URBAN GEOHERITAGE. THE SECULAR WELLS OF CRAIOVA, ROMANIA

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Abstract: The aim of this study is to highlight three of the urban geomorphosites of Craiova city, which can be promoted in a specific itinerary for geotourism or integrated, along with other objectives, in different touristic products. The selection of the three sites was made after analysing historical documents, images and maps, which show the landscape transformation, the development of the community and the settlement expansion. For the assessment of the sites, the method created by the University of Rome was used and two stages were performed: a) the geomorphological analysis by multitemporal and multidisciplinary approaches and b) the geomorphoheritage characterisation by calculating the VSGh index *(Value of a Site for Geotourism index)* based on the presence of five attributes. One of the three sites, *The Valley of the 7 Wells*, is nowadays an invisible geomorphosite with an important geotouristic and educational potential.

Key words: urban geoheritage, urban geomorphology, geotourism, assessment, Craiova

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Introduction

From Geodiversity to Urban Geoheritage

The term geodiversity has been used by geologists and geomorphologists since the 1990s to describe the variety of abiotic nature (Gray 2004, Zwoliński 2004) and its importance in linking Earth, people and cultures was recognised afterwards (Gordon 2012).

Urban geodiversity includes, besides the variety of the geological and physical elements of nature (Sharples 2002), buildings, monuments and other elements that promote and disseminate information about the Earth's surface (Palacio 2014, Tičar et al. 2017).

The elements of geodiversity that are judged to be significant and worthy of conservation thanks to their values are considered geoheritage (Gray 2004). Such elements of geodiversity are the ones that have value to humans, that is, they provide the scientific evidence of the evolution of life on Earth, are important for research and education, aesthetic value and touristic potential, and the sites give a *sense of place* or play a cultural and spiritual role for particular human communities (Sharples 2002). Geoheritage can have intrinsic importance or cultural importance, and the information extracted from it can be used for research, teaching or may have significance for local communities (Brocx, Semeniuk 2017).

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Both concepts, geodiversity and geoheritage, constituted reason for debate not only for geoscientists, but also in a variety of other domains such as biology, spatial planning, general tourism, geotourism or cultural heritage (Coratza et al. 2018). According to the goal of the analysis, multiple assessment methods of geoheritage have been proposed (Pralong and Reynard 2005, Fuertes-Gutiérrez and Fernández-Martínez 2010, Jiménez-Sánchez et al. 2011, Kirchner et al. 2017, Pica et al. 2017, Habibi et al. 2018).

At a geoheritage, the natural feature should be the greatest part, but the secondary (man-made) part is important too; in combination, they result in a significant touristic resource (Kubalíková et al. 2016, Kirchner et al. 2017). The anthropogenic part brings us *information which would normally remain hidden and so it helps to understand the evolution of landscape and Earth history* (Kubalíková et al. 2017).

Kubalíková (2017) considers the following genetic classification with 10 classes to be representative for anthropogenic geoheritage (secondary geodiversity), based on the classification realised by Kirchner, Smolová (2010) and Lóczy et al. (2010): mining landforms, industrial landforms, agricultural landforms, urban landforms, communication landforms, water system landforms with a subset of littoral, military landforms, funeral landforms, celebration landforms and other landforms referring to recreational landforms, archaeological excavations, research landforms and so on.

The study area

Craiova – Past and Present

The settlement named today Craiova is considered to be the inheritor of the old settlement Pelendava, mentioned around 225 AD on the map of the Roman Empire *Tabula Peutingeriana* (Vulpe 1979). The geomorphic characteristics of Craiova's territory reside primarily within the localisation of the city at the contact area between two relief steps, the Getic Piedmont and the Oltenia Plain, in the wide valley of Jiu river (Fig. 1).

The urban settlement has extended on the Jiu terraces, which can be described as an amphitheatre, downstream from the confluence with the Amaradia river. Quaternary deposits have shaped the territory on which the city has developed; the exogenous factors have played a major role in quaternary sedimentation and an endogenous factor has had an important role in the convergence area of Craiova. In the Craiova area, the following

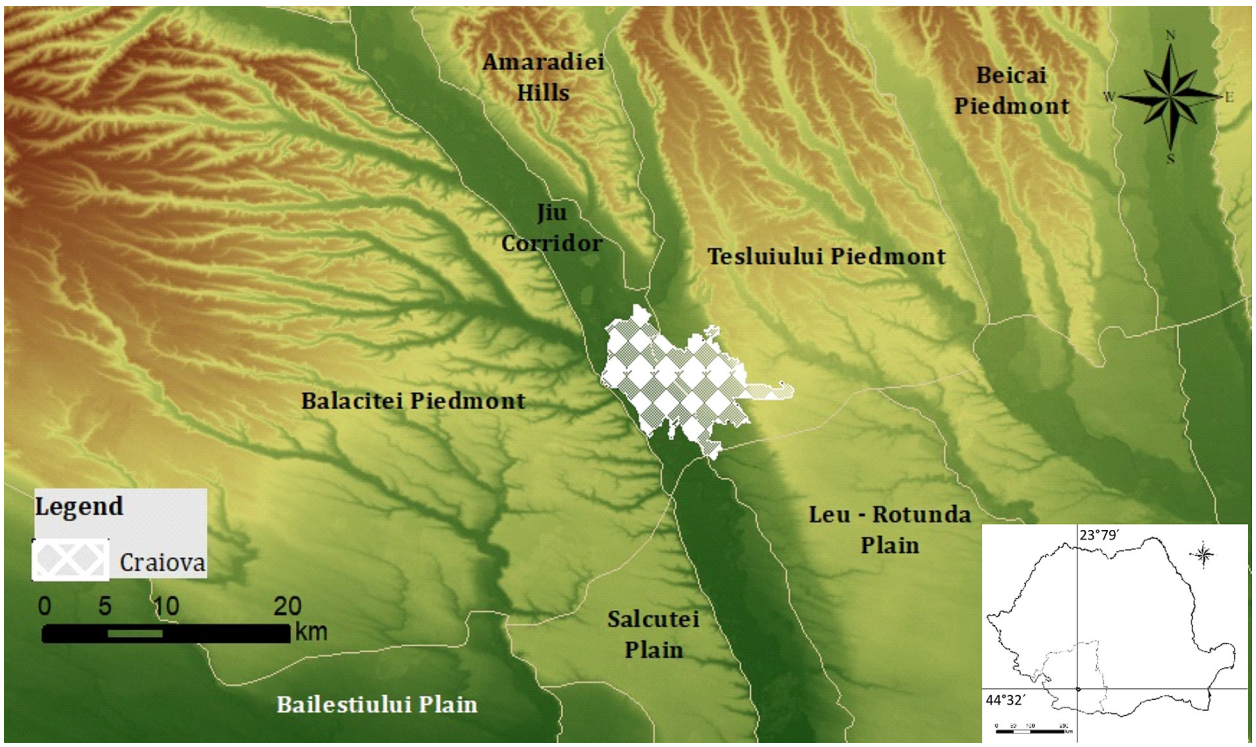

Fig. 1. The localization of the Craiova at the contact of Piemont and plain, localization on the Romania map.

types of quaternary deposits were identified: a) alluvial deposits made of slightly clayish sands; b) loess-like deposits; c) deposits of wind dunes, not only due to the west winds, but also of the hydrographic network, the wind sands coming mainly from the alluvial sands and d) proluvial and gravitational deposits (Coteț 1957). Neotectonic movements during the Pasadena phase (Middle Pleistocene) reactivated the rise of Balș-Optași, which resulted in a change of the flow direction of the Jiu river to the south and a gradual descent to the southwest, sculpting the terrace system only to the left side of the Jiu river (Boengiu et al. 2011).

The Jiu terraces where Craiova is situated have provided the base for the development of human communities since the Neolithic era. Archaeological evidence belonging to this era and also from the Bronze Age, Iron Age (Georgescu et al. 1977, Nica 1979, Toropu 1979) or the Romanic Culture of V–VII centuries AD (Papilian 1979) attest the permanence of the communities in the area.

Developed as a weekly fair on the first terrace of the Jiu, Craiova became the residence of the *Banul Olteniei* – (a kind of governor) in the 15th century, becoming an attraction for numerous squires. Migration of the wealthy people determined a change in the settlement shape through the appearance of the boyar houses around the fair and the permanent extension of the city limits (Georgescu 1936). To further attest the evolution of the settlement are the written records regarding wells built on the border of the city which was in a constant expansion or the written records about the wells situated around the central fair. Relevant passages from historical documents are reproduced below and the location of the wells is visible in Figure 2.

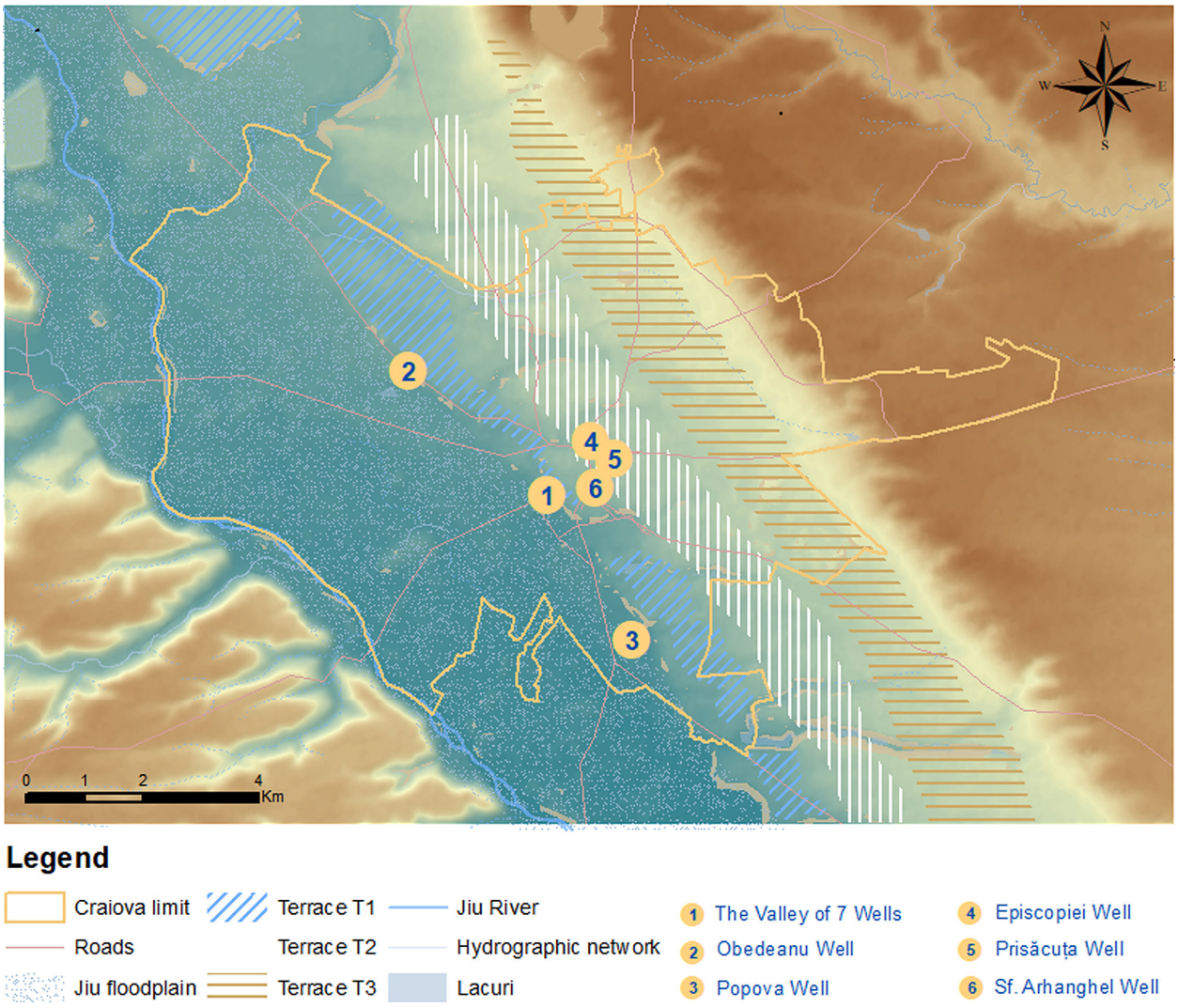

Fig. 2. The secular Wells positioning on the current map of Craiova city.

The well from Orevei road (known as Popova well, marked with no. 3 on the map), *the Well from the Bishopric metoh* (situated behind the current University of Craiova building, in the former Palace of Justice, which was built in the place of Ganescului Church, received at *metoh* by the Bishopric, marked with no. 4 on the map), *The well that is called Prisacuta, on the outskirts of town, on the Bucharest road* (on the road A.I. Cuza from today, in the downtown – no. 5 on the map), *The well from Archangel Saint slum, close to the fish crossroads* (today Fratii Buzesti street, beside the Archangels Saints church, marked with 6 on the map) (Georgescu 1923).

At the end of the 18th century and beginning of the 19th century, the first urbanistic renewal started to emerge, particularly through the expansion of the wells network, sources of drinking water being essential to any modern settlement (Georgescu et al. 1977). In the beginning of the 20th century, extensive systematisation works began, which resulted in drainage of swamps from the floodplain, the draining of local streams and, in their place, the building of main current boulevards (Albă et al. 2018).

Today's city, designated as a pole of growth in the Oltenia region, is pursuing the implementation of an integrated development strategy, where one of the main directions has been the development of tourism. In this regard, the main elements achieved by the city administration are the refurbishment of parks, rehabilitation of the historical centre and increase of cultural tourism, to which an increase of accommodation capacity has been added.

The expanding of touristic heritage by including sites considered as geoheritage will diversify tourist attractions and can be an additional source of income in the touristic industry of the city.

Methods

During the last decades, several attempts have been made to evaluate the quality of geoheritage in various contexts and numerous methods are described for the quantitative assessment of geosites in literature: Bruschi and Cendrero (2005), Coratza and Giusti (2005), Pralong (2005), Serrano and Gonzalez-Trueba (2005), Pereira et al. (2007), Reynard and Panizza (2007), Bruschi et al. (2011), Coratza et al. (2011), Feuillet and Sourp (2011), Pellitero et al. (2011), Comănescu et al. (2012), Coratza et al. (2012), Fassoulas et al. (2012), Kubalíková (2013), Pica et al. (2014), Pereira et al. (2015), Reynard et al. (2015, 2017), Zwoliński et al. (2018) and Coratza and Hobléa (2018) or studies that compare this methods: Erhartič (2010), Kubalíková (2013), Zwoliński et al. (2017).

In order to assess the sites proposed to be geoheritage in Craiova city the method built up by the University of Rome and the Italian National Institute for Environmental Protection and Research was considered the most suitable; a version of this this method was first applied to assess and include the sites from Rome, in the geoheritage category. The method used by Pica et al. (2017) has two main stages:

1. the urban geomorphological analysis by means of multidisciplinary processing of multitemporal data;
2. urban geomorphosites selection and geomorphoheritage assessment.

In our case, the first stage was accomplished by analysing the historical documents, by interpretation of historical and recent topographic maps, by interpretation of lithostratigraphic map and multi-temporal aerial photographs and on-field geomorphology survey, in order to reconstruct the evolution of the geomorphological landscape of Craiova.

For the second part of the method, we calculated the VSGh index *(Value of a Site for Geotourism index)*, which was enhanced by Pica et al. (2017) after assessment of the geoheritage from Rome. The VSGh index was developed by Pica et al. (2017) for the analysis of urban geomorphological heritage on the basis of a previous methodology (Pica et al. 2014). The new VSG index (VSGh) consists of the following attributes (Pica et al. 2014, Zwoliński et al. 2017):

- RP – *representativeness*, including a) *geoscientific value* (the site is a landform representative of the anthropogenic and morphogenetic process; b) *landscape evolution* (the site is a landform representative of the anthropogenic and morphogenetic process) and c) *city image* (the site is a landform representative of the anthropogenic and morphogenetic process),
- V – *visibility* – the landform is recognisable in the landscape,

- GeoHIS – *geohistorical reconstruction significance* (the site is documented and represented in historical records such as early maps, paintings, archaeological maps, etc., that highlight the human impact on landscape transformations),
- AP – *aesthetic peculiarity of the urbanised context* (the shape of the landform is visually disconnected from the context and attracts the attention and curiosity of the observatory),
- TAR – *touristic attractiveness rate* (the site is a tourist attraction, highly visited by people for its features, and the information about geoaspects undoubtedly increases interest in it).

$$VSGh = RP + V + GeoHIS + AP + TAR.$$

For the VSGh, Pica et al. (2017) do not propose scores for each attribute; but similar to the basic method developed by Pica in 2014, Zwoliński et al. (2017), consider that each attribute will have a maximum value of 5 points.

In addition, Zwoliński et al. (2017) bring an improvement in the classification of the VSGh index, considering it suitable to start from 5, since each attribute may have the lowest value of 1 and never has 0. Their proposal for division into classes is as follows:

- low class, from 5 to 15,
- medium class, from 16 to 20,
- high class, from 21 to 25.

This method was also applied to assess the geoheritage from Poznań City (Zwoliński et al. 2017), where the procedure was compared with two other methods: Reynard et al. (2007) and Pica et al. (2014).

Results

After an analysis of documents and historical maps and of visual evidence from the past – photos, postal cards or sketches regarding the development of the city, we have selected for analysis and assessment three secular elements of Craiova:

1. *The Valley of 7 Wells* in the city centre (marked with no. 1 in Fig. 2,
2. *the Obedeanu well,* situated beyond the Barrier to Drobeta Turnu Severin (marked with no. 2 in Fig. 2),
3. *the Popova well,* the oldest well of the city, situated at the south exit of the city (marked with no. 3).

The analysis of the terrain was realised through the geomorphological examination on-site, the study of previous researches and by comparison of multitemporal maps and photos.

The assessment of the sites followed the two stages of the method created by Pica et al. (2017): geomorphological characterisation of the area and characterisation of the geoheritage.

The Valley of 7 Wells

Geomorphological characterisation

The Valley of 7 Wells represents an example of a landscape entirely transformed in order to be used for anthropic activities, initially for the purpose of supplying water to the dwellers of the city centre and the visitors, and then, anthropically retransformed, giving it a new appearance and utility.

During the Quaternary evolution, in the Craiova area, the Jiu river was characterised not only by a permanent movement towards the west, but also by a vertical one, which is reflected in the morphology of the area. The consequence of the neotectonic movements during the Pasadena phase (Middle Pleistocene) was the creation of the terrace system on the left side of the Jiu river. Besides the subsidence caused by the movements of the Earth's surface, erosion has also occurred in the configuration of the Jiu corridor.

Until the Jiu embankment in the second half of the 20th century, the floodplain flooding frequently occurred in large flash floods, sometimes reaching up to the *Valley of the 7 Wells*, situated at the contact of the floodplain with the first slope terrace. The former Jiu channels and river meanders were covered by waters in flash floods and remained in this state for a long time, maintaining a marshy land with ponds (Albă et al. 2017), as is visible in Figure 3. Fragmentation of the T1 terrace is also a result of the lateral erosion of Jiu.

From a lithological point of view, the area of Craiova is defined by the Quaternary deposits. The lithostratigraphic column of the Quaternary is based on clays, albescent and yellowish sands, followed by a layer of fine gravels *(strate de Fratesti)*, related to the Early Pleistocene (Enache 2008).

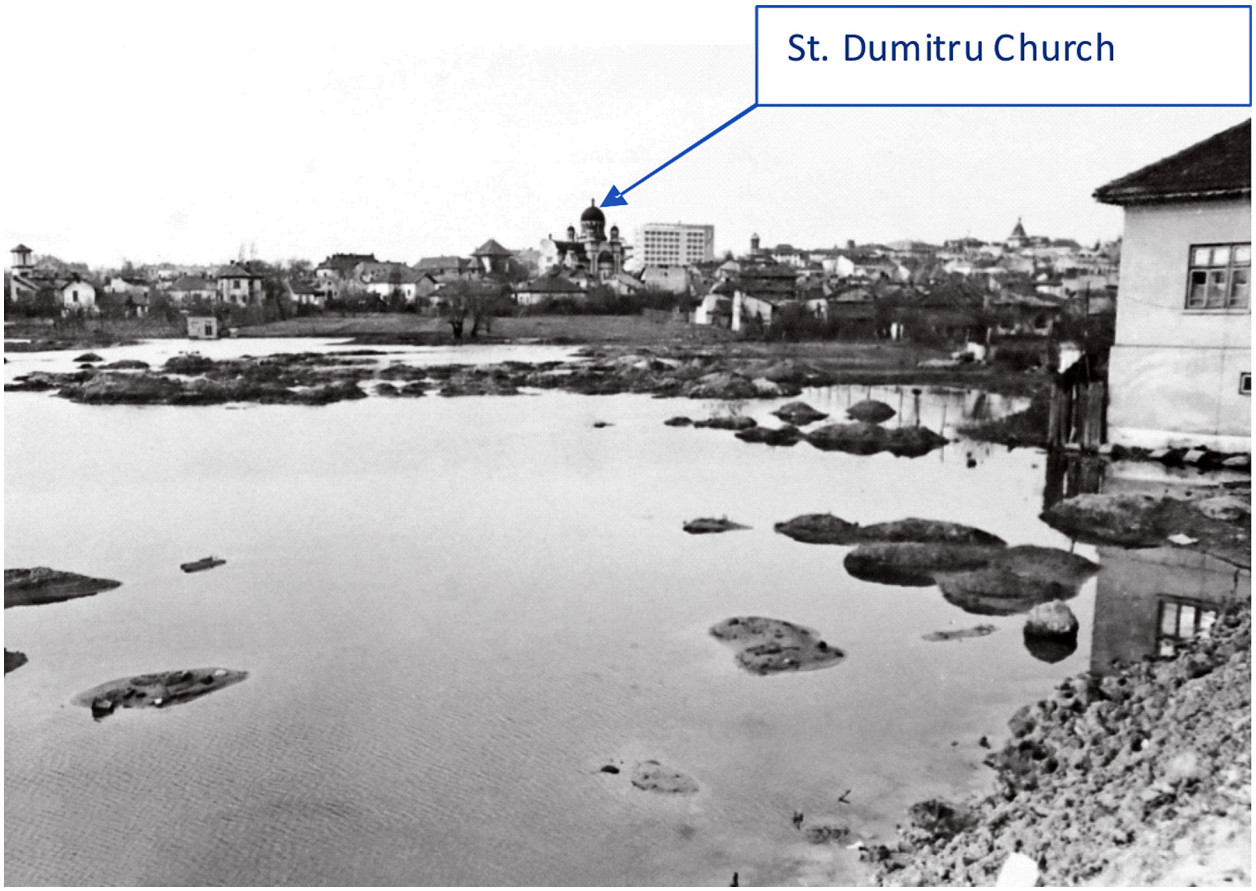

Fig. 3. Geanoglu pond from Jiu floodplain, 1967, in drainage process – view to the center of the city (Omnia Library).

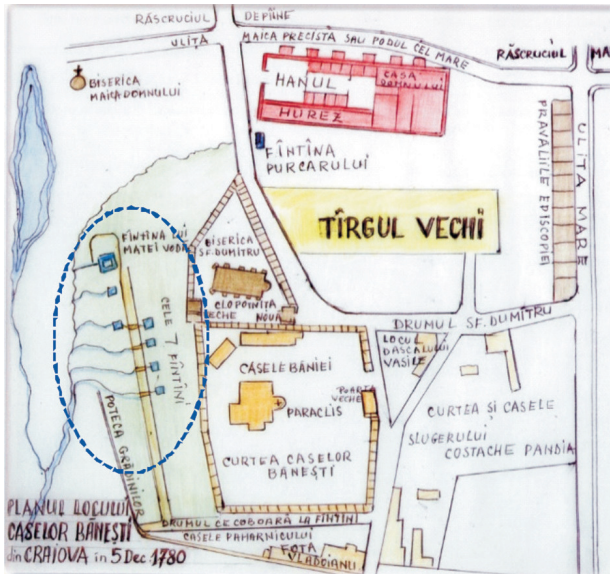

Fig. 4a. Sketch of Craiova in 1780 with the location of the 7 Wells (Buce-Răduț 2008).

Fig. 4b. Location of the 7 Fountains in the central area of the city (Google Maps).

In *The Valley of the 7 Wells*, numerous springs appeared above the ground, at the contact between the upper layers of clay sands and the lower ones made up of clay. The springs with a rich discharge had been round-up as drinking fountains, water being a vital element of the central fair situated nearby, nourishing not only the visitors and animals, but also the inhabitants of the city's central area. The springs were round-up on both sides of the road that crossed the valley, four in the east and three in the west (Fig. 4a). With a centralised water supply and sewerage of the city, conceived in the beginning of the 20th century, the marshes and ponds from the floodplain were drained and the hillslope of the T1 terrace was anthropically reconfigured. The positioning of the site on the current map of Craiova is visible in Figure 4b.

Geomorphoheritage characterisation

In the 18th century, *The Valley of the 7 Wells* was located at the foot of the hill on which the imposing St. Dumitru Church, a symbolic element of the city, was being constructed.

In addition to the sketch of the city from 1780 (Fig. 3a), a representative image of the *Valley of the 7 Wells* is offered to us by a postcard from 1901 (Fig. 5). The wells were called *7 Wells from the Valley (Șeapte Fântăni din Vale)*, the most northern of them being known as *the Well of Matei Voda.* The fountains were built in the same period as the Popova Well (Buce-Răduț 2011), probably in the beginning of the 16th century (Firan, Firescu 1983). Until the 20th century, the water supply to the population was given only from springs and wells, there was no centralised water supply system, and in the central fair area, water was a much greater necessity for the horses to drink, which were the means of transport at the time.

After systematisation of the city, in the interwar period, the springs of the 7 Wells were round-up and the resulting water was used to fill up the Tineretului swimming pool located nearby. The hillslope was terraced (Fig. 6), and the *Valley of the 7 Wells*, as the other valleys that crossed the town (Orbeților Valley, Opinca Valley), was cobbled and then paved with asphalt.

At present, nothing reminds us of the former valley or the 7 Wells, the area being partly asphalted (Câmpia Islaz street) and partially integrated into the St. Dumitru Park, named also as Băniei Garden or Roses Garden.

Fig. 5. *The Valley of 7 Wells* in 1901 (Buce-Răduț 2011).

Although today it is an invisible geomorphosite (Clivaz, Reynard 2017, Pica et al. 2017), *The Valley of 7 Wells* has a high potential to be a geoheritage, having an index VSGh = 20, which results from the following:

- it is a representative site for urban landscape evolution, showing the magnitude of landscape transformation (RP = 5),
- at present, the geomorphosite is unidentifiable, but in the evidence of the past (photos, postcards, sketches), the site had good visibility (V = 5),
- the site is mentioned in historical records such as photos, postcards, sketches of the city (GeoHIS = 3),
- certainly, the presence of seven fountains in a very small area was noted in the past from the landscape; but at present, identification of the site can be made only on the basis of the surrounding elements (St. Dumitru Church, Madona Dudu Church, Baniei House) (AP = 3),
- the site is a tourist attraction because it is presented as a continuation of the Roses Garden park, but the lack of geotourism information leads to valorisation only for the urban value, without highlighting its intrinsic value (TAR = 4).

According to Clivaz and Reynard (2017), *The Valley of 7 Wells* is enclosed in the category of geomorphosites destroyed or hidden by human activity; but by interpreting the images, maps and historical documents, it can be considered a geoheritage, according to the method developed by Pica et al. (2017).

Fig. 6. The former *Valley of 7 Wells*, April 2019.

B, C) The Obedeanu and Popova wells

Geomorphological characterisation

The current hydrological network outlined at the end of the Early Pleistocene and the beginning of the Middle Pleistocene, also the completion of the current valley of the Jiu and the small tributaries in the Craiova area, was settled in Holocene.

The presence of a clay basal deposit is brought to light from the drillings executed on the left side of the Jiu, over which are found intercalations of sands, clays and sandy clay. The well-developed floodplain is made up of alluvial deposits (Fig. 7).

As *The Valley of 7 Wells*, the Obedeanu and Popova wells are situated at the contact of the Jiu floodplain with the versant terrace (Fig. 2).

Reconstruction of the hydrographic map for the year 1880 (Fig. 8), realised in previous studies (Albă et al. 2017, 2018) shows us that the points where the three wells are located represent the limit of large swamp areas which restricted urban expansion in the floodplain.

Works of sewage for the Geanoglu and other ponds, draining of several local streams and of the water that resulted from *the Valley of 7 Wells* were designed in 1887. In this regard, the first work was the plane lifting of all the ponds and marshes between the Obedeanu Fountain, Cernele villages, Jiu channel and Popova well, performed by captain G. Savopol (Nicolaescu et al. 1997). Drainage works began in 1891, with most of the land being settled between 1900 and 1974 (Albă et al. 2017).

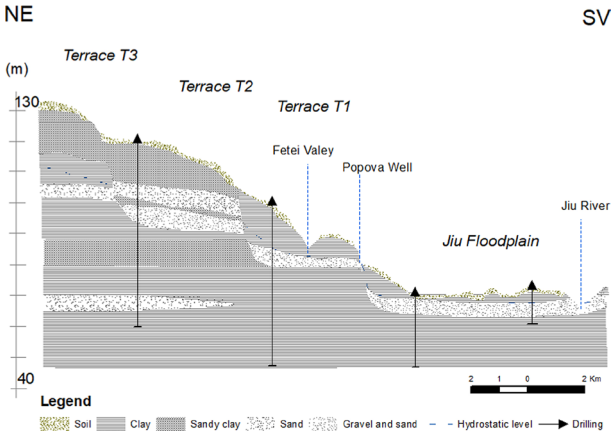

Fig. 7. Lithological cross section on the left hillslope of Jiu.

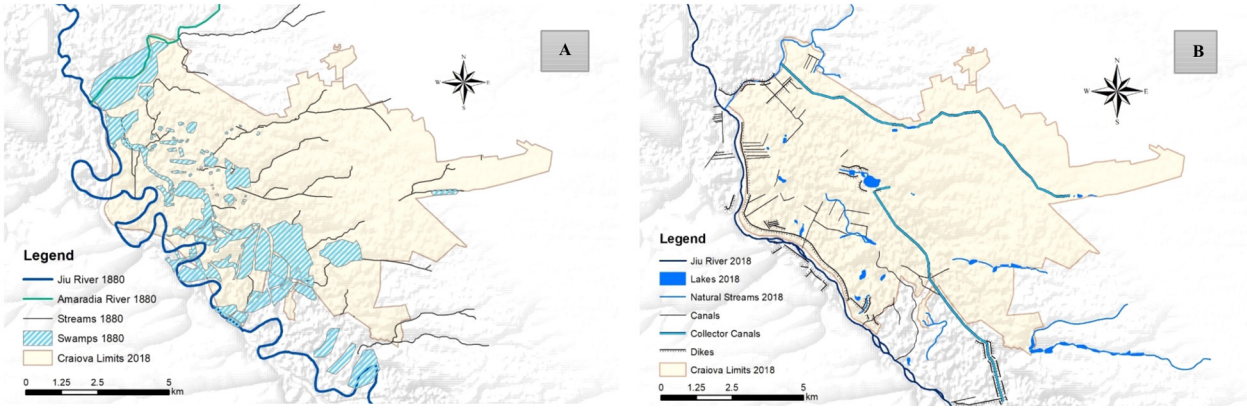

Fig. 8. The comparison of the hydrography of Craiova at the level of 1880 (A) and 2018 (B) (Albă et al. 2018).

In the second half of the 19th century, the area of the marshes in the floodplain sector was included in the current perimeter of the city and represented approximately 28% of it; as a result of the public works launched in 1891 and continued since then (except for the periods of the two world wars), the area of the floodplain marshes decreased to about 2.5% in 1974, currently representing approximately 1.35%.

Geomorphoheritage characterisation

The Obedeanu Well (Fig. 9a, 9b) was built after the year 1774 (Stoicescu 1970) by Stefan Parșcoveanul (a kind of governor) on the place of another well *the Obedencei's well*, which was begun by the Cupbearer Constantin Obedeanu and finished by his wife Stanca Obedeanca (Vasilescu 1927), in an area where there were secular springs probably (Avram et al. 2005).

Over time, the old well had deteriorated, especially during the Russian–Turkish war from 1768 to 1774, which led to its rebuilding. Near the new well, Stefan Parșcoveanul had arranged a pond, a courtyard and a gazebo. During the Austro-Russian-Turkish war of 1789–1792, the well degraded again, the gazebo had disappeared, and the pond was left in decay. At that time, a service for the maintenance of wells was created, consisting of four persons exempt from taxes *scutelnici*, eight well sinkers *fantanari* and a person who made oil *ulier* (Vasilescu 1927), but the fountain was in the administration of the Râmnic Bishopric, which had to take care of the repairs. In an *anaphora* from 1797, a written report addressed to the ruler Alexandru Ipsilante, not only the construction of two new wells in Craiova was requested, but also the repair of four degraded wells, including the Obedeanu and Popova Wells (Bulat 1922), as the Bishopric had left them in decay. The wells were repaired, and thanks to their discharge, the Obedeanu fountain has

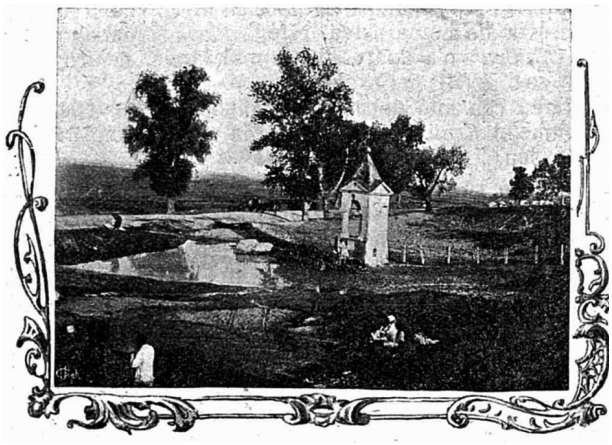

Fig. 9a. The Obedeanu well in year 1927 (*Arhivele Olteniei*, 06, no. 31, May–June 1927).

Fig. 9b. The Obedeanu well in November 2018.

become the most important source of water for the western half of the city (Nicolaescu et al. 1997).

In the years 1835–1836, through a channel system consisting of over 15,500 tiles *urloaie,* the water from the Obedeanu fountain was being transported to the Obedeanu Church, where a drinking fountain was made, and further down to the Madona Dudu Church, where another one was also made (Nicolaescu et al. 1997).

At present, it is one of the few functional wells in the city, and a part of the inhabitants from the northwestern part of the city still prefer to use the water from it for supplying, considering it to have water of superior quality.

For Obedeanu Well, the index VSGh was calculated as VSGh = 17, which resulted from the following:

- the site is an element that marks the transformation of the landscape in the area (RP = 3),
- the Obedeanu Well was and is still located along the road that connects the city to Transylvania (another region of Romania) and has good visibility (V = 5),
- the site, through the related registrations, helps us to recreate previous image of the landscape and the anthropic transformations suffered (GeoHIS = 3),
- it constitutes an element that attracts the attention of the passer-by (AP = 3),
- although it is not located in a tourist area of the city and is not specifically signalled, attractiveness of the Obedeanu Well can become more if the history of the place is known to visitors and the place would be adequately arranged (TAR = 3).

The *Popova well* – the oldest well of Craiova, which is well-preserved today, was rebuilt by the Wallachian voivode Matei Basarab and his wife, Mrs Elina, in the years 1651–1652, which shows it existed long before this year. The Popova Well is an evidence of the town's delimitation in the past and is located at the exit to Bechet. The inscription in stone made in 1651, written in Cyrillic (Fig. 10a), included the message: *Fostau făcută den moşi den stremoşie Domniei Meale ... ca*

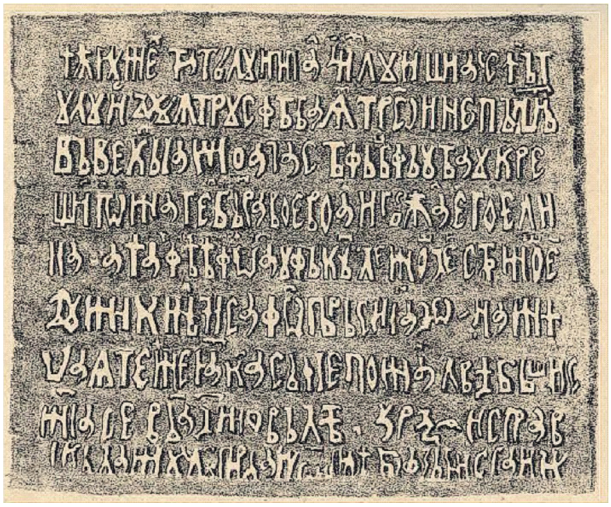

Fig. 10a. The original inscription of Popova Well at the reconstruction from 1651 (Pessiacov 1914).

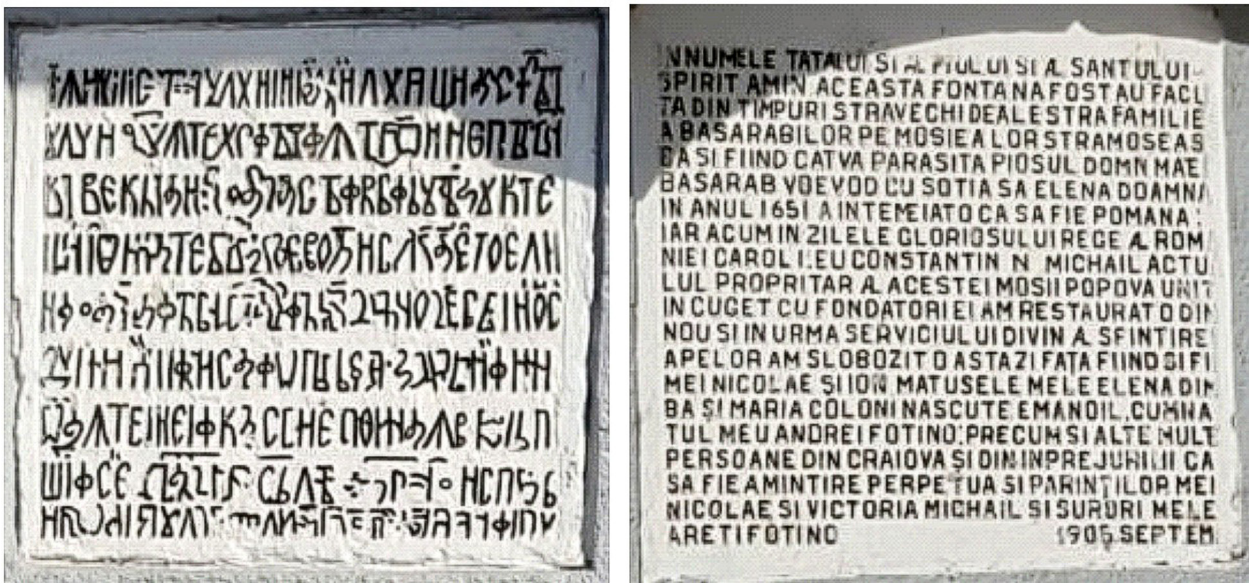

Fig. 10b. Current form of inscriptions from 1651–1652 and 1905.

să fie pomană în veac... (Pessiacov 1914) – *It was made by the ancestors of my reign … to be alms for centuries…*, which indicates the long history of this well. The previous existence of the well is also established by documents mentioning lodging of the ruler Radu Mihnea in this place in 1613 (Nicolaescu et al. 1997). At the beginning of the 16th century, it was known with the name *The Well from Orevei road* or *Fantana Basarabeasca* (Firan, Firescu 1983).

Besides the essential role of supplying water for the inhabitants, at that time, the fountains were given particular attention by the religious duties, being embellished and hallowed almost like the churches. This feature of Wallachian fountain decoration was also noted by foreigners who passed through Craiova, and likened them to those in Turkey and Eastern countries. The Popova Well was preferred by those who travelled through the city, military or civilians, being considered a *spring of living water* (Pessiacov 1914).

Regarding this well, several repairs and restorations were recorded between the 18th and 20th centuries, of which notable are the restoration made by the family of the landowner Constantin Mihail in 1905 (Nicolaescu et al. 1997) and the one in 1910 when his grandson, Dini Mihai, rebuilt the fountain, discovering during the works two other previous catches, behind the drinking fountain, one worked in oak and another in the wall (Georgescu 1936). In the remnants of the previous capture wall, traces of a rudimentary aqueduct and several Roman bricks were identified (Georgescu 1936). A. Georgescu considered the capture from the wall as the one made by the ancestors of Matei Voda Basarb and the wooden one from the 18th century. Nowadays, the Popova Fountain is a historical monument built of brick, a cubic-shaped construction with a side of approximately 4 m and two sides show the inscriptions-pisans from 1651 to 1652 and 1905 (Fig. 10b). From the preserved descriptions and sketches of the well result that the current shape of the fountain (Fig. 11) preserves the original architectural form and style.

Fig. 11. Popova Well, October 2018.

The accessibility towards the Popova Well is now facilitated by the recent road development at the intersection of which the well is situated, but the history and importance of the well are too little known, and therefore poorly promoted.

The VSGh index for Craiova's oldest fountain, preserved to date, is very high: VSGh = 21:

- the Popova Well represents the limit of an intensely transformed area, formed in the past predominately from ponds and marches (RP = 4),
- the site is well maintained and easily accessible and visible for the visitors (V = 5),
- having the longest history among the wells of Craiova, the Popova Well has been recorded in many documents, bringing through them numerous pieces of evidence of the transformation that the relief in the area has suffered (GeoHIS = 5),
- the anthropic part of the site highlights it, increasing its value by preserving the original architectural style (AP = 4),
- although it is the oldest fountain in Craiova preserved today, the lack of adequate promotion and the lack of inclusion in touristic circuits do not highlight the site as having a special attraction (TAR = 3).

Discussion and conclusion

In the urban settlement, the man is the main actor in the landscape transformation, and this

is also applied in the case of the three sites analysed in this study. The anthropogenic part of geoheritage highlights two of the sites presented (Obedeanu and Popova fountains), but totally hides the *Valley of the 7 Wells*. The three elements chosen for evaluation in this study are located at the limit of some intensely transformed areas, on the riser of the first Jiu terrace. The documents and the historical maps on which the three elements are marked provide us with pieces of evidence both regarding the transformations of the relief as well as on the evolution of the community and the settlement.

In the first stage, these geomorphosites were evaluated based on the initial method created by Pica et al. (2014), but accessibility and representativeness, the two attributes of the initial VSG index, as defined here, were not relevant for urban geomorphosites. The method enhanced by Pica et al. (2017) and completed by Zwoliński et al. (2017) can be successfully applied for the analysis of urban geomorphosites. However, it must be adapted in case of invisible geomorphosites since the criteria of visibility and attractiveness are impossible to apply in the same way as for the current geomorphosites. In this regard, Reynard et al. (2017) reiterate some solutions for the interpretation of the invisible urban geomorphological heritage: 3D reconstructions, interpretive images or the reconstructions of ancient landscapes inserted on current urban landscape photographs.

An invisible geomorphosite, such as the *Valley of the 7 Wells*, can only remain a reference in the archived historical documents if it is not brought to light. So, it is necessary to find a suitable method to cover the assessment of different types of urban geoheritage and to highlight the hidden/destroyed/covered geomorphites or for the conservation of current sites.

Through this study, we have assessed three urban geoheritage sites from the city of Craiova, Romania; two of them – *The Valley of 7 Wells* and The Obedeanu Well – have an average VSGh index, and the Popova Well, the oldest fountain in Craiova, has a very high VSGh index, according to the classification of Zwoliński et al. (2017). In order to highlight the urban geomorphological heritage of Craiova, it is necessary to identify, evaluate and promote more geomorphosites to be included in touristic programmes.

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References

Albă C.-D., Zamfir A.G., Boengiu S., 2018. Urban hydrography and Bluespots map of Craiova (Romania). *Journal of the Geographical Institute "Jovan Cvijic", SASA,* 68: 321–332.

Albă C.-D., Zamfir A.G., Boengiu S., Șoșea C., Mititelu Ionuș O., 2017. The impact of the urban expansion on the Jiu floodplain. Case study – Craiova, Romania. *Forum geografic* XVI(2): 132–141. Doi:10.5775/fg.2017.011.d.

Avram C.G., Barbu P.-E., Ciobotea D., Osiac V., 2005. *Dicționarul istoric al localităților din județul Dolj,* Craiova, Editura Alma.

Boengiu S., Ionuș O., Simulescu D., Popescu L., 2011. River undercutting and induced landslide hazard. The Jiu river valley (Romania) as a case study. *Geomorphologia Slovaca et Bohemica* 2: 46–58.

Brocx M., Semeniuk V., 2019. Building Stones Can Be of Geoheritage Significance. *Geoheritage* 11(1): 133–149.

Bruschi V.M., Cendrero A., 2005. Geosite Evaluation; Can we measure intangible values? *Il Quaternario. Italian Journal of Quaternary Sciences* 18: 293–306.

Bruschi V.M., Cendrero A., Albertos J.a.C. 2011. A Statistical Approach to the Validation and Optimisation of Geoheritage Assessment Procedures. *Geoheritage* 3: 131–149.

Buce-Răduț M., 2008. *Trecutul în Craiova de astăzi,* Craiova, Sim Art.

Buce-Răduț M., 2011. *The Past in Craiova of Today*, Sim Art.

Bulat T.G., 1922. O anafora din 1979. *Arhivele Olteniei, 01, nr. 4, decembrie 1922,* 4: 375–381.

Clivaz M., Reynard E., 2018. How to Integrate Invisible Geomorphosites in an Inventory: a Case Study in the Rhone River Valley (Switzerland). *Geoheritage* 10: 527–541.

Comănescu L., Nedelea A., Dobre R. 2012. The Evaluation of Geomorphosites from the Ponoare Protected Area. *Forum geografic* 11: 54–61.

Coratza P., Bruschi V., Piacentini D., Saliba D., Soldati M., 2011. Recognition and Assessment of Geomorphosites in Malta at the Il-Majjistral Nature and History Park. *Geoheritage* 3: 175–185.

Coratza P., Galve J., Soldati M., Tonelli C., 2012. Recognition and assessment of sinkholes as geosites: Lessons from the Island of Gozo (Malta). *Quaestiones Geographicae* 31: 25–35.

Coratza P., Giusti C., 2005. Methodological Proposal for the Assessment of the Scientific Quality of Geomorphosites *Il Quaternario. Italian Journal of Quaternary Sciences* 18: 307–313.

Coratza P., Hobléa F., 2018. The Specificities of Geomorphological Heritage. *Geoheritage. Assessment, Protection, and Management:* 87–106.

Coratza P., Reynard E., Zwoliński Z., 2018. Geodiversity and Geoheritage: Crossing Disciplines and Approaches. *Geoheritage* 10: 525–526.

Coteț P., 1957. *Câmpia Olteniei. Studiu Geomorfologic, cu privire specială asupra Cuaternarului,* București, Editura Științifică.

Enache C., 2008. *Geologia Olteniei,* Craiova, Editura Universitaria.

Erhartič B., 2010. Geomorphosite assessment. *Acta geographica Slovenica* 50: 295–319.

Fassoulas C., Mouriki D., Dimitriou-Nikolakis P., Iliopoulos, G., 2012. Quantitative Assessment of Geotopes as an Effective Tool for Geoheritage Management. *Geoheritage* 4: 177–193.

Feuillet T., Sourp E., 2011. Geomorphological Heritage of the Pyrenees National Park (France): Assessment, Clustering, and Promotion of Geomorphosites. *Geoheritage* 3: 151–162.

Firan F., Firescu A., 1983. *Craiova. Ghid de oraș,* Bucuresti, Editura Sport Turism.

Fuertes-Gutiérrez I., Fernández-Martínez E., 2010. Geosites Inventory in the Leon Province (Northwestern Spain): A Tool to Introduce Geoheritage into Regional Environmental Management. *Geoheritage* 2: 57–75.

Georgescu A., 1923. Identificarea unor vechi fântâni din Craiova. *Arhivele Olteniei, 02, nr. 10, noiembrie – decembrie 1923,* 10: 475–476.

Georgescu A., 1936. *Târgul Craiovei,* Craiova, Editura Ramuri.

Georgescu T., Barbacioru C., Florea F., 1977. *Istoria Craiovei,* Craiova, Editura Scrisul Românesc.

Gordon J. E., 2012. Rediscovering a Sense of Wonder: Geoheritage, Geotourism and Cultural Landscape Experiences. *Geoheritage* 4: 65–77.

Gray M., 2004. *Geodiversity: Valuing and Conserving Abiotic Nature*, John Wiley & Sons Ltd, Chichester.

Habibi T., Ponedelnik A.A., Yashalova N.N., Ruban D.A., 2018. Urban geoheritage complexity: Evidence of a unique natural resource from Shiraz city in Iran. *Resources Policy* 59: 85–94.

Jiménez-Sánchez M., José Domínguez-Cuesta M., Aranburu A., Martos E., 2011. Quantitative indexes based on geomorphologic features: A tool for evaluating human impact on natural and cultural heritage in caves. *Journal of Cultural Heritage* 12: 270–278.

Kirchner K., Kubalíková L., Bajer A., 2017. *Local geoheritage: Its importance and potential for geotourist and recreational activities (a case study from Lomnicko area)*. Mendel University in Brno: 202–211.

Kirchner K., Smolová I., 2010. *Základy antropogenní geomorfologie Fundamentals of anthropogenic geomorphology*.

Kubalíková L., 2013. Geomorphosite assesment for geotourism purposes. *Czech Journal of Tourism* 2(2): 80–104.

Kubalíková L., Bajer A., Kirchner K., 2016. Secondary geodiversity and its potential for geoeducation and geotourism: a case study from Brno city. In: *Public recreation and landscape protection – with nature hand in hand…*: 224–231.

Kubalíková L., Kirchner K., Bajer A., 2017. Secondary Geodiversity and its Potential for Urban Geotourism: A Case Study from Brno City, Czech Republic. *Questiones Geographicae* 36(3): 63–73.

Lóczy D., Szabó J., Dávid L., 2010. *Anthropogenic Geomorphology. A Guide to Man-Made Landforms*, Springer.

Nica M., 1979. Marturii ale unor stravechi civilizatii in zona Craiovei. In: I.Cetateanu, I.Hinoveanu (eds.), *Craiova – Trecut, prezent si viitor*. Craiova: Scrisul Romanesc.

Nicolaescu L., Luckacs S., Avram C., Ciobotea D., Zarzără I., Pleniceanu V., 1997. *Craiova – pagini de istorie și civilizație I. Alimentarea cu Apă,* Craiova, Editura Aius.

Palacio J., 2015. Geoheritage Within Cities: Urban Geosites in Mexico City. *Geoheritage* 7(4): 365–373.

Papilian G., 1979. Craiova in Epoca Post – Romana. In: I.Cetateanu, I.Hinoveanu (eds.), *Craiova – Trecut, Prezent si Viitor*. Craiova: Scrisul Romanesc.

Pellitero R., González-Amuchastegui M., Ruiz-Flaño P., Serrano E., 2011. Geodiversity and Geomorphosite Assessment Applied to a Natural Protected Area: the Ebro and Rudron Gorges Natural Park (Spain). *Geoheritage* 3: 163–174.

Pereira D., Pereira P., Brilha J., Cunha P., 2015. The Iberian Massif Landscape and Fluvial Network in Portugal: A geoheritage inventory based on the scientific value. *Proceedings of the Geologists Association,* 126(2): 252–265.

Pereira P., Pereira D., Alves M., 2007. Geomorphosite assessment in Montesinho Natural Park (Portugal). *Geographica helvetica* 62: 159–168.

Pessiacov A., 1914. *Schite din Istoria Craiovei,* Craiova, Institutul de Arte Grafice "SAMITCA".

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* 14: 176–189.

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): 21–36.

Pralong J.-P., 2005. A method for assessing tourist potential and use of geomorphological sites. *Géomorphologie: relief, processus, environnement* 11(3): 189–196.

Pralong J.-P., Reynard E., 2005. A proposal for a classification of geomorphological sites depending on their tourist value. *Il Quaternario* 18: 315–321.

Reynard E., Fontana G., Kozlik L., Scapozza C., 2007. A method for assessing scientific and additional values of geomorphosites. *Geographica Helvetica* 62: 148–158.

Reynard E., Panizza M., 2007. Geomorphosites: definition, assessment and mapping. *Géomorphologie : relief, processus, environnement* 11(3): 177–180.

Reynard E., Perret A., Bussard J., Grangier L., Martin S., 2015. Integrated Approach for the Inventory and Management of Geomorphological Heritage at the Regional Scale. *Geoheritage* 8: 43–60.

Reynard E., Pica A., Coratza P., 2017. Urban Geomorphological Heritage. An Overview. *Quaestiones Geographicae* 36(3): 7–20.

Serrano E., Gonzalez-Tureba J.J., 2005. Assessment of geomorphosites in natural protected areas: the Picos de Europa National Park (Spain). *Geomorphologie: relief, processus, environnement* 11(3): 197–208.

Sharples C., 2002. *Concepts and principles of geoconservation*. PDF Document, Tasmian Parks & Wildlife Service website.

Stoicescu N., 1970. *Bibliografia Localităților și monumentelor feudale din Romania* Mitropolia Olteniei.

Tičar J., Komac B., Zorn M., Ferk M., Hrvatin M., Ciglič R., 2017. From Urban Geodiversity to Geoheritage: The Case of Ljubljana (Slovenia). *Questiones Geographicae* 36(3): 37–50.

Toropu O., 1979. Pelendava Dacică. In: I.Cetățeanu, I.Hinoveanu (eds.), *Craiova – trecut, prezent și viitor*. Craiova: Scrisul Românesc.

Vasilescu A.A., 1927. Fântâna Obedeanului in sec XVIII-lea. *Arhivele Olteniei,* 06.

Vulpe R., 1979. Pelendava in Tabula Peutingeriana. In: I.Cetateanu, I.Hinoveanu (eds.), *Craiova – trecut, prezent si viitor*. Craiova: Scrisul Romanesc.

Zwoliński Z., 2004. Geodiversity. In: A.Goude (ed.), *Encyclopedia of Geomorphology*, Routledge: 417–418.

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): 125–149.

Zwoliński Zb., Najwer A., Giardino M., 2018. Methods for assessing geodiversity. In: E.Reynard, J.Brilha (eds.), *Geoheritage: Assessment, Protection, and Management*, Elsevier, Amsterdam: 27–52.