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Geotourism potential of Zall Gjoçaj national park and the area nearby

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ABSTRACT

The National Park of Zall Gjoçaj and the surrounding area in Albania have considerable potential for geotourism development thanks to the high geodiversity and biodiversity values. However the geosites of this area are not known or reachable by nature admirers due to the lack of information and poor promotion. This paper intends to fill this gap by recognizing and popularizing the geodiversity of the park and its surrounding area through, valorization and creation of the geoinformation of the geosites. Geotourism potential of this area is evidenced based on geomorphological study of the park and the area nearby. The valorization of the geosites is made according to four criteria of Knapik, et al. modified by Anna Solarska and Zdzisław Jary (Solarska & Jary, 2010). Geoinformation of the geosites is created to inform and guide the visitors at specific sites of interest. A digital database with general and specific data of each site (location, geology, landforms, biodiversity, state of preservation, management, etc) provides information to the public through an inventory card. A database accessible directly from the Web and a Web-GIS application is being developed in order to promote the values of this area to the public and stimulate geotourism development.

1. Introduction

Zall Gjoçaj National Park is located within the territory of Mati Municipality, of Dibra County in northeastern Albania and shares a northern border with Lura National Park. The park is about 39 km from the town of Burrel, 58 km from the town of Rrëshen, and 52 km from the town of Peshkopia. There are a number of villages in the vicinity of the park such as Tanes (1 km), Zall Gjocaj (4.4 km), Vig (14 km), Macukull (28 km), Valgjin (33 km), Kalivaç (34 km), and Lam i Madh (38 km).

Thanks to the high biodiversity, an area of 140 ha was designated National Park in 1996. Although small in size, Zall Gjoçaj National Park is significant for its diverse habitats, being recognized as a plant area of international importance. Most of the park's area is covered by a mixture of beech, fir, pine, ash and maple trees growing on limestone and dolomite rocks. The park is rich in endemic and subendemic species such as *Forsythia europaea*, *Digitalis lutea*, *Gentiana lutea*, *Hypericum perforatum*, Brachypodium albanicum, Orchis sp., etc. The area has many medicinal plants and forest fruits such as *Rosa canina*, black juniper (Juniperis communis), red juniper (Juniperis oxycedrus L.), Gentiana lutea, *Colchicum autumnale*, primula (Primulaceae), nuts (Juglas regia L.), chestnuts (Castanes sativa Mill), strawberry (*Fragaria vesca* L.), etc. Most notable animals that live in the park are brown

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bear (*Ursus arctos*), grey wolf (*Canis lupus*), fox (*Vulpes vulpes* L), lynx (Felis lynx), wild goat (*Rupicapra rupicapra*), deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), rabbit (*Lepus europaeus* Pall.), squirrel (*Sciurus vulgaris* L). Many birds can be found in the park including the golden eagle (*Aquila chrysaetos*), wood grouse (Tatrao urogallus), hawk (Falco sp.), partridge (Perdicinae), pigeon (*Columba palumbus* L), turtle dove (*Streptopelia turtur* L), quail (Conturnix conturnix L).

The park and the area nearby are characterized by diverse landscapes such as high mountains with peaks and alpine meadows, glacial lakes, valleys, water springs, and dense forests. Some of the geosites designated as nature monuments that can be visited along the way to the park are Filmi canyon, Shutrea spring, Këputa cave, the rock "Kepi i Skenderbeut" and Vasha stone. Besides, some cultural objects of historical or religious importance such as churches and towers are situated in villages close to the park area (Macukull, Zall Gjoçaj).

2. Methodology

The geotourism potential of the Zall Gjoçaj National Park and the area nearby is evidenced based on the geomorphological study of the area. There are no publications for this area so far, and in this paper is written for the first time the geomorphological aspect of the area. Geological and topographic maps of the area and literature about the geology and geomorphology of Albania are studied to present the tectodynamic of the study area and the factors that have influenced the geosites' formation. Besides, a field trip to the study area has helped the authors to identify the landforms types and the hiking trails to reach the geosites.

Geosite assessment is realized to identify the geosites with highest geotourism potential. Geotouristic values of the park are evidenced based on their valorization according to four criteria of Knapik et al. (2009) modified by Solarska and Jary (2010): (1) accessibility, (2) state of preservation, (3) scientific value and (4) education value. To determine the importance of individual geosite, each criteria has five features with values of points from 1 to 5 for the accessibility and state of preservation and from 2 to 10 for the scientific and education criteria (see Table 1). Following the approach proposed by Giardino and Mortara (2004) to each geosite a card containing pictures and descriptions divided in sections is created. The database of the geosites and the maps are created using ArcGIS 10.4 (Figs. 1–6, Table 3).

3. Geology and landforms

The dynamic geological history, tectonic movements and erosive activity of the streams in the park and the area nearby, have created diverse landforms such as mountains, valleys, karstic landforms, glacial landforms and erosive ones. Zall Gjoçaj National Park belongs to the tectonic zone of Mirdita (Akademia e Shkencave, 1990) and is situated in the contact of the carbonate rocks of Cretaceous with ultramafic rocks of Jurassic. The landforms on the limestones of Cretaceous include deep and narrow canyons, karstic forms and erosive ones.

The park lies in the southern part of the Lura Mountain Range, along the Zall Gjoçaj valley, between the Lura Mountain in the northeast and the Deja Mountain in the southeast. The valley is about 8 km long and 1–5 km wide situated at the altitudes of 900–1700 m*. Along all its length the valley creates significant morphological contrasts with the mountains around (Deja mount 2246 m and Lura mount 2120 m). The valley is created almost along the tectonic contact of the Lura ultramafic rocks (Jurassic) on the right and the carbonate rocks of Deja Mountain (Cretaceous) on the left (Albanian Geological Service, 2002). In these morphostructural conditions, Zall Gjoçaj valley is formed along a detachment fault, which is also modeled by the glacials of quaternary, the Zall Gjoçaj stream and the karstic processes. The interaction of these morphogenetic phenomena has given a

Table 1
Criteria of assessment for inventoried geomonuments (according to Knapik et al., 2009, modified).

Criteria	Traits	Points
Accessibility	Site clearly visible, located directly on the touristic trail or nature's path	5
	Site clearly visible, located on the road or path	4
	Site barely visible, located more than 250 m away from the path or road	3
	Site difficult to access for tourist (ex. significantly overgrown or difficult to access)	2
	Site unavailable for tourists	1
State of preservation	Well preserved site with no visible signs of degradation	5
	Site in slight violation of its structure	4
	Partially destroyed	3
	Site heavily modified by human	2
	Site destroyed - loss character of geosite	1
Scientific worth	Very high: one site in the region, unique in a wider scale	10
	High: very important for regional studies	8
	Average: significant for regional research	6
	Low: common site with average values	4
	Very low: no particular distinctive features	2
Education	Very high: number of represented issues: 5 and more	10
	High: number of represented issues: 4	8
	Average: number of represented issues: 3	6
	Low: number of represented issues: 2	4
	Very low: number of represented issues: 1	2

Fig. 1. Zall Gjoçaj National Park and Deja mountain.
Photo: Genti Çupi

polygenetic character to this valley, creating a typical alpine landform*. The general shape of Zall Gjoçaj valley is half-arch with a concave form on the southwest. This shape is almost the same as the tectonic longitudinal fault and the transverse fault (in the lower sector) where it is modeled (Albanian Geological Service, 2002).

Along the upper part near the entrance of Zall Gjocaj village, the valley has the shape of a trough for 3.5 km long. The whole lower part of the valley (45 km long) turns westward to Lama i Madh (Melth). At this sector the Zall Gjoçaj stream has deepened transversely the carbonate anticline of Deja mount, and the valley has the dimensions of a typical canyon. The valley presents significant structural asymmetry of the slopes, thanks to the differentiation with 1800–2000 m amplitude of the new block tectonic. The result of this tectodynamic phenomenon is the tectonic uplift of the limestone anticline of Deja mount about 300–400 m higher than that of the ultrabasic massif of Lura*. The slopes of the valley have different morphological features, thanks to diverse lithological construction.

The eastern slope of the valley has an escalated shape where the structural ladder of the relatively soft ultramafic rocks is elevated in the altitude of 1100–1600 m. Above that, in the altitude of 1800–2200 m, stands out the limestone precipice of Deja mount about 7 km long and 300–600 m high. Impressive morphological contrast presents the Lura mountain back side with a slightly wavy form (where a fragment of the erosional neogenic surface is preserved), and the Deja mountain with a typical shape of a very sharp ridge above the precipice*.[1] Dashi path is the only way crossing this ridge, connecting the valley with Mati basin on the west. On the northwestern edge of the valley the path passes through Valza pass to Mati basin.

From Macukull village, Deja Mount has the view of a gigant poltron which dominates the whole landscape of Burrel, Peshkopia, Puka and Rrëshen. In winter snow covers its top up to 2 m. The holes formed as a result of karstic processes are covered with snow throughout the year. This mountain and other peaks nearby such as Mellanit Peak(0.5 km), Burdit të Vogël Mount (1 km), Tollës Hill (3 km), Melthi Peak (3 km), the rock of Kepi i Skenderbeut, Vasha Stone in Vig village, and Boshtra Peak in Macukull village, are touristic attractions for hiking. Just 1 km away is Lura National Park with fourteen beautiful glacial lakes such as Flowers Lake, Black Lake, Great Lake, etc.

On the north of the park dominates the karstic landscape with funnels and karstic dolines of different sizes. Inside the park exist the Tane pass (1740 m), peak of Malthit të Keq (1848 m), peak of Kepi i Beriqes (1700 m) and Murati Pass (1650 m). Some streams flow through the park such as that of Livadhit të Gjonit, Hurdhës së thellë, and a branch of the Zall Gjoçaj stream. There are numerous water springs inside the Park, such as Cold Gjura and White springs. The tectonic movements, the geomorphologic evolution and atmospheric factors have all contributed in the creation of some special landforms enlisted as geomonuments such as the rock Kepi i Skenderbeut, Vasha Stone, Boshtra peak, and Valza wells.

In the area close to the park, and along the road leading to the park, there are biomonuments with ecological and historical values. To name a few, Oaks at the school in Macukull, Oak of the Turk Grave in Vig, Oak of the Good Grave in Macukull, Europian Jews of Mbasdejës (*Taxus baccata*), and Plane tree of Marqeshi (AKZM, 2016). The mountainous landscape, as well as the presence of the highest peak of Mat, Deja Mountain, offers opportunities for the development of adventure sports such as hiking, mountaineering, skiing, jeep safari, and hunting.

4. Valorization of the geosites for geotourism development

Geomonuments are nature monuments classified in the third category of protected areas according to the categories of International Union for Conservation of Nature (IUCN). In Albania 291 geomonuments are included in the list of protected areas as sites of scientific, esthetic and touristic values (Dollma, 2015). Some of these geomonuments are situated in our study area such as the rock of Kepi i Skënderbeut, Vasha stone, Boshtra peak, Valza wells, etc. Along the road to the park there are also some other geomonuments such as Filmi Canyon, Uraka canyon, Valit cave, stone of Urxallës, etc. The geotouristic values of these sites are analyzed through the valorization of these geosites based on the four criteria of Knapik, et al., modified by Anna

[1] Note: * is contribution of Prof. Dr. Gjovalin Gruda, geomorphologist.

Fig. 2. Glacial lake in Lura.
Photo: Merita Dollma

Solarska and Zdzisław Jary. The four criteria for valorization are accessibility, state of preservation, scientific worth and education values. Each criteria has five features with values of points from 1 to 5 for the accessibility and state of preservation and from 2 to 10 for the scientific and education criteria (see Table 1).

For each geosite are valorized the five features of the four criteria and the sum of points ranks the geosites from the highest geotourism potential site to the lowest one (see Table 2). Based on the valorization of the geosites, the results indicate that the rock *Kepi i Skënderbeut* possess higher geotouristic values. This rock is clearly visible, located just 50 m from the local road Lis-Shëlli-Vig-Zall Gjoçaj (*accessibility-4 points*). It is classified as a geosite of international importance due to its huge sizes of 2 ha, geological construction and history of formation (*scientific value-10 points*). *The Rock is a w*ell preserved site with no visible

Fig. 3. Glacial lake in Lura. Coauthor of the paper Merita Dollma by the lake.
Photo: Gjovalin Gruda

Fig. 4. Folk costumes in Macukull and Zall Gjocaj villages.
Photo: Avni Dani

signs of degradation (*state of preservation-5 points*). The rock has geological, geomorphological, esthetic and historic values (*education- 8 points*).

Vasha stone is barely visible, located more than 250 m away from the path but it is in a good state of preservation. *Boshtra Peak* and *Valza wells* situated in Macukull village are difficult to be accessed by tourists. Valza wells are not well preserved and are facing a degradation phase. The scientific values of these geosites are not evidenced enough, for no research is done in the area concerning the development of karstic forms in depths of the wells, etc.

Kepi i Skenderbeut is a limestone rock with a special shape modeled by the tectonic and the atmospheric factors. With an area of 2 ha this rock is 120 m long, 25 m wide and 140 m high and situated 800 m above sea level. The eastern side of this rock stands vertically to the deep canyon of the stream of Shalcës. Besides geological and geomorphological values this rock has also historical values, for Scanderbeg, the Albanian National Hero, used it as a strategic point for observation. Close to this rock are still present the ruins of the Fortress of Stelush and the settlement of Varoshi. According to Albanian geologists this rock is classified as a geomonument of international importance (Neziraj, Moisiu, & Avxhi, 2016). This geomonument is close to the Vig village and can be visited following the road Lis-Vig-Qafë Murrë-Mbasdejë.

Vasha stone is a limestone of the late Cretaceous having the shape of a mushroom, which is formed as a result of the karstic process and wind activity. This stone is situated at 850 m above sea level in the vicinity of Vig village, surrounded by the forests and pastures of Vanasit. It is about 30 m long, 20 m wide and 40 m high and has geological and geomorphological values in terms of the time of its formation and modeling processes (Neziraj et al., 2016). This geosite can be visited on the road Burrel-Lis-Vig.

Valza wells are located north and northwest of Macukull village, 900 m above sea level, between the beautiful meadows and pastures of Valza. They are karstic wells, still unexplored, with a diameter of 2 m, 2–3 m deep reaching up to 5–12 m. The territory where Valza wellsare located is made of limestone of the late Cretaceous and represents an interesting karstic landscape.

Fig. 5. Tower-type houses in Macukull.
Photo: Ylber Malaj

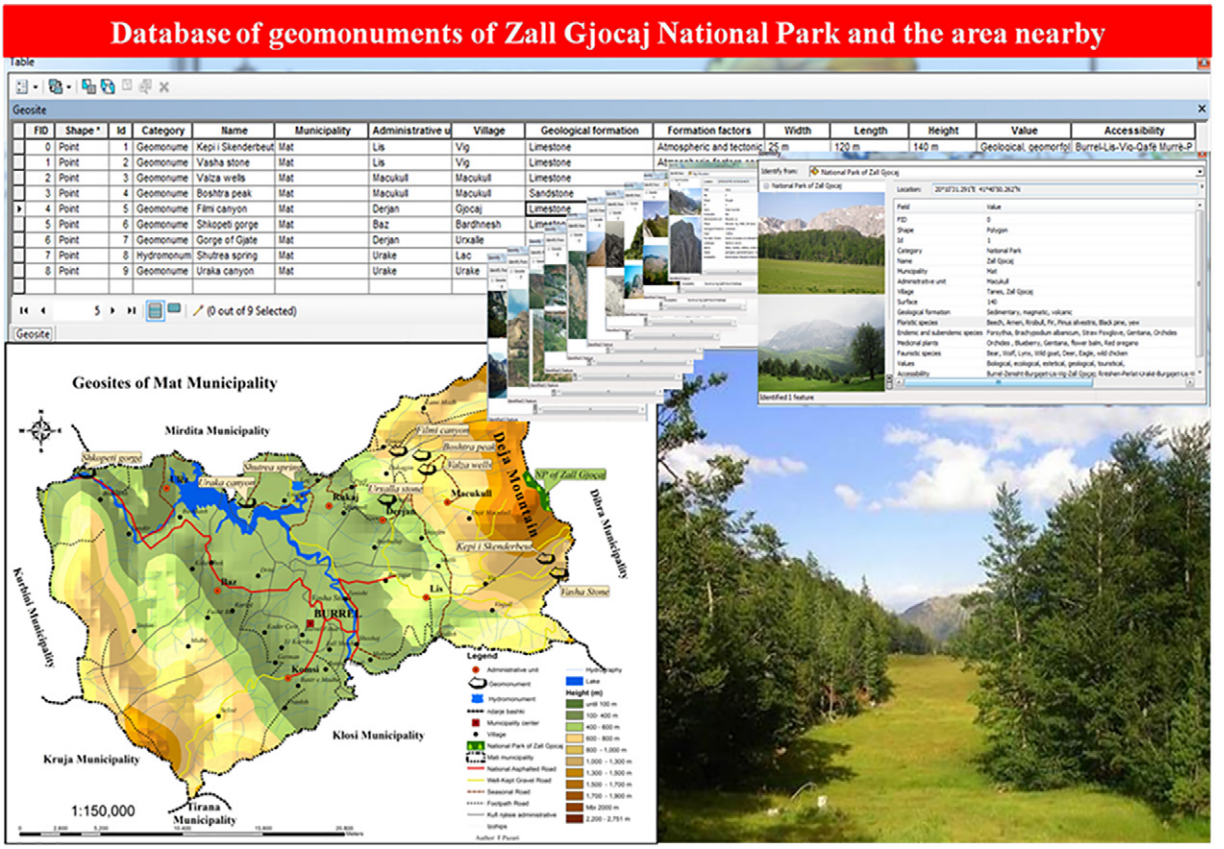


Fig. 6. Database of the geomonuments of Zall Gjoçaj Park and the area nearby.

*Valza wells*are located near the Macukull village about 28 km from Zall Gjoçaj National Park and can be visited via Burrel-Burgajet-Derjan-Macukull.

Boshtra Peak is a sandstone rock with a pyramid shape which is formed as a result of erosion. It is located at an altitude of 1118 m above sea level and has the size of about 900 m long, 500 m wide and 100 m high. From the rock can be seen the entire area of Mat Municipality. This geomonument with geomorphologic and geology values is located near the Macukull village and can be visited along the road Burrel-Burgajet-Derjan-Macukull.

5. Cultural heritage

Besides the natural attractions discussed above, the area has considerable cultural heritage sites such as Stelush fortress in the southeast of Varosh; the church of St. Trinity in Shëlli village; the church of St. Kollit and characteristic tower type houses.

The Castle of Stelush is located near the village of Vig. In Turkish documents, this fortress was called Istulush, while the locals call it the fortress of Varosh. According to the archaeologist Skender Anamali who excavated in the area, there was an Illyrian settlement since ancient times. The fortress and the town of the V BC century have existed until the beginning of the XVI century. Around the fortress, a medieval town called Stelush by the ottomans was founded in the middle ages, which served as the headquarters of the Kastrioti family. This strategic fortress was constructed to stop the invading armies coming from the east. Close to the fort of Skanderbeg many roads crossed, whose traces still exist in the villages of Vig, Mbasdejë, Gurrë Lurë, (Anamali, 1967).

In the vicinity of Stelush town (Shëlli village) is situated the church of St. Trinity, which houses the oldest baptism document written in the Albanian language. In this church, on November 8, 1462, the Assembly of Mat was gathered in order to stop the spread of the Islamic religion and strengthen the Christian faith. The most important act of the assembly was the formulation of a separate sentence, which it is considered as the first document proving the writing of the Albanian language. Every believer could do the act of baptism of the child by saying in the Albanian language the phrase*: "Un të pagëzonj pr'emen't Atit e t'birit e t'shpirtit shenjt"* meaning "I baptize you in the name of the Father, the Son and the Holy Spirit". The baptismal formula of Pal Ëngjëlli constitutes a monumental value for the written Albanian language and for the entire history of Albanians.

The area around Zall Gjoçaj National Park has numerous characteristic tower-type houses. These houses have stone towers with turrets of great technical and architectural values. The building material of the tower is stone and limes (Kurti, 1999). Some of these towers are older than 100 years, and are designated as monuments of culture such as the tower of Rustem (Dyl) Kryekurtit (in Macukull village), Pashaj tower (in Zall Gjoçaj village), Mati is also an area rich in folk costumes. Zall Gjoçaj

Table 2
Valorisation of geosites near Zall Gjocaj National Park.

Nr.	Geosite	Criteria				
		Accessibility	State of preservation	Scientific values	Education	Summarized value
1	The rock "Kepi i Skënderbeut"	4	5	10	8	27
2	Vasha stone	3	5	4	6	16
3	Valza wells	3	3	4	5	15
4	Boshtra Peak	3	3	2	5	13

and the surrounding area belong to the ethnographic division of Prelli, where women's dress is very similar to those of Mirdita closeby. The women's outfits are quite varied in types and variants (Kurti, 2004).

Local festivals are a perennial tradition from generation to generation. Summer Day (March 14th) symbolizes the winter leaving and the summer coming. St. George's day, known locally as the feast of cattle, celebrates the end of winter and the arrival of summer. Macukull feast is another local celebration introduced lately in the area, whose purpose is to promote mountain tourism through sport events, fairs, concerts, etc. Tourism development is provided by local organic products such as dairy (goat cheese), lamb grown in the wild (grilled), honey, bee milk, various types of pies (fli), Macukull pancakes, forest fruits (blueberries, nuts, chestnuts, hazelnuts) as well as various types of medicinal plants harvested in the wild by the inhabitants of the area. The area is also known for the handicrafts (carpets, brooms, and embroidery).

6. Promotion of geotourism potential of Zall Gjoçaj National Park and the area nearby

Although Mat has a considerable potential for geotourism it does not have a tourist guide, tourist map or a website where the natural and cultural attractions of the area are described and promoted. There are no touristic itineraries, hiking trails that the tourist can follow either for hiking, mountaineering, climbing, etc. Although very close to the National Park of Lura, Zall Gjoçaj National Park is not mentioned as an area of high scientific and tourist value. The promotion of the values of this area would foster the interest of tourists to explore the geosites and stimulate the geotourism development.

The designation of tourist itineraries as well as the creation of the geo-information of Zall Gjoçaj National Park and the geosites nearby is an important step for the promotion of geotourism of the area. Touristic itineraries are created by taking into consideration the accessibility and tourist requirements. There are designated itineraries for those who cannot stay longer than one night as well as itineraries in the area nearby the park for the nature admirers that can stay longer than two nights. *The first itinerary* is that of Burrel - Zall Gjoçaj. Following this itinerary the tourist can visit the village of Burgajet where the Albanian King (1926–1938) Ahmet Zog originates, Marqeshi plane, the Forttress of Stelush, Kepi i Skenderbeut, Vasha stone and Zall Gjoçaj.

The second itinerary is that of Rrëshen - Zall Gjoçaj. During this tour, tourists can see some geosites such as the Film canyon, Uraka canyon, the valley cave, the village of the King Ahmet Zog, the castle of Stelush, Kepi i Skenderbeut, Vasha stone and Zall Gjoçaj. *The third itinerary* is that of Peshkopi - Zall Gjoçaj. Tourists who want to spend more time can follow the tour one and the second and follow the tour from Burgajet village to Macukull. In the village of Macukull the tourist can visit the gesosites of Valza wells and Boshtra peak as well as the typical tower-type houses. The visitor can see the way of living in these villages, enjoy the local products and food as well as undertake various sport activities such as hunting, mountaineering, hiking, and picnics. From Macukull village following the walking paths to the Zall Gjoçaj National Park beautiful vistas can be enjoyed.

Following the approach proposed by Giardino and Mortara (2004) to each geosite a card containing pictures and descriptions divided in sections is created. The information of each site is inventoried in the card including the state of preservation and the accessibility. The general data of the site is presented in the first section; pictures and text in the second, cultural values in the third section and state of preservation and risks in the last one.

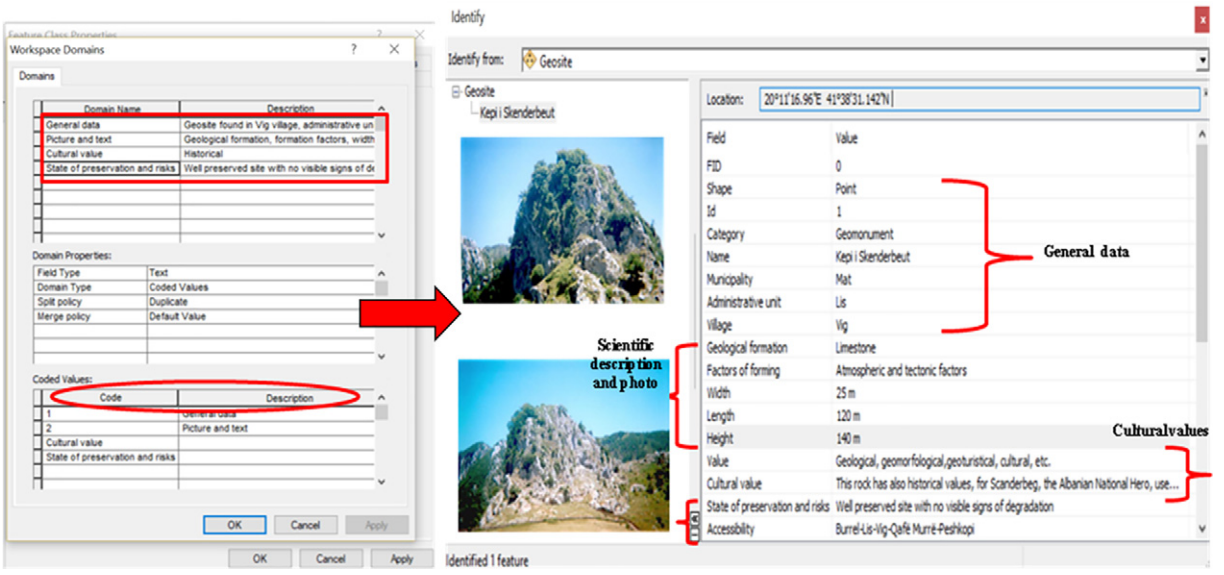
The inventory cards need to be completed with other information about geology and geomorphologic evolution, stratigrafic sections, 3 D views (Dollma, 2016), for some of the sites are not fully explored and studied. After completing the cards a website will promote the geosites of this area including the hiking trails, difficulty level, and best time of visiting. The following picture demonstrates the geoinformation of the geomonuments of Zall Gjoçaj National Park and the area nearby.

The digital product provides scientific based information, which can be updated any time and is accessible to anyone. Geoinformation of the sites can be useful to tourists who can navigate the website and create their own itinerary from home; to local and central institutions that deal with the management of protected areas; to researchers (biologists, geologists, hydrologists, etc.) and to students who research, study and organize field trips in national parks.

7. Conclusions

Based on the valorization of the geosite, Zall Gjoçaj National Park and the surrounding area, it is clear that there is considerable potential for geotourism development. The problem is that this area is little known by individuals interested in nature or cultural heritage sites, hiking, climbing or other outdoor activities, due to lack of information and poor infrastructure. Valorization of the geosites of Zall Gjoçaj National Park and the area nearby is the first step toward geoheritage promotion for geotourism development. Much more needs to be done to update the information about this area for public consumption, especially completion of the database with more geological and geomorphological aspects of the geosites, hiking trails, accessibility and safety, as well

Table 3
Inventory card of geosite "Kepi i Skenderbeut".



as the implementation of amenities for tourists such as hostiles, restaurants, walking and running paths, maps and itineraries. The creation and publication of the website should be the next step where itineraries of geotours are proposed to the general public together with maps and other information.

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