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**Department of Landscape Management  
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**Public recreation and landscape protection  
–  
with nature hand in hand?**

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# LOCAL GEOHERITAGE: ITS IMPORTANCE AND POTENTIAL FOR GEOTOURIST AND RECREATIONAL ACTIVITIES (A CASE STUDY FROM LOMNICKO AREA)

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## **Abstract**

Geodiversity, respectively its valuable part – geoheritage is considered an important resource for the geotourism and recreation purposes. In the Czech Republic, there are a lot of examples of such use of geoheritage: sandstone rock cities (e.g. Elbe Sandstones), karst areas (e.g. Moravian Karst) or polygenetic relief at mountain areas (e.g. Krkonoše Mts.) and others. These geoheritage features are usually significant on the national level, their existence assure the attractiveness of the given area, enables the geotourist and recreational activities and support the local and regional development. However, in the local scale, the geodiversity (respectively geoheritage, represented by particular geosites and geomorphosites) can also serve the above mentioned purposes. Maybe these landscapes or landforms are not so breathtaking at the first sight, but they often reach high scientific, added (e.g. historical or artistic) and economical values, so they certainly dispose a potential for geotourist and recreation activities.

The paper presents the example from Lomnicko area (approximately 30 km northwest of Brno), which can be seen as an “average” area from the geodiversity/geoheritage point of view on the national level, but on the local and regional level, there is a considerable number of geosites and geomorphosites with a potential for geotourism and recreation.

**Key words:** geodiversity, geosite, geomorphosite, geotourism

## **Introduction: geodiversity/geoheritage as a resource for tourist and recreation activities**

Geodiversity (respectively its valuable part – geoheritage) is considered to be the basic resource for geotourism and related educational and recreational activities and it is defined as “the natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (landforms, topography, physical processes), soil and hydrological features, including their assemblages, structures, systems and contribution to landscapes” (Gray 2013).

This definition presents the geodiversity as value-free quality of the natural environment. Those elements of geodiversity, that are seen as significant (of course according to particular subjective criteria) are called “geoheritage” (Sharples 2002). The concept of geoheritage is based on the definition of natural heritage which was presented already in 1972 (UNESCO 1972). The term geoheritage was defined as those components of natural geodiversity of significant value to humans, including scientific research, education, aesthetics and inspiration, cultural development, and a sense of place experienced by communities (Dixon 1996 in Dingwall 2005:14). A similar definition was presented by Eberhardt (1997); he emphasises that geoheritage belongs to the “things we would wish to retain for present and future

generations". Sharples (2002) says that geoheritage is represented by those elements of natural geodiversity, which are of significant value to humans for non-depleting purposes which do not decrease their intrinsic or ecological values. In addition, it is represented by specific examples of features and processes, which are worth of protection and conservation.

In the above mentioned definitions of geoheritage appears the word "natural" (natural geodiversity or primary geodiversity, that means the features formed without the human impact or activity). Obviously, the natural features represent bigger part of geoheritage (both on global and local scale), but the secondary (or man-made) geodiversity should not be omitted as it also represents a significant resource for tourist and recreation activities (Kubalíková, Bajer, Kirchner 2016). Secondary or man-made geodiversity can be defined (analogically to the Gray's definition of geodiversity) as „the range/diversity of the man-made/anthropogenic landforms, including their assemblages, relationships, structures and systems". The anthropogenic (or man-made) geosites and geomorphosites often have high scientific and added values and they can increase the overall diversity (respectively landscape diversity) of certain area (Cílek 2002), so they form the full-value and indisputable part of the geoheritage both on global and local level.

If the statements mentioned above are accepted and taken into account, the slightly modified definition of the geoheritage can be presented: *components or features of primary (natural) and secondary (man-made or anthropogenic) geodiversity which are of significant value to humans, including scientific research, education, aesthetics and inspiration, cultural development, and a sense of place experienced by communities.*

### **From the globally important geosites and geomorphosites to the local geoheritage**

Practically, the geoheritage is represented by particular geosites and geomorphosites or their systems and complexes for which can be used a term "wider landscapes" (Reynard, Panizza 2005) – that means the systems or complexes of several particular landforms.

The geosites are defined as portions of the geosphere that present a particular importance for the comprehension of Earth history, geological or geomorphological objects that have acquired a scientific, cultural/historical, aesthetic and/or social/economic value due to human perception or exploitation (Reynard 2004 in Goudie ed. 2004:440); geomorphosites are the landforms to which a value can be attributed and they can be used by society as a geomorphological resource (Panizza 2001).

Concerning the question of dimensions of particular examples of geoheritage, Grandgirard (1997 in Reynard, Coratza, Regolini-Bissig 2009:16) states that geoheritage is visible at all scales, from the small isolated landforms to large landscapes (Tab. 1). He provides following classification based on the number of landforms and processes:

Usually, the main resource for recreational and tourist activities on the global or national level is the highest level – geomorphological system or complex, so called geomorphological landscape. These systems cover larger area, they dispose high number of specific and particular landforms that have been formed by different processes. These landscapes are often the cores of the protected areas and national parks and they are traditionally exploited by tourism industry and abundantly visited. These areas plays a key role in the tourism and recreation on the

national level and they have an important influence on the regional development. Also, these areas usually possess the developed tourist infrastructure (including accommodation, catering services, transport facilities, marked paths, tourist shelters and other supporting services) so they are very popular, but also very overcrowded and overused especially during the holidays.

Tab. 1: The classification of geoheritage based on the dimensions of particular features (source: Reynard, Coratza, Regolini-Bissig eds. (2009))

<i>number of processes and landforms</i>	<i>specification</i>
one main process, one type of landforms	isolated landform or group of landforms („simple geosite or geomorphosite“)
one main process, several types of landforms	complex of landforms (wider landscape or complex of geosites and geomorphosites)
several main processes, several types of landforms	geomorphological system or complex (Reynard (2005) introduces the term “geomorphological landscape“)

Another type of sorting of the geological and geomorphological heritage can be based on the importance for particular area. It is linked with the dimension (mentioned above), but also with the knowledge and “popularity” of the site and other values (e.g. historical, economical, aesthetic or ecological aspects). From this point of view, we can sort the geoheritage into several groups:

1) *Global geoheritage*, which represents the highest level including the UNESCO sites or Global geoparks.

2) *National geoheritage*, which is represented by features (complex or system of features) that usually form a significant part (or core) of national parks, large protected areas, nationally protected nature monuments or national geoparks. This level of geoheritage usually corresponds with “geomorphological landscapes” or “geomorphological systems”, but this category can also include particular geosites and geomorphosites of high importance that are usually protected in the category of National Nature Monuments or National Nature Reserves.

3) *Regional or local geoheritage*, which usually corresponds with simple (or particular) geosites and geomorphosities and “wider landscapes” or “complex of landforms”. These features can be protected by law (usually in the lowest category of Nature Reserve or Nature Monument or Natural Park), but there are many cases where the legal protection is not established. However, it does not mean that these sites lack scientific or other values. In fact, these values can reach similar values as in the case of the geoheritage features of higher levels, but due to various factors (e.g. accessibility, knowledge and popularity of the site/landscape, localization or uniqueness and rarity), they are not considered the “nationally significant” geoheritage. Nevertheless, this local or regional geoheritage is very important for local development (on the level of communities, higher administrative units (districts) and in some cases particular regions or counties) and it represents an important resource both for local tourism and recreation as well as it offers the alternative to the traditional tourist destinations.

It has to be mentioned that this sorting of geoheritage according to the global/local importance is not definitive and it is sometimes hard to say in which category (or level) the particular feature of geoheritage (particular geo(morpho)site or landscape)

can be included in. It depends on various factors and also on the criteria that are set for the classification and sorting.

### **Local geoheritage as a resource and alternative (short reflection about factors that emphasizes the importance of local geoheritage)**

As stated above, the features of local geoheritage are not usually so breath-taking, extensive or unique (as the geoheritage features on global and national level), but they possess the values that are very important for the tourist and recreational purposes (respectively for the potential visitors or users) and their possible further development. These can be:

- 1) *scientific, conservation and educational value* (e.g. the landforms and the processes are illustrative, visible and simple to understand, the integrity or conditions of the landforms are relatively good which can be affected by lower amount of visitors and less intensive use of the local geoheritage features),
- 2) *added values* (e.g. ecological, historical or archaeological values, artistic values represented by local legends linked with geoheritage, aesthetic values),
- 3) *economic value* (accessibility, presence of tourist infrastructure or background for short-term visits, financial availability – that means “local geoheritage – local prices”),
- 4) *number of visitors and knowledge/popularity of the site/area* (local geoheritage is not so well-known and popular and the number of visitors is not so high as in the case of national and global geoheritage, so it offers a friendly and nice alternative for visitors that are looking for something new, original, calm and not so overcrowded and overused at the same time),
- 5) *stronger feel of local identity* (local products, “real” or authentic local people and services, not only “theatre”).

Of course, the list is not exhaustive, there are much more values, criteria and factors that can be taken into account and also, the most of them are disputable. To specify exact factors and values that influence and emphasize the importance of the local geoheritage, the detailed investigation should be done, but this task stands outside the frame/scope of this paper.

### **Study area**

Lomnicko is situated 30 km northwest from Brno which is the second largest city in the Czech Republic (approximately 380 000 inhabitants, but real number of people living here is higher) and the capital of the South-Moravian region. It can be said that study area lies within the wider surroundings of the metropolis and represents the recreational and touristic background of the city. The study area lies approximately between these villages: Osiky – Sýalov – Lomnice – Veselí – Ochoz u Tišnova – Běleč – Křeptov, but some specific segments of landscape within the close surroundings are included too.

For the study area, the harmonic landscape with well conserved natural features and with proofs of the sustainable use of them is typical and it offers a good example how the people exploited the landscape in the past. The part of the area is legally protected within the Natural Park Svratecká Hornatina, some specific segments of abiotic and biotic nature are protected within the category of National Reserve or National Monument.

Natural Monuments: Horní Židovka, Sýkoř, Míchovec, Sýalovské kopaniny, Dobrá studně, Klášterce, Veselský chlum, Veselská lada, Hrušín, Luzichová.

Natural Reserves: Sokolí skála, Pod Sýkořskou myslivnou.

Geologically, the basement is formed by biotit-muscovitic, sericite-muscovitic gneisses of the Bíteš group (part of the Moravicum) covered by Quaternary sediments and in some specific places, there are remnants of the marine sediments of Ottnang age (webpage of the Czech geological survey). Just relatively monotonous geological composition of the area enabled the formation of extraordinary geomorphological landforms and features.

Geomorphologically, the study area is affected by several processes, but the most significant landforms were created mainly by periglacial and cryogenic processes: tors, ridges, castle-koppies, structural ridges, block accumulations and flows, nivation depressions, cryoplanation terraces, frost-riven cliffs, abri, rims, etc. (Demek et al. 2010) – these landforms are considered the main geoheritage feature with potential for tourist and recreational activities. Also, the anthropogenic features of the relief are present here: especially of agricultural origin (heaps, terraces, ramparts, small walls). Due to unique combination of geology and geomorphological landforms and features, Lomnicko area belongs to best preserved areas with periglacial and cryogenic rock landforms in the Czech Republic, which is the basis for a very high morphogeodiversity of the area.

The study area is rich in various cultural features, the most important are probably the historically and architectonically valuable objects in Lomnice on the southern part of the area (Jewish cemetery, synagogue, plaque column, castle, chapel and church). In the villages, other sacral objects and traditional agricultural buildings and other objects of folk architecture can be found. In the landscape, the small sacral objects are common (crosses, small chapels etc.).

Concerning the dimensions and character, the study area can be considered a “wider landscape”. As stated above, the main process is represented by group of specific cryogenic processes that formed the most significant landforms. These processes were accompanied by anthropogenic, slope and fluvial processes in several parts of the area that also formed specific landforms (e.g. anthropogenic agrarian landforms, river or stream valleys).

### **A method for the analysis of the potential for tourism and recreational purposes**

Although the assessment method for the evaluation of the tourist and recreational potential of the study area comes out from the numerical assessment methods that have been already used for different type of particular geosites and geomorphosties (e.g. Panizza 2001; Coratza and Giusti 2005; Pralong 2005; Serrano and González Trueba 2005; Reynard et al. 2007; Pereira and Pereira 2010, Kubalíková 2013, Kubalíková, Kirchner 2016), this assessment is not numerical, it only follows selected criteria that were set in specific methodologies. The result is qualitative evaluation of the touristic and recreational potential supplemented by SWOT analysis of the study area.

The assessment criteria (Tab. 2) are based especially on Kubalíková (2013), Bajer, Kirchner, Kubalíková (2015) and Kubalíková, Kirchner (2016) and they respect the principles and definitions of geotourism (Dowling, Newsome 2010).

Based on the detailed field research and assessment according to the selected criteria, the SWOT analysis of the study area is done (SWOT analysis summarize the Strengths, Weaknesses, Opportunities and Threats).



Tab. 2: Criteria for the assessment of geotourist and recreational potential  
*source: Kubalíková (2013), Kubalíková, Kirchner (2016)*

<i>Scientific values</i>	
Earth-science importance and rarity/uniqueness	scientific importance – from the geological, geomorphological point of view; presence of specific features, existence of the features that are unique also on the higher level, e.g. national level
Diversity of particular landforms and processes	number of different landforms and processes within the study area
Integrity, conservation	the degree of disturbance or the damage of the landscape within the study area, risks and threats to the landscape – both anthropogenic and natural, management measures to prevent the possible damage and disturbance, existence of legal protection, proposals of legal protection, other types of protection
Educational value	visibility and comprehensibility of the landforms and processes, intelligibility to the laic public, possibility of explaining the corresponding processes
<i>Added values</i>	
Aesthetic value	viewpoints, landscape pattern and visual diversity, colours etc.
Cultural value	historical, archaeological, artistic features of the study area
Ecological value	presence of specific biological features – protected species, rare ecosystems...
<i>Economical values</i>	
Accessibility	both by public and individual transport, parking places, the access to the particular site, the “permeability” of the landscape, safety of the access
Supporting services and tourist infrastructure	accommodation, catering, local products, tourist paths and shelters, information centres
Promotion of the area	promotion on the web pages of the local communities and elsewhere, where can potential visitor obtain more information, knowledge of the area, its popularity, eventually attendance etc.

## Results

The analysis of the potential for recreational and geotourist purposes was done for the whole study area, not for particular geosites and geomorphosites. The results are presented in Tab. 3. The SWOT analysis follows (Tab. 4).

## Conclusions

Lomnicko area is a good example of an area with high geodiversity and cultural-historical heritage. The region has a high tourist recreational potential, in spite of the fact that there are no top tourist attractions. Lomnicko area represents an area which can be considered as an alternative to tourist overloaded top destinations (e.g. Bohemian Paradise, Moravian Karst, Krkonoše Mts.). But even here, sustainable tourism must be taken into consideration and suitable infrastructure must be developed with respect to protection of nature heritage.

Tab. 3: Assessment of the geotourist and recreational potential of the Lomnicko area  
*source: authors*

<i>Added values</i>	
Aesthetic value	Within the study area, there are a lot of viewpoints to the open landscape. The landscape pattern is quite diverse (small pieces of fields, forests, little villages...), so the study area is quite attractive from this point of view.
Cultural value	Probably the most important cultural features are concentrated in the Lomnice municipality (Jewish cemetery, synagogue, Catholic church and chapel). There are numerous small sacral objects both in the villages (chapels) and in the open landscape (wayside crosses). Also, there are some old agricultural buildings and other objects of folk architecture. These issues (e.g. buildings or walls built of local stone) represent a significant part of geoheritage too and they enable to see the historical, architectonic and cultural features in the context of using the natural resources. There is also a specific artistic feature: the pathway of Jára Cimrman which is attractive for the theatre-lovers and admirers of this unappreciated Czech genius.
Ecological value	Most of the landscape segments which are legally protected are home to the specific and rare species, so the ecological value of the study area is quite high.
<i>Economical values</i>	
Accessibility	Generally, there is a possibility of parking a vehicle in the villages. The public transport is sufficient as the area is partly included into the Integrated transport system of the South-Moravian region. The accessibility to the particular sites is quite easy and safe as the terrain is not very difficult, there is a network of paths and local communications (both marked and not marked). The „permeability“ of the landscape is quite good thanks to the presence of that network.
Supporting services and tourist infrastructure	There are marked paths within the study area, which lead through the most attractive segments and the main attractions are well signed. The limited possibility of accommodation is possible in the Lomnice or Tišnov (outside the study area), but as the area is rather used for one-day trips, this is relatively sufficient. There are also some local restaurants even in the smaller villages.

Promotion of the area	<p>The area is promoted especially via web pages of the local communities and web pages devoted to the touristic attractions of the South-Moravian region. The information about scientific features of the particular landforms can be found on the Database of geological localities which is kept by Czech Geological Survey. Some specific sites are mentioned in the local guides and leaflets that are occasionally issued by local communities or other institutions.</p> <p>The knowledge and popularity of the area is rather local/regional (it can be said that it is not known on the national level), the area is used especially for short-term recreation and one-day trips as it is situated not far from Brno city. Due to the fact that there are more attractive areas close to the Brno (e.g. Moravian Karst), the study area do not suffer from the excessive number of tourists and it is not overcrowded even during the holidays and week-ends.</p>
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Tab. 4: SWOT analysis of the Lomnicko area (*source: authors*)

Strenghts	Weaknesses
<ul style="list-style-type: none"> <li>- harmonic landscape with well-conserved natural issues and evidences of the regardful use of the landscape by man-made</li> <li>- the landforms and processes are well visible and comprehensible for the public</li> <li>- the terrain is not difficult, the accessibility is quite good</li> <li>- marked paths leading to the most attractive natural features</li> <li>- the network of the paths and communication that assure the permeability of the landscape</li> <li>- the area does not suffer from excessive attendance</li> <li>- presence of important cultural and ecological values</li> </ul>	<ul style="list-style-type: none"> <li>- the tourist infrastructure is not sufficient if the visitors want to spend here more time</li> <li>- the educational, recreational and tourist potential is not still fully recognized</li> <li>- the geoheritage features are not promoted to the public</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>- a good option for one-day trips from Brno city and other towns situated within the outskirts of the metropolis</li> <li>- better promotion of the area as the alternative to overcrowded sites</li> <li>- educational potential of the geoheritage that can be used both for the laic public (visitors) and organized groups of students of local/regional schools</li> <li>- reasonable developing of the recreational and tourist potential as a driving force for the local development (on the level of communities, voluntary associations of the municipalities or subjects within Local Action Groups etc.)</li> </ul>	<ul style="list-style-type: none"> <li>- the fast and inadequate development of the tourism can cause the disturbances and damages to the landscape</li> <li>- the building – up and construction of the tourist infrastructure can negatively affect the character of villages or generally, the harmonic character of landscape</li> </ul>

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### **Souhrn**

Geodiverzita je považována za základní předpoklad geoturismu a navazujících rekreačních případně vzdělávacích aktivit. Na regionální či lokální úrovni představuje geodědictví (geodiverzita) vždy důležitý zdroj lokálního turismu a rekreace a může nabízet alternativu k tradičním turistickým destinacím. V příspěvku jsme se zaměřili na zhodnocení turistického a rekreačního potenciálu území Lomnicka (území situované cca 30 km SZ od Brna). Hodnocení území vycházelo z koncepce geomorphosites a jeho výstupem bylo kvalitativní zhodnocení turistického a rekreačního potenciálu daného území doplněné SWOT analýzou. Lomnicko je dobrým příkladem území s vysokou geodiverzitou a kulturně historickým bohatstvím, což se odráží v jeho vysokém turistickém a rekreačním potenciálu. Jedná se typické území, které může být alternativou k přetíženým turistickým top destinacím. Nejvhodnější pro rozvoj region by měl být tzv. šetrný turismus, který bude v souladu s principy udržitelného rozvoje a ochrany přírody.

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