GEOMORPHOSITES IN THE DOBRUDJA PLATEAU. INVENTORY AND EVALUATION

Mădălina NICA
"OVIDIUS" University, Constanța, Faculty of Natural and Agricultural Sciences
nicamadalina98@yahoo.com
Adriana-Bianca OVREIU
University of Bucharest, Faculty of Geography
ovreiuadrianabianca@yahoo.com
Gheorghe LIXĂNDRESCU
University of Bucharest, Faculty of Geography
lixandrescu_george@yahoo.com
Manuela BĂRBĂRIE
University of Bucharest, Faculty of Geography
manuelabarbarie@gmail.com

Abstract
Geomorphosites are landforms of great scientific importance, to which humans have attributed value according to use and perception. They play a major part in the touristic development of a territory and can be included in geotouristic itineraries. The main aim of this work is the evaluation of the most important geomorphosites in the Dobrudja Plateau, making use of two of the most known evaluation methods, namely the Pralong method (2005) and the Reynard et. al. method (2007). The age of the geological structures and the geomorphologic diversity of the area o study requires a detailed analysis of the landforms of scientific, but also touristic importance. The results have shown that the Dobrudja Plateau has spectacular landforms, with high geotouristic potential (for instance Pricopanului Ridge, Dobrogea Gorges).
Key words: *geomorphosites, evaluation, relief, tourism, geodiversity, the Dobrudja Plateau.*
JEL code: *L83, P28, Z32.*

I. INTRODUCTION AND THEORETICAL BACKGROUND

The relief has been proved to be the essential element of the touristic potential of an area, with its plethora of processes and landforms. The analysis of landform favorabilities and restrictictivities is an indispensable stage in the touristic development of a region, becoming a priority for the scientific community (Comănescu and Nedelea 2010; Comănescu and Nedelea 2015).

Geomorphosites are landforms of great interest for the society. Geomorphosites are involved in the process of "heritage construction", their importance being more and more recognized in sectors such as: politics, education, tourism and nature conservation (Reynard et. al. 2-16). Some researchers have defined geomorphosites as landforms of great scientific importance, to which humans have attributed value on grounds of personal perception or their use (Panizza 2001; Reynard 2005; Reynard et. al. 2007). So, geomorphosites can obtain different types of value: scientific, esthetic, cultural, economic and global.

This geomorphosite concept was initiated in the specialized literature at the beginning of the 1990s, but the first important work of cultural geomorphology was published only in 2003 (Panizza, Piacente 2003).

A majority of the specialized research in this field focused on the elaboration of complex methodologies of selection, inventory, evaluation and mapping of geomorphosites (O'Halloran et. al. 1994; Wimbledon et al. 1995; Sharples 2002; Brilha 2005).

The first geomorphosite evaluation criteria (integrity, representability, rarity, paleogeographic value) were established by Grandgirard (1999) who also underlines the importance of a clear objective establishment in the evaluation process. The touristic potential of a geomorphosite includes the unique character, the touristic valence, the way and time in which it satisfies touristic demand, as well as the favorability or restrictivity of the site (Cocean 1984). As part of the Geosites project, Wimbledon et al. (200) have established criteria which include the

representativity, complexity and geodiversity and the potential of the site for its study. Bruschi and Cendrero (2005, 2009) have recommended selection methods based on quantifiable characteristics and have analyzed the problem of subjectivity in the selection of geomorphosites. Brilha et al. (2005), Pereira et al. (2007) and de Lima et al. (2010) have said that the first step in the evaluation of geomorphosites is the establishment of geological conditions in which they are formed (Reynard et al. 2016).

An important evaluation method of the geomorphosites has been conducted by Pralong (20015) and Reynard et al. (2007) and consists of the realization of an evaluation sheet of the geomorphosites made up of six parts: general data, description, scientific value (integrity, rarity, representability, paleogeographic value), additional values (ecologic, esthetic, cultural, economic). Being used very often, this method has pointed out certain disadvantages such as the lack of some selection criteria and the fact that the paleogeographic value puts the young sites on the last place (Perret 2008; Pagano 2008; Masse et al. 2011; Kubalikova 2013), and, as a response, they have developed a new evaluation method which starts with the selection of geomorphosites and also includes management strategies.

In Romania, the evaluation of geomorphosites has mainly focused on the regions with a high natural potential, because the most diverse and numerous geomorphosites can be found here. Studies have been conducted in areas such as: The Eastern Carpathians, the Meridional Carpathians, The Mehedinți Plateau and the Dobrudja Plateau (Comănescu and Dobre 2009; Comănescu and Nedelea 2010; Comănescu et al. 2009, 2010, 2012; Gavrilă 2012; Comănescu and Nedelea 2017; Ovreiu 2021; Ovreiu et al. 2019), the Transylvanian Basin and in the surrounding subcarpathian areas (Cocean 2011; Cocean and Surdeanu 2011; Irimuș et al. 2011; Irimia and Toma 2012).

The first large-scale work in Romania belongs to Comănescu and Nedelea (2017), where several evaluation methods of the geomorphosites have been applied: Pralong (2005), Coratza and Giusti (2005), Bruschi and Cendrero (2005), Serrano and Gonzalez Trueba (2005), Reynard et al. (2007), Pereira et al. (2007), Zourous (2007). The unique thing about this work is the fact that all the methods used have been compared, the advantages and disadvantages of each of them being highlighted.

The present study aims to evaluate a series of geomorphosites present in the Dobrudja Plateau by using two known methods in specialized literature: Pralong (2005) and Reynard et al. (2007). The evaluated geomorphosites have been selected on accounts of their representability to the area of study.

II. THE AREA OF STUDY

The Dobrudja Plateau is located in the south-east part of Romania and extends on a great part of the natural unity Dobrudja, taking up about 4, 3% of our country's territory (Fig. 1). The Dobrudja Plateau is a platform unit and is made up of three subunits with southern, central and northern position (Posea et al. 1974).

From the point of view of the relief, the Dobrudja Plateau has a medium altitude of about 125 meters, being a low unit. The highest heights can be found in the North-West part, in the Țuțuianu Peak, Pricopan Ridge, heights of about 467 meters. The altitude of 400 meters is surpassed only in the four peaks of the Măcin Mountains. The minimum altitude can be found in the south-east sector, by adding the shoreline to the plateau units, where the altitudes go as low as under 10 meters.

The most important aspects of the relief are constituted by: valleys focused on synclines and anticlines, valleys organized along the rifts, tectonic depressions (Nalbant, Cerna-Mircea Vodă), elongated ridges and witnesses of erosion rounded on volcanic rocks, ridges on quartzitic shales (Pricopan), exokarst in triassic, jurassic and cretaceous limestones, limestone pavements (Tulcei Hills, the Babadag Plateau), sinkholes and poles (Mereni), keys and canaries (Hârșova), endokarst (Caves on the Mangaliei Valley, the Movile Cave) and fossil cast in limestones situated on different levels (Southern Dobrudja) (Ielenicz 1999).

From a geological point of view, there is a huge petrographic variety. The most important rocks are: crystalline rocks present in Northern Dobrudja, formed by loamy shales, quartzites, conglomerates, limestones and granite magmatites; the sarmatian limestone plate which shows up on the surface in Southern Dobrudja; the green shales present in Central Dobrudja (Ionesi 1992).

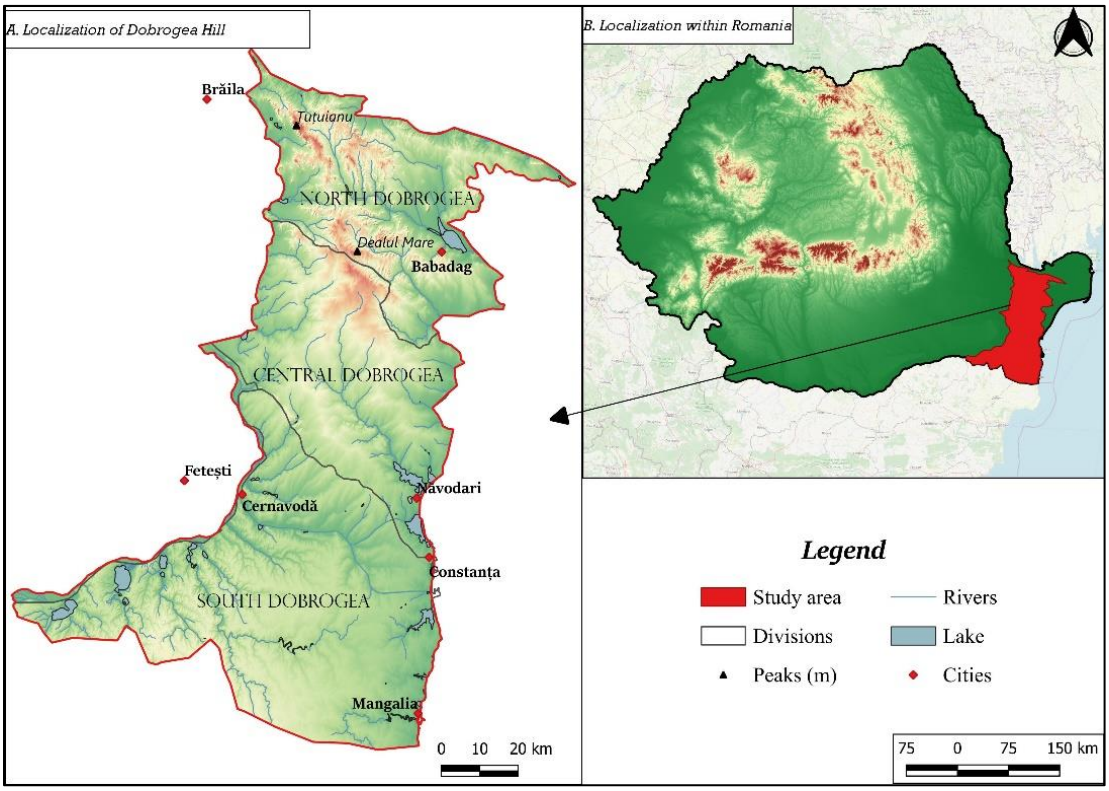

Figure 1. The geographic position of the Dobrudja Plateau

III. METHODOLOGY

3.1. The selection of geomorphosites

The selection process is an indispensable one, being a stage that highlights the most representative geomorphosites which are to be evaluated. In this study, the selection of the geomorphosites has been conducted by taking into consideration the important landforms for understanding the origin and the evolution of the region, as well as for the geomorphologic diversity of the area of study (Comănescu et al. 2010; Reynard et al. 2007; Ovreiu 2021).

Geomorphosites have been classified on the basis of several criteria which target the paleogeographic role, the formation mode, the spatial extension, and their relevance (Fig. 2, Table 1).

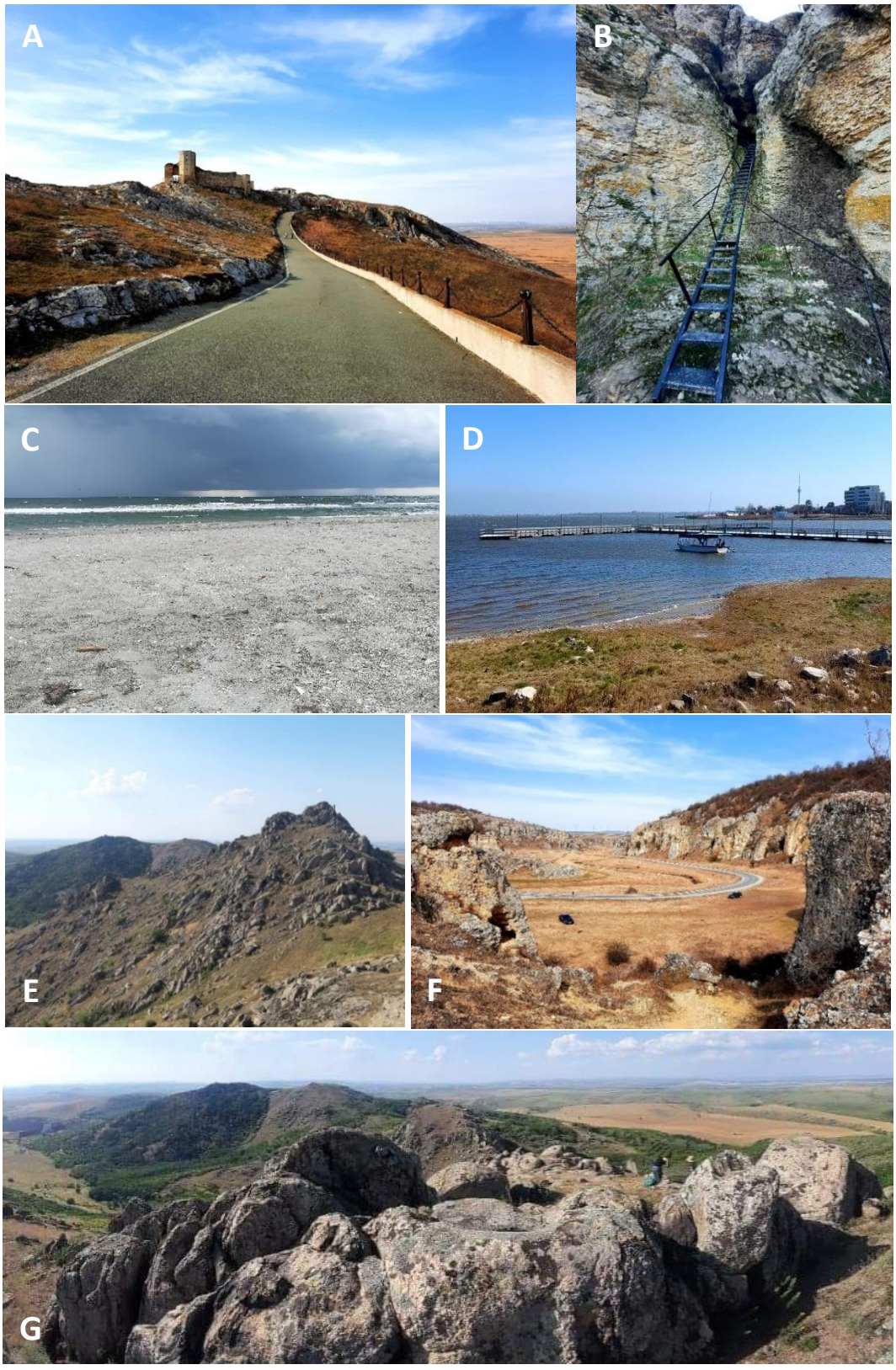

Figure 2. Examples of geomorphosites from the Dobrudja Plateau: A – The Enisala Hill and Fortress; B – The Casian Hill; C – The Corbu Beach; D – Techirghiol Lake; E – Pricopanului Ridge; F – The Dobrogea Gorges; G – Pricopanului Ridge

Table 1. The classification of the geomorphosites selected from the Dobrudja Plateau

Nr. crt.	Geomorphosite	Functionality	Genesis	Size/type	Touristic relevance
1.	Pricopanului Ridge	Passive	Morphologic	Linear	Regional
2.	Dobrogea Gorges	Passive	Fluvial	Linear	National
3.	Enisala Hill	Passive	Morphologic	Areal	National
4.	Sarica Hill	Passive	Morphologic	Areal	National
5.	Sfântul Andrei Hill	Passive	Karstic	Punctual	Regional
6.	Casian Hill	Passive	Karstic	Punctual	Regional
7.	Hârșovei Canaries	Passive	Karstic	Areal	Regional
8.	Techirghiol Lake	Passive	Fluvial-maritime	Areal	National
9.	Corbu Beach	Passive	Seaside	Areal	National
10.	Iacobdeal Lake	Passive	Anthropic	Areal	Regional

3.2. The evaluation of the geomorphosites

The applied evaluation methods take into account the central (scientific) value and the additional values (esthetic, ecologic, cultural, economic) of geomorphosites, evaluated based on several criteria. The scores attributed to the evaluation criteria vary between 0 and 1, and through their mediation the final score is obtained (Comănescu et al. 2010, Ovreiu et al. 2019).

The first method used in the evaluation of the geomorphosites is the Swiss method elaborated by J.P. Pralong (2005) which follows the determination of the touristic value of geomorphosites on the basis of four values: esthetic, scientific, cultural and economic.

For the esthetic value (Vsce) the following criteria are taken into consideration: *the number of visible points – Sce1* (situated at less than 1 km and accessible through paths), *the medium distance at the belvedere point – Sce2* (it's determined in m and represents the sum of the distances for each belvedere point, reported to the number of belvedere points), *the geomorphosites surface – Sce3* (a quantitative scale is established in ha adapted to the type of the geomorphosites from the studied area), *the difference in level – Sce4* (a quantitative scale is established in meters adapted to the type of the geomorphosites from the studie darea), *the color contrast – Sce5* (this refers to the color contrast between the geomorphosite and the environment) (Pralong 2005). The calculation formula is: *Vsce= (Sce1+ Sce2 + Sce3 + Sce4 + Sce 5)/5.*

The scientific value (Vsci) has been evaluated by analysing the following parameters: *the paleogeographic interest – Scil* (the importance of the site for the reconstitution of morphoclimatic conditions in which it was formed and it evolved), *the representativity – Sci2* (it shows how suggestive it is for the area of study, but also from a didactic point of view), *the surface – Sci3* (it exposes the percentage of the geomorphosite from the total surface of the study area), *the unicity – Sci4* (it is established according to the number of geomorphosites of the same type in the studied area), *the integrity – Sci5* (it takes into account the presence of natural hazards or of the human factor which affects the geomorphosite), *the ecological interest – Sci6* (it establishes whether the geomorphosite represents a habitat for rare, endemic species or for a big number of species) (Pralong 2005). The calculation formula is: *Vsci= (Sci1 + Sci2 + 0,5 * Sci3 + 0,5 * Sci4 + Sci5 + Sci6)/5*. The differentiated percentage was introduced because the third and fourth criteria determine the unicity linked cu the third criterion inside the estethic value (*Sce3*) (Comănescu et al. 2010).

The cultural value (Vcult) has been evaluated on the basis of the following criteria: *cultural-historical characteristics – Cult1* (this refers to the symbolic, cultural and historical role, without taking into consideration the vestiges or constructions), *the iconographic representations – Cult2* (the total of the paintings, engravings and the photos which represent the geomorphosite are taken into consideration), *the historical and archeological relevance – Cult3* (it takes into consideration the historical, architectural and archeological importance of the constructions inside the geomorphosite, as well as their degree of conservation), *the religious relevance – Cult4* (the presence of worship places is taken into consideration, but also the links of the geomorphosites with the popular traditions), *the art and cultural events – Cult5* (this refers to the presence of certain cultural events dedicated to the geomorphosite, which can take place inside it or not) (Pralong 2005). The calculation formula is:

*Vcult= (Cult1 + 2 * Cult2 + Cult 3 + Cult 4+ Cult 5)/6.* The introduction of the percentage is explained through the fact that the second criterion is of great importance as it evaluates the numbers of citations from different works.

The economic value (Veco) is given by the following aspects: *accessibility – Eco1* (it takes into consideration the distance from the means of transport to the geomorphosite), *the natural risks – Eco2* (this refers to the degree of risk and to the protection and combat methods), *the annual number of visitors in the region – Eco3* (this takes into consideration the number of visitors registered in the closest resort, having as result an equal number of visitors for all the geomorphosites from that area. In this study, a difference from the point of view of the number of visitors could be carried out duet o the very high surface of the analysed area), *the official level of protection – Eco4* (it depends on the level of protection of the site which is inversely proportional to the economic exploitation), *the attraction – Eco5* (this aspect takes into consideration the origin of the tourists) (Pralong 2005). The calculation formula is: *Veco= (Eco1 + Eco2 +Eco3 + Eco4 + Eco5)/5.*

The global touristic value of geomorphosites is the aritmethic mean of the four values (esthetic, scientific, cultural and economic), the calculation formula being: *Vtour = (Vsce + Vsci +Vcult +Veco)/4.*

The second method used for the determination of the scientific and additional values, as well as for the brief description of the problems related to the promotion and protection of geomorphosites, is the method elaborated by Reynard et al. (2007), with some modifications and additions.

According to this method, the scientific value (Vsci) takes into account the criteria established by Grandgirard (1999) namely: *the rarity – Ra*, *the representativity – Rp*, *the integrity - In* and *the paleogeographic interest – Ip* (Comănescu et al. 2010). The calculation formula is: *Vsci= (Ra+ Rp+ In + Ip)/4* (Ovreiu 2021).

The ecological value (ECOL) is determined on the basis of the *ecological impact – Ecl* and of *the degree of protection – PS*, which take into account the characteristic of the site to provide the existence of some private ecosystems (Reynard et al. 2007, Ovreiu et al. 2019). It is calculated according to the formula: *Eco (Ecl + PS)/2*.

The esthetic value (AEST) takes into account aspects such as *the belvedere points – VP* and *the structure – STR* (contrast, vertical development) and it is calculated like this: *AEST= (VP + STR)/2* (Reynard et al. 2007).

The cultural value (CULT) covers the following criteria: *the religious importance – REl*, *the historical importance – HIS*, *the literary-artistic one – ART*, *the geohistoric one – GEO*. These capture the spiritual role of the geomorphosite, its importance for artists and writers and the role of the site in the evolution of natural sciences (Panizza, Piacente 2003). In the case of the present method, in order to obtain the cultural value, the average isn't calculated, but the criterion with the highest score is taken into account. Things are done this way because it is very unlikely that a geomorphosite to present all of the characteristics encompassed in the evaluation criteria (Reynard et al. 2007).

The economic value (ECON) is determined by both qualitative (infrastructure and geotourtistic products) and qualitative (number of visitors) data (Reynard et al. 2007, Comănescu and Nedelea 2016). For the granting of the evaluation points a scale adapted to the specific of the selected sites has been conducted.

The synthesis of the study encompasses the global value of the geomorphosites (VG) as an average of the scientific and additional values (*VG= (Vsci + AEST + CULT + ECOL + ECON)/5*), the short presentation of the protection and exploitation problems of the geomorphosites, as well as the proposal of adequate management measures (Comănescu et al. 2010, Ovreiu 2021).

IV. RESULTS

The results of the study have highlighted the fact that in the Dobrudja Plateau there are several important geomorphosites for the scientific research and attractive from a touristic point of view.

The Pricopanului Ridge presents geologic formations which date back to 255 million years ago and conveys a unique landscape through the presence of the spectacular crest, of the panoramas, of the granite formations and of the cliffs, most of them facing the Luncavița Dunării Depression, the cities Galați and Brăila (Albotă 1987).

The Dobrogea Gorges are a protected area, situated in Central Dobrudja (The Casimcea Plateau), and from an administrative point of view, in the county Constanța. What is remarkable about them are the calcarous steeps from the jurassic, the fossile, landscape fauna and the speological importance. (https://natura2000.eea.europa.eu/).

The Enisala Hill is located in Northern Dobrudja, between the limits of the Tulcea county, in the north-east of the Enisala village. It is a calcareous hill, on which the archeological site „Enisala Fortress" is also situated. (http://ran.cimec.ro/).

The Sarica Hill is situated in the Niculițel Plateau, Tulcea county, and it is a natural reservation. Its uniqueness consists of the many endemic floristic species and of the fact that it is the only reservation which preserves tendril populations, a plant which helps alleviate muscular pain (http://www.cimec.ro/Monumente/Zonenaturale.htm).

The Sfântul Andrei Hill is located at a distance of 3-4 km from the Ion Corvin village, in Southern Dobrudja. The religious valences are represented by the fact that it has the shape of a church at the end of which an altar can be found (Orghidan et al. 1984).

The Sfântul Ioan Casian is located in the Constanța county, Târgușor village, above the Casimcea Valley. It is a calcareous hill, consisting of several rooms, some of them very hard to access (Orghidan et al. 1984).

The Hârșova Canaries are located on the Dobrudja shore of the Danube, being also declared a protected area of national interest. The natural reservation is an area with hilly escarpments on the right shore of the Danube ((https://eunis.eea.europa.eu/).

The Techirghiol Lake is situated in Southern Dobrudja and it constitutes a unique ecosystem. It is the largest salty lake in Romania, being used for touristic purposes duet o the curative properties of the mud and water (Bărbulescu and Maftei 2014).

The Iacobdeal Lake is situated near Turcoaia, Tulcea county, in Northern Dobrudja. It is an anthropic lake which was formed in a former granite career, with a depth of 20 m (Gavrilă et al. 2012).

The Corbu Beach, located in the vicinity of the same-name village, is a virgin beach, under the protection of the Danube Delta Biosphere Reservation (Sîrbu et al. 2019).

The Global Touristic Value of geomorphosites determined through the Pralong method (2005) varies between 0.26 points for the Iacobdeal Lake which is a low promoted geomorphosite and 0.56 points for the Techirghiol Lake. It is followed by the Dobrogea Gorges with a score of 0.53 points, both geomorphosites being a better promotion and exploitation, while also being two of the most important attraction elements of the Dobrudja Plateau (Fig. 3, Table 2).

Table 2. The global touristic value of geomorphosites in the Dobrudja Plateau, using the Pralong method (2005)

Nr. crt.	Geomorphosites	Scenic Value	Scientific Value	Cultural Value	Economic Value	Global Touristic Value
1.	Techirghiol Lake	0,50	0,77	0,20	0,80	0,56
2.	Dobrogea Gorges	0,55	0,77	0,20	0,60	0,53
3.	Pricopanului Ridge	0,55	0,77	0,20	0,50	0,50
4.	Enisala Hill	0,40	0,40	0,33	0,60	0,43
5.	Corbu Beach	0,60	0,70	0,08	0,33	0,42
6.	Sfântul Andrei Cave	0,15	0,27	0,45	0,80	0,41
7.	Sarica Hill	0,40	0,55	0,04	0,55	0,38
8.	Casian Cave	0,40	0,32	0,29	0,50	0,37
9.	Hârșova Canaries	0,40	0,42	0	0,50	0,33
10.	Iacobdeal Lake	0,25	0,32	0,04	0,45	0,26

The Scenic Value has a low score because the altitude is pretty low, since it is a plateau area. The score varies between 0.55 for the Pricopanului Ridge and the Dobrogea Gorges, where there are several

belvedere points, and the difference in level and the surface of the relatively big geomorphosites, and 0.15 for the Sfântul Andrei Hill, characterized by a very low difference in level, low color contrast and reduced number of visibility points.

The Scientific Value presents high scores for the geomorphosites indispensable for the understanding of the genesis and the relief evolution (Comănescu et al. 2011b). It varies between 0.77 for the Pricopanului Ridge, the Dobrogea Gorges and the Techirghiol Lake and 0.27 for the Sfântului Andrei Hill. The high values of the geomorphosites have been supported by the genesis and age of the relief, by the spectacularity of the key-like forms and of the properties of the Techirghiol Lake water.

The Cultural Value is low, with scores varrying from 0-0,45. The geomorphosite with the highest cultural value is the Sfântul Andrei Cave due to the religious valences and to the nearby places of worship.

The Economic Value registers the highest scores. The majority of the geomorphosites are important tourist attractions in the Dobrudja Plateau, being promoted and exploited accordingly. The scores vary between 0.80 for the Sfântul Andrei Cave and the Techirghiol Lake and 0.33 for the Corbu Beach which presents a protection form which limits the arrangement and the obtaining of economic benefits.

As a result, according to the Pralong method (2005), 30% of the evaluated geomorphosites register a medium global touristic value (Pricopanului Ridge, Dobrogea Gorges and Techirghiol Lake), the rest of 70% registering a low global touristic value.

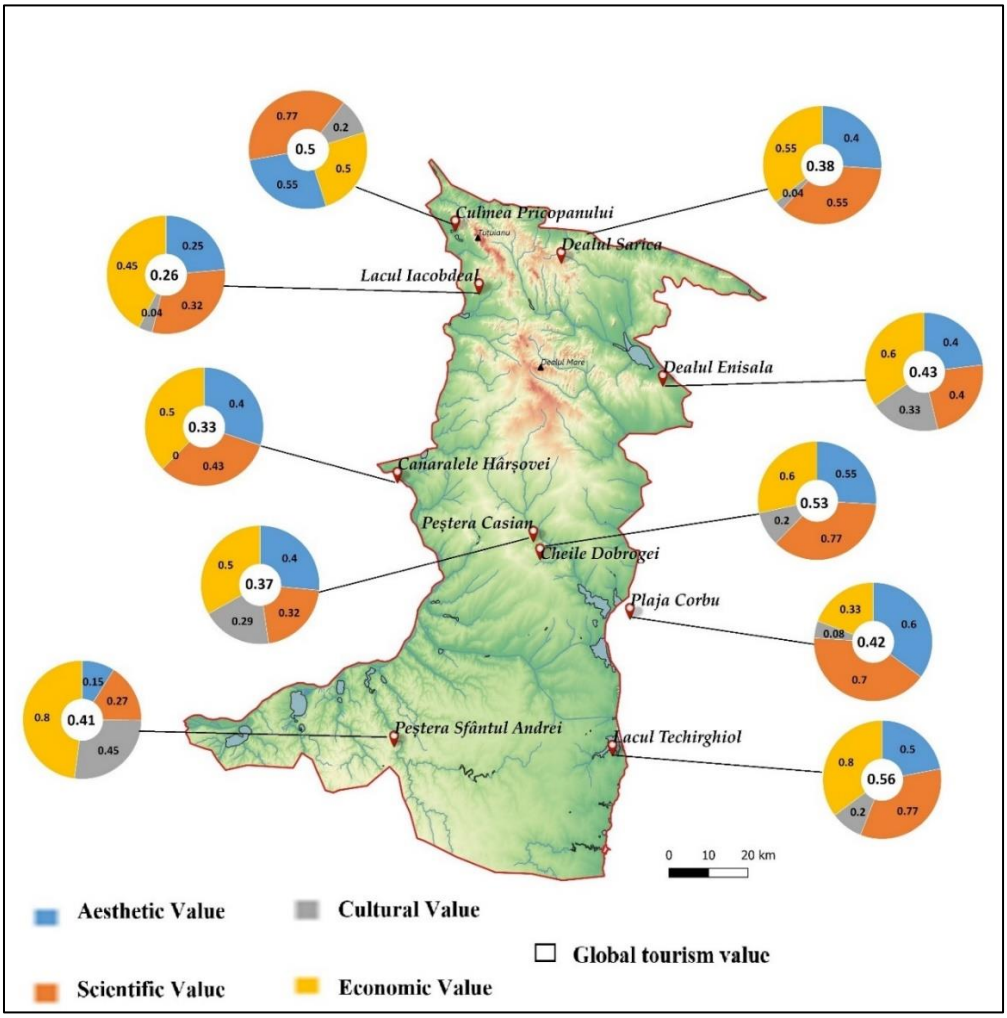

Figure 3. The values of the geomorphosites obtained through the Pralong method (2005)

The Scientific Value of the geomorphosites obtained through the Reynard et al. method (2007) presents values varying between 0.31 and 0.93. The Pricopanului Ridge is the geomorphosite with the highest score (0.93), and on the opposite side there is the Sfântul Andrei Cave with a score of only 0.31 (Fig. 3, Table 3).

The Ecologic Value presents scores varying between 0.25-0.75. The Corbu Beach and Dobrogea Gorges geomorphosites register the highest score (0.75) because they can support private ecosystems and present protected area status. The Iacobdeal Lake and the Hârșovei Canaries have the lowest scores (0.25), not having an important ecological impact.

The Esthetic Value is of great importance, because the beauty of the landscape constitutes an element of great interest for the tourists. It presents scores varying between 0.25 and 0.75. The geomorphosites which have registered high scores for the esthetic value are the Techirghiol Lake and the Corbu Beach, because the number of visible points is very great, and the color contrast is accentuated, imposing itself in the landscape.

The Cultural Value takes into consideration especially the religious and historical importance of geomorphosites and varies between 0 and 1. The sites with the greatest cultural value (1 point) are the Enisala Hill duet o its great historical valences (the presence of the archeological site "Enisala Fortress") and the Sfântul Andrei and Casian Caves as a result of the arrangement of religious spaces inside them.

The Economic Value is given by the high touristic potential of the geomorphosites. The highest value is registered by the Techirghiol Lake (0.87), which is an important sightseeing, the annual number of visitors being very high due to the therapeutic effects of the lake water.

The Global Value of the geomorphosites varies between 0.64 for the Dobrogea Gorges and 0.29 for the Hârșovei Canaries. So, according to the Reynard et al. method (2007), 70% of the evaluated geomorphosites register a medium global value and only 30% register a low global value (Sarica Hill, Hârșovei Canaries and Iacobdeal Lake).

The following geomorphosites have a low protection degree: Casian Hill, Hârșovei Canaries and Iacobdeal Lake, while also registering a low ecologic impact. The problem of the protection degree is tightly linked to the exploitation of the geomorphosites, having an inefficient and low promotion. The best exploited geomorphosites are: the Pricopanului Ridge, the Dobrogea Gorges, the Techirghiol Lake and the Corbu Beach which most have a high protection degree. The most highly protected geomorphosites are: The Dobrogea Gorges, the Enisala Hill, the Sarica Hill and the Corbu Beach.

For a better exploitation and for a rise in the degree of protection we propose the following management methods: the efficient monitoring of the protected areas, the promotion of the geomorphosites in order to attract visitors and population awareness actions in regards to the importance of the geomorphosites in the Dobrudja Plateau.

Table 3. The global value of the geomorphosites in the Dobrudja Plateau, using the Reynard et al. method (2007)

Nr. crt.	Geomorphosites	Scientific Value	Ecologic Value	Esthetic Value	Cultural Value	Economic Value	Global Value
1.	Dobrogea Gorges	0,87	0,75	0,62	0,25	0,75	0,64
2.	Corbu Beach	0,75	0,75	0,75	0,25	0,62	0,62
3.	Techirghiol Lake	0,81	0,62	0,62	0	0,37	0,61
4.	Enisala Hill	0,43	0,50	0,37	1	0,62	0,58
5.	Pricopanului Ridge	0,93	0,50	0,75	0,50	0,87	0,58
6.	Sfântul Andrei Cave	0,31	0,37	0,25	1	0,75	0,53
7.	Casian Cave	0,37	0,37	0,50	1	0,37	0,52
8.	Sarica Hill	0,50	0,62	0,50	0,25	0,50	0,47

9.	Iacobdeal Lake	0,37	0,25	0,37	0,25	0,50	0,34
10.	Hârșovei Canaries	0,50	0,25	0,37	0	0,37	0,29

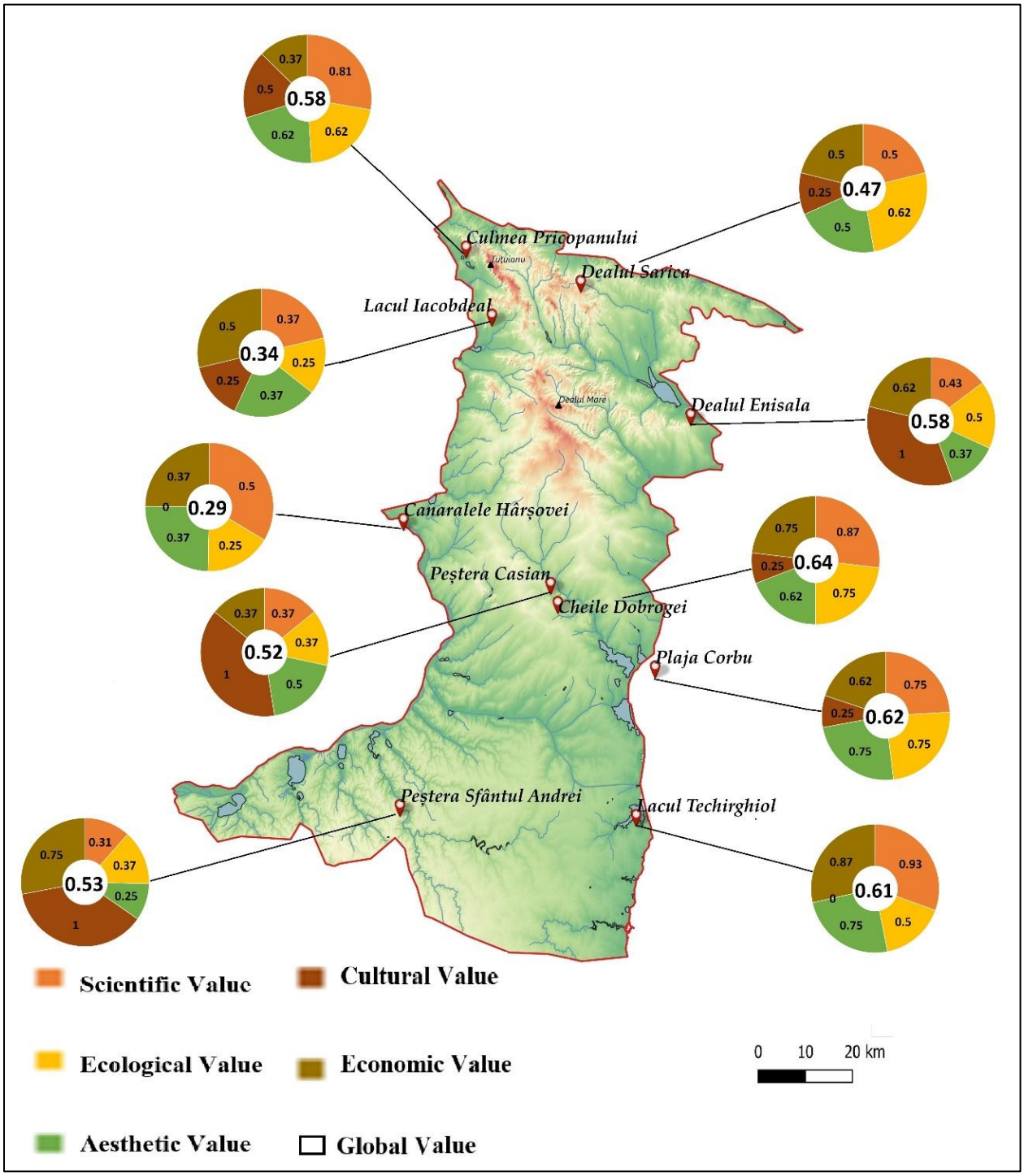

Figure 4. The values of the geomorphosites obtained through the Reynard et al. method (2007)

V. DISCUSSIONS

Although both of the methods applied in this study take into consideration approximately the same evaluation criteria (ex. Integrity, rarity, paleogeographic importance etc) they can have diverse purposes, focusing on different aspects (Comănescu et al. 2012, Comănescu and Nedelea 2016).

The Pralong method of evaluation (2005) has as a general objective the establishment of the touristic attractivity of the geomorphosites, as well as of their usage mode in this activity. Therefore, it pays great attention to the touristic infrastructure and to the exploitation possibilities of the sites (Comănescu and Nedelea 2016).

The Reynard et al. method (2007) has as main purpose the quantification of the scientific importance of the geomorphosites and its correlation with the society's perception of them. Therefore, the method also quantifies the additional values and analyses from a quality point of view aspects such as: general data, description and morphogenesis, risks and management measures (Reynard et al. 2007, Comănescu and Nedelea 2016).

Even though both of the methods adopt a quantitative approach, the subjectivity is present in the evaluation to some extent. This thing is determined by the usage of some qualitative scales for the defining of some attributes (big, medium, small), as well as by the fact that every criteria is evaluated by a specialist according to his or her experience and to the way in which he or she perceives the analyzed geomorphosites. Both the Pralong (2005), and the Reynard et al. (2007) method follow the scientific constituent of the sites, but the second one gives major importance to it, taking into account especially the scientific value, which gives the method a higher degree of transparency.

According to the Comănescu and Nedelea method (2016), in the following we have made up a hierarchy of the ranks on the basis of the scores obtained by the geomorphosites with the two applied evaluation methods (Fig. 5). This thing is very necessary for minimizing the evaluation subjectivity. The ranking provides a general image of the geomorphosites value, being obtained by adding up the geomorphosite's rank in each method applied. The total or medium value of the rank is inversely proportional to the true value of the geomorphosite. As a result, the sites that have registered higher values with both of the evaluation methods, situated at the top part of the hierarchies, will have reduced values of the rank (Table 4).

The values obtained through the two methods differ according to the evaluation criteria, but the hierarchy of the geomorphosites remains roughly speaking the same. This fact is also supported by the high value of the correlation coefficient R of 0.86 (Fig. 6).

The geomorphosites Dobrogea Gorges and Techirghiol Lake are situated in the top part of the hierarchy in both of the evaluations due to the scientific and esthetic importance, to the high accessibility, to the promotion and the superior use. They have registered the lowest values of the rank (3, respectively 4).

On the other side, there are the geomorphosites Hârșovei Canaries and Iacobdea Lake with the highest rank (19), which means reduce global values. They have been situated in the ninth, respectively the tenth place in both evaluation methods duet o the reduced cultural, esthetic and economic valences.

As a result, although the ranking of the geomorphosites may differ from one method to another, the sum of the ranks can lead to a hierarchy as correct as possible (Comănescu and Nedelea 2016).

Table 4. The rank of the geomorphosites evaluated with the Pralong method (2005), respectively Reynard et al. (2007)

Nr. crt.	Geomorphosite	Pralong (2005)	Reynard et al. (2007)	Total rank	Mean of rank
1.	Dobrogea Gorges	2	1	3	1.50
2.	Techirghiol Lake	1	3	4	2.00
3.	Corbu Beach	5	2	7	3.50
4.	Pricopanului Ridge	3	5	8	4.00
5.	Enisala Hill	4	4	8	4.00
6.	Sfântul Andrei Cave	6	6	12	6.00
7.	Sarica Hill	7	8	15	7.50
8.	Casian Hill	8	7	15	7.50
9.	Hârșovei Canaries	9	10	19	9.50

10.	Iacobdeal Lake	10	9	19	9.50

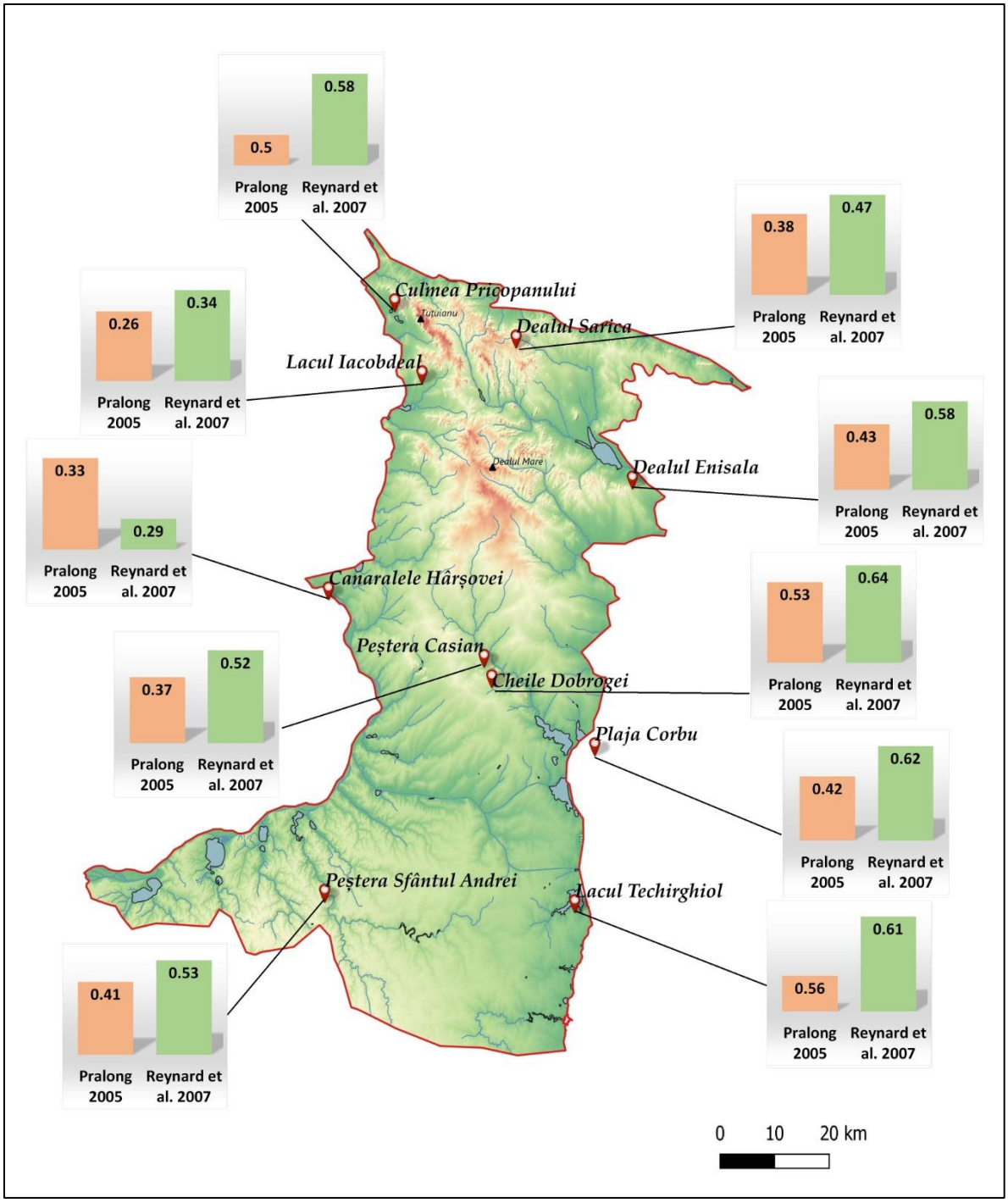

Figure 5. The global value of the geomorphosites obtained through the Pralong method (2005), respectively Reynard et al. (2007)

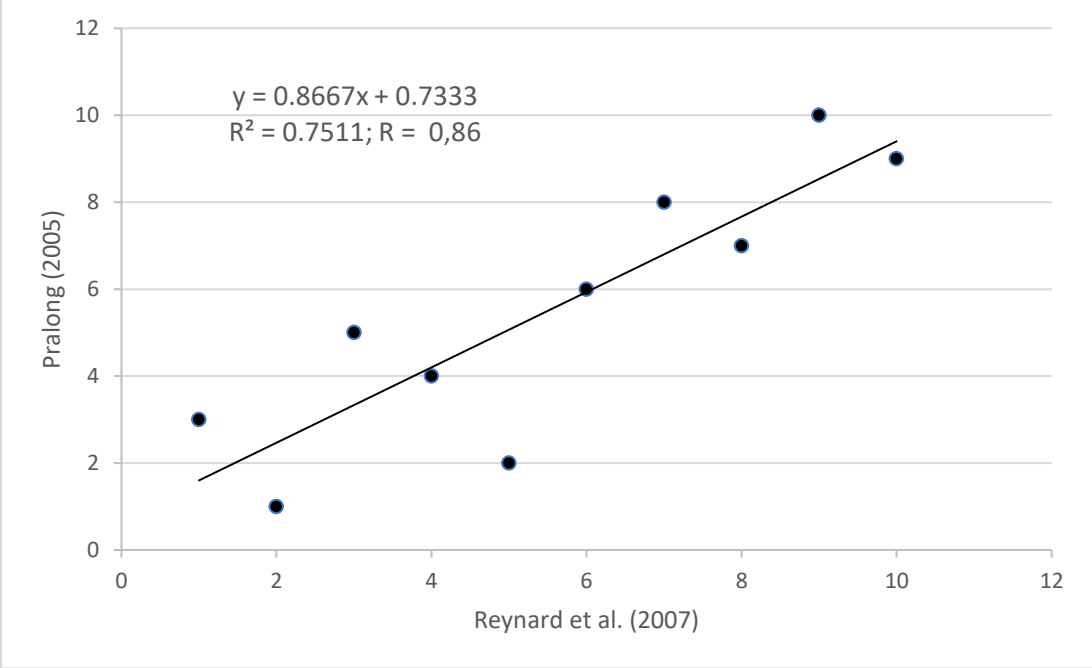

Figure 6. The correlation of the geomorphosites ranks for the Pralong method (2005), respectively Reynard et al. (2007)

VI. CONCLUSIONS

The importance of the geomorphosites evaluation stems from the fact that the evaluation methods allow the highlighting of the landforms with a particularly important scientific and touristic role, which can constitute the fundament of the touristic development of a region by their inclusion in geotouristic itineraries.

As far as the applied methods are concerned, several advantages and disadvantages could be identified. The methods evaluate the scientific value of the geomorphosites, without which a landform cannot be considered a geomorphosite, but it presents a subjectivism level duet o the qualitative scales used for the description of some attributes, Although both of the methods approach the central value of the geomorphosites, we can observe the fact that the direction of the Pralong method (2005) is mainly touristic, while the Reynard et al. method one (2007) is mainly scientific.

Although there are clear differences between the two methods concerning the numerical values registered by the geomorphosites, their hierarchy stays mainly the same, which means that for a classification of the geomorphosites both of the evaluation methods can be used successfully.

The area of the study shows geomorphosites with a different genesis and a high degree of representativity for the Dobrudja Plateau, but which generally show lower values in comparison to other regions of the country.

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