PROTECTION AND MANAGEMENT OF SHOW CAVES IN SLOVAKIA

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ABSTRACT

According to the Act of the National Council of the Slovak Republic No. 287/1994 on Nature and Landscape Protection, all the caves should be considered nature monuments. The most important caves are designated national nature monuments. The caves as a public property are included in the amended version of the Constitution of the Slovak Republic from 2001.

Twelve caves have been opened to the public in Slovakia to date. Their appropriate and optimal utilisation rests in monitoring of visitors´ impact on natural environment of caves, including its regulation. All the show caves are designated national nature monuments. The Ochtinska Aragonite Cave, Domica Cave, Gombasecka Cave and Jasovska Cave have been included in the World Natural Heritage since 1995, Dobsinska Ice Cave since 2000. The protection and management of the show caves in Slovakia are under the responsibility of the Slovak Caves Administration in Liptovsky Mikulas – a qualified institution of nature protection of the Ministry of the Environment of the Slovak Republic.

CAVES IN SLOVAKIA AND SLOVAK CAVES ADMINISTRATION

The extent of karst regions in Slovakia represents an area of over 2,700 sq.km. More than 4,250 caves occur in this country. The strictest 5th level of legislative protection is related to the caves. Reasons for their protection are geomorphological values, representation of unique calcite, aragonite or ice filling, osteological and archeological findings, and historical memorabilia.

The Slovak Caves Administration realizes the protection and management of twelve show caves in Slovakia. Its nature protection activities also refer to the caves that are genetically connected with the show caves. Basic characteristics of the show caves are shown in Table 1, the total number of visitors in 1996–2000 is shown in Table 2. Simultaneously, this institution manages the reconstruction and building of objects and technical devices of show caves. It also takes part in realisation and development of speleotherapy and speleoclimatic stays in these caves.

PROTECTION, UTILISATION AND MANAGEMENT OF SHOW CAVES

A show cave is an educational locality where a part of underground spaces is technically adjusted for cultural and educational purposes or other community based utilisation at the same time with keeping the stability of cave geosystems and supporting their protection. Show caves rank among caves that are the most attacked and utilized by man. Their protection requires an enhanced attention.

The main tasks of caves complex protection and management are: basic documents preparation for show caves legislative protection; elaboration of specialists' viewpoints and documents for decision making of state executive offices; elaboration and realization of upkeeping programs to maintain cave geosystems stability; projects elaboration on show caves protected zones declaration; realization and coordination of research, exploration, documentation and other activities in these caves; monitoring and evaluation of cave environmental conditions and impact of the rate of visitors and other utilisation of cave geosystems; projection and

enforcement of show caves operation regime; specialists' supervision of accessibility works in caves; supervision of licensed activities realization in show caves, etc.

Table 1. Basic characteristic of show caves in Slovakia.

Belianska Cave Belianske Tatry Mts. (Belianske Tatras)	890 m a.s.l., 2,350 m long, tourist path 1,135 m, carbonate speleothems, front parts were known in the first half of the 18th century, opened to the public since 1882, lightened since 1896
Bystrianska Cave Bystrianske Foothills	565 m a.s.l., 2,000 m long, tourist path 490 m, carbonate speleothems, discovered in 1923, opened to the public in 1939–1940, reopened since 1968, speleotherapeutic procedures since 1971
Demanovska Cave of Liberty Nizke Tatry Mts. (Low Tatras)	870 m a.s.l., 8,126 m long, tourist path 1,800 m, part of Demanova Cave System (31.5 km in length), carbonate speleothems (rimstone dams, spathite stalactites, pagoda-like stalagmites, columns, draperies, flowstone, moonmilk, shelfstone, pearls), discovered in 1921, opened to the public since 1924
Demanovska Ice Cave Nizke Tatry Mts. (Low Tatras)	840 m a.s.l., 1,750 m long, tourist path 650 m, part of Demanova Cave System, ice filling in the lower parts, first written mention in 1719, old inscriptions on walls, open to the public in the eighties of the 19th century, reopened since 1952
Dobsinska Ice Cave WORLD HERITAGE Spis-Gemer Karst, Slovak Paradise	971 m a.s.l., 1,232 m long, tourist path 475 m, total volume of ice filling is more than 110,000 cubic meters, maximum thickness of ice is 26,5 m, 12 species of bats, discovered in 1870, opened to the public since 1871, lightened since 1882
Domica Cave WORLD HERITAGE Slovak Karst	339 m a.s.l., 5,300 m long, tourist path 1,315 m, genetical entity with Baradla Cave in Hungary, carbonate speleothems (shields, rimstone dams, columns), 15 species of bats, important archeological site (Neolithic Era), discovered in 1926, opened to the public since 1932, boat trip
Driny Cave Male Karpaty Mts. (Lesser Carpathians)	399 m a.s.l., 680 m long, tourist path 410 m, carbonate speleothems (draperies, flowstone, stalagmites, stalactites, rimstone dams), discovered in 1929, opened to the public since 1935
Gombasecka Cave WORLD HERITAGE Slovak Karst	250 m a.s.l., 1,525 m long, tourist path 285 m, carbonate speleothems (unique straw stalactites), discovered in 1951, opened to the public since 1955, first speleotherapeutical procedures in 1968
Harmanecka Cave Velka Fatra Mts. (Great Fatra)	821 m a.s.l., 2,650 m long, tourist path 720 m, carbonate speleothems (stalagmites, flowstone, draperies, rimstone dams, moonmilk), 9 species of bats, discovered in 1932, opened to the public since 1950
Jasovska Cave WORLD HERITAGE Medzevska Upland	257 m a.s.l., 2,704 m long, tourist path 550 m, carbonate speleothems, 17 species of bats, archeological site, the oldest inscription on the wall from 1452, opened to the public in 1846, reopened since 1924, speleotherapeutical procedures since 1995
Ochtinska Aragonite Cave WORLD HERITAGE Revucka Highland	642 m a.s.l., formed in a lens of Paleozoic crystalline limestones, 300 m long, tourist path 230 m, unique aragonite filling (kidney-like forms, needle-like forms of anthodites, spiral forms of helictites), discovered in 1954, opened to the public since 1972
Vazecka Cave Kozie chrbty Mts. (Goats´ Crests)	784 a.s.l., 530 m long, tourist path 235 m, carbonate speleothems, palaeontological site (bones of cavern bear), discovered in 1922, opened to the public in 1933, after reconstruction since 1954

Table 2. Number of visitors in show caves of Slovakia in 1996–2000

(* seasonally opened caves).

Cave/Year	1996	1997	1998	1999	2000
Belianska Cave	88 450	89 203	100 783	104 096	115 225
Bystrianska Cave	30 250	31 874	29 939	27 433	27 195
Demanovska Cave of Liberty	127 404	135 047	157 744	158 004	161 879
Demanovska Ice Cave*	60 220	52 486	53 861	62 570	76 331
Dobsinska Ice Cave*	84 000	73 844	79 602	82 537	84 454
Domica Cave	26 957	24 815	23 464	24 081	22 534
Driny Cave*	38 450	39 512	36 478	35 812	35 083
Gombasecka Cave*	16 586	15 278	14 633	14 276	13 194
Harmanecka Cave*	23 509	21 495	21 983	21 466	20 978
Jasovska Cave*	12 676	22 501	21 553	18 119	16 542
Ochtinska Aragonite Cave*	27 800	29 696	26 447	30 221	30 482
Vazecka Cave	32 775	32 091	28 517	27 731	27 027
Total	569 077	567 842	595 004	606 346	630 924

The practical protection includes liquidation of undesirable „lampflora“ and realization of preventive actions against its growth (the electric input of a new electrical installation in the Ochtinska Aragonite Cave was reduced by one third, as well as in the Domica Cave and Dobsinska Ice Cave by changing the lighting units), installation of devices against a mechanical destruction of sinter filling (new barriers and underground remote video control system in the Demanovska Cave of Liberty and Ochtinska Aragonite Cave), determination of visitors regime and limits in potentially threatened caves (ten persons for one guide in the Ochtinska Aragonite Cave), construction of cave entrance closures, etc.

Because the realization of practical protection depends on detailed knowledge of cave natural conditions, the Slovak Caves Administration supports a geoscientific research (geology, geomorphology, hydrology, speleoclimatology, biospeleology) and consecutive geographic synthesis that are aimed at the stability and carrying capacity of cave geosystems. Since the half of the nineties, the monitoring of speleoclimatic changes, caused by the rate of visitors, has been accomplished in the Ochtinska Aragonite Cave, Dobsinska Ice Cave, Driny Cave and Vazecka Cave; hydrological monitoring continues in the Domica Cave and Jasovska Cave; geomorphological and mineralogical research of the Ochtinska Aragonite Cave resolved underground caverns genesis and creation of aragonite filling; geological research of structure and tectonic conditions in the Dobsinska Ice Cave evaluated a stability of overlying rock; the underground glacier movement had also been observed in this cave; radioisotopic dating and paleomagnetism research of speleothems from the Demanovska Ice Cave and Demanovska Cave of Liberty contributed to the geochronology of the Demanova Cave System; monitoring of chiropterofauna is realized continuously, etc.

Our attention is also directed to documentation and registration of cave research, exploration and monitoring results. We are setting up a geographic information system on show caves on the platform of a digital three dimensional model of cave spaces. Undocumented parts of several show caves (Demanova Cave System, Jasovska Cave, Belianska Cave, Domica Cave) are surveyed in cooperation with the Slovak Speleological Society.

The exactingness and narrow specialness of some tasks necessitates the cooperation of caves protection department with scientific institutions or speleological organisations. Show caves research knowledge can be applied also for other caves and karst area in Slovakia. The Slovak Caves Administration organized seminars and scientific conferences where attained results were presented (Protection of Ice Caves, 1995; Show Caves – Research, Protection and Utilisation, 1996; Research, Protection and Utilisation of Caves, 1997, 1999).

Show caves operation strictly depends on building and reconstruction of objects and technical devices at the cave entrances on the surface and in the underground spaces. The building of a new entrance object of the Jasovska Cave was finished in 1996, the one of the Dobsinska Ice Cave in 1998. The new electrical installation of the Ochtinska Aragonite Cave and reconstruction of foot-path part of the Dobsinska Ice Cave were realized in 1997. The sound system in caves enables providing a commentary in foreign languages. The state of underground technical devices (foot-paths, electrical installation), stability of overlying rock, the cave safety plan and observance of other safety regulations for visitors moving (Safety Regulations for Caves No 3000/1975 SBU) are controlled by offices of State Mining Administration. Yearly mining safety inspections in individual show caves are accomplished at the beginning of tourist season with participation of these offices.

SHOW CAVES AS EDUCATIONAL LOCALITIES

The show caves present educationally important localities, concentrating a great attention of large community. Therefore these caves have an important mission for the environmental education. The majority of show caves are situated in nature protected areas. The commentary in the show caves should have also educational character with regard to the necessity of nature protection. Permanent expositions on natural values and cultural memorabilia of caves are installed in the entrance objects of the Domica Cave, Ochtinska Aragonite Cave, Jasovska Cave, Dobsinska Ice Cave. Educational paths are installed along foot-paths from valley parking-places to some show caves (Harmanecka Cave, Belianska Cave, Demanovska Ice Cave, Dobsinska Ice Cave, Demanovska Cave of Liberty).

CONCLUSION

The protection and reasonable utilisation of show caves in Slovakia is of state interest. According to karst area location, show caves are situated appropriately in the whole territory of this country, however, more concentrated in the Slovak Karst and the Low Tatras regions. Caves in the radius of the Low Tatras, the High Tatras and the Slovak Paradise tourist resorts (Demanovska Cave of Liberty, Demanovska Ice Cave, Belianska Cave, Dobsinska Ice Cave) have the largest number of visitors. The Slovak Caves Administration manages the maintenance of individual show caves properly and evenly. There are not heavy differences as for their protection, research, technical equipment and publicity. The propagation of show caves has to respect the necessity of cave protection (visitors' regime and limits).

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