

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

NOTE: It is important that you read the accompanying *Explanatory Note and Guidelines* document before completing this form.

1. Date this sheet was completed/updated:

20 April, 1999

FOR OFFICE USE ONLY.

DD	MM	YY

Designation date

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Site Reference Number

2. Country: Slovenia

3. Name of wetland:

(refer to most widely-used name for international purposes, but include local names in brackets)

Škocjanske jame
(Škocjan Caves)

4. Geographical coordinates: 45° 40' N; 14° 00' E

5. Altitude:

(average and/or max. & min.)

max: 317 ms

min: app. 214 ms (156 ms)

6. Area:

(in hectares)

area of the cave system projected against the surface¹: 305 ha
catchment area²: 337 km² (cca 400 km²)

7. Overview:

(general summary, in two or three sentences, of the wetland's principal characteristics)

Škocjanske jame are a karst underground water cave system developed in the area of the "classical" Karst/Kras³. Their main characteristics are underground water flow and the extremely high fluctuations of ground water level. The area holds typical karst phenomena and karst features developed at the contact between permeable and impermeable rocks and in the limestones. The cave system provides habitat to numerous endemic and endangered animal species. In 1986, Škocjanske jame were designated a World Heritage Site due to their exceptional natural values. At the national level, the area is protected as a Regional Park Škocjanske jame.

8. Wetland Type

(please circle the applicable codes for wetland types as listed in Annex I of the *Explanatory Note and Guidelines* document.)

[NOTE: karst & other subterranean hydrological systems should be added to marine/coastal and man-made categories.]

marine-coastal: A · B · C · D · E · F · G · H · I · J · K

inland: L · M · N · O · P · Q · R · Sp · Ss · Tp · Ts
· U · Va · Vt · W · Xf · Xp · Y · Zg · Zk

man-made: 1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9

Please now rank these wetland types by listing them from the most to the least dominant: **Zk**

9. Ramsar Criteria:

(please circle the applicable criteria; see point 12, next page.)

1a · 1b · 1c · 1d | 2a · 2b · 2c · 2d | 3a · 3b · 3c | 4a · 4b

Please specify the most significant criterion applicable to the site: 1

10. Map of site included? Please tick *yes* -or- *no*

(Please refer to the *Explanatory Note and Guidelines* document for information regarding desirable map traits).

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

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Please provide additional information on each of the following categories by attaching extra pages (please limit extra pages to no more than 10):

12. Justification of the criteria selected under point 9, on previous page. (Please refer to Annex II in the *Explanatory Note and Guidelines* document).

Škocjanske jame system lies in the Dinaric karst and in the *Kras/Karst* area that gave the name for the karst phenomena and characteristics all over the world.

1. Škocjanske jame are exceptional due to their dimensions and the three dominant hydrological characteristics:
 - within the system, there is the underground river with a discharge oscillating between 0.050 m³/s and more than 400 m³/s;
 - moving water currents fed by rainwater;
 - pools of stagnant water in the Cave system.

Water oscillations cause the ground water level fluctuation of more than 130 metres in the researched parts of the Cave system. Studying and knowing the hydrological phenomena in the Cave is important for understanding such hydrological phenomena in karst areas in general.

1. The cave system supports endemic and endangered animal species.
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13. General location: (include the nearest large town and its administrative region) Community of Divača in the Republic of Slovenia, 13 kilometres north-east of Trst/Trieste Bay (Slovenia-Italy).

14. Physical features: (e.g. geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate. *See Guidelines for karst systems*)

Škocjanske jame were formed by the Reka river (also called Velka voda) sinking in Palaeocene and Upper Cretaceous limestones. Flowing off the Eocene flysch and reaching the carbonate bedrock the Reka river (8.32 m³/s mean discharge in the period 1953-1992) incises in a 2 km long karst canyon and finally, under 100 m high, vertical limestone wall disappears underground at the altitude of 317 m a.s.l. After sinking the Reka river reappears again in the bottom of the two collapsed dolines, Mala Dolina and Velika Dolina which are joined with a natural bridge. But at the western slope of Velika Dolina the Reka river entirely disappears underground.

The main cave passage is represented by elliptic, up to 30 ms wide passage at the altitude of about 330 ms and an underground 100 ms deep gorge cut in it. After 1.94 kms the main passage ends by a siphon at the altitude 214 ms. In front of the siphon lies the chamber Martelova dvorana. It is 308 ms long, 123 ms wide and at its highest point the height between the bottom and the top is 146 ms. The calculated volume of the chamber is 2.1 million m³. With such dimensions it ranges among the largest underground chambers in the world. Straight after Martelova dvorana, the ceiling lowers down to the river. After 160 m of the water passage, the cave finds its end in the sump lake Mrtvo jezero. Towards the north, the new cave section ends with another sump draining the Reka waters along still unexplored channels towards the inlet sump of the Kačja jama (Kačja cave) near Divača in a distance of less than 1 km (according to the latest findings about 900 metres). The underground flow of the Reka may also be observed in the cave Lobodnica (or in Italian, Grotta di Trebiciano) near Trebče (in Italian, Trebiciano) on the Italian side of the Slovenian-Italian border 13 kilometres west of the entrance to Škocjanske jame. The entire system of Škocjanske jame is over 5,800 ms long and 209 ms deep.

Water-tracing, carried out already before WW1, indicated that the underground Reka river discharged into the karst springs of the Timavo river near Devin (Duino), in the North Adriatic Sea in Italy.

The average precipitation is 1449 mm (in the period 1961-1990). The maximum precipitation is in autumn (November, October, September mean precipitation is 425 mm), while the driest is winter-spring period (January, February, March mean is 299 mm). The air temperature in Škocjanske jame is between 10 and 12°C. Water quality of the Reka river is in the fourth class (2-3) out of seven water classes. The hydrological system belongs to the “cold” water system. Occasional measurements of water temperature show that it varies between 0°C and 20°C.

15. Hydrological values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

The catchment area of the cave system covers 337 square kms (the area of influence). The surface flow of the Reka river discharge vary between the minimum, 0.12 m³/s and the maximum which exceeds 400 m³/s, the average being 8.32 m³/s. After sinking in Škocjanske jame it flows underground for 41 kms and appears on the surface again in Italy as the Timavo river (Potok). In Škocjanske jame we can follow the underground Reka for 2.4 kms, from the altitude 317 metres down to 214 metres above sea level at the terminal sump or siphon. Only 900 ms NW, in Kačja jama (Kačja cave) the Reka river flows in the galleries at the altitude of about 182 ms (the inflow siphon is at the altitude of 204 metres) and disappears in the final sump at the altitude 156 ms above sea level.

The main hydrological value of the hydrological system is in the possibility to store water. Water from this system is used as drinking water for the urban areas in Italy. The hydrogeological, hydrogeomorphological and hydrological values could be summarised in the following points:

- karstic and surface water drainage from the catchment area;
 - formation of characteristic underground karst features;
 - karst ponors and springs;
 - water storage;
 - drinking water supply for the urban areas (e.g., Trieste and its urban area).
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16. Ecological features: (main habitats and vegetation types)

Forest was the original vegetation type around the entrance of Škocjanske jame, but in the past the area was deforested. At present, the predominant climato-zonal community is the *Seslerio Autumnalis-Ostryetum* forest growing together with *Pinus nigra* plantations. As habitat types, the rocky cliffs of the collapsed dolines and the river canyon are important. However, ecologically and from the conservation perspective, the most important is the cave environment with significant number of endemic troglomorphic and Stygobiontic animal species.

17. Noteworthy flora: (indicating, e.g., which taxa/communities are unique, rare, endangered or biogeographically important, etc.)

The flora of the collapsed dolines, galleries and shallow chasms of the river valley at the entrance of the cave system is extremely diverse, due to the mixture of the ecological and microclimatic conditions. In addition to predominate Iliric, Dinaric, Balkan as well as South and Central European floristic elements occurring on the small scale also some Alpine glacial relicts (e.g., *Primula auricula*, *Saxifraga incrustata*, *Viola biflora* and *Kerneria saxatilis*) and Mediterranean species (*Adiantum capillus-veneris*, *Asparagus acutifolius*, *Tortella flavovirescens*) are present side by side in the collapsed dolines (e.g., Velika Dolina, Mala Dolina). *Lamium orvala* var. *wettsteinii* is endemic to Škocjanske jame and another endemic species *Campanula justiniana* is here present at its typical locality. Further more, another nine species growing in the area are recognised rare in the Slovenian Red Data Book.

18. Noteworthy fauna: (indicating, e.g., which taxa are unique, rare, endangered, abundant or biogeographically important; include count data, etc.)

The cave system of Škocjanske jame is zoologically remarkably important for its aquatic and terrestrial subterranean environment. *Proteus anguinus* lives in the hydrographic system. Additionally, a great number of endemic subterranean animal invertebrate species belonging to different groups are present. There are many endemic crustacean species (*Acanthocyclops hypogeus*, *Acanthocyclops venustus stammeri*, *Speocyclops infernus*, *Elaphoidella jeanneli* and others) and cave beetles (*Anophthalmus schmidti*, *Laemostenus cavicola*, *Bathysciotes khevenhuelleri*, *Bathyscia montana*, *Glyptomerus cavicola*). Among more than 7 species of bats, the rare and endangered *Miniopterus schreibersi* breeds in significant numbers. The rare and endangered fauna species occur on the rocky cliffs. The cave system is known as breeding site of *Apus melba*, *Columba livia livia*, *Bubo bubo* and other species.

The dry karst grasslands around and above the caves additionally hold significant number of rare and endangered bird species, as for example, *Emberiza hortulana*, *Emberiza cia*, *Emberiza cirius*, *Caprimulgus europaeus*, *Upupa epops*, *Anthus campestris*, *Lullua arborea*, *Circaetus gallicus*, *Lanius collurio* and others. The Kras/Karst area is designated as an IBA (Important Bird Area).

19. Social and cultural values: (e.g. fisheries production, water supply, forestry, religious importance, landscape values, archaeological site etc.)

The area around Škocjanske jame has also a significant archaeological value. In this area, there are 18 cave and surface archaeological localities dating from the Neolithic to bronze and iron age cultures.

The typical karst landscape and traditional land use need to be encouraged.

The area has possibilities to develop small scale tourism. In addition to natural, it has considerable social values (cultural, education and scientific research values).

20. Land tenure/ownership of:

(a) *site* - The cave system is the State property.

(b) *surrounding area* - The surface catchment area of Škocjanske jame is mainly privately owned land.

21. Current land use:

(a) *site* - Škocjanske jame are used for tourism.

(b) *surroundings/catchment* - The main land-use of the catchment is extensive agriculture and forestry. Small villages are scattered in the catchment. There is one bigger settlement upstream with abandoned industrial activities. Due to social changes in the catchment vegetation succession causes overgrowing (increase in forest areas) and changes in cultural landscapes. The Padež brook, a tributary of the Reka rivers is used for local water supply.

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

(a) *at the site* - on the surface of the cave system the main land use includes: settlements, infrastructure, agriculture that can affect the ecological character of the site;

(b) *around the site* - in the catchment area one of the main pollutants, production of organic acids has been abandoned and currently the untreated sewage of most of the settlements is the main pollutant. A potential effect can be a spill on the motorway and railway connecting central Slovenia and the harbour of Koper (one of the main traffic corridors from West to the East) passing by the northern border of the designated part of the cave system. Additionally, landfills scattered in the area and local roads have to be taken into consideration.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Managing authority has been established taking over conservation and management as well as development of the Škocjanske jame World Heritage Site and the Regional Park of Škocjanske jame. The law protecting the area of

Regional Park Škocjanske jame was passed in 1996. It covers 413 hectares and it provides some specific measures for the protected area and some general measures for the whole catchment area. Furthermore, it forms part of the proposed protected area Regional Park "Kras" which will include the whole area to the border with Italy.

24. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

A management plan is in preparation for the surface and underground parts of the Regional Park Škocjanske jame.

25. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

An inventory of cave fauna and the birds of the area are in preparation. Already a few years the Karst Institute (IZRK-SAZU) and the University of Trieste conduct research on the water quality in the cave (measurements of water temperature, growth of flowstone, etc.).

26. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

To-date conservation education has not been well organised, although some facilities do exist. There is some environmental education for primary and secondary schools and field work organised for students of biology, forestry and geography from the University of Ljubljana. In January 1999, the established Management Authority for the Regional Park Škocjanske jame gradually takes over entire management of the area. The management plan that is currently in preparation considers use of the area for conservation and environmental education.

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

Many tourists visit the area, mainly in spring, autumn and summer, less in winter. The World Heritage Site is visited by guides. In 1996, over 40,000 visitors (foreign and domestic) entered the cave. In 1997, there were 47,000 visitors.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture/Dept. of Environment etc.)

Republic of Slovenia.

29. Management authority: (name and address of local body directly responsible for managing the wetland)

The management authority for the Škocjanske jame Regional Park is "Javni zavod Park Škocjanske jame" (the Public Agency of the Škocjan Caves Park).

30. Bibliographical references: (scientific/technical only; focus on internationally available material)

- Frank, H. 1994: Netopirji v Škocjanskih jamah- Fledermause in den Škocjanske jame. Mednarodni simpozij "Zaščita Krasa ob 160-letnici turističnega razvoja Škocjanskih jam" Lipica, 7.-9. oktobra 1982, Tiskarna VEK, Koper.
- Grom, S. 1956: Prispevek k poznavanju flore v sistemu Škocjanskih jam. Acta carsologica 2, 253-262, Ljubljana.
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- Leben, F. 1984: Arheološki prispevek k zaščiti Škocjana in okolice. Mednarodni simpozij "Zaščita Krasa ob 160-letnici turističnega razvoja Škocjanskih jam" Lipica, 7.-9. oktobra 1982, Tiskarna VEK, Koper.
- Martinčič, A. 1973: Reliktna flora v Škocjanskih jamah in njihova ekologija. Biološki vestnik 21 (2), 117-126, Ljubljana.
- Rojšek, D. 1992 -1: O nekaj imenih s Krasa in Posočja - About some names from Kras in Posočje, Geografski vestnik, Vol. 64, 185 - 190, Ljubljana.

- Rojšek, D. 1992 -2: Geografska informacijska postaja Škocjan - Geographical Information Station in the Škocjan village, *Geografski vestnik*, Vol. 64: 191 - 203, Ljubljana.
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- Vidic, J. *et all.* 1992: Red data Book of animal species of Slovenia. *Varstvo narave (Nature Conservation)*, Vol 17. 1-223, Ljubljana.

Attachments:

- Cucchi, F., A. Mihevc, F. Ferrarese & U. Sauro, 1997: Guide for the excursion, Classical Karst, Meeting IUS 1997, Postojna-Bologna, August 24-28. From: *Supplementi di Geografia Fisica e Dinamica Quaternaria*, suppl. III-t.2-1997, pp. 167-180, 19 figg.
- Rojšek, D. 1996: Velika voda - Reka - a Karst River, *Acta carsologica*, Vol. 25: 193-206, Ljubljana.
- Simić, M. 1997: Some Basic Information on the UNESCO World Heritage Site Škocjanske jame (Škocjan Caves) in the Republic of Slovenia. (manuscript)

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¹ This is the surface area above the cave system.

² The catchment area includes all the known surface and underground waters draining in the system.

³ The “classical” Kras/Karst in this context means the original area which gave the name to the karst phenomena.