

THE ROLE OF GEOMORPHOSITES IN THE LOCAL ECONOMY DEVELOPMENT OF THE CARPATHIAN AND SUB-CARPATHIAN AREA OF VRANCEA COUNTY, ROMANIA

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ABSTRACT: The development of geotourism already represents an element that must be taken into consideration by the Administrative Territorial Units (ATUs) in order to obtain a sustainable economy. This study was divided into three main stages. In the first part of the study, an assessment of geomorphosites from the Carpathian and Sub-Carpathian area of Vrancea County was done, resulting in the ranking of geomorphosites. The second stage focussed on an analysis of the local economies in the studied area at the level of each ATU and four-digit Classification of National Economic Activities (NACE) code for a period of 19 years (2000–2018) using four economic indicators to determine the share of the tourism sector in the economy of each ATU. The data was used to generate trend matrices and relevant cartographic materials about the contribution of tourism to each ATU's local economy in the analysed area. The last stage consisted in drawing a parallel between the concentration of geomorphosites in the analysed area, the score obtained by them in the evaluation and the tourism sector's share trend in local economies. This study shows how the ATUs with a positive share trend in the tourism sector of the economy are directly influenced by the presence of geomorphosites in their administrative territory or in their proximity. It also emphasises the significance of geomorphosites in increasing tourism complexity in the study area, as well as in the development of tourism and local economies.

KEY WORDS: geotourism, geomorphosites, assessment, analysis, local economies

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Introduction

Nowadays, tourism has become an important sector of the global economy and a specific characteristic of modern society, a society for which travel, relaxation or a healthy lifestyle play a major role in planning and organising activities. Being one of the most dynamic and competitive industries (Kavaliauske, Kocyte 2014, Drăghici et

al. 2015, Grecu et al. 2019), the tourism industry requires continuous adaptation to global changes and tourists' needs (Vivek et al. 2020). At the same time, the field of tourism represents one of the most important economic sectors globally. In 2018, tourism contributed to the global economy with >8.8 trillion USD, representing >10.4% of the gross domestic product (GDP). Moreover, >319 million jobs belonged to the tourism

industry in the same year, which in percentages equals around 10% of the available jobs (World Travel & Tourism Council 2019). For Romania, in 2018, tourism had a contribution of approximately 5.3% of the economy, with an increase of 3% compared to the previous year (World Travel & Tourism Council 2019).

One of the newest concepts in the field of tourism, geotourism has become an activity practised worldwide (Newsome, Dowling 2018). It aims to highlight the geological and geomorphological features of the landscape by promoting them as tourist attractions (Stoffelen, Vanneste 2015). Geotourism proves to us that different fields of study, such as geosciences and tourism, can coexist and correlate (Garofano 2012), creating a way to promote, preserve and understand the geoheritage (Hose 1995), which includes elements of the geodiversity that need to be protected because of their value (Gray 2018). Geotourism is also an efficient economic activity that generates benefits for the economy (Newsome, Dowling 2018) by incorporating several tourism activities, from transportation and accommodation to ways of leisure or recreation. Moreover, geotourism has educational values, with tourists having the opportunity to accumulate various useful information about how the environment works, the need for preserving the geotourism heritage and the importance of practising sustainable tourism (Comănescu, Nedelea 2010, Yolal 2012, Dowling 2015, Necheș, Erdeli 2015). Over the years, geotourism has been defined from different perspectives, with some researchers presenting it as geological tourism and others considering it as geographical tourism (Newsome, Dowling 2018). In this context, during an International Congress on Geotourism in 2011, geotourism was defined as 'the tourism which sustains and enhances the identity of a territory, taking in consideration its geology, environment, culture, aesthetics, heritage and the well-being of its residents' (Arouca Declaration 2011).

As a relatively recent term (Panizza 2001), 'geomorphosite' is considered one of the multiple types of geosites (Kubalíková 2013) and can be understood as a landform that has acquired a special value due to human perception or exploitation (Panizza, Piacente 2003). The value of the geomorphosite can vary depending on the orientation: scientific, ecological, cultural, aesthetic

and/or economic (Reynard 2005). Another definition of the geomorphosites states that it can be any part of the Earth's surface that is important for understanding the Earth, its climate or the history of life (Grandgirard 1999, Reynard 2005). Different authors declared that geomorphosites can be single geomorphological objects or larger landscapes and can be affected, modified or even destroyed by human activities (Reynard, Panizza 2005).

The geomorphosite quality of an object is established following an evaluation process carried out according to specific methodologies, with a series of studies addressing this aspect (Bruschi, Cendrero 2005, Pralong 2005, Pereira et al. 2007, Reynard et al. 2007, Comănescu et al. 2011, Vujičić et al. 2011, Brilha 2018, Pal, Albert 2021).

Geomorphosites can have an important role in increasing the complexity of the functions of tourism within an area and can have a positive influence on local economies (Brilha 2018, Newsome, Dowling 2018). In order to demonstrate their role, an integrated economic analysis is needed to understand the evolution of the economy in an area, as well as the complex relationships that are created within (Nica et al. 2018, Ren et al. 2019). Moreover, economic development involves the creation of plans and strategies with the aim of increasing the economy of a place or area (Vivek et al. 2020), but using local resources.

Although in the literature from this field of study there are various works that focus on the assessment of geomorphosites or on the economic analysis of the tourism sector, there is no research that approaches the relationship between geomorphosites and the tourism share trend in local economies. Such methodology is necessary in order to demonstrate the influence of geomorphosites on the tourism sector in a certain area and implicitly on local economies.

The aim of the present study is to demonstrate the role of geomorphosites in the development of local economies in the Carpathian and Sub-Carpathian area of Vrancea County, Romania. To achieve this goal, this research will develop an assessment method for geomorphosites that best fits all of the features of the area, calculate the share of the tourism sector in local economies from 2000 to 2018 and find a way to observe the influence of geomorphosites on the tourism

sector share trend over time. The study also aims to raise awareness about the value of the geomorphosites (including the economic one) in the analysed area, to offer a starting point for rethinking the protection and conservation measures and to promote the geotourism activities.

Methodology

The study was divided into three main stages, as described below.

The assessment of geomorphosites

The first stage follows the geomorphosite assessment in the Carpathian and Sub-Carpathian area of Vrancea County, in order to establish the geomorphosite feature of the tourism attraction within the analysed area. For this stage, the evaluation methodology was proposed by Tufănoiu et al. (2020). It involves four sub-stages (Fig. 1).

Starting from the already existing evaluation methodologies (especially the works of Comănescu et al. 2011 and Pereira et al. 2007), it was aimed to obtain an evaluation of geomorphosites that takes into consideration the classic values of geomorphosites (scientific, aesthetic, ecological and cultural), but especially the useful characteristics for the tourism exploitation of geomorphosites or for increasing the degree of their integrity. As the geoheritage is just a part of the geodiversity of an area (Reynard et al. 2015), the objectives targeted by the evaluation process were selected after reading the literature of this field of study, consulting the topographic map of Romania, the satellite images and, most importantly, during the field trips, keeping in mind the four main pillars that support a good inventory: the topic, the value of the site, the scale and the

aim (Lima et al. 2010). Once the geomorphosites were selected for evaluation, a database with their most important attributes could be created. The database was used in the evaluation process and also for creating the cartographic materials. The evaluation of the selected geomorphosites was done according to the criteria presented in Table 1.

The total value of each geomorphosite was calculated according to the formula:

$$V_{tot} = V_s + V_e + V_a + V_c + V_{mu} / 100$$

- V_{tot} – total value of the geomorphosite,
- V_s – scientific value,
- V_e – economic value,
- V_a – aesthetic value,
- V_c – cultural value,
- V_{mu} – management and use value.

The evaluation involves the distribution of 100 points (absolute maximum) among the five values (scientific, economic, aesthetic, cultural, and management and use) with their sub-criteria. Each of the five values receives more (or less) points depending on the degree of importance established by the author. The total points accumulated by each geomorphosite following the application of the criteria were divided by 100, so that the final value of the evaluated geomorphosite was between zero (minimum value) and one (maximum value). The results obtained by each geomorphosite were classified so that the values obtained for each individual criterion could be compared. They can be extremely useful in the eventuality of improving protection measures, but also for tourism promotion.

A Geographic Information System (GIS) software (Arc Map 10.3 – Esri, Redlands, California, USA) was used to create the cartographic materials.

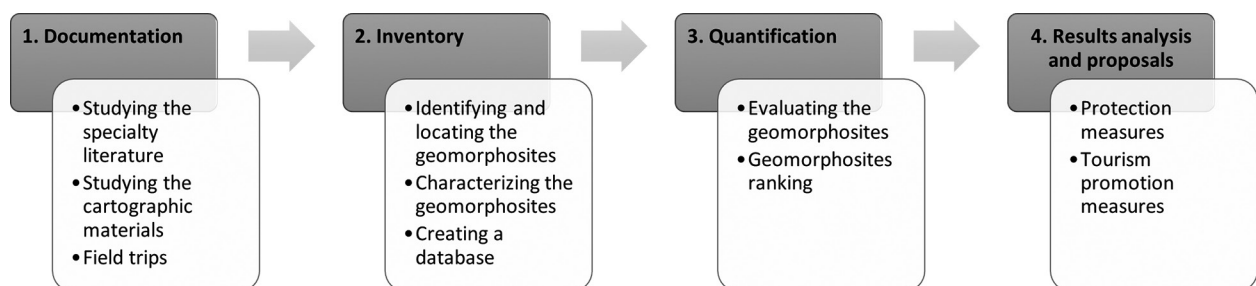


Fig. 1. The different stages of studying geomorphosites (Tufănoiu et al. 2020).

Table 1. The criteria proposed for the evaluation of the geomorphosites (acc. to Comănescu et al. 2011, with modifications and additions by Tufănoiu et al. 2020).

Scientific value		Economic value		Aesthetic value		Cultural value		Management and use value	
	25 points		20 points		20 points		20 points		15 points
1.5	Rareness at national level	4	Infrastructure	4	Visibility	4	Symbolic value	3	Preservation degree
1.5	Rareness in relation to the area	4	Accessibility	4	Colour contrast	4	Cultural characteristics	3	Intensity of use
3	Degree of scientific knowledge on geomorphological issues	4	Number of types and forms of use (inclusively touristic)	4	Level difference	2	Iconographic/ literary representations	3	Use of aesthetic, cultural and economic value
3	Palaeogeographic interest	4	Yearly number of visitors	4	Landscape framing	4	Religious characteristics	2	Vulnerability / natural risks
3	Integrity / intactness	4	Economic potential (incomes)	4	Space structuring	4	Historical characteristics	2	Relationship with planning policies
3	Use in educational purposes					2	Cultural manifestations	2	Equipment and support services
2	Diversity								
5	Ecologic value								
2	Representativeness								
1	Other geological features								
	Vs points		Ve points		Va points		Vc points		Vmu points
					Total points				
0	Minimum				Total value			1	Maximum

The economic analysis regarding the share of tourism in the local economy

This second stage of the present study involves the analysis of the 47 Administrative Territorial Units (ATUs) in the Carpathian and Sub-Carpathian area of Vrancea County from a tourism perspective by using four economic indicators: the number of companies, number of employees, turnover and profit from tourism. An economic database was created with the four previously mentioned indicators for a period of 19 years (2000–2018), based on each four-digit Classification of National Economic Activities (NACE) code. Once the database was created, it was possible to calculate the shares of the four tourism sector indicators in the total economy of each ATU. The resultant data was used to generate trend matrices regarding the share of the tourism sector in the total economy of each ATU and suggestive graphic and cartographic materials regarding the tourism sector share trend in the local economies of the Carpathian and Sub-Carpathian area of Vrancea County, Romania.

Visual comparison of the geomorphosite assessment results with the economic analysis results

The last stage of the study was focussed on making a parallel of the results obtained after the first two stages in order to demonstrate the relationship between geomorphosites and the evolution of tourism in the analysed area, as well as the role of geomorphosites in the development of local economies. A database was created, including all 47 ATUs and attributes resulting from the geomorphosite evaluation and the economic analysis. Thus, suggestive cartographic materials that can demonstrate the influence of geomorphosites on local economies in the Carpathian and Sub-Carpathian area of Vrancea County, Romania, were obtained.

Study area

The study area is located in the western part of Vrancea County, in southeast Romania,

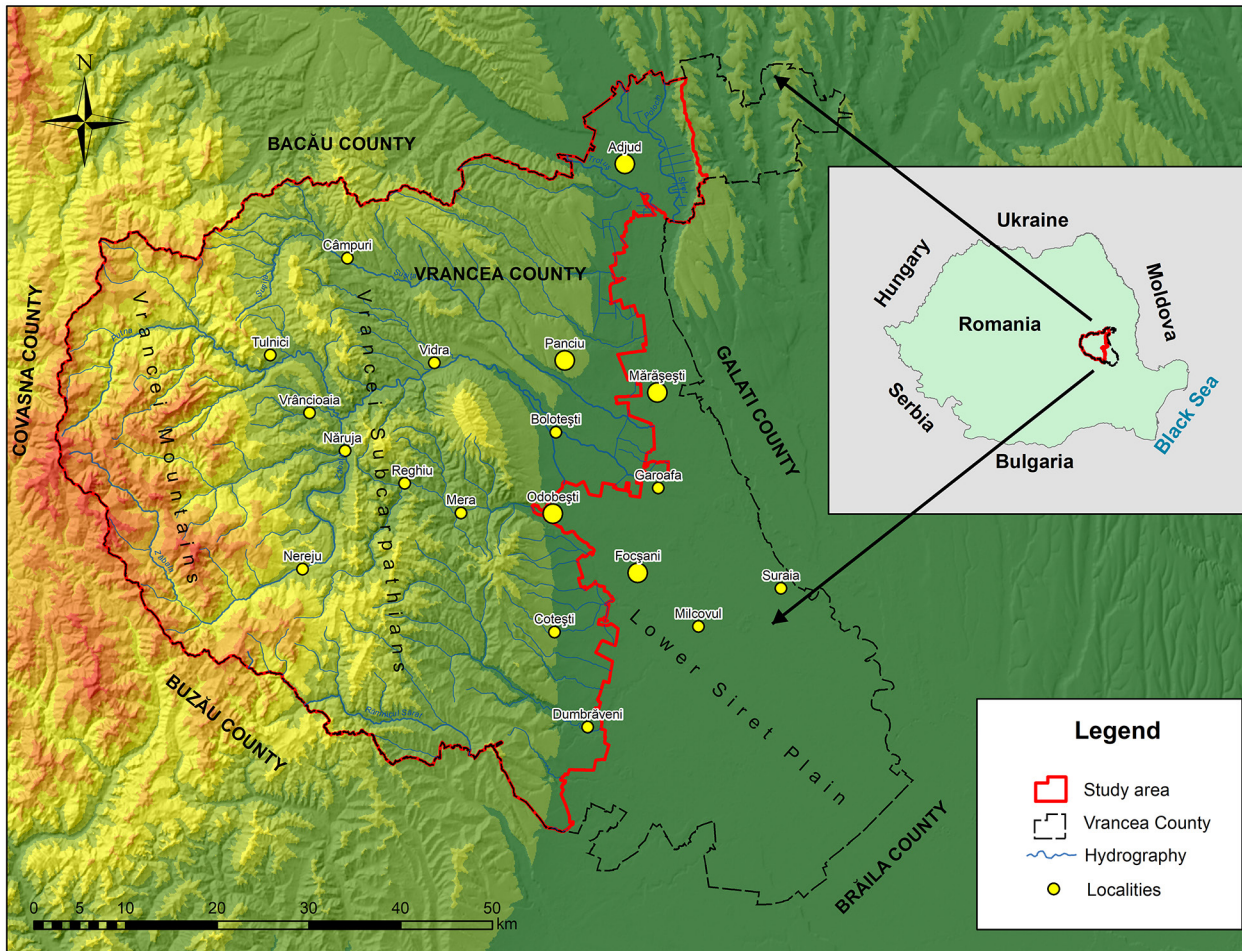


Fig. 2. The geographic location of the study area.

extending over approximately 70% of its surface (Fig. 2), which means around 3358 km² (including 47 ATUs). The main major relief units that define the position of the studied area are the following ones: the Vrancea Mountains, which represent the Carpathian part of the study area and are located on its western side; and the Vrancea Sub-Carpathians between Trotuș Valley and Râmnic Valley, which occupy the eastern part of the analysed area. These main relief units of the analysed area were formed during alpine orogenesis following the epeirogenic movements and belong to the flysch deposits (Roman 1989). One of the main characteristics of the Vrancea Mountains and Vrancea Sub-Carpathians is petrographic heterogeneity (Roman 1989), which contributes to the formation of an important geoheritage in the area. With a friendly temperate-continental climate, the study area offers favourable conditions for practising geotourism. The dominant

vegetation cover is represented by forests, of which the coniferous ones are the most significant. Another important aspect of the study area is that it includes the Putna-Vrancea Natural Park, a major natural protected area in Romania that corresponds to the fifth category according to the International Union for Conservation of Nature (IUCN) classification. All of the above characteristics make the Carpathian and Sub-Carpathian area of Vrancea County an area with geotouristic potential that is suitable for such a study.

Following field trips and consultation of available materials, a total of 22 geomorphosites from the Carpathian and Sub-Carpathian area of the Vrancea County were selected for evaluation (Fig. 3): Cascada Putnei (Fig. 4), Valea Algheanului, Cheile Tișței (Fig. 5), Groapa cu Pini, Strâmtura Coza, Cascada din Horn, Cascada Văsui, Cascada Mișina, Cheile Nărujei, Căldările Zăbalei (Fig. 6),

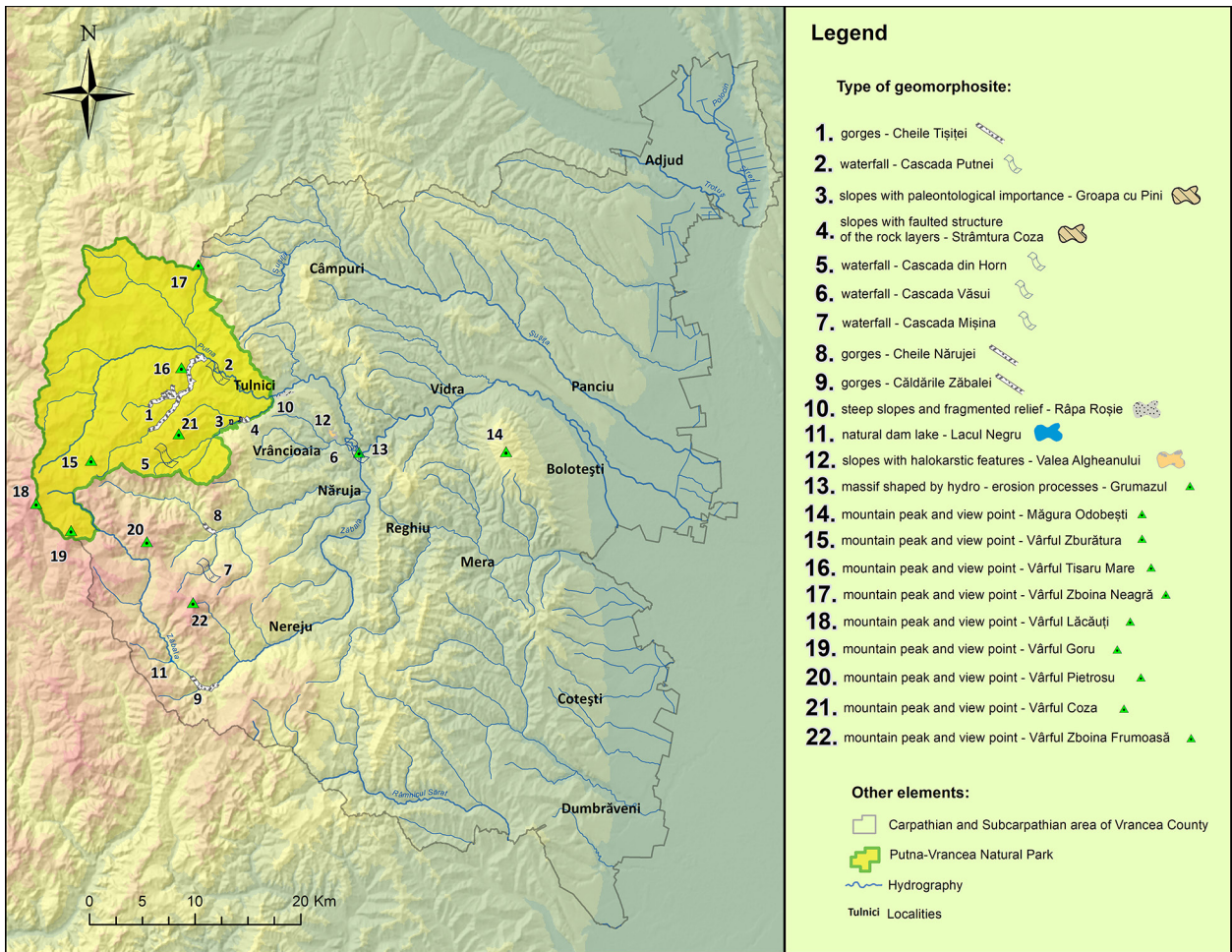


Fig. 3. The location of the analysed geomorphosites.



Fig. 4. Cascada Putnei.

Râpa Roșie, Lacul Negru (the lake bed), Grumaz, Vârful Lăcăuți, Vârful Goru, Vârful Zboina Neagră, Vârful Tisaru Mare, Vârful Zburătura, Vârful Coza, Vârful Pietrosu, Vârful Zboina Frumoasă and Măgura Odobești.



Fig. 5. Cheile Tișitei.



Fig. 6. Căldările Zăbalei.

Results

The assessment of geomorphosites

The evaluation process of the 22 geomorphosites was applied as in Table 2 (e.g., geomorphosite no. 2: Cascada Putnei), by assigning points to each geomorphosite according to the criteria presented above in Table 1. The final

values and scores of the geomorphosites are presented in Table 3 and Figure 7.

Following the evaluation, the maximum value of 0.77 was obtained by geomorphosite number 2 (Cascada Putnei), and the minimum value was recorded by geomorphosites 6 and 20 (Cascada Văsui and Vârful Pietrosu), obtaining a total value of 0.41.

Considering that most of the analysed geomorphosites are part of a protected area (some of them even have the status of independent nature reserves), they enjoy a favourable legislative framework, which positively influences their protection.

The economic analysis regarding the share of tourism in the local economy

In order to create the map of the tourism sector share trend in the local economies of the Carpathian and Sub-Carpathian area of Vrancea County, the shares of the economic indicators of the tourism sector from the indicators related to the entire economy were initially calculated for each year and each individual ATU.

Table 2. An example of the assessment (applied on the geomorphosite no. 2 Cascada Putnei).

Scientific value		Economic value		Aesthetic value		Cultural value		Management and use value	
25 points		20 points		20 points		20 points		15 points	
1.5	Rareness at national level	3	Infrastructure	4	Visibility	3	Symbolic value	2.5	Preservation degree
1.5	Rareness in relation to the area	4	Accessibility	4	Colour contrast	4	Cultural characteristics	2.5	Intensity of use
3	Degree of scientific knowledge on geomorphological issues	2	Number of types and forms of use (inclusively touristic)	4	Level difference	0.5	Iconographic / literary representations	2.5	Use of aesthetic, cultural and economic value
3	Palaeogeographic interest	3	Yearly number of visitors	2	Landscape framing	2	Religious characteristics	1	Vulnerability / natural risks
2.5	Integrity / intactness	3	Economic potential (incomes)	2	Space structuring	2	Historical characteristics	1	Relationship with planning policies
3	Use in educational purposes					0.5	Cultural manifestations	1.5	Equipment and support services
1.5	Diversity								
4	Ecologic value								
2	Representativeness								
1	Other geological features								
	23		15		16		12		11
					77 points				
0	Minimum				0.77			1	Maximum

Table 3. The ranking of geomorphosites.

No.	Name	Scientific value	Economic value	Aesthetic value	Cultural value	Management and use	Total points	Evaluation score	Rank
1.	Cheile Tișiței	23	11	17	11	10	72	0.72	2
2.	Cascada Putnei	23	15	16	12	11	77	0.77	1
3.	Groapa cu Pini	21	6	15	13	7	62	0.62	7
4.	Strâmtura Coza	19	6	15	11	7	58	0.58	10
5.	Cascada din Horn	12	4	16	12	6	50	0.50	14
6.	Cascada Văsui	10	5	11	11	4	41	0.41	18
7.	Cascada Mișina	21	6	18	11	8	64	0.64	5
8.	Cheile Nărujei	22	8	17	11	7	65	0.65	4
9.	Căldările Zăbalei	23	7	16	11	8	65	0.65	4
10.	Râpa Roșie	21	10	14	11	7	63	0.63	6
11.	Lacul Negru	20	7	15	11	6	59	0.59	9
12.	Valea Algeanului	18	9	11	12	6	56	0.56	12
13.	Grumaz	8	5	15	13	5	46	0.46	16
14.	Măgura Odobesti	16	9	17	15	10	67	0.67	3
15.	Vârful Zburătura	12	3	19	8	7	49	0.49	15
16.	Vârful Tisaru Mare	12	6	20	8	9	55	0.55	13
17.	Vârful Zboina Neagră	14	7	20	9	11	61	0.61	8
18.	Vârful Lăcăuți	12	6	19	9	10	56	0.56	12
19.	Vârful Goru	16	3	20	10	8	57	0.57	11
20.	Vârful Pietrosu	8	3	18	6	6	41	0.41	18
21.	Vârful Coza	9	4	18	8	6	45	0.45	17
22.	Vârful Zboina Frumoasă	12	3	20	8	7	50	0.50	14

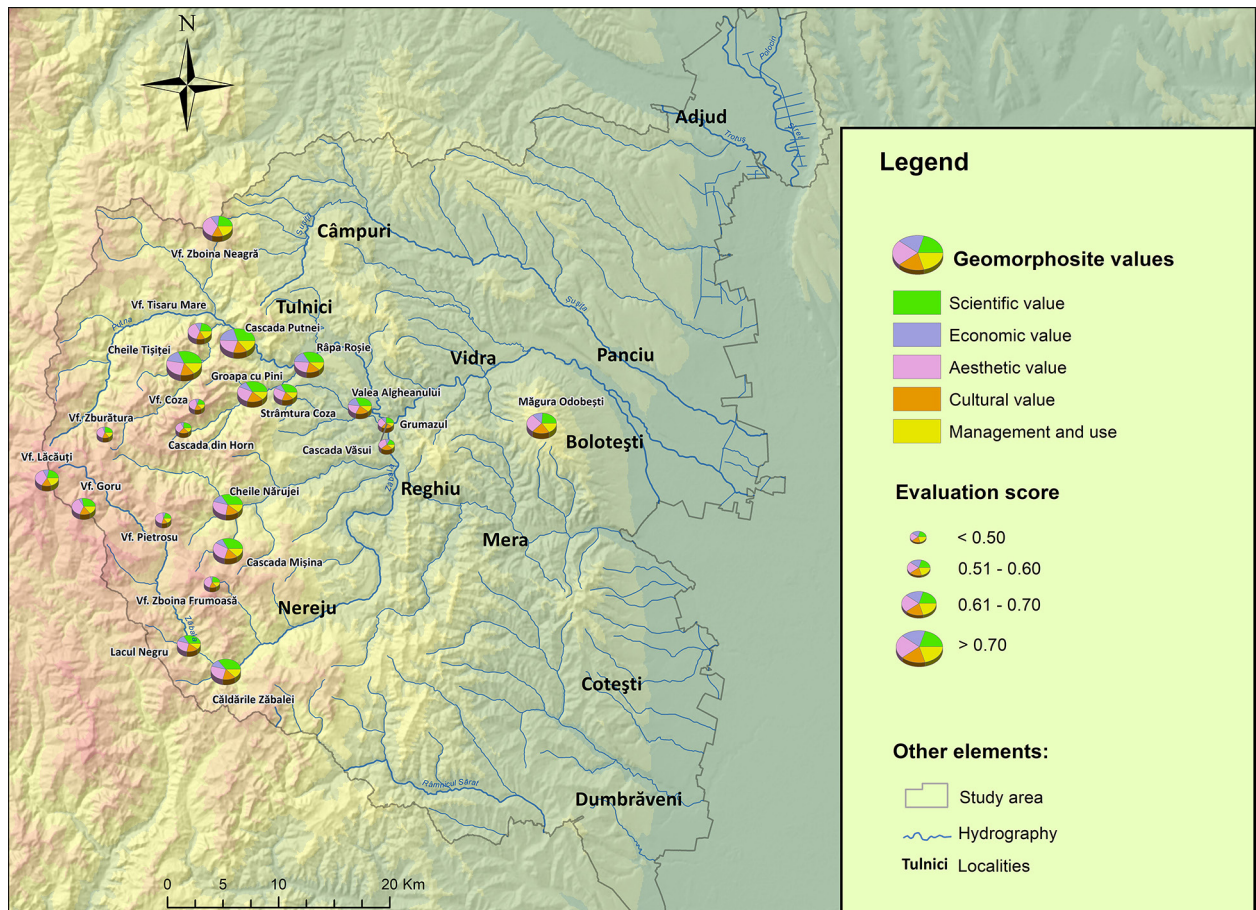


Fig. 7. The evaluation of the geomorphosites.

Trend matrices (one for each indicator: number of companies, number of employees, turnover and profit from tourism) regarding the share of the tourism sector in the total economy of each ATU were generated. The resulting numerical

data served as the foundation for the creation of evolution graphs (Figs 8, 10, 12 and 14), as well as suggestive cartographic materials (Figs 9, 11, 13 and 15). For each tracked economic indicator, two examples of evolution are presented in the

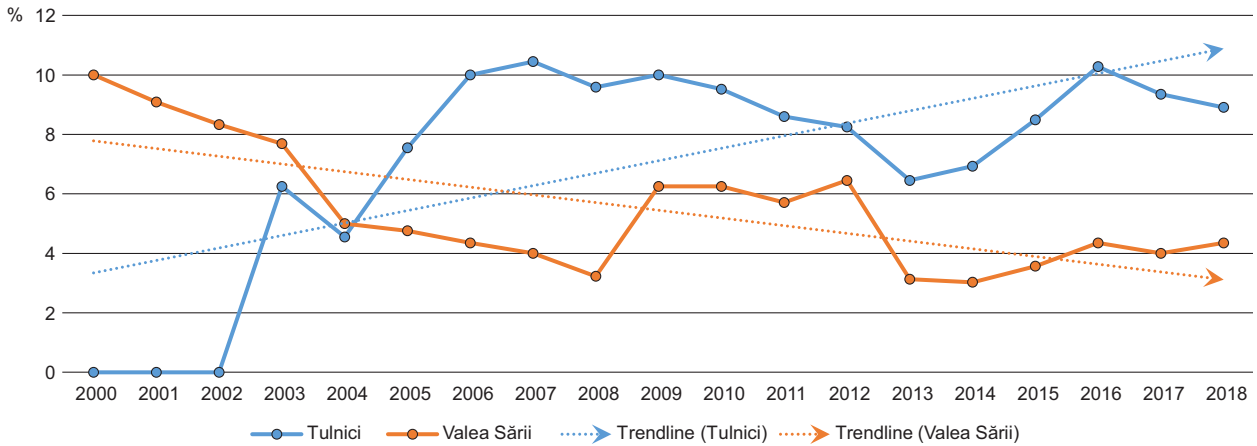


Fig. 8. Tourism companies share trend for Tulnici and Valea Sării, 2000-2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

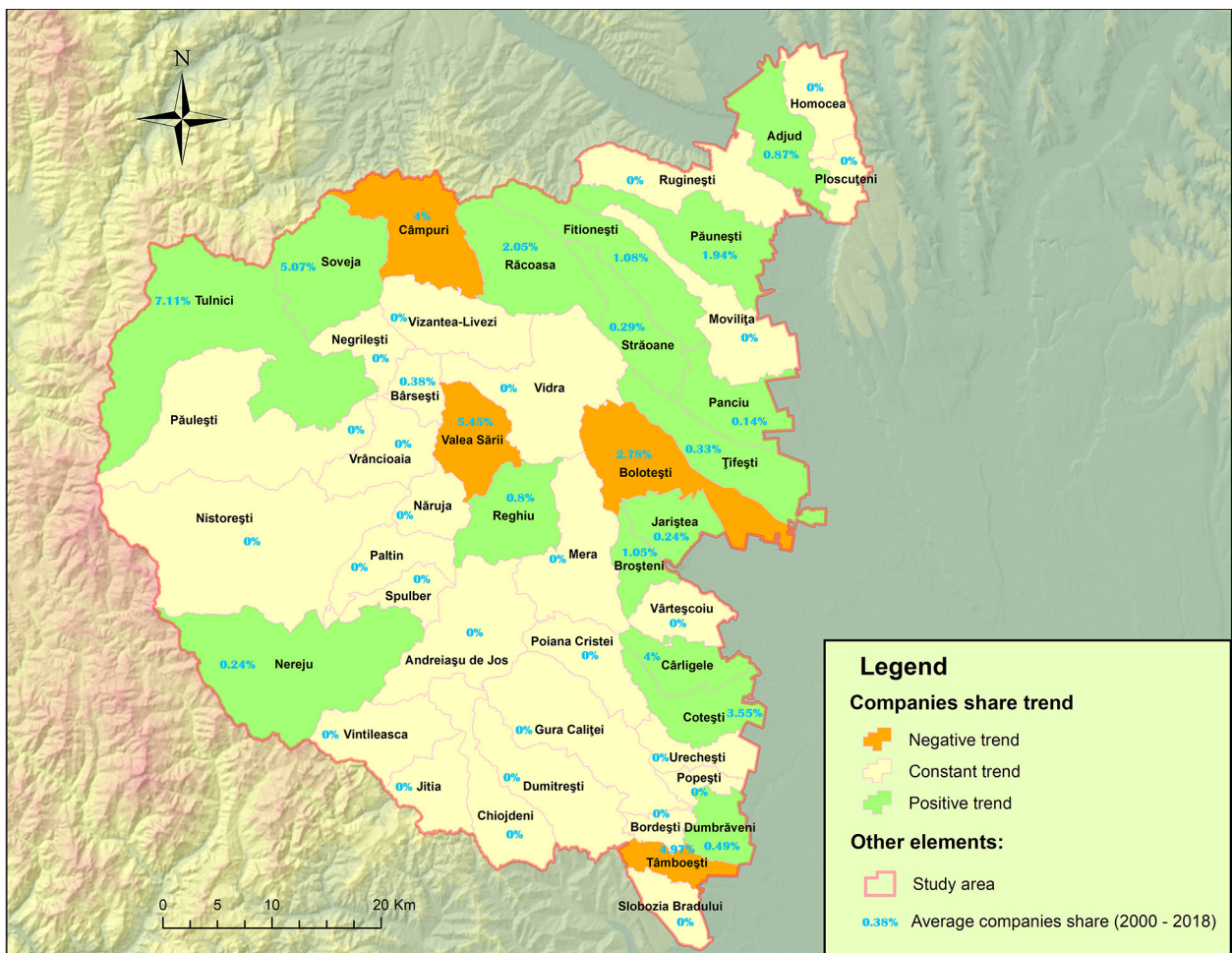


Fig. 9. Tourism companies share trend for each ATU, 2000-2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

graphs (a positive evolution in blue and a negative evolution in orange). In the trend maps, the red colour marks a negative trend, the yellow/orange indicates a constant trend or no tourism data during the analysed period, and the green

highlights a positive trend. The average share of the analysed period is displayed (with blue colour) for each ATU and each economic indicator in order to set a reference regarding the intensity of practising tourist activities. Thus, regarding

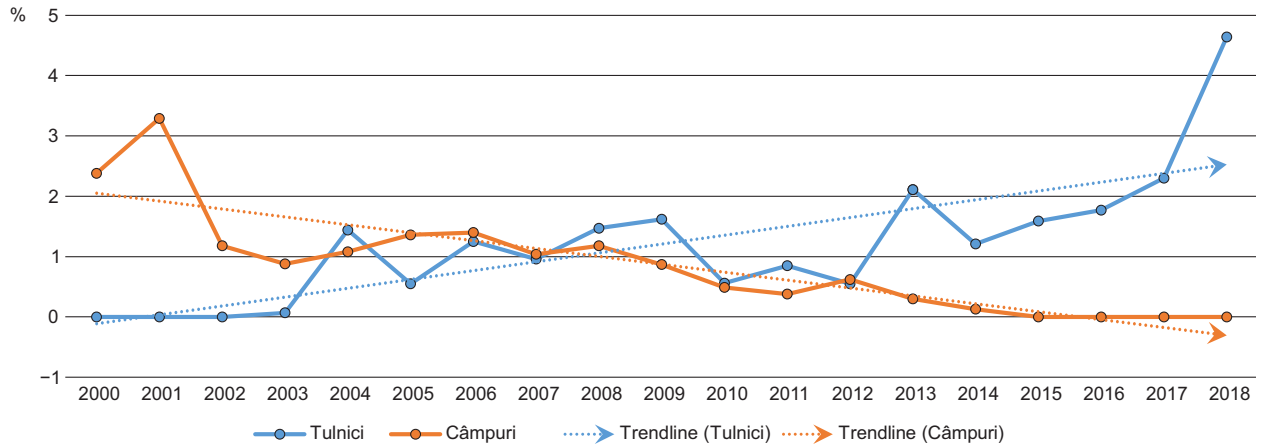


Fig. 10. Tourism turnover share trend for Tulnici and Câmpuri, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

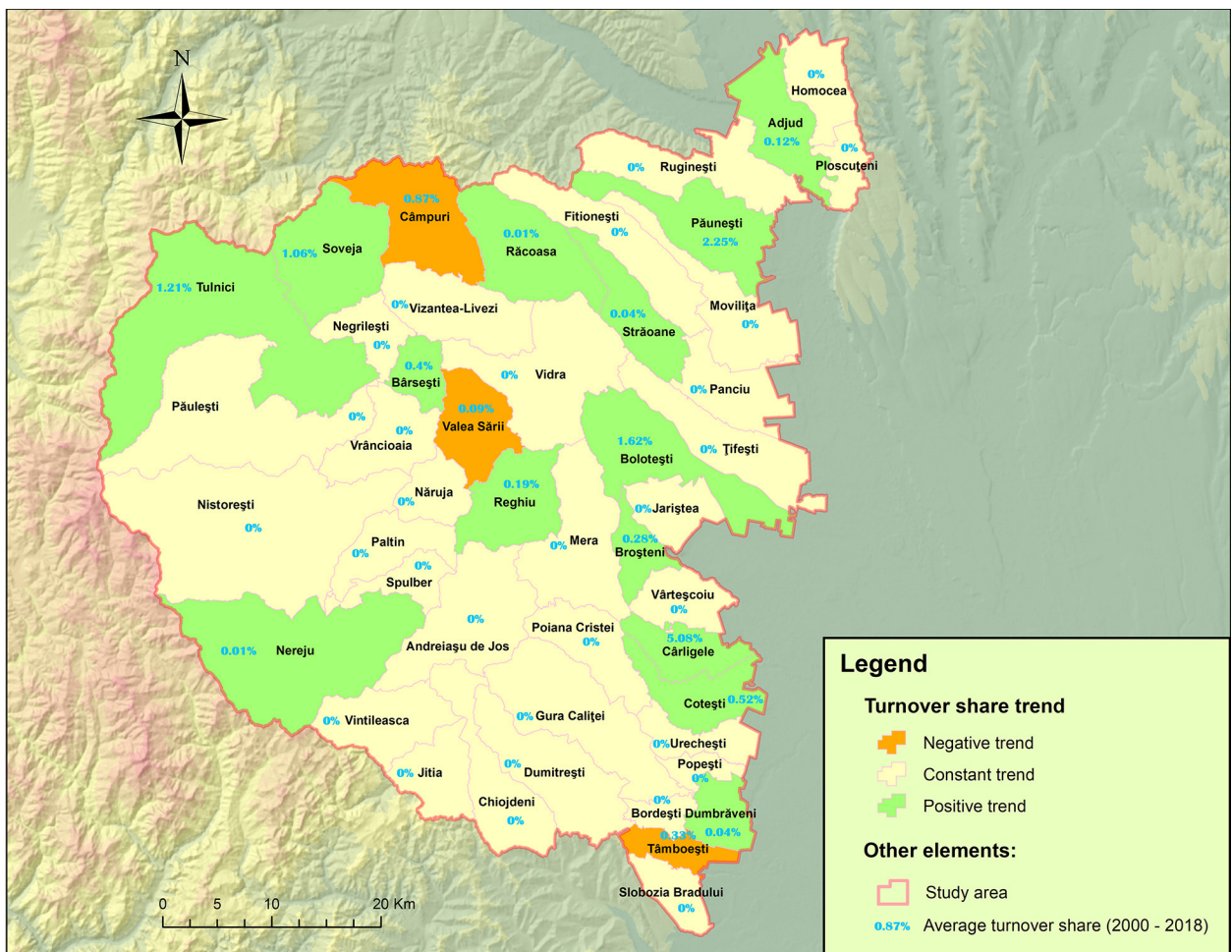


Fig. 11. Tourism turnover share trend for each ATU, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

the share of tourism companies in the total number of active companies, the trend matrix was composed of 16 ATUs with a positive trend, four ATUs with a negative trend, and 27 ATUs with a constant evolution (Fig. 9).

For the second indicator used in our analysis, the trend matrix includes 14 ATUs with a positive trend of the share during the 19 years of analysis, three ATUs with a negative trend and 30 ATUs with no data (Fig. 11). The share

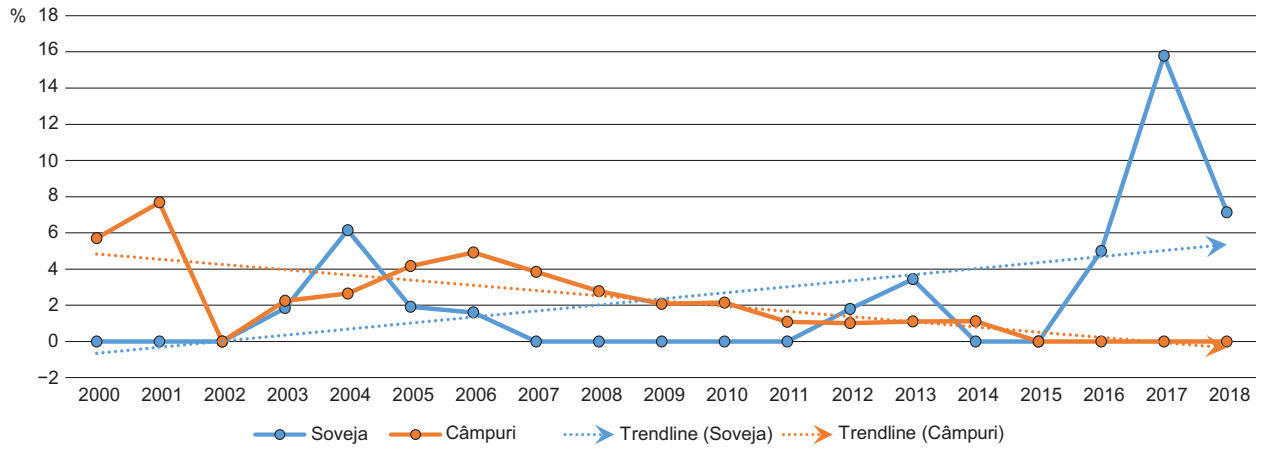


Fig. 12. Tourism employees share trend for Soveja and Cămpuri, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

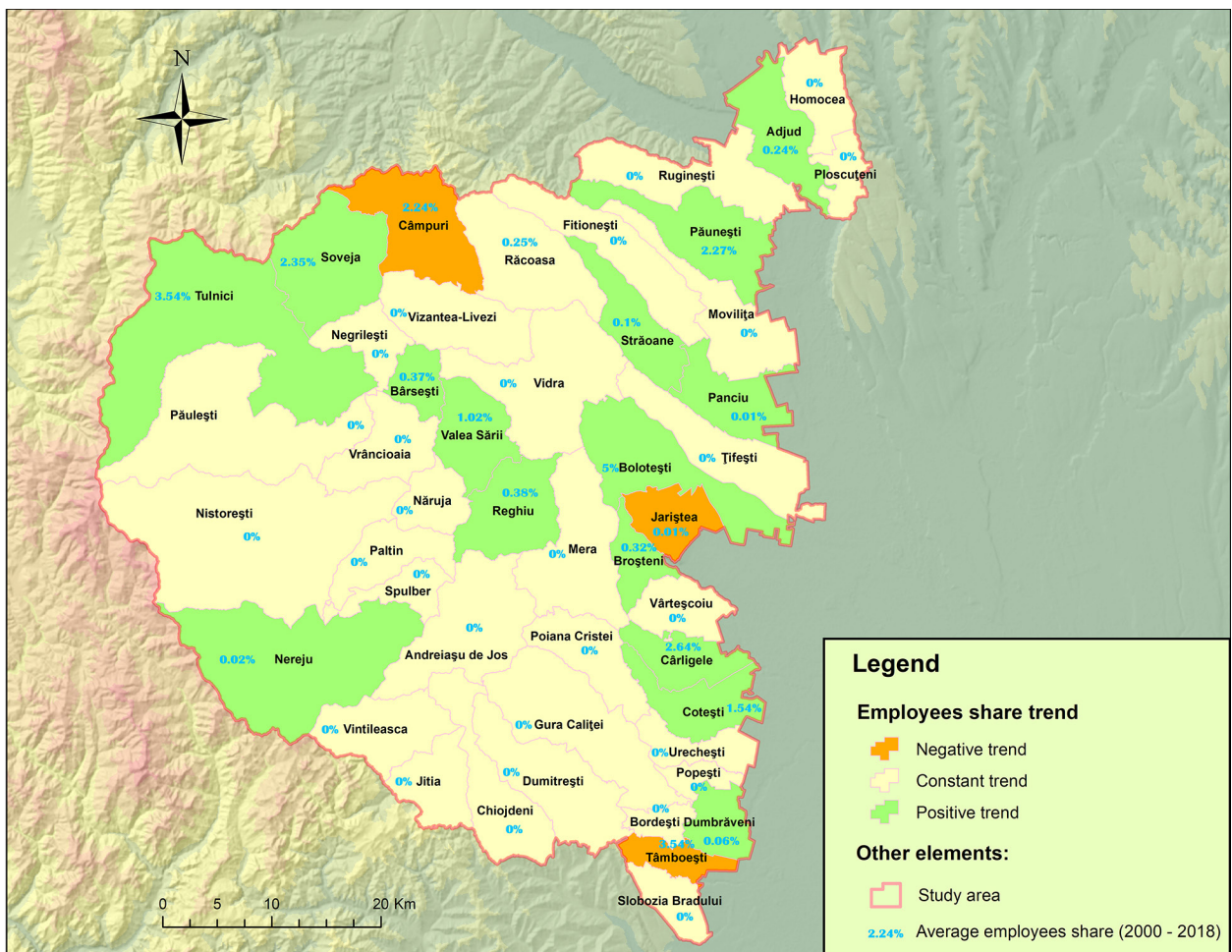


Fig. 13. Tourism employees share trend for each ATU, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

of tourism sector employees had an increasing trend in the case of 15 ATUs, a decreasing trend for another three ATUs, and an unchanged evolution for the remaining 23 ATUs of the study area (Fig. 13).

Regarding the last indicator used, the trend matrix of tourism profit share registered a positive evolution during the studied period for 13 ATUs, a negative trend for two ATUs and a constant evolution for the remaining ATUs (Fig. 15).

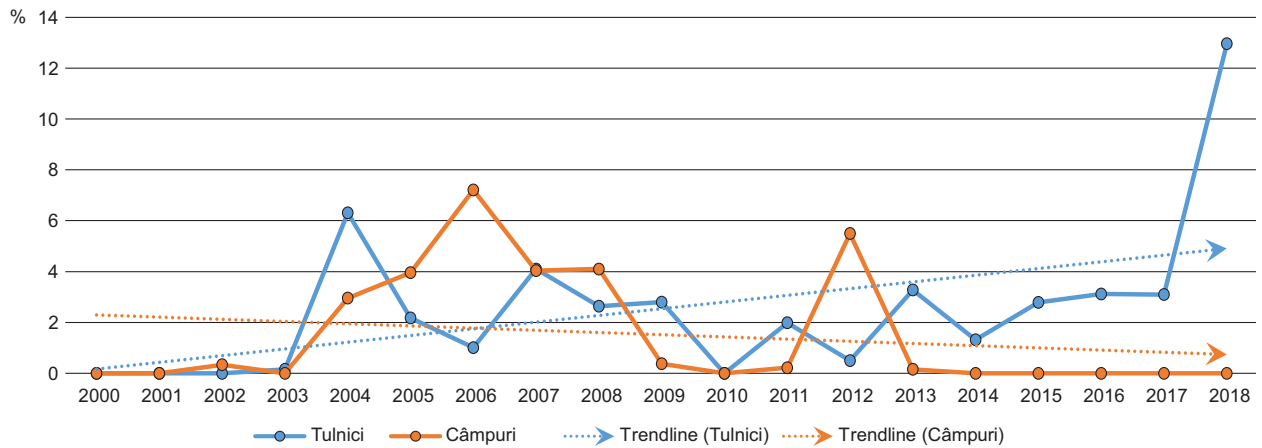


Fig. 14. Tourism profit share trend for Tulnici and Câmpuri, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

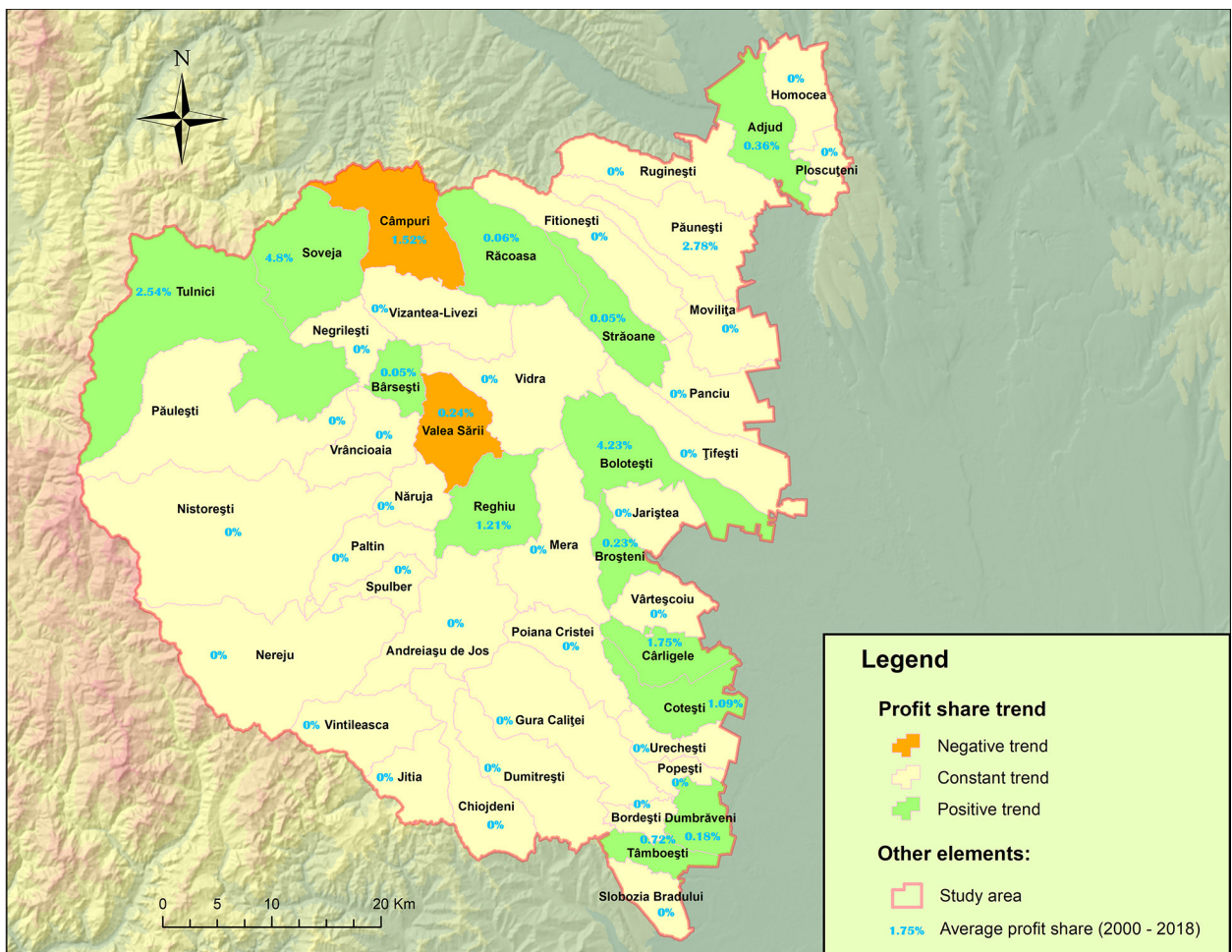


Fig. 15. Tourism profit share trend for each ATU, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

Depending on the share trends obtained for each individual economy at the level of the tourism sector during the 19 years of analysis, five categories of tourism sector share trends in local economies were obtained (Fig. 16). The first category represents a clearly negative evolution of the tourism sector share trend in the local economy, in which the evolutions of all four indicators had this tendency during the 19 years of analysis. The second category represents a predominantly negative evolution, in which three of the four indicators had a negative evolution, while the fourth indicated the opposite. The third category is that of ATUs whose tourism sector had no contribution to the local economy, thus there was no evolution of the share. The fourth category marks the ATUs that experienced a predominantly positive evolution of the tourism sector share trend in the local economy, with three out of four indicators confirming the positive

evolution, while the last category represents a clearly positive evolution.

Visual comparison of the geomorphosite assessment results with the economic analysis results

To highlight the relationship between geomorphosites and the evolution of tourism in the analysed area, a map that includes attributes specific to the geomorphosite evaluation stage, but also attributes specific to the economic analysis stage, of the evolution of the tourism sector in the analysed area was created (Fig. 16).

Discussion

Many authors have addressed the evaluation of geomorphosites (Coratza, Giusti 2005,

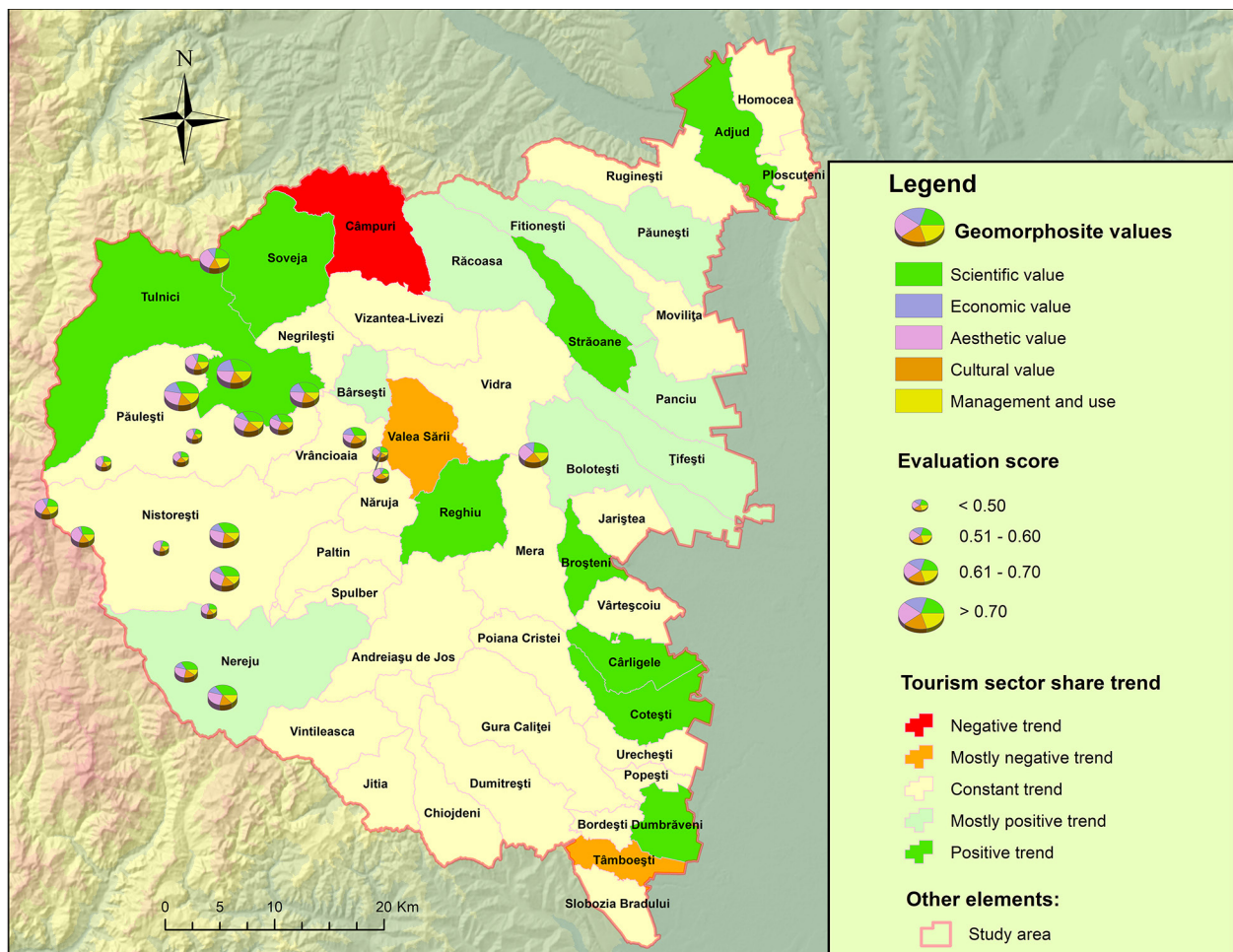


Fig. 16. The relationship between the geomorphosite assessment and tourism sector share trend for each ATU, 2000–2018 (acc. to Research Centre for Integrated Analysis and Territorial Management, 2022).

Serrano, Gonzalez-Trueba 2005, Pereira et al. 2007, Comănescu, Nedelea 2010, Erhatic 2010, Comănescu et al. 2011, Vujičić et al. 2011, Brilha 2018, Tufănoiu et al. 2020, Barbălată, Comănescu 2021, Pal, Albert 2021), as well as the economic approaches of tourism (Drăghici et al. 2015, Grecu et al. 2019), but none have presented a method that combines these two types of study, geomorphosite assessment and tourism economic analysis, to demonstrate the relationship between geomorphosites and the tourism sector.

At first glance, it is clear that the majority of the geomorphosites are concentrated in the western and northwestern parts of the study area. It can also be observed that seven out of the 22 geomorphosites are located within or in the immediate vicinity of the administrative boundary of Tulnici ATU, and many others are located in the areas of neighbouring ATUs. It is important to analyse the results from a quantitative point of view (the density of the geomorphosites in a specific area), but especially from a qualitative one, because an important geomorphosite can have a greater influence on the local economy than several others with lower values. In this regard, it can be observed that two (Cascada Putnei and Cheile Tișitei) out of the seven geomorphosites located in the area of Tulnici ATU represent the geomorphosites that obtained the first two positions following the evaluation carried out in the first stage of the study.

Drawing a parallel between the positioning of geomorphosites, the score obtained by them in the evaluation and the evolution of the tourism sector share trend in the economy, we can assume that the geomorphosites have a positive influence on the evolution of the tourism sector and the development of local economies. Even if the area of Tulnici-Soveja ATUs confirms the efficiency of the method, it is a partial one because it can be observed that in the analysed area, there are some ATUs with a positive evolution of the tourism share trend in the local economy, although they are not directly influenced by geomorphosites (Adjud, Străoane, Broșteni, Cârligele, Cotești and Dumbrăveni). The positive evolution of the tourism sector share trend in the economies of these ATUs can be explained by a tourism activity stimulated by other factors (the practice of wine tourism, positioning along a heavily trafficked road section or urban centres).

The perfect method for this research does not exist; there will always be a slight subjectivity from the evaluator (Pal, Albert 2021) or difficulty in obtaining relevant data. Although the presence of geomorphosites is an important aspect that influences economic indicators, there can be other reasons that contribute to the positive evolution of the tourism sector (attractive vegetation and fauna; presence of cultural heritage such as old wooden churches; ecotourism activities). Despite the fact that this method is only a visual comparison of the results and has limitations, it can aid in understanding the complex relationship between geoheritage and economy and can serve as a jumping-off point for future research.

Conclusions

The first stage of the study consisted of the evaluation of geomorphosites in the Carpathian and Sub-Carpathian area of Vrancea County. The results of this first stage highlight very high values of aesthetic value for most of the analysed geomorphosites, an important aspect for the eventuality of touristic exploitation of these objectives. With a few exceptions, the scientific value represents a large part of the total value of the geomorphosites, which demonstrates their great importance from a scientific point of view. Regarding the cultural value, an important aspect for possible tourism utility, the fact that the analysed area is under the influence of the cultural region known as 'Țara Vrancei' has a big impact. It should be noted that most of the geomorphosites scored low for economic value, mostly due to the lack of infrastructure and poor accessibility, but also for management and use value. This fact should prompt immediate measures by the local authorities in order to improve the weak points.

The second stage of the present study represented the contribution of economic data necessary to establish the evolution of the tourism sector in the period 2000–2018 at the level of each ATU. Following the completion of the trend matrix and trend maps regarding the share of the tourism sector in the economy of each ATU for each of the four economic indicators, it can be observed that some evolutions were positive, some were negative, but most of them had a constant

evolution (the ATUs with a share of zero for all 19 years). Even though several ATUs experienced a positive trend in the share of the tourism sector in the economy during the analysed period (Tulnici, Soveja, Reghiu, Străoane, Adjud, Broșteni, Cârligele, Cotești and Dumbrăveni), the Tulnici ATU stood out through a much clearer evolution than the others.

The results of the third stage of the study consist of a graphic representation that includes both the information obtained from the completion of the first stage and the information resulting from the second stage of the study. It allows us to have an overview of all attributes and to observe that there is a connection between the position of geomorphosites, their values and the tourism sector share trend in local economies.

This study can make an important contribution to the development of methodologies dedicated to the analysis of the role of geomorphosites for the development of the tourism sector and local economies, but it can also increase the degree of awareness among the population regarding the tourism value of geomorphosites and help to re-evaluate strategies for protecting or promoting them.

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