

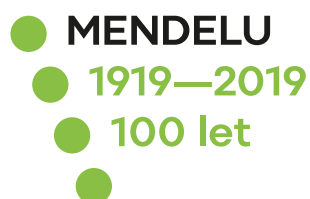
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**Czech Society of Landscape Engineers – ČSSI, z.s.,**



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## CULTURAL FUNCTIONS AND SERVICES OF GEODIVERSITY WITHIN URBAN AREAS (WITH A SPECIAL REGARD ON TOURISM AND RECREATION)

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### Abstract

Geodiversity (or abiotic nature) within urban areas has numerous functions and offers various benefits and services. In addition, it has strong links to cultural heritage and historical aspects and it influences and is influenced by urban development and planning. The geodiversity functions and services can be sorted according to the ecosystem services approach: regulating, supporting, provisioning and cultural services. The last mentioned includes a wide spectrum of aspects (spiritual, religious, historical, archaeological, social, artistic, sense of place etc.) and besides this, it encompasses also the tourist and recreational functions which are (in some cases) unexplored and underestimated in urban areas. The paper presents examples from two different Czech cities – Brno and Liberec. Selected geocultural sites are described and assessed and specific proposals for tourist, recreational and educational use are outlined. The results of evaluation show that they can represent an interesting alternative to the traditional tourist destinations within urban areas.

**Key words:** geotourism, geocultural site, assessment, Brno, Liberec

### Introduction

Geodiversity and geoheritage within urban areas have numerous functions that can be analysed and assessed in the context of ecosystem services (Gordon, Barron 2012, Gray 2018). These functions, services and benefits have been already recognized and discussed (Reynard et al. 2017, Kubalíková et al. 2017, Habibi et al. 2018), numerous methods were applied for assessing geodiversity sites with regard to geoconservation and geotourism (Reynard et al. 2016, Pica et al. 2016) and in some cases, geodiversity importance in towns is respected and supported by conceptual documents (London Geodiversity Partnership 2014). Geodiversity and geoheritage within cities are closely linked to cultural heritage (e.g. Borghi et al. 2014, Del Lama et al. 2015) and particular geodiversity sites represent a resource for recreation, tourism and education: these aspects can be considered specific examples of cultural (spiritual, religious, artistic) and knowledge functions and services of geodiversity within urban areas. In the Czech Republic, the cultural and knowledge services of geodiversity are appreciated especially within rural areas (Kubalíková 2016). However, in the urban areas, these functions, services and benefits remain rather unexplored and underestimated. This paper presents two geocultural sites: Stránská skála in Brno and Ruprechtice quarry in Liberec. The results of the assessment show that these sites reach high values despite the position within urban areas and strong influence of human activities.

### Methods

For the assessment, the methodological approach proposed by Reynard et al. (2016) was used. This approach has been developed within the concept of “geomorphosites” which are defined as geomorphological objects or wider landscapes and may be modified, damaged, and even destroyed by the impacts of human activities (Panizza and Reynard 2005). The method was practically applied e.g. by Boukchim et al. (2018) for the assessment of geocultural sites. Figure 1 explains particular steps of the assessment in detail.

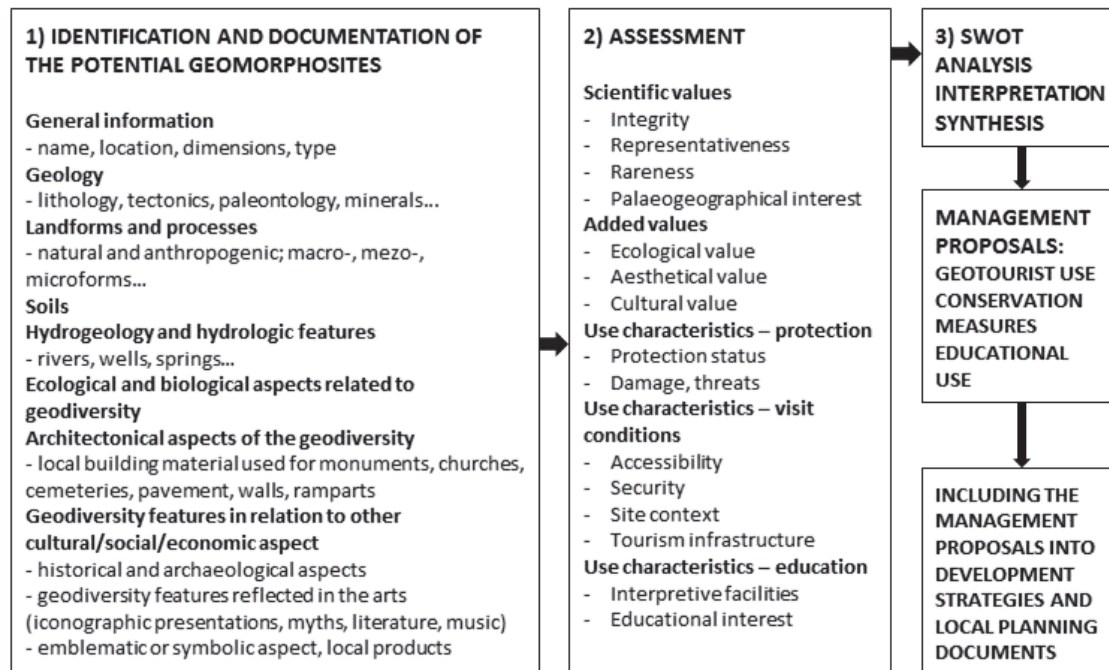


Fig. 1: A method for inventorying and assessing geomorphosites or geocultural sites (adapted from Reynard et al. 2016)

### Sites selected for the assessment

**Stránská skála** (Figure 2A) is located in the eastern part of Brno city. The site represents a denudation relic of the Upper Jurassic limestones which are paleontologically rich (e.g. crinoids or cephalopods) and strongly affected by karstification (the relics of three caves are present). Two levels of fluvial sediments have been preserved in the abandoned valley of Svitava between Nová hora and Stránská skála, which is important from the paleogeographical point of view (Novák, Müller 2000). Concerning anthropogenic transformations, the northwestern slope is considerably changed by quarrying and during WWII, the tunnels of the underground factory Flugmotorenwerke Ostmark and the air protection objects were driven. The site is botanically valuable with the occurrence of protected species and relics of thermophilic species that have spread from the Mediterranean during the warm periods of the Holocene. Stránská skála was repeatedly inhabited already during the Palaeolithic period (the oldest settlements about 600,000 BC). The extraction of building stone probably started at the beginning of the 13th century – the material was used for the first time in the Church of St. Jiljí in Brno-Komárov and St. Kunhuta in Brno-Zábrdovice which was ordained in the spring of 1211. Later, the material was extensively used in numerous buildings in Brno, e.g. Petrov cathedral, Špilberk and Veveří castles, the Old Brno basilica, the Church of St. Thomas and St. James, the portal of Old Town Hall. The material was also used in sculpture (statues in Petrov cathedral, Zderad's Column, Parnas fountain in Zelný Trh Square – Figure 2B) and as tombstone (Mrázek 1993). Nowadays, the site is protected as National Natural Monument.

The **Ruprechtice Quarry** is the largest active quarry in Liberec granite (Figure 2C). The oldest mention of it is from 1875, but the quarry was founded earlier. The present quarry was created by connecting the previously separated quarries of Lednice, Wagner and Wagner II (Šrek 2012). The company Ligranit, a.s, currently operates it. Liberec granite is medium to coarse grained, deep, igneous rock. It has gray-pink colour and porphyritic texture. Liberec granite originated during the Variscan Orogeny, i.e. it is of Paleozoic age. The magmatic to porphyric texture of Liberec granite indicates a slow crystallization from granite magma below the Earth's surface. Large crystals (porphyric spores) of potassium feldspar – orthoclase, which has a pink to reddish colour, form the porphyric texture. A characteristic feature is that these orthoclase growths have a white hem of plagioclase (soda-lime type feldspar) around them. The rest of the rock is biotite (dark mica) and quartz. Secondary changes of minerals (sericitization of feldspars and chloritization of biotite) are evident. The porphyric spruce growths first crystallized from magma, the other minerals whose crystals are smaller solidified later. The texture is mostly homogeneous, sometimes with dark streaks and enclosures, with pegmatite patches of light (Rybařík 1994). Granite is often used as a sculptural or decorative material. It was used, for example, for tiling in Prague metro stations, the fountain in Mariánské Lázně, the pavement at Prague's National Theater, or at the base of the demolished Stalin

monument. It was used as a building block on a number of buildings in Liberec and its surroundings; in the 1930s, it was even exported to Germany for the construction of the Nazi meeting area in Nuremberg (Šrek 2012). It is also often used for the production of paving blocks or sidewalk frames. During more than 140 years of mining, roughly 500,000 m<sup>3</sup> of rock was broken out in the Ruprechtice quarry (Šrek, 2017), which was used in a number of locations in the region, creating a typical character of local buildings and an element of local identity. Stonework has a long history in the region and is one of the traditional sectors. The use of decorative elements from Liberec granite in contemporary interiors and exteriors then confirms how popular it is still.



Fig. 2: Examples of geocultural sites in urban areas: A – Stránská skála in Brno (northwestern slope affected by quarrying), B – Parnas fountain in Zelný Trh Square where the crinoid limestone was used, C – Ruprechtice quarry in Liberec, D – Use of granite as a building and decorative stone (Komenského Street, Liberec). All photos: personal collection.

## Results

The results of the assessment (Table 1) will serve as a basis for SWOT analysis and management proposals. This phase will be done in cooperation with municipal offices and Nature Conservation Agency of the Czech Republic.

Tab. 1: Assessment of Stránská skála and Ruprechtice quarry

		<b>Stránská skála</b>		<b>Ruprechtice quarry</b>	
<b>scientific value</b>	integrity	well-conserved, however, quarrying has affected natural karst system	0,75	site affected by quarrying, however, thanks to the existence of the quarry it is possible to observe unweathered granite	0,5
	representativeness	typical site for Jurassic lithology and palaeontology; representative geomorphology (denudation relic, karst features)	1	location with the highest quality Liberec granite, natural outcrops in the area	1
	rareness	there is several similar denudation relics within the area, however, the sequence of Jurassic limestone and Quaternary sediments are displayed very well	0,75	there are several other quarries in Liberec area, but granite is already quite weathered in them	0,75
	paleogeographical interest	importance for reconstruction of old valley of the Svitava River	1	importance for reconstruction of formation of nearby mountain ranges	0,5
	synthesis		0,88		0,69
<b>added value</b>	ecological	botanically valuable, protected species	yes	active quarry	no
	aesthetical	harmonic landscape (rock outcrops and remains of old quarry with steppe vegetation and trees), viewpoint	yes	harmonic landscape (viewpoint on the city of Liberec and Ještěd ridge)	yes
	cultural	archaeological importance (Palaeolithic settlements), use of local building stone, anthropogenic landforms	yes	use of local building stone, stone as cultural heritage, anthropogenic landforms	yes
<b>use characteristics</b>	protection status	site protected as National Natural Monument	yes	active quarry (no legal protection)	no
	damage, threats	uncontrolled visitors, destruction of underground spaces	fair	uncontrolled visitors can threaten themselves	fair
	accessibility	accessible by urban transport, marked paths	good	accessible by urban transport, unmarked paths	fair
	security	the path is not in good condition, underground spaces are visitable only at own risk	fair	the need to respect the safety rules of the quarry	fair
	site context	impressive landscape, offering views of Brno and surroundings	high	impressive landscape, offering views of Liberec and Ještěd ridge	fair
	tourist infrastructure	marked paths, shelters, catering within walking distance	good	paths are not marked, no additional infrastructure	poor
	interpretive facilities	educational path with information about geology	high	only in literature	poor
	educational interest	the interpretation of Jurassic geology, palaeontology, geomorphology (also in wider context), archaeology, links to the cultural heritage	high	the interpretation of regional geology (petrography) and geomorphology, cultural and historic value	high

Source: authors

## Discussion and conclusion

Concerning the method used for the assessment, we find it good in the terms of assessing the scientific values (although the diversity or number of different Earth-science aspects is not considered) and visitor's conditions – for the purposes of development of tourist and educational activities, the assessment is sufficient. However, the method is not suitable for the assessment of added values, especially cultural values. As the geodiversity sites in urban areas affects and is affected by human activities and as it is closely linked to cultural heritage, the cultural value should have more criteria (not only “present/absent” cultural aspects, but rather number of different aspects – e.g. archaeological, historical, technical, and architectural) or it should somehow reflect the historical relevance of the sites. Nevertheless, the assessment proved that anthropogenically affected sites situated within urban areas can reach high scientific values (scores 0,88 and 0,69) and thus they are important from the conservation point of view. High added values and suitable use characteristics prove that these sites have important cultural and knowledge functions and therefore possess a considerable potential both for tourist/recreational and educational activities. Thanks to these values, the sites can be considered an important resource for geotourism activities (alternative to the traditional tourist destinations within urban areas) and should be considered within urban development strategies and planning documents.

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**Souhrn**

Kulturní (zejména turistické, rekreační a vzdělávací) funkce geodiverzity jsou v ČR oceňovány zejména ve venkovských oblastech, ve městech zůstává její potenciál částečně nevyužitý. Příspěvek se zaměřuje na zhodnocení kulturních a vzdělávacích funkcí vybraných geomorfologických (geokulturních) lokalit v rámci měst, přičemž klade důraz na jejich turistické využití, vzdělávání a význam pro ochranu přírody. Pro hodnocení je aplikována jedna z metod vyvinutá v rámci konceptu "geomorphosites", která je vhodná právě pro geokulturní lokality. Na příkladu dvou lokalit (Stránská skála v Brně a Ruprechtický lom v Liberci) je ukázáno, že i tvary reliéfu, které jsou ovlivněny lidskou činností a které se nacházejí v rámci městských území, mohou mít značnou turistickou, ochrannou a vzdělávací hodnotu.

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