

Sink Šturec in Kremnica

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ABSTRACT

Geotourism, as a modern type of tourism, is partly a variety of cognitive tourism. Recognition of geological objects and processes is a job for professionals but can be also attractive for non-professionals just interested in geology, in the Earth structure and in various processes active at the Earth's surface. Relief and landscape belong to the most attractive features of natural environment. Someone, who admires the natural beauty of the landscape not always knows how particular landforms were formed. At the end of the paper we briefly introduce the possibility of using the Šturec sink as geotouristic object. This place has all the prerequisites to become a top destination for geotourism.

Keywords: Kremnica, geotourism, sinkhole, pings, Šturc, gold, mint

INTRODUCTION

At present, tourism is an important area of national economy of developed countries in the world, which contributes to increasing the standard of living and gradually becomes an integral part of consumption (Kršák et al., 2011). Geotourism, as a modern type of tourism, is partly a variety of cognitive tourism (Rózycki, P., 2010). Conclusions of montane landforms research are currently important and often irreplaceable use in an increasingly growing of geotourism (Hronček et al., 2011). Study addresses the issue of sinkhole (Coratza et al., 2012) which shows the geosite assessment procedure and discusses its outputs, according to which 6 out of the 17 investigated sinkholes can be considered as geosites of geomorphological interest (geomorphosites). The emphasis on geoconservation, due to the predominantly karstic characteristics of the studied landscape give the study (Martín-Duque et al., 2012). Analysis of the spatial distribution anthropogenic forms of mining

in the village Slovinky and Rudňany deals Juliana Krokusová. (Krokusová, 2005; Krokusová & Čech, 2007). Research of pseudomontaneous anthropogenic relief shapes utilizes the same scientific methodology that applies to geomorphology or anthropogenic geomorphology. A detailed and comprehensive overview of the scientific methodology for the study of anthropogenic geomorphology with particular focus on montaneous anthropogenic geomorphology was presented in a separate monograph written by the collective of authors together with P. Rybár and K. Weis (Hronček et al., 2011).

SHORT HISTORY OF KREMNICA

Kremnica was among the major mining towns of the world during the Middle Ages and in Modern Times due to the abundant gold ore deposits in the Kremnica Mountains. However, the first evidence of sub-surface mining activities comes from the 9th century. In the 13th century the

inhabitants of this area were affected by the invasion of the Mongols. Following that difficult period, Hungarian kings invited new colonists from Germany to settle in the region to help replenish the decimated population. They went on to restore the mining activities in the town. The first written reference to the town dates back to 1328, when it was granted royal town privileges by King Charles I of Hungary.

The town's mint was already in existence at the time of the granting of royal privileges. Starting in 1335 the mint produced golden florins and later the famous "Kremnica ducats", which were used as an international means of payment as a result of their consistently high purity of gold. It was the most important mint, and later the only one, in the Kingdom of Hungary, in Czechoslovakia and nowadays in Slovakia; the prosperity brought to the town led to it being given the nickname "Golden Kremnica". In 1331, Kremnica became the seat of the Chamber Count (Kammergraf) who was the head of the most important mining and minting chamber of the Kingdom of Hungary. The Count administered all the mines and mints in twelve counties of the kingdom in the Middle Ages. At the end of the 14th century, Kremnica became the capital of the mining towns in central Upper Hungary.

The steady annual production of gold and silver guaranteed the prosperous development of the town. In the 15th century Kremnica was the second most important city in the Kingdom of Hungary. The town was continuously being granted new privileges and the deputies of the town occupied the second place in the Hungarian Diet (the first place was reserved for the representatives of Buda, the capital of the Kingdom). Gold mining and coin production in Kremnica culminated in the 14th and 15th centuries. As one of the most important centers of Protestant Reformation in the country, the town belonged to the Protestant "League of Seven Mining Towns" together with Banská Belá, Banská Bystrica, Banská Štiavnica, Ľubietová, Nová Baňa, and Pukanec. In the 16th century, the town was a major center of production of (mostly religious) medals, especially by Joachim Deschler. At the same time however, the miners had to dig deeper and deeper to reach new deposits and the mining conditions deteriorated because of underground water in the shafts. The cost of mining increased and the mining was becoming less profitable. The last gold was extracted in Kremnica in 1970, at which time all the mines were closed (Factualworld, 2014).

Kremnica lies at an altitude of 564 meters



Fig. 1 Kremnica and Kremnické vrchy Mts.

(1,850 ft) above sea level and covers an area of 43.136 square kilometers (16.7 sq. mi). It is located in the Kremnica Mountains on the brook Kremnický potok, which is a tributary of the Hron River. It is located around 20 kilometers (12 mi) west of Banská Bystrica (by line), 45 kilometers (28 mi) south of Martin and around 175 kilometers (109 mi) from Bratislava.

The castle built in the 13th through 15th centuries towers over the town. In the first half of the 14th century, it became the residence of the Chamber Count. The town was immediately fortified with a double wall containing several bastions and towers. The castle represents a unique example of a very well preserved fortification system in Central Europe. In the 14th century, it developed into a multifunctional complex of buildings and thus became the centre of local administration, religious life, and defense. At the end of the 15th century, the Chamber Count moved to a newly built house with a unique diamond vault. Thereafter the residence of the Count in the castle was converted into the St. Catherine's Church.

Other sites of interest also include the Museum of Coins and Medals, the Museum of Skiing and a historical main square with a monumental Baroque plague column. The Gothic Church of St. Catherine hosts the popular European Organ Festival. A 20-km long aqueduct, built in the 15th century, is still working, supplying three hydroelectric power plants (one of them located 245 m below the ground). Forested mountains around the town offer plenty of opportunities for hiking and cross-country skiing.

The geographical centre of Europe is claimed to be in the nearby village of Krahule.

One category of shapes, incurred by indirect anthropogenic geomorphological processes, are anthropogenic declines, depression shapes, shifts (with deleveling and folding), stepped terrain deformation, cracks and pitfalls. The most important parts of this group were undermined

subsidence phenomena in mining areas. It was formed by the action of gravity in the montane massif basement. Subsidence, respectively decreasing into the rock mass underground caverns, accompanied by the formation of a concave forms in the overburden excavation mining areas, are mainly in the coal fields (Hronček et al., 2011).

ŠTUREC SINK HISTORY

A sinkhole, also known as a sink-hole, sink, swallow hole, shakehole, swallet or doline, is a depression or hole in the ground caused by some form of collapse of the surface layer. Sinkholes may vary in size from 1 to 600 m both in diameter and depth, and vary in form from soil-lined bowls to bedrock-edged chasms. Sinkholes may be formed gradually or suddenly, and are found worldwide. The different terms for sinkholes are often used interchangeably. In urban settings in particular, sinkholes may owe their development to human activity as much as anything else. The following human actions can also cause sinkholes:

- Drilling and vibrations,
- Mining,
- Changes in weight,
- Lots of foot or vehicle traffic,
- Heavy increase in water flow, formation of a pond or body of water, or broken pipes, among other things.

Sinkholes may also form in places where water flows regularly, such as a storm drain, or when water sources are diverted or cut off, especially by pumping out groundwater. A broken pipe can contribute to sinkhole development by flooding and weakening the soil, but it can also provide an outlet for the dirt and rock that's supposed to surround pipes. After enough material falls into pipes and is transported



Fig. 2 Sink Šturec (source: Google Earth)

away, the surrounding earth becomes destabilized, contributing to sinkhole formation, sewage or water spills, or other disasters (Silverman, J., 2008).

Šturec sink, called also Lapser, or in German called der Sturz. Natural sinkhole formation is related to tectonic processes in the distant past. Two overburden veins, called Schrämenová and Main, are associated in Šturec, below of them are veins Schindler and Kirchberg. Northern (80 meters high) wall of the sink can be seen from afar. Gold mining in Šturec is confirmed in the document from 1385 which is the first written evidence of the hereditary tunnels as well as mining in Slovakia. The Upper Hereditary Tunnel is the oldest tunnel in Šturec. It is 4,280 meters long and it was closed in 1385. The duration of excavation using a hammer and handcuff was not more than 22 meters per year. In this fact, Kremnica had to be established for several centuries before 1328, when it obtained town privileges. Since 1519th, the second tunnel called Deep Hereditary Tunnel was excavated 94 years long. Its length is about 7000 meters and it was excavated approximately 102 m below the Upper Hereditary Tunnel. The third

tunnel-called Main Hereditary Tunnel or The tunnel of Emperor Ferdinand was designed in 1821, the beginning of the excavation was in 1841. It was excavated by discontinuous modern technology in the



Fig. 3 Memorial to all miners (photo: Ján Filanda)

length of 15,481 meters, made available Kremnica major mining field in 1909 and completed in 1931 (Kremnica, 2014).

Šturec sink, isolated in neighboring countries, length of approximately 700 m, width 250 m, max. depth of 170 meters. Northern wall of the sink is 80 meters high and is visible from afar. This sink came collapsed section of mining works in the earthquake in 1443rd In the accident, killed about 500 miners (Kremnica, 2014). The initiation of mining activities Šturec only assume, because in terms of geology it could be only bare vein structure containing gold. Because of weather conditions it eroded and rocks for release the small pieces of gold, which water carry away and settled to the bottom of the creek. Space of Šturec today had at that time a different form than how we see it today. First gold seekers acquire gold panning in the creek silt around the year 800. Creek led them to vein structures, the primary source of gold. They started to exploit it with caving, then from the exposed veins and then began to lead the shafts and tunnels. It is estimated that gold mining in Šturec started already before 1000, but the golden age of development and mining and the city itself

Kremnica is dated to 14 century until the mid-15th century. Gradually, there is a decline in mining activities both mined rich deposits or flooding adits. Decline of mines continued in the 16th century. After 1918 the mine assumed by the State. The worsening economic situation decline in gold prices on the world market has resulted in abandonment of mining gold in 1972 (Geocaching, 2011).

CONCLUSION

Travel and recreation are nowadays mostly linked to cultural and historical aspects, civilization's heritage elements, natural elements and leisure infrastructures. However, geomorphology is rarely considered as a major tourist element of attraction. Tourism development in Kremnica has grown to be one of the most important economic activities in region. Tourism in Kremnica is also linked to outstanding cultural assets and to the pristine rural and natural environment. The latter is well-preserved and widespread especially in Kremnica. The ever-growing consolidation of this kind of tourism



Fig. 4 Sink Šturec photo: Ján Krošlák

focused on environmental elements implies an important challenge: the development of a sustainable tourism. . The original contribution of this study is to show that sites of geomorphological interest, such as sinkholes, can become part of a culturally accessible and shared heritage, making them a resource for social and economic development in their own territory. The sinkholes can be considered as new elements that can catalyze the potential of a territory which is often neglected or pass unnoticed. The preservation of the mining heritage of a country or region becomes an interesting alternative by giving the opportunity to restore areas affected by the mining activity at the same time that it puts them into value again, giving opportunities to the local population to continue exploiting and getting benefits from the former mine through a new and sustainable activity, tourism (Cedron, 2012). Anthropogenic relief shapes are essential for the functioning of technical progress of modern contemporary human society (Hronček, 2013). Some of the benefits of the past development of the area are: long history, Šturec sink - memorial place for miners, in the city was implemented in the years 1765 - 1772 one of the last plague column in the former Habsburg countries, Mint, Thermal pool.

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