

## Additional material

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### Ecosystem services

#### Hydrological values:

The hydrography and hydrology of the site differ substantially from those of the surrounding area. Streams originating in non-karst area of Drahanská Uplands sink below the ground immediately after entering the limestone area. Hydrography and hydrology of the area is rather complicated - some sinks and springs function depending on the water dynamics, subterranean streams cross each other at differing levels, a sink may become a spring and vice versa, etc. Surface streams are almost non-existent, subterranean streams and their catchments do not correspond with the surface relief. In the area of sinkholes, valleys with abrupt dead-ends, or partially so, have been created and streams are periodical. This karst area has its own, mainly subterranean, hydrographic systems with single erosion base being the drainage system of the Punkva stream. Detailed hydrology of the area is highly complicated and not yet fully understood. Sloupský potok and Bílá voda streams are the sources for the Punkva stream, that has a catchment area of 170 km<sup>2</sup> and average discharge of 0.96 m<sup>3</sup>.s<sup>-1</sup>. Before reaching a cave, the waters of Sloupský stream, during the period of low water level, disappear down about 20 sinkholes or infiltrate into the bottom substrate at the time of low water discharge. Thus, part of the stream is periodical. The stream disappears finally underground at Staré skály (rocks) near Sloupsko-šošůvské Caves. At a depth of 70-100m it creates the Sloupský corridor that belongs to the Amateur Cave complex. The stream Bílá voda disappears down sinkholes at Nová Rasovna. As in the case of the sinkholes of Sloupský stream, the Bílá voda stream may also dry out as a result of water infiltration before reaching the sinkholes (for some hundreds of metres). The water further continues through the caves of Piková Dáma, Spirálka and others. During the flood periods, the water may also disappear into the cave Stará Rasovna (so-called flood sinkhole). After the water runs through the Holštejn part of the Amateur Cave complex, the Punkva stream is created at the confluence of the Bílá voda and Sloupský streams. The Punkva stream then flows through mostly unknown beds to the Macocha chasm, and through the Punkva Caves to the place where it emerges at the ground surface. The vast majority of the Amateur Cave complex consists of passageways, about 34 km in length, that are flooded only at the time of flood events. The Amateur Cave complex is connected with several small streams that disappear down sinkholes at Plánivý, Jedle, Vavřinec, Suchdol, etc. The area of the Amateur Cave is marked on the surface by a row of sinkholes, such as Cigánský závrť, Měšiny, Dolina, Městikád', Hluboký and others.

The so-called Labyrinth of Malý Výtok at Pustý žleb is genetically connected to another cave system, so far little known. This 'labyrinth' is created at sinkholes along the streams of Lopač, Krasovský and Vilémovický. The interior of caves are known only in the vicinity of sinkholes, especially near to Vilémovice. Important caves are Vilémovické propadání, Kajetánův závrť and Společňák. In the area of Ostrov, there are further caves - Balcarka, Lopač, and the chasm Vintoky. The Labyrinth of Malý Výtok is, during the periods of high water table, connected with the Amateur Cave complex.

#### Social and cultural values:

The cave Kůlna has archaeological value as the oldest settlement in the Moravian karst area which has been documented (110,000 years old). Also important are the ruins of two castles

Holštejn and Blansek. A wind mill in the village of Ostrov has been designated a cultural monument.

In the surroundings of Sloup and Holštejn villages are numerous climbing terrains. Four caves and the Macocha chasm are accessible to the public. Almost half of the forested area is located within nature reserves, meaning that these forests will have limited commercial use.

Agricultural land is in Zones I and II of nature protection (Zone 1 represents core zone of highest conservation value) and requires only extensive farm management.

**Current land (including water) use:**

(a) within the Ramsar site:

About one third of the site has been designated at some level of reserve status under national legislation: National Nature Reserve Vývěry Punkvy; Nature Reserve Bílá voda and Nature Reserve Sloupsko-šošůvské jeskyně; thus conservation interests prevail here.

As far as agricultural land is concerned, most areas are used as meadows and pastures, with only a limited area as arable land (i.e. land included because cave complexes exist underneath). Present use of the karst area is governed by nature conservation (PLA and NNR/NR - National Nature/Nature Reserves). A small part of the cave system is open to tourists, and scientific surveys are performed based on permission from the nature conservation authority. One of the smaller underground tributaries is used as a source of drinking water.

(b) in the surroundings/catchment:

Land on the surface above the karst system is used: by forestry; as agricultural land (arable, meadows and pastures); as water areas, and is partly built-up urban area. It is in the Zone I or II of the PLA (or within NNR/NR reserves). Since 2003, the agricultural land has been managed under the SAPARD programme, entitled "Methods of agricultural production complying with environmental protection and landscape conservation", that will be followed by all other agroenvironmental programmes. Forest management follows the Forestry Management Plan, which was approved by the nature conservation authority. On a small part of the surface bed of the Punkva River controlled sport fishing is allowed.

**Current recreation and tourism:**

The RS is the most visited area of the Moravian karst, as it includes all four caves with public access. The Punkva Caves (opened throughout the whole year) are visited by more than 250,000 visitors every year (mainly in summer months). The other three caves with public access - Balcarka, Kateřinská Cave and Sloupsko-šošůvské Caves - are closed for three months in winter. Also the Macocha chasm has a high number of visitors. Caves are also used for speleotherapy.

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**Noteworthy fauna:**

**Communities of the Macocha chasm** (transitional zone between the above- and below-ground). Communities of the Macocha chasm are transitional communities between cave biotopes and outside-cave biotopes, distinguished as the 5<sup>th</sup> altitudinal vegetation zone. Typical species are the springtails *Onychiurus granulatus*, *Tetrodontophora bielanensis*, *Folsomia quadrioculata* and the cave-springtail *Folsomia litsteri* (troglophile), and the molluscs: *Laciniaria biplicata*, *Ena montana*, *Vitrea transsylvanica*, and *Semilimax semilimax*. Amongst the beetles, most numerous is the family of *Staphylinidae*. Many species of the Macocha chasm are allochthonous species, whereas some species are, more or less, autochthonous and breed in the chasm. Amongst the latter are especially sub-montane and montane species that require biotopes with minimal human impact, such as *Geodrumicus nigrita*, *Syntomium aeneum*, *Ancylophorus aureus*, *Philonthus decorus*, *Quentus mesomelinus*, *Chilopora longitarsis*, *Ocalea rivularis*. Endemic in the Moravian karst area is an aquatic oligochaete *Bythonomus absoloni*. Important crustaceans are *Niphargus tatrensis* and *Gammarus fossarum*, the molluscs *Bythinella austriaca* and *Ancylus fluviatilis*, found in Jalové koryto (ravine).

**Cave communities:** as mentioned under point 16, caves offer highly specific life conditions. Three groups of species, classed according to their level of adaption to life in caves, have been distinguished (see also point 16):

- Troglobionts: Important are springtails (e.g. *Arrhopalites bifidus*, *A. pygmaeus*, *A. ruseki*, *Schaefferia emucronata*), and mites (*Oribellopsis cavatica*, *Belba clavigera* and *Parasitus spelaeus*). In this group do not occur any vertebrates.
- Troglaphiles: For example, the segmented worm *Eophila antipae* var. *tuberculata*, the mite *Rhagidia reflexa*, the spider *Meta menardi*, the springtail *Folsomia litsteri*, the caddisfly *Micropterna nycterobia* (adult), the beetle *Trechoblemus micros*, and several species of bats (with the exception of tree bats).
- Troglaxenes: Mainly insects, around cave entrances regularly overwinter adults of moths *Scoliopteryx libatrix* and *Triphosa dubitata*.

**Aquatic karst underground fauna:** is not specific to karst; for more information see section 16.

**Springs:** typical inhabitants are the snail *Bythinella austriaca*, the mayfly *Torleya belgica*, the stonefly *Amphinemura triangularis*, and caddisflies of the genus *Rhyacophyla*. Also found was the chironomid *Syndiamesa branickii* (a montane species, known from the Tatra mountains where it goes upto 2200 asl.). The karst streams are characterized by high water hardness, oscillating discharges, drying out in summer, and, in the area of springs, by low temperatures and good oxygenation. The most abundant benthic species are crustacean *Gammarus fossarum* and mayfly *Baëtis rhodani*. Typical are submontane and montane species of brooks and streams (larvae of mayflies *Baëtis alpinus*, *B. lutkeri*, *Ecdyonurus venosus*, the stonefly *Leuctra albida*, the caddisfly *Philopotamus montanus*, the true-fly *Odagmia monticola*, etc.).

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