Geotourism within urban areas: New ways of promotion of natural and cultural heritage (Case study from Brno City).

Kubalíková, Lucie
2018

Geotourism within urban areas: new ways of promotion of natural and cultural heritage (case study from Brno city)

Lucie Kubalíková[1, 2]

Aleš Bajer[1]

[1]Department of geology and pedology, Mendel University in Brno, Zemědělská 3, 613 00 Brno, Czech Republic

[2]Institute of geonics, Czech Academy of Sciences, Drobného 28, 602 00 Brno, Czech Republic

kubalikova@geonika.cz

Abstract: Geotourism is based especially on geodiversity, but it also uses the cultural-historical aspects of an area, it is linked to the education and counts with active engagement of the local people. Currently, geotourism is developed mainly within rural areas, but there are activities that point on the geodiversity and its importance within urban areas.

Rational and sustainable use of geodiversity within urban areas can represent an alternative to the traditional tourist destinations and contributes to the understanding of the importance and necessity of protection of geodiversity itself. Geodiversity, respectively geoheritage within urban areas does not include only issues of primary (natural) geodiversity (substrate, landforms, soils), but also anthropogenic landforms and processes (secondary geodiversity), hydrological features (wells, millraces) and geodiversity ex-situ (museum collections, building material). The paper presents this new form of tourism, gives the examples of good practice and focuses on geodiversity/geoheritage within the Brno city.

Key words: geodiversity, geoheritage, urban geotourism, Brno

1 INTRODUCTION

Geotourism is defined as a form of nature tourism that focuses on landscape and geology, but also on the biotic and cultural features that are linked to the abiotic nature (Dowling 2013). Generally, geotourism should fulfill these criteria: it should be geologically based, environmentally educative, sustainable and locally beneficial and it should ensure tourist satisfaction (Dowling, Newsome eds., 2010). In the last few years, geotourism has shown a considerable growth all over the world (Dowling 2011) and it is appreciated and accepted as a useful tool for promoting natural and cultural heritage and for fostering local and regional economic development especially within rural areas, however, Dowling (2010) says that geotourism may occur also in urban areas and gives the example of the Hong Kong Global Geopark. The role of urban geology was discussed even before (Hawley 1996, Hose 1996) especially in connection to the educational potential and tourism development.

Later, a new form of geotourism appeared, so called urban geotourism. Numerous case studies were introduced, e.g. Rodrigues et al. (2011), Reynard et al. (2015), Palacio Prieto (2015), Pica et al. (2016), Erikstad et al. (2017) and also an international workshop and conference was held in Rome in October 2016, where another case studies from the towns and cities of Europe were presented (Kubalíková et al. 2017, Tičar et al. 2017, Zwoliński et al. 2017) and some methodological aspects (Reynard et al. 2017, Pica et al. 2017) were discussed. Actually, urban geotourism is already accepted as one of the ways how to promote geoheritage within urban areas and how to use its educational potential.

As well as traditional geotourism, urban geotourism uses similar tools to promote geoheritage, e.g. geo-walks and geo-trails, however, the geotourist activities should not be done like isolated projects; if geotourism is considered to be environmentally educative, sustainable and locally beneficial and to cover tourist needs (according to the definition above), it should be framed by a plan or conception how to treat geodiversity and geoheritage within urban areas in general. The role and importance of geodiversity action plans is presented and discussed by Natural England and Ferrerro et al. (2012).

In the UK, the Geodiversity Action Plans fill these functions: they describe geodiversity and geoheritage of an area, they analyse their function and potential, they include particular activities that enhance the role of geodiversity and geoheritage and they also deal with local/regional/state policies and landscape planning. These Geodiversity Action Plans are generally made for larger areas, but also for towns and cities. In 2010, London Geodiversity Action Plan was approved (Poole et al. 2010) and it covers the above mentioned facts (it stresses the importance of geodiversity and geoheritage

within the city, analyses its potential and functions and proposes particular activities to conserve the geoheritage and to promote it). It has to be said that in the UK, geoconservation has a long tradition and already in the 1980s there were activities to promote geoheritage in urban areas via geo-trails and geo-walks (Robinson 1982, 1984, 1985). Similar activities were later presented in other countries/cities, e.g. in France – Balladés géologiques (Geologic walks, e.g. Baudin 2015, Billet et al. 2008) or in the Czech Republic (Chlupáč 1999, Bajer 2012).

2 WHY TO DEVELOP URBAN GEOTOURISM? AND WHAT SHOULD BE INCLUDED?

Poole et al. (2010), Gray (2013), Reynard et al. (2017) and Pica et al. (2017) give reasons why the geodiversity in urban areas is so important, why the geoheritage should be promoted and why the urban geotourism should be developed. The main reasons are:

- provision of invaluable natural resources (materials) and contribution to the industry, mining, agricultural and other activities

- basic role of landforms for the situation of the towns and cities themselves, for the localisation of main buildings and main communications

- urban sprawl often interacts (and it is also limited) with geolgoical and geomorphological features and processes (e.g. landslides)

- geological and geomorphological context of cities often represents their own image (landforms contribute to the urban landscape and natural heritage of cities, geodiversity influences on art and architecture, traditional building stone, urban landscape dominants,)

- potential for recreation, tourism, education (urban geotourism as an alternative to the "traditional" destinations: castles, sacral objects, important buildings; promoting geodiversity features can enrich the information about tourist objects, e.g. use of traditional dimension stone as an example of local building material)

- influence on biodiversity and localisation of parks and greenery, ecosystem functions

- understanding the geodiversity and geoheritage can help the acceptation of its conservation and rational use

- availability and accessibility to a large number of people (both local and visitors): "it presents important and democratic points because most of people live in metropolis and all cities are able to develop it" (www.geoturismobrasil.com)

It is obvious that geodiversity and geoheritage within urban areas have an important role. Poole et al. (2010) and Reynard et al. (2017) present the main activities that should be developed to manage the geodiversity and geoheritage rationally and sustainably:

1) Understanding the geodiversity and geoheritage (analysis of existing sources – maps, monographies; mapping, identifying the objects geoheritage, comparison with archaeological or historical sources, review of historical iconography and consultation of historical press, photographs and landscape paintings, news about releases of major urban works)

2) Identify the geodiversity resources for specific activities (assessment of the geoheritage sites, analysis of their potential for geotourism, recreation and geoeducation)

3) Conserve and manage individual sites and wider places (proposals of management measures, particular activities for particular geoheritage features, include the promotion of geoheritage into the current tourist offer, other activities to support the geodiversity within urban areas and to support the conservation and rational use of the geoheritage sites)

4) Promotion of geodiversity and geoheritage – to support the wider involvement of people in geodiversity through accessible life-long learning, geotourism and conservation activities – it can help the better acceptation and better understanding of the need of geoconservation activities

5) Networking (cooperation between scientists, tourist offices, municipality and other stakeholders) and influencing regional planning, policy development and practice.

3 METHODS

The first step how to develop the geotourism and geoeducation activities within urban areas is to analyse historical and actual maps, literature and other sources about an area. These activities help to further identifying and inventorying the geoheritage features (not only sites, but also viewpoints or other geoheritage issues as dimension stone). Following list gives the guidelines what should be taken into account when identifying the geoheritage features of an urban area:

1) geology (rocks) – description of lithological diversity, tectonic situation, geological evolution, palaeontology of specific rocks etc.

2) landforms – natural and anthropogenic, processes, genesis of the relief, landforms as a factor for localisation of important buildings, communications and so on, geomorphological risks, how the landforms influenced the urban spreading, how the urban space and

urban needs influence geomorphological features and geologic/soil features too

3) soils and how they influenced the urban spreading

4) hydrogeology (underground/hidden water resource – to stress an importance of water as an invaluable resource) and hydrologic features (rivers, streams, wells, mileraces…)

5) geoheritage features in relation to architecture (building material, dimension stone, material used for monuments, statues, pavement, walls, ramparts…)

6) museum collections (mineralogical, palaeontological, petrographical…)

7) viewpoints (where a visitor can have an overview about large portion of urban landscape)

8) geological gardens (open air) and the geoscience educational facilities (e.g. profiles, rocks, soils…) available to the wide public

9) geoheritage features in relation to the town/city appearance – the dominant hill, valley, typical building stone or other material (bricks, tiles)

10) geoheritage features in relation to the toponyms (names of the streets, local names)

11) geoheritage features in relation to other cultural aspects (archaeology, geomythology), geoheritage features with geohistorical significance, links between cultural and social events and geodiversity/geoheritage

After identifying the above mentioned, the potential form the geotourism and geoeducation purposes can be done. Assessment methodologies for geo(morpho)sites were already developed, used and critically analysed by various authors in various countries for various purposes (e. g. Panizza 2001; Coratza and Giusti 2005; Pralong 2005; Reynard et al. 2007; Reynard 2009; Pereira and Pereira 2010; Kubalíková 2013, Kubalíková and Kirchner 2016), for urban areas, an assessment method was proposed by Pica et al. (2014) and Pica et al. (2017) – so called Value of a site for Geotourism (VSG index). For the assessment of geotourist potential of the sites within urban areas, Pica et al. (2014) propose these criteria:

1) Representativeness (geoscientific, landscape evolution, city image)

2) Visibility

3) Geohistorical reconstruction significance

4) Aesthetic peculiarity of the urbanized context

5) Touristic attractiveness rate

Total score is represented by the sum of the above mentioned.

Another method for assessing the geotourist and geoeducation potential was presented by Kubalíková (2013), Bajer et al. (2015) and Kubalíková, Kirchner (2016) – they propose following criteria:

1) Scientific and intrinsic values (Earth-science importance, scientific knowledge, diversity of the site, respectively landforms)
2) Educational values (exemplarity and representativeness, presence of education facilities)
3) Economical values (number, distance and quality of tourists services, accessibility, current tourist use of the site)
4) Conservation values (degree of protection, risks and threats, current status of the site)
5) Added values (cultural, ecological and aesthetic value)

It has to be said that these methods are suitable only for landforms and it is problematic to apply it for other geoheritage features (e.g. dimension stone, building material) and for the overall assessment of the geoheritage of certain city/town. For these purposes, SWOT analysis can be used or the above mentioned assessment methods has to be modified and updated.

4 STUDY AREA: BRNO CITY

The Brno city is the second largest city in the Czech Republic (population approximately 380 000) and it is situated in the region of the South Moravia (south-eastern part of the Czech Rep.). It lies on the contact of the Bohemian Massif and Carpathian Foredeep, so the geology and geomorphology arrangement of the area is quite complicated and varied.

Following description of the geological and geomorphological settings is based on Novák et al. (1991), Müller, Novák (2000), geological maps and information available on the web page of the Czech Geological Survey (www.geology.cz) and Demek, Mackovčin eds. (2014).

The Brno Massif (part of Brunovistulicum) and its Paleozoic cover (Moravian–Silesian area) forming the basement, is covered by the Neogene sediments of the Carpathian Foredeep. Brno Massif is the Cadomian magmatic body (570–600 My old) composed of the Eastern and Western Granodiorite Area, which are separated by the Metabazite Zone composed of slightly metamorphosed

basalts with geochemistry similar to basalts of mid-ocean ridges. This is the oldest proved part of the Brno Massif (~725 My old).

The Paleozoic cover is represented by Devonian basal clastic sediments, which crop out in a tectonic slice of the Babí lom zone (e.g. Červený kopec, Žlutý kopec), and Devonian limestones, which can be found especially on the north-eastern part of the city (e.g. Hády). In a few isolated cases in the south-eastern part of the study area, the Jurassic limestones occur (e.g. Stránská skála). The Neogene sediments of the Carpathian Foredeep cover the Brno Massif preferentially along the tectonically predisposed valleys. The Ottnangian gravels prevail in the north part of the city (e.g. Jinačovice trough). The Řečkovice–Kuřim trough (northern part of the study area) is filled by the thick Badenian calcareous clays with sands and gravels at the base, which can be found also in the southern part of the study area under the Quaternary loess and fluvial deposits.

There is no active mine or quarry, but the exploitation of construction material (building stone, loess) can be traced back to the 14th century and it has markedly influenced the landscape. The most important limestone quarries are situated on the north-east of the city (Hády, Lesní lom), diorite was extracted e.g. in the north-western part of the study area, the loess and sands were exploited in the southern part of the city.

The study area belongs to two different geomorphological provinces: Czech Highlands (northern and central part of the study area) and Western Carpathians (southern part). In the northern and central part, the relief is tectonically influenced (occurrence of horsts and grabens and tectonically conditioned valleys of Svratka and Svitava) and more pronounced (significant elevations – Petrov, Špilberk, Kraví hora etc.), the southern part is rather flat and it was formed especially during the Neogene and Quaternary. The relief of the study area is strongly influenced by the anthropogenic activity.

5 PARTICULAR EXAMPLES OF URBAN GEOHERITAGE WITHIN BRNO CITY

Secondary geodiversity features…

Dominants…

Building stone…

6 CONCLUSIONS

The project is on the beginning; cooperation with Office of Urban Architect, Municipality of Brno (office of Environment), Tourism bureau of South Moravian Region, Mendel University, Institute of Geonics, eventually archaeologists and other specialists…

The perception of geodiversity – a survey that could be done (how the geodiversity is viewed? it is recognizable? is it considered important? is it attractive? or absolutelly uninteresting? - not only the landscape, but also in the connection with architecture – dimension stone or situation of important objects (e.g. bunker/shelters or important buildings and communication).

Specific questions: why there is no underground in Brno? is it a problem of substrate?

Currently: mapping the geoheritage features within Brno.

Later: particular activities – geowalks, a material for leaflets, add an information about geodiversity to the current tourist prospects, enrich the current tourist offer

Workshops: people that can be involved…

References

Bajer A (2012) Geologické vycházky okolím Brna. Rezekvítek Brno.

Bajer A, Kirchner K, Kubalíková L (2015) Geodiversity values as a basis for geosite and geomorphosite assessment: a case study from Žďárské Vrchy Highland. In Lněnička L (ed.) Sborník příspěvků z 23. ročníku středoevropské geografické conference

Baudin F (2015) Geologic walk around La Défense. Biotope, Mèze—MNHN, Paris (Collection Balades géologiques), 38p

Bennett MR, Doyle P, Larwood JG, Prosser CD (1996) Geology on your doorstep: the role of urban geology in earth heritage conservation. Geological Society, London, 270pp

Billet G, Bonnefoy B, De Wever P, Houssaye A, Merle D (2008) Promenade géologique à Etampes. Biotope, Mèze—MNHN, Paris (Collection Balades géologiques), 28p.

Chlupáč I (1999) Vycházky za geologickou minulostí Prahy a okolí. Academia Praha 258pp

De Wever, P., Baudin, F., Pereira, D. et al. Geoheritage (2016). https://doi.org/10.1007/s12371-016-0210-3 The Importance of Geosites and Heritage Stones in Cities—a Review

Del Lama, E.A., de La Corte Bacci, D., Martins, L. et al. 2015 Urban Geotourism and the Old Centre of São Paulo City, Brazil Volume 7, Issue 2, pp 147–164 https://doi.org/10.1007/s12371-014-0119-7

Del Monte M. (2017) *Aeternae Urbis Geomorphologia*—Geomorphology of Rome, Aeterna Urbs. In: Soldati M., Marchetti M. (eds) Landscapes and Landforms of Italy. 339 – 350.World Geomorphological Landscapes. Springer, Cham

Dowling RK (2008) The emergence of geotourism and geoparks. J Tour 9(2):227–236

Dowling RK (2010) Geotourism's global growth. Geoheritage. doi:10.1007/s12371-010-0024-7

Dowling, r. K. (2013). Global Geotourism – An emerging Form of sustainable tourism. Czech Journal of Tourism, 2(2), 59-79. DOi: 10.2478/cjot-2013-0004.

Erikstad, L., Nakrem, H.A. & Markussen, J.A. Protected Geosites in an Urban Area of Norway, Inventories, Values, and Management, Geoheritage (2017). https://doi.org/10.1007/s12371-017-0223-6

Ferrero E, Giardino M, Lozar F, Giordano E, Belluso E, Perotti L (2012) Geodiversity action plans for the enhancement of geoheritage in the Piemonte region (north-western Italy). Ann Geophys 55(3):487–495. doi:10.4401/ag-5527

Gomez-Heras M, Smith BJ, Viles HA (2010) Oxford stone revisited: causes and consequences of diversity in building limestone used in the historic centre of Oxford, England. In: Přikryl R, Török Á (eds) Natural stone resources for historical monuments, vol 333. The Geological Society, Special Publications, London, pp 101–110

GRAY, Murray. 2013. *Geodiversity: Valuing and Conserving Abiotic Nature.* 2nd Edition: Wiley Blackwell. 495 s.

Hawley D (1996) Urban geology and the national curriculum. In: Bennett MR, Doyle P, Larwood JG, Prosser CD (eds) Geology on your doorstep. The Geological Society, Bath, pp. 155–162

Hose TA (1996) Geotourism or can tourists become casual rock hounds. In: Bennett MR, Doyle P, Larwood JG, Prosser CD (eds) Geology on your doorstep. The Geological Society, Bath, pp. 207–228

Hose TA (2012) 3G's for modern geotourism. Geoheritage 4:7–24

KUBALÍKOVÁ, Lucie. 2013. Geomorphosite assessment for geotourism purposes. Czech Journal of Tourism 2 (2), s. 80-104.

KUBALÍKOVÁ, Lucie, KIRCHNER, Karel. 2015. Geosite and Geomorphosite Assesment as a Tool for Geoconservation and Geotourism Purposes: a Case study from Vizovická vrchovina Highland (Eastern Part of the Czech Republic). Geoheritage, DOI 10.1007/s12371-015-0143-2.

Palacio-Prieto, J.L. Geoheritage Within Cities: Urban Geosites in Mexico City, Geoheritage (2015) 7 (4): 365-373. https://doi.org/10.1007/s12371-014-0136-6

Pereira P. & Pereira D. (2010). Methodological guidelines for geomorphosite assessment. *Géomorphologie: relief, processus, environnement* 1(3), pp. 215-222.

Pica A., Fredi P., Del Monte M., 2014. The Ernici Mountains Geoheritage (Central Apennines, Italy): Assessment of the Geosites for Geotourism Development. *GeoJournal of Tourism and Geosites* 7/2(14): 193–206.

Pica A, Vergari F, Fredi P, Del Monte M (2016b) The Aeterna Urbs geomorphological heritage (Rome, Italy). Geoheritage 8:31–42. doi:10.1007/s12371-015-0150-3

Pica A., Luberti G.M., Vergari F., Fredi P., Del Monte M., 2017. Contribution for an urban geomorphoheritage assessment method: proposal from three geomorphosites in Rome (Italy). *Quaestiones Geographicae* 36(3), Bogucki Wydawnictwo Naukowe, Poznań, pp. 21–36.

Poole JS, Higgs J, Harris KE, Birch JL (2010) London's geodiversity action plan 2009–2013. Consultation Draft. Co-ordinated by Capita Symonds with assistance from the London Geodiversity Partnership

Portal, C. & Kerguillec, R. Geoheritage (2017). The Shape of a City: Geomorphological Landscapes, Abiotic Urban Environment, and Geoheritage in the Western World: the Example of Parks and Gardens https://doi.org/10.1007/s12371-017-0220-9

PRALONG, Jean-Paul. 2005. A method for assessing tourist potential and use of geomorphological sites. Géomorphologie: relief, processus, environnement 1 (3), s.189-196.

Přikryl R ed. (2004) Dimension stone. Dimension Stone 2004 - New Perspectives for a Traditional Building Material: Proceedings of the International Conference in Dimension Stone 2004, 14-17 June, Prague, Czech Republic CRC Press Reference - 338 Pages ISBN 9789058096753

Reynard E. et al. (2007). A method for assessing the scientific and additional values of geomorphosites. *Geographica Helvetica*, 62(3), pp. 148-158.

Reynard, E., (2009), The assessment of geomorphosites, in Reynard, E., Coratza, P., Geomorphosites, p. 63-71, Pfeil Munich.

REYNARD, Emmanuel, CORATZA, Paola, REGOLINI-BISSIG, Geraldine (eds.). 2009. *Geomorphosites*. München: Verlag Dr. Friedrich Pfeil. 240 s.

Reynard E, Kaiser C, Martin S, Regolini G (2015) An application for geosciences communication by smartphones and tablets. In: Lollino G et al (eds) Engineering geology for society and territory, vol 8. Springer, Heidelberg, pp 265–268. doi:10.1007/978-3-319-09408-3_46

Reynard E., Pica A., Coratza P., 2017. Urban geomorphological heritage. An overview. Quaestiones Geographicae 36(3), Bogucki Wydawnictwo Naukowe, Poznań, pp. 7–20 Robinson E (1982) A geological walk around the City of London—royal exchange to Aldgate. Proc Geol Assoc 93:225–246

Robinson E (1984) Illustrated geological walks, vol 1. Scottish Academic Press, London

Robinson E (1985) Illustrated geological walks, vol 2. Scottish Academic Press, London

Rodrigues ML, Machado CR, Freire E (2011) Geotourism routes in urban areas: a preliminary approach to the Lisbon geoheritage survey. GeoJournal of Tourism and Geosites 8(2):281–294 Available at: http://gtg.webhost.uoradea.ro/PDF/GTG-2-2011/12_100_ Rodrigues.pdf. Accessed 17 August 2016

RodriguesML, Machado CR, Freire E (2011)Geotourismroutes in urban areas: a preliminary approach to the Lisbon geoheritage survey. Geo J Tour Geosites 8(2):281–294 ISSN 2065-0817, E-ISSN 2065-1198

da Silva, C.M. Urban Geodiversity and Decorative Arts: the Curious Case of the “Rudist Tiles” of Lisbon (Portugal) Geoheritage (2017). https://doi.org/10.1007/s12371-017-0253-0

K. Swarna, S. K. Biswas, T. Harinarayana Development of Geotourism in Kutch Region, Gujarat, India: An Innovative Approach Journal of Environmental Protection, 2013, 4, 1360-1372 Published Online December

2013 (http://www.scirp.org/journal/jep)
http://dx.doi.org/10.4236/jep.2013.412157

Tičar J., Komac B., Zorn M., FerkM., Hrvatin M., Ciglič R., 2017. From urban geodiversity to geoheritage: the case of Ljubljana (Slovenia). *Quaestiones Geographicae* 36(3), Bogucki Wydawnictwo Naukowe, Poznań, pp. 37–50.

Zwoliński Z., Hildebrandt-Radke I., Mazurek M., Makohonienko M., 2017. Existing and proposed urban geosites values resulting from geodiversity of Poznań City. Quaestiones Geographicae 36(3), Bogucki Wydawnictwo Naukowe, Poznań, pp. 125–149.

Shrnutí

Geoturismus těží zejména z geodiverzity, avšak zároveň využívá i kulturně-historické prvky a živou přírodu dané oblasti, je propojen se vzděláváním a počítá s aktivním zapojením místních. V současnosti je rozvíjen hlavně ve venkovských oblastech, avšak objevují se i iniciativy, které upozorňují na geodiverzitu a její význam v rámci měst.

Racionální a udržitelné využití geodiverzity ve městech může tvořit alternativu pro tradiční turistické cíle a přispět k pochopení významu a nutnosti ochrany geodiverzity samotné. Geodiverzita, respektive geodědictví ve městech nezahrnuje pouze objekty a jevy primární (přirozené) geodiverzity (skalní podloží, tvary reliéfu, půdy), ale i antropogenní tvary a procesy (sekundární geodiverzita), hydrologické prvky (studny, náhony) a v neposlední řadě i geodiverzitu ex-situ (muzejní sbírky, stavební materiál). Příspěvek přibližuje tuto novou formu turismu, uvádí příklady dobré praxe ze zahraničí a zaměřuje se na geodiverzitu/geodědictví v rámci města Brna.