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THE TOURISM DEVELOPMENT OF THE SUREANU MASSIF BY VALORISATION OF THE NATURAL POTENTIAL

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Abstract

The extraordinary complexity of the natural setting, the excellent geographical position, the diversity of landforms, the multitude of tourist resources resulting from human creations (cultural, historical, technical, economic, etc.) within the Șureanu Massif are favorable conditions for tourism development. The uneven distribution of the elements of the tourist potential has determined the creation of tourist concentrations with an easily observable territorial distribution: the natural tourist potential is found mainly in the central, less anthropized part of the massif, where it abounds in various tourist objectives. As we move away from the high central area and approach the hearth of the meadow settlements, the spectacular relief decreases, the natural tourist elements being replaced by the anthropic tourist potential, consisting of unique anthropic buildings, of a special beauty. The diversity of resources with tourist attractiveness was the basis for the development of a varied mountain tourism (winter sports, speotourism, weekend tourism, adventure tourism, integrated tourism, cultural tourism, etc.).

Key words**:** *GIS, development, natural potential, tourism planning, valorisation.*

INTRODUCTION

The Șureanu massif presents a generous natural setting and has constantly attracted the attention of many geographers who have crossed these mountains and tried to mark these things through their writings. The natural resources with tourist attractiveness are numerous and can be found on the whole surface of the massif. The natural tourist potential is thus distinguished by its diversity, being determined by the morphological stratification from the periphery to the interior of all the components of the natural environment which in turn determined a certain type of habitation and natural valorisation (Voicu, 2019).

On the territory of the Șureanu Massif, the morpho-touristic potential "is established in the richest and most varied tourist resource and constitutes the backbone of any landscape", being involved in drawing the attractive features of the other elements of the natural environment, such as hydrographic, climatic or biotic (Cocean, 1996).

The tourist development of the massif can be materialized with the help of the diversified and complex natural environment, the existence of the areas declared as protected areas to which is added the influence of some physical-geographical factors (climate, hydrography, vegetation, etc.). The different valorisation, in the past, of the elements of attractiveness was mainly due to the degree of accessibility compared to the main centers of tourist interest.

MATERIALS AND METHODS

In the achievement of the desideratum of tourism development of the Șureanu Massif were accomplished using different methodological tools, methods, techniques and means, treated separately in the following.

a. *The creation of the database:* it was the first stage of work for the realization of this study. Starting from the choice of the research topic, the study area and its current limits were individualized, seen through the prism of several applied criteria (geology, geomorphology, etc.). In the case of cartographic representation, for a better accuracy of the already existing digital models, the main elements found in most of the drawings (hydrography, access infrastructure, built perimeter, etc.) were vectorized and the primary or secondary data were entered in ArcGIS 10.1. The documentation stage for the

cartographic representation of the main phenomena or elements studied and not only was completed by accessing current or older cartographic materials and collecting data from specialized institutions or by accessing public databases.

b. *The on-site documentation* included discussions with representatives of public and/or private authorities to identify the views, visions and issues facing the community or existing local/regional socio-economic initiatives. Some hypotheses regarding the territorial reality were verified, certain information from the field was collected and updated, eliminating certain data recorded incorrectly or that no longer correspond to reality. The objectives, buildings and phenomena of interest identified in the field were also photographed.

c. *The data processing* was performed using various programs and software of a general nature (Microsoft Office) or specific (AutoCAD, ArcGIS 10.1 etc.).

d. *The interpretation of the results* and the elaboration of the maps had as first step the consultation of the specialized literature, which consisted in works that can be found in profile libraries, scientific articles dealing with the studied subject, national and international databases, cartographic documents that served capturing some evolutionary territorial analyzes (orthophotoplanes). Based on this information, we made maps for each type of analysis at the level of the components of the Șureanu Massif territorial system, being analyzed at local level and synthesized at regional level. The last step consisted in writing the study.

RESULTS AND DISCUSSIONS

A first step for achieving the desideratum of development and valorisation of tourism of the natural morphotourism potential of the Șureanu Massif is its correct spatial delimitation (Figure 1). The boundaries of the region have been drawn and treated in various specialized studies, each of the authors having his own opinion on this issue (Voicu & Voicu, 2018).

In this case, the delimitation offered by Trufaș V. and Trufaș C. (1986), Velcea V., Savu Al. (1982) and the Romanian Carpathians, 1987, was taken into account, being considered adequate for the development and valorisation of tourism because of it supports maintaining the unity of geomorphological individuals. It was followed by inventory of the morpho-touristic potential, which is being found on the entire surface of the Sureanu Massif and determined by the morphological stratification from the periphery to the interior of all the components of the natural framework and which in turn determined a certain type of living and natural valorization.

Within the Sureanu Massif we find a varied number of morpho-touristic elements that will be treated separately during this paper.

The tourist potential of the High Mountains in the Șureanu Massif is noticeable at the level of four peaks that exceed 2000 m altitude: Pătru's Peak - 2130 m, Șureanu Peak - 2059 m, Cârpa Peak - 2012 m and Auşel Peak - 2009 m.

The relief modeled on crystalline shales impresses the Șureanu massif with contrasting physiognomies, essential elements for the development of tourism, consisting of strong orographic nodes, gentle or tiered peaks and systems of narrow and deep valleys, with frequent slope breaks. The main ridge of the massif, located in the southeast, is established in a real orographic node, with a length of 50 km and an east-west orientation (between Vârful lui Pătru and Mr. Taia). The high altitudes, with the appearance of domes, which consist of several heights (Taia - 1702 m, Ștevia - 1763 m, Comărnicel - 1894 m, Gropșoarele, Pârva - 1901 m, Șureanu - 2059 m and Vârful lui Pătru - 2130 m), are sweetened by their integration within a structural surface, the Borăscu platform - which presents an overall aspect of a true “suspended plain”, whose unit is relatively destroyed by the Gura Poteculuiand Șureanu curbs.

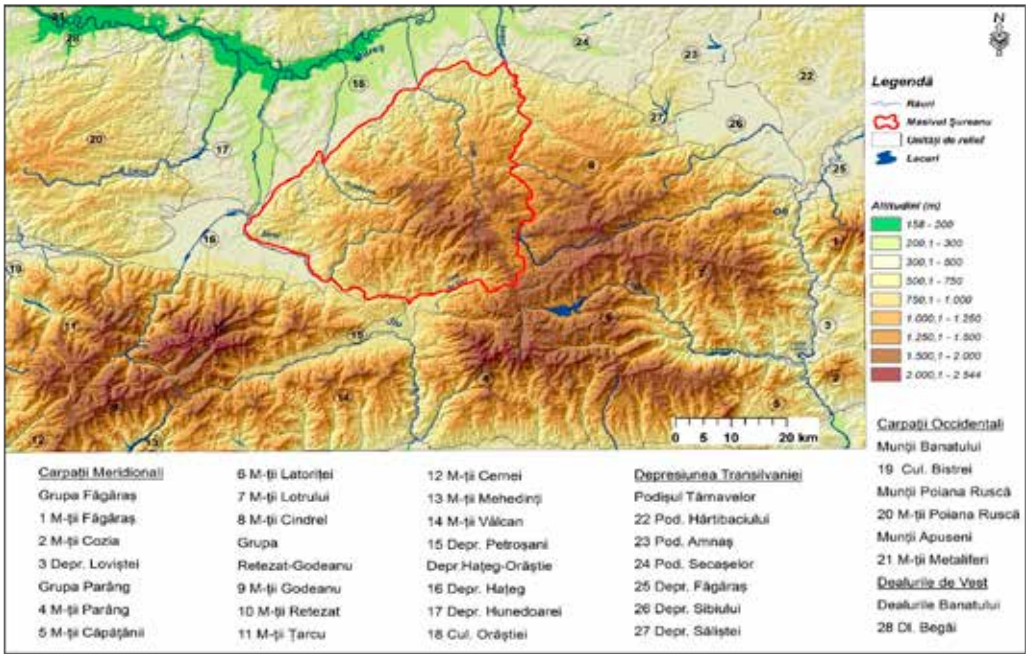

Figure 1. Șureanu Massif. Geographic location

The Borăscu, Râu-Șes and Luncani erosion platforms, through the gentle physiognomies of suspended plains, wide interfluvial bridges, steps and shoulders present within them, are established in morphometric elements favorable to hiking, by ensuring special visibility on the surrounding geographical landscapes. The presence of marginal glacial circuses, generated by quaternary plateau glaciers, enhances the charm of the Borăscu platform.

Crystalline shales thus develop unique and particularly interesting geological structures, confirmed by Law no. 5 of March 6, 2000 on the approval of the National Spatial Planning Plan - Section III - Protected Areas, where we find in the category of monuments and nature reserves the following geological reserves: "Oul Arșiței", "Masa Jidovului", "Stânca Grunzii" and "La Grumaji".

In the upper part of the mountain region, the glacial relief is developed, which has associated forms characterized by specific physiognomies, obviously increasing, through charm and variations introduced in the geographical landscape, the degree of attractiveness of the Șureanu Massif. Thus, simple glacial circuses appear, with the appearance of nests, except for the Cârpa circus, which shows a complex development. Their association with the forms of the cyclical relief imprints on the high floor a "Borăscu-type" physiognomy (Cocean, 1996). The areas on which the glacial relief is developed are less typical and appear on small surfaces, at altitudes over 1650 m., Cârpa, Pârva and Gropșoara, as well as those in the upper basins of some tributaries of Sebeș and Jiu de Est. It is represented by simple glacial circuses of the Pyrenean type, the most outlined being those with a northern exposure from Pătru, Șureanu, Cârpa and Pîrva. Thresholds, ram's backs and moraines are recognized in them.

The most important morphotourism differentiation, even if manifested on a relatively small territory in relation to the surface of the massif (4.5%), is induced by the appearance of limestones. "The presence of limestones in the southwestern part of the massif has determined the appearance of karst forms of surface and depth, particularly spectacular, but little known to hiking lovers" (Trufaș & Trufaș, 1986).

The speoturistic potential within these areas is a special one, expressed by the diversity of the forms of the calcareous and karstic relief. It is illustrated especially by caves, deep karst

forms, which were systematically studied by the members of the Speleology Club "Emil Racoviță". Their number is difficult to determine and differs depending on the authors due to the definition criteria used. Their most representative inventory was made by Trufaș and Trufaș (1986), authors who considered a number of 46 caves and avenues as the most representative, caves that are numbered in the text and represented cartographically in Figure 4. Of these, two are over 2000 m long: Ponorici-Cioclovina karst system (7890 m), (Figure 2) and Șura Mare Cave (3143 m) (Figure 3) and three have elevation differences of over 100 m: The Oat from Dosul Lăcșorului (268 m), Ponorici karst system -Cioclovina (174 m) and the oat from Tăul Negru (Bâtan) (101 m). The tourist and environmental value of some of them (Ponorici-Cioclovina Karst Complex (1.5 ha), Șura Mare Cave and Tecuri Cave) is confirmed by Law no. 5/2000, where they are classified as nature reserves and monuments. Tourists eager to practice speotourism look for them especially because of the attractiveness resulting from the special shape of the underground void, the size and manner of formation, the richness and diversity of stalagmite forms and fossil ice deposits, the difficulty of exploration and traces of primitive man.

On the surface of the massif, we find four areas with different extensions in which this type of relief is spread: Vârtoapele Massif, Cioclovina - Baru Mare Area, Crivadia Area - Disease Cave and Piatra Leșului Area (Drăguț, 2003)

The Vârtoapele Massif Karst Area is developed in the form of a limestone plateau with an area of approximately 2.5 km^2 and an average altitude of 900-950 m (the maximum being 1004 m), being delimited by Valea Rea (west), Valea Anineșului and Valea Mică (south) and Culmea Comărnicel (northeast). The exocarstic relief forms found on its surface are represented by sinkholes and lapies, the most widespread being sinkholes, with a diameter ranging from 2-3 m to 60 m (with an average value of 40 m), and the depth between 1-25 m (the most common having depths of 10-15 m), (Trufaș & Trufaș, 1986). The genesis of sinkholes can be explained by the corrosion process, which is suggested by the funnel shape of most sinkholes.

Figure 2. Cioclovina with Water Cave

Figure 3. Șura Mare Cave

The endocarst forms are smaller in number and size and consist of small caves clogged with detritus, Piatra Bodii cave, La Izvoare cave or Capul Pietrii avenue.

The Cioclovina-Baru Mare area is located between Bârnei, north-west and Petrosului, south-east. In the northern part of the border, the contact with the Christian Cistern is in the south, forming a sedimentary sediment of the superior Cretaceous. It includes a karstic plateau, Ponorici-Cioclovina, dominated by hills, which appear as witnesses of erosion: Mr. Arsului, Mr. Robului, Mr. Padeș, Mr. Mocșoarei, Mr. Law, Bl. Blidaru, Mr. Mătușanului etc (Voicu, 2019).

The exocarst is varied and well represented, here we find clints, which appear everywhere, in free or buried form. The most numerous are the sinkholes, which are grouped in the form of fields (Ponorici plateau, where they form an uvalas depression) or rows of sinkholes, forming valleys (Albii valley, Lunca Priporului, etc.). The valleys of this land appear as relic valleys, completely devoid of water, during

which numerous antithetical steps can be observed, developed downstream by the successive water losses. The steep slopes appear to the northwest and have a diverse limestone relief (needles, towers, spurs and overhangs), to which are added caves and oats. The contact karst depressions Ponorici and Fundatura Ponorului, appear at the contact of the limestones with the impermeable rocks in the vicinity, in this case crystalline schists. Considered by some authors to be polished, it beautifies the landscape offered by the karst relief. The Ponor Foundation is the largest and most complex depression in the Șureanului Mountains, with a length of 1200-1300 m (Voicu, 2019).

The endocarst is also well represented by numerous caves and oats, there are several categories of caves depending on the formation: active caves - located at the end of the blind valleys (Ponorici Cave, Ponor Foundry), cavities through which the waters infiltrated in plateau (Cocolbea Cave, Valea Cheii Cave) and the third category, fossil cavities, witnesses of the old drains that remained at the upper levels of the current active networks (Cioclovina Uscată Cave, Avenul Ciobanului, etc.). Șura Mare Cave is distinguished by several rooms of impressive size, with a special acoustics (Table 1), (Voicu, 2019).

Table 1. Caves and oats in the Cioclovina-Baru Mare karst area

Crt. no.	Naming	Development (m)	Level difference	
			(-)	(+)
1.	Ponorici-Cioclovina with Water Cave	7890	174	-
2.	Șura Mare Cave	3143	-	50
3.	Dosul Lăcșorului Oat	796	268	-
4.	Cioclovina Uscată Cave	763	-	-
5.	Fundătura Hobenilor Oat	295	78	7
6.	Plăișorului Cave	239	-	28
7.	From Valea Cheii Cave	230	-	16
8.	Gavrilaș Vulcu's Cave	161	8	-
9.	Ponorici Oat	150	20	-
10.	Tău Negru (Bâtan) Oat	150	101	-
11.	Șura de Jos from Federi Cave	130	15	-
12.	Cocolbea's Cave	125	-	-
13.	Balaj Oat	92	46	-
14.	Scoaba Trăiștiorului Cave	85	-	3
15.	Potecă Cave	72	9	-
16.	Gaura Frânțoanei Cave	67	-	2
17.	Fața Comarnicelor Cave	51	9	-
18.	Cascadă Cave	47	-	13
19.	Balcan Oat	45	43	-
20.	Lăzuiu Oat	29	29	-
21.	Șesul Leordei Oat	27	16	-

Source: Trufaș V., Trufaș C., 1986

The Crivadia-Peștera Bolii karst area is delimited by the Petrosului and Jgheabului valleys (west), the narrow strip in which the Peștera Bolii (east) is shaped and different lithological formations to the north and south. The plateau is strongly karstified, higher than the Cioclovina-Baru Mare area (1100-1200 m), being rich in karst forms such as clints, sinkholes and dry valleys (Table 2). The very representative sinkholes are grouped in sinkhole fields (Comărnicel) (Voicu, 2019).

At the contact of the limestones with the neighboring lithological formations, complex forms are individualized: karst contact depressions, sinkholes, antithetical valleys (Clenjii valley), gorges (Crivadia gorges) or waterfalls.

Table 2. Caves and oats in the karst area Crivadia-Peștera Bolii

Crt. no.	Naming	Development (m)	Level difference	
			(-)	(+)
1.	Valea Clenjii Cave	1467	103	-
2.	Gaura Oanei Cave	577	-	-
3.	Under Cetate (Șarpelui) Cave	510	12	31
4.	Tecuri Cave	458	49	-
5.	Cetatea Bolii Cave	455	2	-
6.	Mare Cave from Piatra Peretelui Urzicari	427	15	4
7.	Ulciorului Cave	420	12	17
8.	Malul Roșu Cave	343	-	-
9.	Next to Pod Cave	281	-	-
10.	Perete Cave	273	14	-
11.	Țepoasă Cave	166	10	-
12.	Cezar Manea's Cave	150	5	-
13.	Gaura Boului Cave	122	15	-
14.	Urșilor Cave	120	-	12
15.	Izvoreni Cave	100	-	5
16.	Capul Stâncii's Cave	79	-	-
17.	Teiul Lung Cave	61	3	7
18.	Tecanul Rotund Oat	20	17	2

Source: Trufaș V., Trufaș C., 1986

Regarding the endocarst, limestone relief forms such as caves, oats and ponoare are highlighted. A particular case of caves is the Bolii Cave, which is actually a meandering tunnel about 450 m long, created by the Jupâneasa River.

The Piatra Leșului karst area is a limestone bar pierced at the ends of the Roșia and Taia valleys. The limestone relief is highlighted by various shapes (needles, spurs, towers, fangs, etc.) and the endocarst is represented by several small caves, developed especially in the Rosiei Gorges (Table 3).

The fluvial relief, made on the main valleys belonging to the Mureș and Jiu River basins, delimited by the main peak of the Șureanu Mountains, canton special landscape elements. The current network of valleys was finalized following the movements in the Wallachian and Pasadena phases. The overall appearance of the valley network is divergent, the rivers starting from the high peak of the massif to the north (Mureș Corridor), west (Hațeg Depression), east (Sebeș Valley) and south (Eastern Jiu Valley). The hydrographic network generates complex and spectacular forms of relief, such as: gorges and quays (Voicu, 2019).

The gorges represent the first and wildest stage of the valleys, formed by the actual sculpting of the morpho-hydrographic narrowing, when the stream of water overlaps a permanently flooded valley. Some representative examples of gorges found on the massif, some included in the list of nature reserves and monuments under Law no. 5/2000 would be Crivadiei Gorges, Taiei Gorges (Figure 5), Roșiei Gorges, Râului Mic (Cugirului) Gorges and Băniței Gorges. The Sebeș Valley, characterized by a succession of wide and narrow sectors, develops a spectacular physiognomy, especially in the gorge sector between Tău and Șugag.

Table 3. Caves and oats in the Piatra Leșului karst area

Crt. no.	Naming	Development (m)	Level difference	
			(-)	(+)
1.	Ursilor Cave from Valea Roșia	189	8	6
2.	Cave with Patru Intrări	145	7	6
3.	No. 7 Cave from Valea Roșia	92	2	4
4.	No. 4 Cave from Cheia Taia	76	-	-
5.	Două Etaje Cave	52	3	-
6.	Under Fag Cave	45	-	-
7.	No. 5 Cave from Valea Roșia	34	3	2

Source: Trufaș V., Trufaș C., 1986

"The ridges and peaks the result of the intersection of strongly sloping slopes, are established in real viewpoints above the surrounding regions" (Candea et al., 2012). Pătru Peak, Șureanu Peak, Clabucet, Jigoru Mare Peak, Negru Peak or Comărnicel are just a few examples of peaks that offer spectacular scenery for hiking lovers.

The bare mountainsides are attractive due to their permissiveness to capitalize by the location of the ski areas, allowing the arrangement of slopes located at altitudes between 1600 m and over 2100 m. The ski area Șureanu is the second in the country, after Sinaia, in terms of altitude located.

The steps and passes in the geographical area analyzed are distinguished not so much by the landscape or attractive value as by the functionality it confers. They play "a decisive role in concentrating tourist flows, in certain preferential directions" (Cocean, 1996).

Following the decantation of the tourist qualities of each of the components of the morphotourism potential of the Sureanu Massif and by analysing the attractiveness of the natural setting of the mountain area, the following aspects stand out:

- As a whole, the natural tourist potential of the Sureanu Massif presents diversity and an appreciable number of forms, but its components lack the spectacular element;
- The situation is saved by the morphostructure of the natural environment and the presence of relief types that provide important landscape differentiations (karst relief, glacial relief, fluvial relief, relief developed on crystalline schists), the presence of the ski area and the high number of protected natural areas;
- The areas that have on their territory the ski area (Șugag, Cugir, Petrila), the areas with a high number of protected natural areas, the areas that have very well-developed karst relief, with numerous caves, keys stand out in the top of the value of the natural tourist potential and gorges (Orăștioara de Sus, Pui, Boșorod, Baru, Bănița, Șugag) and ATUs that have unique and spectacular objectives on their territory, such as those developed on crystalline shales - the rocks: Spurs from Jina Coast, Jidov's Mass, Stânca Grunzii or Oul Arșiței;
- At the opposite pole, the areas with reduced natural tourist potential can be noticed, such as the Romoș, Bretea Română and Săliștea areas, where we find only a few elements of the fluvial relief.

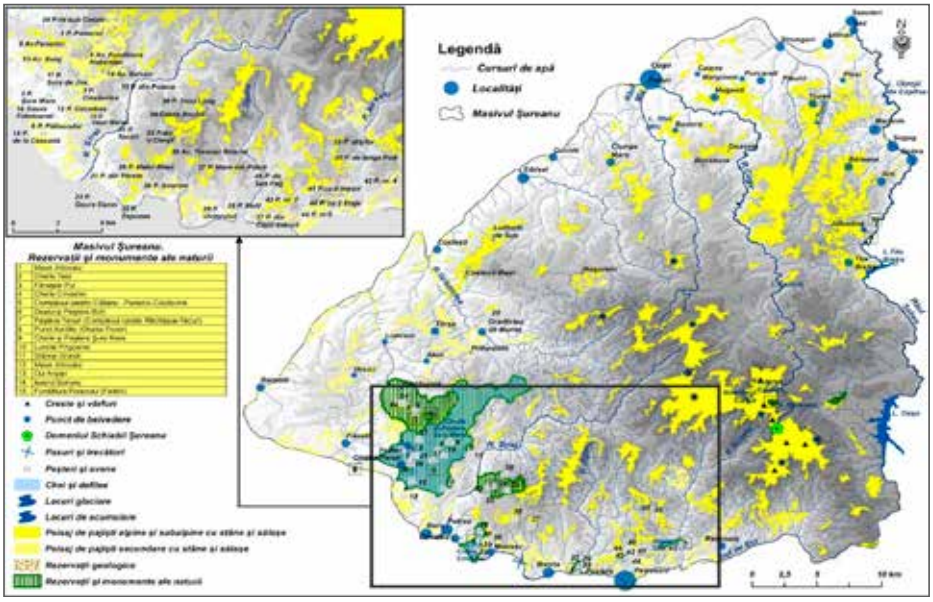

Figure 4. Șureanu Massif. Morphotourism potential

Figure 5. Taia Gorges (left) and Crivadia Gorge (right)

CONCLUSIONS

The tourist development of the Șureanu massif is supported by the richness of the morphotourism resources, which are presented, at individual level or of the landscape association, under an appreciable number of forms with a special morphopeisagistic attractiveness: steep, ridges, steps and passes, gorges, gorges and canyons, valleys, shores, fields with dunes or sinkholes, ponoare, ravines, caves, meanders, etc. From this point of view, tourism knows favorable conditions for development, benefiting from an extraordinary complexity and richness of the attractive elements offered by the natural environment.

The confirmation of the existence of this potential is given by the Law 190/2009 regarding the approval of the National Spatial

Planning Plan, Section VI, Tourist Areas, which mentions the territorial administrative units Mun. Petroșani Or. Petrila, Băița, Baru, Beriu, Bretea Română, Pui, Romoș, Sălașu de Sus and Sântămăria Orlea as having a high concentration of natural resources. A favorable aspect is the fact that many of these objectives are part of the category of protected areas, thus ensuring a high degree of conservation and protection.

The relief is also assigned the support function for the tourist infrastructure, from the accommodation and food bases, to the communication routes, the leisure infrastructure and the different tourist arrangements. Although the researched area has a generous tourist potential, it is very poorly exploited. The state of the tourist infrastructure is a possible cause of the low valorisation of the tourist potential, along with which there are certainly other conjunctural aspects that have contributed over the years to a low valorisation of tourism.

The tourist development of the mountain area of the Șureanu Massif, of the valleys that cross it, through the existence of the protected natural areas or the ones with a high tourist attractiveness, in correlation with some ethnographic, sociological or cultural heritage aspects, etc. provides all the conditions for practicing organized tourism.

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