and yet represent an ecological unity with it, were also proposed for adequate protection, but these initiatives have not been validated yet.

A substantial number of proposed measures and activities is contained in the Spatial Plan of the special purpose zone "Deliblatska peščara" for the period until 2022, as well as in the Regional Developmental Strategy for the same period.

29. Current scientific research and facilities:

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

The Deliblatska peščara Sands, together with adjoining part of the Danube, represented and represents an exceptional scientific base, which is proved by numerous published research papers.

The contents of the scientific research in the protected area are primarily determined with characteristics and diversity of biota. General trends of scientific research are directed toward monitoring of nature assets, particularly of rare and endangered species and their ecosystems, first of all in order to propose adequate measures of protection and sustainable development of the area.

Although in the past forestry was the primary area of research, nowadays research of particular groups of flora and fauna (Banat peony, marshy/swampy and aquatic vegetation, permanent monitoring of bird migration, imperial eagle, small mammals) is also conducted, as well as monitoring of grassland revitalisation and analyses of post-fire community successions.

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.

Taking into account all nature assets and scientific significance of this area, it is evident that it has an outstanding significance for conducting educational activities. Education in form of field courses is already included in teaching plans of faculties of biology in Novi Sad and Belgrade, geography in Novi Sad and forestry in Belgrade.

The CEPA activities can also be realised through organised visits of smaller groups from elementary and secondary schools. It is particularly important that student of natural sciences (biologists, forestry engineers, agricultural engineers) become acquainted with such unique and extremely vulnerable ecosystems and their functioning.

These activities represent a form of investment into future aimed at creation of high level of awareness of the necessity of adequate and hospitable relationship toward a natural heritage, and they should have priority in conservation programmes.

Planned and regular activities on education of the local population and potential users, aimed at improvement and better usage of the protected area, coordinated with its basic purpose, are conducted regularly, as well as activities on adequate promotion of existing nature assets as developmental potentials of the Ramsar side and its surroundings.

All these activities are improved through:

- organisation of expert lectures on the protected area;
- presentation of the protected area through mass media (radio, television);
- preparation and publishing of promotional material about the protected area through posters, brochures, etc.

The area of Podunavlje with the Deliblatska peščara Sands represents an outstanding scientific base. Special interest of scientist and experts from various fields for this area should be encouraged and used in future, through a coordinated planning of scientific research, the results of which should give answers to many questions of fundamental scientific interest, as well as directives and practical solutions for future management of the protected area. The area of the Deliblatska peščara Sands together with the Danube has a particular significance as a base for realisation of educational activities as well.

The fact that the local inhabitants are insufficiently informed represents a significant hazardous factor both for natural and human-made assets, as well as their low awareness of the uniqueness of the natural values of national and international significance, and the lack of opportunity to take part in management of the protected area. Such situation is caused by previous incorrect policy of management and usage – once introduced ban of grazing, and later the construction of a fence around the protected area, among other things. Although basically the process of problem genesis belongs to the past and the process of solving problems to the future, it is of essential importance to involve the local population in protection and development of the Special Nature Reserve "Deliblatska peščara" through planned actions, especially since this protected area is nominated for becoming a part of the international ecological network, which will in the first place promote environmental protection and sustainable development.

31. Current recreation and tourism:

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

Tourism, primarily in the form of planned and organized special so-called ecological tourism, represents a significant potential for sustainable development of this part of the Danube catchment area and the Deliblatska peščara Sands as its hinterland. It should be especially taken into account that this part of the region of Podunavlje represents one of the last oases of preserved environment with traditional ways of living of its inhabitants and without any large infrastructure objects. In the same time, this area represents a very important and significant biological diversity centre in this region, and one of the most important and particular bird habitats in Serbia. It is a unique migratory station for many migratory bird

species, and a habitat of very rare plant and animal species that can be seen only here. This area has an outstanding tourist potential that still has to be adequately valorised and set into function. Previous usage of this area was mainly limited to hunting of waterfowl and large game animals and sport fishing, as well as occasional visits by mountaineers and individual nature lovers. The only large scale visits by tourists and groups of pupils are present at the picnic grounds of Devojački bunar, in the north-western part of the Deliblatska peščara Sands, where the traditional gathering of beekeepers is also held. Art colonies are also occasionally organised in surrounding villages.

Since this area has many attractive landscapes, it is often used for movie and music video shooting, which is not accompanied with charging adequate fees for usage of a protected nature asset.

The contact zone of the Deliblatska peščara Sands and the Danube, and the mighty river flooding over swamps and marshes, offer specific possibilities for the development of tourism (bird watching and photography, experience of spring and autumn migration of waterbirds, hunting and fishing, nautical tourism).

Nature tourist motifs are highly ranked in tourist valorisation of the Deliblatska peščara Sands, and special nature assets even higher, which is an indicator of great attractiveness and rarity of the area. Anthropogenous motifs are lower ranked, since all used criteria designate them as potential values. Therefore, investments into tourist equipment, with adequate promotional activities, should contribute to recognition of tourism as one of the basic activities in the future development, coordinated with conservation of nature assets.

32. Jurisdiction:

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

Depending on authority and the degree of management and usage, this area is managed and cared from 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.

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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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