

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:

28 February 2008

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.

Zasavica

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):

Bogatić. The riverine ecosystem dominates the area, with the rivulet Zasavica and its tributary the Batar, with the total length of 33.1 km. Aquatic and swampy ecosystems line up along with fragments of floodable meadows and forests. The rivulet Zasavica is fed by ground waters from the river Drina and by gravitational water from the Cer Mt. It belongs to the Black Sea watershed and it represents one of the last preserved pristine swamp areas in Serbia. The river Zasavica and its riparian area are protected as the Special Nature Reserve "Zasavica" since 1997. The total area of the reserve is 835 ha, within the 2nd level protection regime, and the buffer zone comprises 1078 ha. The principal features of the flora are the threatened and protected aquatic and swamp plant species, such as the water-soldier (*Stratiotes aloides*), which build specific and rare communities. The forest vegetation comprises hydrophilous forests of the narrow-leaf ash, poplar, willow, and black alder. Zasavica is the only habitat in Serbia of the waterwheel plant (*Aldrovanda vesiculosa*) and the fish mudminnow (*Umbra krameri*). Natural conditions in the rivulet Zasavica are favourable for many rare plant and animal species, such as greater spearwort (*Ranunculus lingua*), water violet (*Hottonia palustris*), marsh nettle (*Urtica kioviensis*), freshwater sponge (*Spongilla lacustris*), a rare species of oligochaete (*Rynchelminis limnosela*), Danube crested newt (*Triturus dobrogicus*), ferruginous duck (*Aythya nyroca*), and otter (*Lutra lutra*). The project of the beaver (*Castor fiber*) reintroduction into Serbia was successfully realised in the reserve. In scope of the programme of conservation of the autochthonous cattle races, Mangalitsa pigs and Podolian cows are bred on the open pastures. The preserved pristine landscapes, the authentic folklore features, and the cultural-historical monuments make Zasavica a unique tourist unit.

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

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: Zasavica is an extraordinary example of a specific wetland habitat, extremely rare and threatened within the biogeographical region to which it belongs, at the bordering line between the central-European and south-European forest and the steppe. It represents a remnant of once widely distributed wetland habitats of Mačva. The rivulet Zasavica is fed by ground waters from the river Drina and by gravitational water from the Cer Mt. It belongs to the Black Sea watershed and it represents one of the last preserved pristine swamp areas in Serbia. The biota is rich, diverse, specific, and unique.

Criterion 2: Zasavica enables the survival of vulnerable, endangered, and critically endangered species and threatened ecosystems, such as the IUCN Red List (2007) species: - *Umbra krameri* (Vulnerable) and *Aythya nyroca* (Lower Risk: Near Threatened).

Lutra lutra and *Castor fiber* are amongst other species also protected under the EU Habitat Directive.

Zasavica represents the only habitat of the mudminnow, *Umbra krameri*, in Serbia.

The waterwheel plant (*Aldrovanda vesiculosa*), a plant that was considered extinct for more than 80 years in Serbia, was found in Zasavica in 2005.

The species *Hottonia palustris*, *Hippuris vulgaris*, and *Ranunculus lingua* are included in the "Red List of the Flora of Serbia Vol. 1 – extinct and critically endangered taxa".

Zasavica is habitat of a number of other threatened species of plants and animals, 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: Zasavica enables the survival of valuable populations of plants and animals important for the conservation of biological diversity in this biogeographical region, such as: *Stratiotes aloides*, *Thelypteris palustris*, *Urtica kioviensis*, *Shoenoplectus triqueter*, *Acorus calamus*, *Apatura metis*, *Ciconia nigra*, *Castor fiber*. This unique mosaic of aquatic, wetland, and terrestrial ecosystems is an important centre of ecosystem, species, and genetic diversity in the region.

The reintroduction of the beaver (*Castor fiber*) in Serbia was for the first time successfully realised in Zasavica.

Five species of insects, new for the fauna of Serbia, were recorded in Zasavica: 1. *Arhopalus syriacus*, which has a Mediterranean distribution; within the reserve, it was found at the locality Jovača, on dry alluvial ridges in the forest. 2. *Morinus asper* was found in Drenova Greda, in the forest of ash and oak. 3. *Agapanthia lais*. 4. *Bagoini puncticollis* was found at the localities Sadžak and Valjevac. 5. *Hylobius transverovittatus* was found at the locality Batar, in the forest litter with the moss *Marchantia polymorpha* in the forest of hornbeam and oak.

Zasavica represents the only habitat in Serbia for 16 animal species of Hydracarina, Ostracoda, Rotatoria, and Curculionidae.

Criterion 4: Zasavica is an important area for the survival of rare animal species, the beaver *Castor fiber*, the mudminnow *Umbra krameri*, and the pygmy cormorant *Phalacrocorax pygmeus*, during the unfavourable periods of the life cycle. In the winter, the river provides shelter for the beaver, and the riparian herbaceous and woody vegetation offer rich food resources. The mudminnow spends the unfavourable winter period hibernating in the mud of Zasavica. To the pygmy cormorant, Zasavica is an important resting place during the spring migration.

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 regionalization scheme)

From the phytogeographical aspect, the area of Zasavica is in the Pannonian province of the central-European floristic-vegetation region. Azonal gallery forests of the common oak and narrow-leaf ash, *Alno-Quercion roboris*, and the meadow communities along the alluvial planes of the lowland rivers in Vojvodina floristically belong to the central-European 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.

Stevanović, V. (1999): Crvena knjiga flore Srbije 1 - iščezli i krajnje ugroženi taksoni (*Red List of the Flora of Serbia Vol. 1 – extinct and critically endangered taxa*). – Ministry of Environmental Protection, Biological Faculty of the University of Novi Sad, Institute for Nature Conservation of Serbia, 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.

Geomorphological characteristics

The part of the Mačva Plane where the Zasavica is positioned is mildly inclined from the south towards the north. The principal geomorphological form is the alluvial plane of the river Sava. Narrow elongated ridges and swales are prominent along this entire alluvial plane. Swales are much frequent than ridges. In most of the swales, water remains for a longer time and creates ponds. The ridges are built of the riverine material, and represent higher and more drained soil. The Drina ridges stretch in the north-south direction, and the Sava ridges in the west-east direction, namely the ridges follow the river courses of the Drina and the Sava.

Hydrological characteristics of Zasavica

The watershed of the rivulet Zasavica represents an example of the influence of physical-geographical factors on the formation of hydrological characteristics of a terrain. By accumulating the material, the Drina created a wide macro-alluvium with mighty pebble-sandy deposits. The watershed of the Zasavica covers the area of 109 km² and makes 1/8 of Mačva. The watershed is inclined towards the east. The width of the watershed is from 5 to 6 km. The watershed consists of the rivulet Zasavica with the Batar and its tributary Žurava. Observing the near past, it can be concluded that both Batar and Žurava represent former river courses of the Drina, since their flow is parallel to the present course of the Drina. The same applies for the upper course of the Zasavica, and therefore it is supposed that it was also created by the activity of the Drina. The rivulet Zasavica is made by the confluence of the waters from the Duboka Jovača and the channel Prekopac. The Duboka Jovača feeds with water from the swamp Jovača, through which the Drina used to flow in a certain period. The channel Prekopac receives water from Široka Bara, the position of which indicates the same situation. The Zasavica creates six large meanders along its course. The terrain around the river is partly swampy, particularly around the meanders, which indicated that the river is fed by ground waters of the Drina and the Sava.

Hydrogeological characteristics

Only intergranular type aquifers have developed in the Quaternary sediments of this area, which is of homogenous composition by its origins. Provisionally "waterless" parts of the terrain are represented by Pontic sediments – clays and marl clays. Although the springs are rare, helocene and depression springs are present. Helocene springs occur in the inundation planes, triggering creation of ponds, such as Jovača, Prekopac, and others. The occurrence of suffosion is observed near Bakreni Batar, as well as at the river mouths of the Prekopac and Jovača. The water temperature ranges from 11.5°C to 16°C during the course of the year, which is the consequence of the shallow filling of the ground waters and of daily and seasonal temperature fluctuations. The chemical composition varies, but the waters are mainly of the hydrocarbonate-sulphate type.

Climate characteristics

For the overview of the climate characteristics in Zasavica, the data from the meteorological station in Sremska Mitrovica from 1991-2004 were used.

The average annual air temperature for this period is 11.4°C. The absolute maximum air temperature is 40.0°C, while the absolute minimum air temperature is –22.1°C. In the same period, the average yearly air temperatures for different seasons were: for the spring 11.8°C, for the summer 21.2°C, for the autumn 11.4°C, and for the winter 1.0°C. During the vegetation period, from April to October, the average monthly temperature was 17.2°C. The average annual number of frosty days with the mean minimal temperature lower than 0°C is 86. The average annual number of tropical days with the temperatures above 30.0 °C is 23.6.

The relative humidity of Zasavica and its surroundings annually varies from 68% in May to 89% in December and January. The average annual relative humidity in the observed period is 77%. The average annual amount of sunshine is 2093.5 hours, of which the summer months have 846.5 hours, and the winter months have 221.3 hours. The average annual number of clear days during the year is 73.9, and the number of cloudy days is 87.9.

The average annual amount of precipitation is 613.7 mm. The lowest monthly precipitation amount has February with the average of 27.7 mm, and the highest has June, 76.2 mm. During the vegetation period, April-October, the average annual precipitation amount is 410.4 mm. During the year, the average number of days with snow is 23.6. The average annual number of days with snow cover and with fog is 32.2. The average annual number of days with hail is 1.2.

The analysis of the average annual wind frequency shows that the eastern wind is dominant with 260‰, followed by the western wind with 224‰. The winds from the southern quadrant have the weakest intensity, 35‰, and from the northern quadrant, 56‰. The strongest wind, in the average, is the northwestern wind with 2.8 m/sec, and the weakest are the southern winds with the average of 1.8 m/sec.

According to the cited parameters, Zasavica and its surroundings belong to the temperate climatic zone with distinctive continental characteristics.

Pedological characteristics

The wider area around Zasavica consists of several types of soil. The most important are the following three pedological components: The alluvial clayey soil is present in valleys of almost all rivers in western and northwestern Serbia. It is one of the sub-types of the alluvial soil in the wider surroundings of Zasavica, and it occupies the entire alluvial plane of the river Sava. The characteristic of this soil is that it is often covered with sandy sediments, particularly in places where the flooding occurs. At the pedological profile of the mineral-pond soil covered with alluvial deposits, two layers are distinct: the lower layer, older by origin, and the newer, upper, shallower layer of alluvium. The mineral –pond soil was made by processes of soaking of the alluvium in swales, under the influence of flooding and high ground waters. It is a relatively new soil, of a marsh chernozem type. Diverse hydrophilous flora used to grow on it before these terrains were drained, and a significant amount of humus was created by its decaying and decomposition. Along with the humus, this soil has a high amount of mineral substances, for which it is named the mineral-pond soil.

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, which was once the Pannonian Sea, developed in the Pleistocene. When the sea was drained, the lowland was created, filled with thick layers of marine sediments, and during the Pliocene, the loess and sand started to cover these sediments. In the Pleistocene, the sediments were covered with loess layers, through which large rivers have cut their wide valleys, accumulating large deposits of alluvial sediments. Sea sediments can be

found in layers deeper than 10 m, and, near the surface, they are mixed with the alluvial deposits.

From the geomorphological aspect, Mačva represents a Quaternary plane. The wider surroundings of Zasavica are made of Quaternary sand and other deposits of the rivers Sava and Drina.

The absolute height of the wider surroundings of Zasavica is from 80 to 100 meters. The wider surroundings of Zasavica make a part of the Srem-Mačva depression.

The thickness of the sandy-pebble sediments in Crna Bara are 88.4 m, in G. Zasavica 70 m, in Ravnje as much as 170 m, in Salaš Noćajski 55 m, and in D. Zasavica 94 m. The sandy-pebble sediments have good filtrating characteristics and certainly represent a good water-permeable medium.

The supply of intergranular type aquifers is combined: by infiltration of precipitation; by infiltration of surface waters of the Drina and Sava, and of several smaller rivers such as Zasavica; by impeded overflow of aquifer waters under the pressure from the deeper horizons or other hydrogeological structures. Under the conditions of the hydrogeological maximum, the aquifer flow has a general direction towards the Sava, namely from the southwest to the east-northeast. In the zone of the intensive supply, the central area of Mačva, the direction of the aquifer flow is generally towards the northeast. In the northern and eastern area of Mačva, in the zone of the aquifer drainage, the flow of the aquifer water is mainly towards the northeast and east. The outflow of the ground waters occurs by subterranean flows, by springs along the waterways, by surface flows, and artificially. The drainage of aquifer waters during the conditions of the maximum level occurs by flows into the riverbeds of the Drina and Sava, and into smaller riverbeds such as Zasavica and Bitva. A part of the ground waters is lost through the evapotranspiration.

Vojvodina is characterised by the continental climate, precisely the Pannonian climate of the semiarid type. Such climate has four seasons. Winters are long and cold, and summers are warm. Great temperature variations exist in the course of the year. The continental climate features are enhanced by cold currents that come from the east through the Đerdap Gorge, and mitigated by the influence of the central-European climate from the northwest, from where more atmospheric precipitation comes, as well as by the warm influence of the Mediterranean climate from the south and southwest. More intensive air movements are the consequence of the unequal barometric pressure between the Eurasian continent and Europe on one side, and the Atlantic and the Mediterranean Sea on the other side.

18. Hydrological values:

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

The aquatic vegetation of Zasavica plays an important role in purification of its waters that reach the river Sava.

The gradual influx of water enables the sedimentation of the sand, silt, and organic particles, increasing the amount of humus.

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, Ts, Xf, W, 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.

“Zasavica” represents one of the last oases of pristine nature, of once widely distributed marshes, ponds, swamps, meadows, and forests of Mačva, which are reduced, disturbed, and fragmented by ameliorative activities and construction of levees. From the ecological aspect, aquatic and swamp ecosystems line up along with fragments of floodable meadows and forests. The water surface of the channels Jovača and Prekopac, the channelled and natural course of the brook Batar, and the rivulet Zasavica, which is directly connected with the river Sava through the channel Modran, make the axis of the reserve. Zasavica is fed by ground waters from the river Drina and by gravitational water from the Cer Mt.

Forest vegetation

There are not many oak forest in Zasavica, and much of the area is covered with ash (*Fraxinus angustifolia*), mixed with willow (*Salix sp.*). These communities survived mainly on wet parts of the swales along the riverbed of the Zasavica, where the interest of turning the soil into cultivated fields was not particularly present.

The current type of forest with gley soils along the riverbed of the Zasavica is the ash forest with grey willow (*Salix cinerea* - *Fraxinetum angustifoliae*). Besides ash, white poplar (*Populus alba*) and willow (*Salix fragilis*) occur at the first forest floor. At the shrub forest floor, there are *Rhamnus frangula*, *Salix cinerea*, and *Amorpha fruticosa*. Occupation of the habitat by the grey willow (*S. cinerea*) clearly demonstrate the shifting trend of vegetation and conditions within the habitat, turning from pond vegetation, over pioneer shrubby species, to wet forests of narrow-leaf ash.

All forest surfaces in the closer surroundings of Zasavica are privately owned, which clearly determines their future appearance and management type. Only 130 ha of forest land in Vrbovac are state-owned, of which 110 ha are used as willow and poplar plantations since 1962. The present trees are around 15 years old, and in their second rotation period.

Herbaceous vegetation

From the phytocoenological aspect, the diversity of the vegetation types in the protected part of Zasavica is not very high. The reason for this is the position of the borderline of the natural asset, laying mainly in the immediate vicinity of the riverbed, where water surfaces are overgrown with associations of aquatic macrophytes, while the associations of emerged plants of the swamp vegetation type are developed in the riparian area, and they dominate in the aquatic biotope of Zasavica.

According to the preliminary insight into the situation in the field, the vegetation of Zasavica, from the aspect of systematics, comprises the following syntaxonomic units:

Classis: Lemnetaea W. Koch et Tx 1954

Ordo: Lemnetalia W. Koch et Tx 1954

Alliance: Lemnion minoris W. Koch et Tx ex Ober 1957

(Lemno-Salvinion natantis Slavnić 1956)

Asoc.: Lemno-Utricularietum vulgaris Soo (1928) 1938

Classis: Potametea Tx et Prsg 1942

Ordo: Potametelia W. Koch 1926

Alliance: Potamion eurosibiricum W. Koch 1926

Asoc.: Nymphaeetum albo-lutae Nowinski 1928

(syn.: Myriophyllo-Nupharetum W. Koch 1926)

Asoc.: Hydrocharo-Nymphoidetum peltatae Slavnić 1956

Asoc.: Potameto pusilli-Ceratophylletum demersi Jank. 1974

Asoc.: Nymphaeto-Stratiotetum aloidi Jank. 1974

Asoc.: Hottonietum palustris Tx. 1937

Classis: Phragmitetea Tx. et Prsg. 1942

Ordo: Phragmitetalia W. Koch 1926

Alliance: Phragmition communis W. Koch 1926

Asoc.: Scirpo-Phragmitetum W. Koch 1926

Subas.: phragmitetosum Schmale 1939

Subas.: typhetosum (angustifoliae-latifoliae) Soo 1973

Subas.: schoenoplectetosum lacustris Soo 1957

Asoc.: Acoro-Glycerietum maximae Hueck. 1931

Aquatic vegetation

This type of vegetation is mostly present in the waterway of the rivulet Zasavica, and it occasionally occurs in the pond Ribnjača, during flooding periods when the water levels of the Drina and Sava are high, filling the pond with water through the channel Jovača. Open water surfaces with this vegetation type are noticeably reduced, since the waterway of the Zasavica is highly overgrown with tall emerged vegetation.

The representatives of aquatic macrophytes build various communities from several orders and alliances within the classes *Lemnetea* and *Potametea*.

The class *Lemnetea* includes a group of freely floating flowering plants, which represents the pioneering vegetation that is overgrowing the waterway. In the area of Zasavica, the community of duckweed and swollen bladderwort (*Lemno-Utricularietum vulgaris*) was recorded so far. It is developed in fragments in smaller inlets of the waterway, and it is in direct contact with the vegetation of reeds. It is characterised with the presence of ivy-leaved duckweed (*Lemna trisulca*) which actually floats under the water surface, and alternates the light and temperature regimes of the habitat. The presence of the insectivorous swollen bladderwort (*Utricularia vulgaris*) is characteristic for this community.

The class *Potametea* includes several associations from the alliance *Potamion eurosibiricum*. In the area of Zasavica, the most numerous is the community of the white water lily and yellow pond lily (*Nymphaeetum albo-luteae*), which appears along the entire waterway, and it is inhibited only in parts where the pure alliances of water-soldier have completely overgrown the water surfaces of the river. It is built of the most beautiful and the biggest aquatic macrophytes, the white water lily (*Nymphaea alba*) and the yellow pond lily (*Nuphar luteum*). The large amount of the plant biomass produced by these plants triggers high organic production and induces siltation of the riverbed. Usually, groups of white water lily and yellow pond lily grow separately, creating in this way two subassociations, *nymphaetosum* and *nupharetosum*.

In a very confined area in Zasavica, in inlets where small bridges were built, the community of frogbit and fringed water-lily (*Hydrocharo-Nymphoidetum peltatae*) was found. This phytocoenosis is an indicator of the late phase of turning into pond and of the high level of eutrophication.

Only in a small area, below the bridge near the settlement of Ravnje, the presence of a stand of small pondweed and hornwort (*Potamogeto pusilli-Ceratophylletum demersi*) was observed.

Newer studies revealed that the stands of the water violet (*Hottonietum palustris*) are numerous, which points to a specific richness of the ecosystem biodiversity in the area of Zasavica.

The most striking plant cover of Zasavica is the one dominated by a species of the water-soldier (*Stratiotes aloides*). The water-soldier is the main feature of the vegetation of this area, and it grows over large surfaces of the waterway. This is, in the same time, its richest find in our country.

Swamp vegetation

The semi-aquatic vegetation of the class *Phragmitetalia* and the alliance *Phragmition communis* is developed in the riparian part of the riverbed of Zasavica, to which the community of reeds (*Scirpo-Phragmitetum*) represents the main trait. The typical stands of this association-subassociation (*phragmitetosum*) are present along the shore as wide areas of pure reeds on higher terrains, which are occasionally and rarely flooded. Such complexes of reeds in the area of Zasavica can also be found at localities Sadžak, Vrbovac, and Valjevac.

In habitats that are constantly humid and wet, another sub-association of reeds is developed, with the narrowleaf cattail and broadleaf cattail – *typhaetosum (angustifoliae-latifoliae)*. The stands of this subassociation with broadleaf cattail are the most distinct in the place where the channels Jovača and Prekopac meet and form the waterway of the Zasavica. Large floodable areas are here densely overgrown with pure stands of the broadleaf cattail, which is an indicator of deep layers of deposited silt. A rare species of spearwort, the greater (*Ranunculus lingua*), was found in this subassociation, which is enlisted in the "Red List of the Flora of Serbia" and is protected as a natural rarity. It is significant that this plant occurs, within the protected area, exclusively in the subassociation *typhaetosum angustifoliae*, which shows that its ecological characteristics are linked to this more humid variant of the reed communities.

The stands of the subassociation of reeds with the common club-rush – *schoenoplectosum lacustris* dominate in the riparian part of the riverbed of Zasavica, in the channel Bakreni Batar, and in the pond Ribnjača. It is built by tall emerged plants, reed (*Phragmites communis*) and common club-rush (*Schoenoplectus lacustris*), which dominate over the landscape of the riparian area of the Zasavica.

The vegetation of reeds is accompanied by the community of the sweet flag *Acoro-Glycerietum maximae*. It has a limited distribution; it is very rare in Vojvodina and it has a differential character in comparison with the same vegetation type in central Europe. The presence of this community within the protected zone is of great importance for the conservation of the ecosystem diversity of this area. This community develops only where the level of ground waters is high, and it needs frequent floodings, therefore it is linked to the waterway of Zasavica. The richest stands of this phytocoenosis are developed in Valjevac, and within the narrow riparian belt it occurs at a restricted number of localities.

Meadow vegetation

According to the preliminary study of this protected natural asset, the presence of certain types of the meadow vegetation was also observed. Although this type of vegetation is under the strong human influence, due to the cattle grazing, some elements of wet and moderately wet meadows were detected, and in their degradation phases.

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.*

According to the previous research, more than 600 taxa were recorded in the flora of Zasavica. The largest number of plants belongs to the group of widely distributed taxa, such as cosmopolitan, circumpolar, and Eurasian continental species. However, some of them, although being widely distributed, are legally protected, and their disjunctive range points to the relic character.

There are 45 species of aquatic macrophytes in the flora of Zasavica, of which many are, according to European authors, the Tertiary remnants of northern and central Europe, and in the Pannonian Plane they have a relic character. Some of these species are rooted floatant plants: white water lily and yellow pond lily (*Nymphaea alba*, *Nuphar luteum*), which build rich communities in the aquatic vegetation of the pond-swamp area.

Of submersed forms of this group of plants, the significant species are the insectivorous bladderworts: *Utricularia vulgaris* and *Utricularia australis* (syn. *U. neglecta*). Both species of the genus *Utricularia* can grow within the same or in different plant communities.

In the group of aquatic macrophytes of Zasavica, a Mediterranean plant of the central-European character was detected, the water chestnut, which belongs to species of the relic genus *Trapa*, marked as the collective species *Trapa natans* agg.

Important plant species of the relic character, from the preliminary Red List of the Flora of Serbia, are present in the swamp vegetation of the waterway: water-soldier (*Stratiotes aloides*), marsh fern (*Thelypteris palustris*), marsh nettle (*Urtica kioviensis*), and a representative of the relic family of sedges (*Cyperaceae*), the triangular club-rush (*Schoenoplectus triqueter*).

Some of the important official medicinal herbs that grow in this area include valerian (*Valeriana officinalis*) and marshmallow (*Althaea officinalis*), which are protected as species under control of exploitation and trade by the Decree of the Ministry of Environmental Protection.

The invasive species are also present in the flora of Zasavica, and some of them are allochthonous (adventive) species that are in the phase of expansion and domestication in the autochthonous flora. One of these species is from the family of gourds (*Cucurbitaceae*), *Echinocystis echinata*, which is generally spreading around the Danube, the Sava, and the Tamiš.

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.*

Invertebrata

The characteristics of the aquatic ecosystem of Zasavica are favourable for many species of invertebrates, such as: the freshwater sponge (*Spongilla lacustris*), jellyfish (*Craspedacusta sowerbii*), oligochaeta (*Rynchelmnis limnosela*), and many species of planaria. All these organisms are good bioindicators of water quality.

Five species of Amphipoda, three species of Branchiopoda, and nine species of Ostracoda were found in Zasavica.

Of molluscs, 37 species of snails and four species of slugs, of which *Tandonia kusceri* is a Balkan endemic, were found.

During the field studies in the thickets along Zasavica, an endemic bush-cricket *Zeuneriana amplipennis* was found.

So far, recorded number of butterflies in Zasavica is 56 species, with eight internationally threatened species, such as: *Zerynthia polyxema*, *Lycaena dispar*, and *Melitaea aurelia*. The fauna of Odonata has 37 species, among which *Epithea bimaculata*, which was considered

extinct from the territory of Serbia, and *Somatochlora flavomaculata*, which was found only in Zasavica and in eastern Serbia. The previous studies revealed the presence of 31 species of ants (Formicidae), three species of stem sawflies (Cephidae), eight rare species of longhorn beetles (Cerambycidae), eight species of water mites (Hydracarina), and 41 species of weevils (Curculionidae).

Vertebrata

Ichthyofauna

Specific hydrological and hydrobiological features indicate that these waters are mainly inhabited by species of the cyprinid family, and that the area represents a lowland cyprinid region. A total of 23 fish species from 8 families and 20 genera were found, of which 20 are autochthonous, and 3 allochthonous species, of which two species are from North America and one species from Asia. Among the recorded species, 7 are on the list of protected species as natural rarities, such as the bitterling (*Rhodeus sericeus amarus*), weather loach (*Misgurnus fossilis*), and spined loach (*Cobitis taenia*). The wels catfish (*Silurus glanis*) was reintroduced into the Zasavica as part of the realisation of the project "Return of the autochthonous fish species".

Herpetofauna

The area offers optimal conditions for the survival of herpetofauna, both for terrestrial and for species that live in aquatic habitats. Of a total of 27 recorded taxa, all amphibians and 4 reptiles are legally protected as natural rarities, and some of them are on the preliminary list of species and subspecies for the Red Book of Vertebrates of Serbia. Six taxa of amphibians and seven taxa of reptiles, threatened at the European level and protected by the Decree of the Bern Convention, are present here. So far, Zasavica represents a habitat for two Balkan endemics – the Danube crested newt (*Triturus dobrogicus*) and eastern subspecies of the sand lizard (*Lacerta agilis bosnica*), as well as for two rare and threatened species, fire salamander (*Salamandra salamandra*) and common spadefoot (*Pelobates fuscus*).

Ornithofauna

A total of 182 species of birds were recorded in this area so far. The determined number of proved nesting species is 87, while another 10 species represent potential nesting species. For its generally known ornithological values, Zasavica is included in the registry of areas of international significance for birds, according to the IBA project. The ornithological value is primarily reflected in richness of rare and threatened nesting species, as well as for its significance for the emigration and wintering. Among the important species there are the bittern (*Botaurus stellaris*), night heron (*Nycticorax nycticorax*), little egret (*Egretta garzetta*), spoonbill (*Platalea leucorodia*), marsh herrier (*Circus aeruginosus*), and lapwing (*Vanellus vanellus*).

The white stork (*Ciconia ciconia*) is nesting in the surrounding settlements and feeding on the terrains of Zasavica. With the purpose to improve the nesting conditions for this species, wooden platforms were placed in Zasavica and in the surroundings.

Theriofauna

So far, the presence of 45 species of mammals was determined. This area has sufficiently preserved diversity of natural conditions for the survival of many species of mammals, particularly those that are linked to aquatic and swamp habitats, reeds, and marsh forests, such as the otter (*Lutra lutra*), Miller's water shrew (*Neomys anomalus*), muskrat (*Ondatra zibethica*), wild cat (*Felis silvestris*), and ermine (*Mustela erminea*). Many present species – all species of bats (*Chiroptera*), harvest mouse (*Micromys minutus*), hazel dormouse (*Muscardinus avellanarius*), martens (*Martes martes*, *M. foina*), are on the list of natural rarities of Serbia.

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 local inhabitants in the hinterland of Zasavica is related to the ecological character of this area, nowadays the same as it was before. The life style of the people is connected with the wet habitats, primarily through fishing and cattle breeding, and these activities go far into the past.

During the times of the Roman Empire, the nearby Sremska Mitrovica was called Sirmium, and it was one of the four capitals and the centre of the entire Pannonia. The Romans were the first to make an irrigation system in this area. From Sirmium to present Zasavica, the Artemis' bridge led across the Sava. The main road to Bosnia continued further from that bridge, along the ridges and dry terrains of Mačva. There was a pier in Banov Brod. In sporadic enclaves of arable land and pastures, surrounded by swamps and forests, the Romans built their rural houses, the *Vilae Rusticae Romanae*. In the recent history, the most important events in this region were the battles of Serbian rioters for the liberation from the Turkish rule at the beginning of the 19th century. The Turkish army from Bosnia was met at the ridges near the village of Ravnje, the only place where it could have passed through the wilderness of Mačva.

The old legends about dragons are associated with the origins of Zasavica, dating as far as to the Celtic times. The legend tells that the ponds and meanders were the dragon's dwelling, shiny castles each with seven rooms. Dragons were the curators and bearers of strength and fertility. The revival of these legends came in the image of the haiduk Stojan Čupić, called Zmaj od Noćaja (Dragon from Noćaj), and hid heroic deeds in the struggle against the Turkish rule.

Although the areas under pastures and mown meadows are today significantly reduced in comparison to their previous state, the traditional cattle breeding in the form of freely roaming cattle is still present on the pasture Valjevac. The cattle is here put to graze by the villagers from surrounding villages, as well as by the Manager of the Reserve, who started to breed Podolian cows in spring of 1998. Around fifty Podolian cows are freely grazing on the pasture Valjevac, comprising the area of 300 hectares. Furthermore, the nature conservation club "Pokret Gorana" started to breed Mangalitsa pigs in 1998. During time, the herd increased and today it counts four hundreds heads of this race. The Mangalitsa pigs are bred in old traditional way, freely roaming on the enclosed pasture Valjevac. It is important to mention that the autochthonous dog race, the pulin, and the Balkan donkey are also bred on this pasture.

Several shepherds' stories are preserved until today. Among them, the one that in the most beautiful manner describes the bond between the people and the Zasavica, is the love story of Dostana and Stanko, who fell in love while guarding cattle, playing shepherds' games, and picking water lilies in Zasavica.

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 grazing and cattle breeding, particularly of autochthonous races, along with the several centuries' long usage of the area, supports the maintenance of grassland habitats within the Reserve.

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

The archaeological localities of Neolithic settlements, as well as traces of Celts and Illyrs, and numerous Roman artefacts are present along Zasavica. The findings of jewellery, tools, weapons, coins, ceramics, all point to the several centuries' long presence and alternation of numerous civilisations in the milieu of former ponds, swamps, and floodable forests of Mačva.

Zasavica has inspired many legends and myths, and it is woven into the cultural being of the people. Among the most colourful are the legends of dragons and tales of shepherds.

- 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:

Within the Reserve, the land is almost exclusively state-owned (90.9%). Privately owned are 137 enclaves, which are small and patchily distributed. Private lots prevail in the buffer zone.

- b) in the surrounding area:

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

25. Current land (including water) use:

- a) within the Ramsar site:

The most widely spread way of land usage is agriculture, followed by forestry and by fishing to a lesser extent. On the pasture Valjevac, with the area of approximately 300 hectares, there are about 500 cattle heads, mainly, cows and pigs, but sheep, goat, and donkeys as well. Patchily distributed agricultural areas in the surroundings are used for truck and crop farming. Depending on the season, the ponds are present in the area of Jovača and Prekopac during the high water level, while temporary farming is present during the low water level. Forests in the immediate surroundings of Zasavica are mainly privately owned, which clearly determines their future development and management. Only 130 ha of the forest land in Vrbovac are state-owned, of which 110 ha are used as willow and poplar plantations since 1962. The present trees are around 15 years old, and in their second rotation period. The ash forests are the most important in this area, and they represent the first economic unit. Sport and traditional fishing are present in Zasavica, controlled by the Manager. For the fans of fishing, Zasavica offers 23 species of fish, of which around ten species are of commercial

significance. Eighteen boats are at disposal to the anglers, who can use them for fishing pike, carp, tench, goldfish, and other species. The largest species in the Zasavica is the pike, the specimens of which can reach length of more than 150 cm and weight of 10 or even more kg. The allowed daily catch is up to 3 specimens of large fish (pike, carp, wels catfish, tench) and up to 5 kg of smaller species and of the brown bullhead. The water of the Zasavica is not used for irrigation, although it was once drawn by a waterwheel, a wooden wheel moved by horses. A waterwheel similar to the old one was constructed in 2007, on the shore of the Zasavica near the visitors' centre.

b) in the surroundings/catchment:

Arable land dominates in the surroundings, primarily truck and crop farming. Fruit growing and intensive cattle breeding are present to a lesser extent, as well as exploitation of forests within small and isolated private forest enclosures.

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:

According to various sources (written documents, topographic charts, pools), the main hydro-ameliorative activities in the area of Zasavica were not carried out until the middle of the 20th century. Dense channel networks in the area of Bitva, Batar, and western part of Zasavica were dug mostly during 1950-1970. The colony of herons, being an excellent bioindicator of such changes, emerged in that period, when the activities were most intensive. The process of regulation of the water regime is now mostly completed, and the only swampy area that remains is the area of Sadžak in the eastern part of Zasavica, along with small pond complexes in the western part.

The construction of a pumping station on the channel near Mačvanska Mitrovica, in 1953, did not have drastic effects on the decrease of the ground and surface waters in Zasavica for the next 20 years, until the dense channel network was completed in 1970's.

The spring floods (spills from the riverbed) of Zasavica are minimal, and they primarily depend on the regime of the pumping station. In April 1996, the flood intensity was only 5-6% in comparison to the situation 100 years ago, which was even worse further in the past, when the riverbed of Zasavica was semi-dry. It is obvious that current water regime and floodable zone primarily depend on the pumping station near M. Mitrovica. According to the inhabitants, the pastures of Valjevac were regularly flooded in spring with water deeper than 1 meter.

DOMBROVSKI (1895) emphasizes that to reach the "pond of Zasavica" in spring, when the herons are nesting, is life threatening. He talks about wandering peat islands with bushes of sallows and willows, and older current residents remember that these peat bogs were still present 40-50 years ago.

There were several large and more compact forest complexes on elevated terrains along Zasavica some 100 years ago. Today, only several enclosed areas remained, and somewhat more compact areas with woody vegetation can be found northwards to Sadžak, in the area of western Valjevac, in Vrbovac, as well as westwards from Batar in Poljanski. The human influence caused separation of compact forest communities and, by favouring the exploitation of certain species, it contributed to their uniformity.

Today, the forest clearing as a negative factor in conservation of pristine areas and species richness is slowed down, since there are no more large forest complexes, and only small enclosures remain. However, clearing of some complexes with old trees of oak, ash, and poplar is still present. Many natural forests are replaced with plantations of European-American poplars.

The area surrounding the waterway is an alternated natural environment with arable fields, and the natural vegetation is characterised with rare remains of forests and small surfaces of wet and moderately wet meadows where cattle actively graze, which are therefore degraded to a large extent.

The waterway is overgrown with a large biomass of plant material, followed with high organic production that permanently provokes siltation of the riverbed, stops the water flow, and further deteriorates the water regime conditions within the waterway, so it is necessary to implement active measures of protection by removing the vegetation in order to sanitise the conditions in this waterway.

Hydromechanic and ameliorative activities carried out in Mačva alternated the image of this area. However, the rivulet Zasavica succeeded to retain its former image to a certain extent.

Recently, Zasavica have been exposed to a great human influence, which, along with the natural processes, led to fast eutrophication and degradation of some parts of this aquatic ecosystem.

The value of the saprobity index, the total number of algae, and the presence of certain species, indicate that the water is relatively clear with the low organic content, and with less intense eutrophication processes than in other similar aquatic ecosystems. However, values of saprobity index as large as 2.5 were estimated at certain localities, corresponding to the intermediate category between the 2nd and 3rd water quality class. Usually, these are places where the human impact is the most prominent.

Some of the potential negative factors are the inadequate regulation of the water regime through the dam and the state of neglect of the channels that supply Zasavica with water.

Aquatic ecosystems are exposed to pollution by the runoff of insecticides and fertilizers from the surrounding cultivated areas and, to a lesser extent, by spills of faecal waters.

Sporadic cases of disposal of mechanical waste and opening of wild depots, both in dry habitats and along the waterway, were observed.

Spontaneous introduction of American predatory fishes *Ameiurus nebulosus* and *Lepomis gibbosus* into the river Zasavica has also triggered negative effects.

b) in the surrounding area:

In the 19th century, northern Mačva was much more covered with forests and swamps than with arable land. Since the last decade of the 19th century these forest are decreasing, but ponds and marshes still occupy a large part of Mačva. Compact forests units were cleared mainly between 1860 and 1880, and during the 20th century they have even more been chopped up, which led to the present existence of sporadic enclosures.

Large swamp complexes in the western part of Zasavica (from Crna Bara to Ravnje), in the central part from Vrbovac to Sadžak, and to the south in, at that time still not ameliorated, watershed of Bitva around Nočaj and Glušac, can be seen on topographic maps from the beginning of the 20th century. Regular spring floods in this area comprised more than 2,500 ha, with particularly good habitat conditions for the development of many types of communities linked to water.

The expansion of the urban and weekend zones and of the infrastructure, intensification of the agriculture, and disturbance of natural features of the Drina and Sava and their riparian areas, also have a significant impact.

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 Decree on Preliminary Protection of the natural asset "Zasavica" was issued on December 22, 1995.

In 1997, the Government of the Republic of Serbia proclaimed the **Special Nature Reserve "Zasavica"**, with a total area of 835 hectares, and with the buffer zone of 1078 hectares. The protection regime of the 2nd degree was established within the Reserve.

In 2005, this area was nominated as IPA (Important Plant Areas) "Zasavica".

In 2000, Zasavica was included in the registry of areas of international importance for birds, according to the **IBA (Important Bird Areas)** project, on the area of 5,200 hectares.

Sixty-one areas, including Zasavica, which are of particular interest for protection and conservation of wild plants and animals and their habitats, were processed for the Emerald project and for the planned ecological network in Serbia.

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?:

Five-year long mid-term protection and development plans are issued for the Special Nature Reserve "Zasavica", from which one-year long protection and development plans result. These programmes include a wide spectrum of activities:

The guardian service consists of seven employees, and it has a field vehicle and several boats. It is regularly present in the field, it watches over the Reserve, prevents illegal fishing, controls and coordinates activities with protection measures, and guides and educates the visitors.

Active measures of biodiversity protection realised so far include the reintroduction of the beaver into Serbia, reintroduction of the wels catfish into Zasavica, and placing platforms for white stork nesting.

Deposits of pond vegetation are removed from the part of Zasavica near Sadžak, with the aim to improve the water flow and to prevent blockade of the riverbed. The project of sanitation of the swales on the pasture Valjevac is also one of the important measures of active protection. A river branch, 1.5 km long and stretching around willows, was revitalised in one part of this pasture. Removal of the allochthonous tree species along the riverbed of the Zasavica is also going ahead according to the plan. As one of the measures of maintaining the function of the pastures in keeping with the natural demands, along with regular cattle grazing, is the removal of a part of the shrubby vegetation from the pasture Valjevac. Organised removal of mechanical waste was realised on several occasions.

d) Describe any other current management practices:

Among the most significant measures of protection related to the Ramsar site are the following:

The ban to change the approved water regime, the level of the ground waters, the damming of the waterway, the usage of water for irrigation, the pollution of water, the increase of the areas under poplar plantations, the cutting of the autochthonous forests,

the cutting and burning of reed, the construction of all types of objects (except for the purpose of planned tourist points), and the usage of motor boats.

28. Conservation measures proposed but not yet implemented:

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

One of the main activities in this filed is the initiative for the revision of the boundaries of the reserve, namely the initiative for widening of the borderline and inclusion of the present buffer zone within the boundaries of the reserve, as well as the intensification of protection measures within the present borderline.

The realisation of the existing projects and plans for the revitalisation of the wetland habitats is also planned, first of all of desiltation of a part of the riverbed of the Zasavica. Deepening of the shallower, silted riverbed of the Zasavica is planned at five localities using a dredge from the shore.

It is also planned to bring back the water into the ponds at the largest pasture "Valjevac", as well as to continue its cleaning from shrubby species and herbaceous allochthonous flora, such as the common milkweed (*Asclepias syriacus*).

Furthermore, it is planned to buy up the land in scope of the EAF and to widen the floodable zone along with water regulation in the temporarily ponds that are usually dried out.

It is planned to design and realise the project of revitalisation of wet floodable meadows at the locality Pačija Bara.

29. Current scientific research and facilities:

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

The multidisciplinary studies of Zasavica are the most comprehensive in comparison to all other protected natural areas in Serbia, including a wide spectrum of scientific and expert fields (water quality, macromycetes, flora, vegetation, snails, crustaceans, dragonflies and damselflies, butterflies, ants, longhorn beetles, fishes, amphibians, reptiles, birds, mammals). The results of these studies were publishes in the form of two Proceedings from expert conferences dedicated to Zasavica, held in 2001 and 2007. Since the proclamation of the Reserve until nowadays, sixteen new species for Serbia were recorded here, from the groups Hydracarina, Ostracoda, Rotatoria, and Curculionidae.

A research camp is organised each July and August in the Special Nature Reserve Zasavica, by the Scientific Research Society of Biology Students "Josif Pančić". Ten to fifteen biology students participate in the research of the biodiversity of the reserve.

A master's thesis on aquatic macrophytes of Zasavica, analysed after the method of Köhler, was successfully defended in December 2003.

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.

With the support of the Institute for Nature Conservation of Serbia, the Manager participates in permanent education of the public, local community, all interested parties, and the beneficiary of the natural asset, on values and significance of the natural values of "Zasavica", through numerous contributions in electronic and written media. Informative boards, signposts, and billboards were placed near all major traffic directions. The visitors' centre at the edge of the pasture Valjevac is the focal point in education on nature protection, with the guides, lecturers, adequate educational material, and souvenirs. A lot of educational-informative material, such as prospectus, calendars, and books, was printed, including the richly illustrated "Guide through the nature in the Special Nature Reserve Zasavica".

For the third consecutive year, in the period July-August, the Management of the Reserve organizes an international working camp in the nature reserve Zasavica. Up to 10 young people, older than 18 years, participate in this camp. In the first year, the participants worked on removal of waste and macrophyte (flotant) vegetation, which has completely grown over the waterway in a part of the reserve (the village Zasavica 2, the pasture Valjevac) where the route for the tourist boat "Umbra" was planned. In the second year, the volunteers made souvenirs of the reserve from natural materials.

On February 2nd, 2002, the Special Nature Reserve Zasavica was the host of the celebration organised on the occasion of the World Wetland Day.

A draft study of the tourism management plan for the protected area of the SNR "Zasavica" was also realised. Three training seminars and lectures were held during its realisation, where, through the workshops, the principal directions were determined and the data were gathered. Another study was also realised in scope of the international project "Development of methodology and management plan for tourism in SNR Zasavica". A seminary dedicated to the raising of public awareness on the reduction of the pollution and the protection of the ecosystems in SNR Zasavica was also organised.

In addition to the good relations with local elementary schools, and the pool on the significance of Zasavica carried out in surrounding villages, all regular and occasional workers are the inhabitants of the nearby villages. The international project "*Zasavica, the support to the local economy through the sustainable tourism – A feasibility study*", financed by the European Union, and realised by the European Agency for Reconstruction is also carried out within the reserve.

31. Current recreation and tourism:

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

The visitors centre represents a central tourist point of the reserve. It is a wooden building with a turret 18 m tall, from which the view spreads over the pasture and the widest and the most beautiful part of the rivulet Zasavica. This object hosts the souvenir shop and has two rooms with seven beds, as well as two auxiliary rooms. In front of it is a wooden quay that leads to the boats and a tourist vessel "Umbra" on which tourists make tours around the reserve. Zasavica has up to 6,000 visitors per year, among which the largest number are schoolchildren. Near the wooden object, there is a waterwheel as a tourist attraction. Of other objects, there are the "Beaver's Tavern" and the ethnic room with an eave, representing an ethnographic-historic exhibition of the old household and agricultural objects and tools from the end of the 19th and the beginning of the 20th century. There is also a toilet with indoor and outdoor showers to be used in the summer. In the "Beaver's Tavern" there is a barbecue, a "talandara" (plough disk), and a kettle for food preparation. Recently, a parking place for cars and busses was arranged in front of the visitors' centre, but outside of the reserve. This whole area is at disposal for visitors 24 hours daily and 365 days yearly, since there is always one of the workers, who guards the objects and the area, and greets the guests. This is a place where tourists can obtain the necessary information on the reserve by lectures or by informative billboards (maps of the reserve, the greatest values of the reserve – photos of the flora and fauna, a board with a small entomological exhibition, and other supplementary elements). For the purpose of tourism developing, the tourist vessel "Umbra" with 60 seats is available for tourists since 2002. Since 2003, the vessel's route goes through the most beautiful part of the reserve, from Valjevac to the forester's bridge, along 7 km. The guests can view the widest part of the Zasavica, behind which is the pasture, followed by the complex of floodable forests, so that in a glance one can observe both the waterfowl and the various forest birds. Sport anglers, with a little luck, can fish nice specimens of the wild carp, pike, or goldfish, at special locations and fishing blinds. Boat tours along the Zasavica are a true enjoyment for the fans of photo safaris, and the eco-

bread and a speciality of Mačva - fish grilled on the plough disk, are offered as a special attraction. Traditionally, the spring and autumn pike hunt, a competition in pike fishing in Zasavica, is organised twice a year. So far, five of these pike hunts were organised, gathering around 50-60 anglers from different parts of Serbia.

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 the Autonomous Province Authorities
- b) 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.

Nature Conservation Club "Pokret Gorana" Sremska Mitrovica

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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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