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Analysis of the geotouristic potential of geosites in Divjakë-Karavasta National Park, Albania

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Abstract

Elements of geodiversity evaluated for scientific value should be protected, conserved and promoted as potentially important for geotourism. The Divjakë-Karavasta National Park is a large natural area that comprises six geosites along the Adriatic coastline of Albania. Geosites are elements of the geosphere that should be preserved for geoeducation of the present and future generations, in view of the fact that they yield significant data on Earth's history. By means of the Geosite Assessment Method (GAM) and the SPSS program (version 20), we have analysed the geotouristic values of the Divjakë-Karavasta geosites and interpreted the importance of each subindicator. A correlation analysis, performed through SPSS and Pearson's correlation coefficient as a test statistics, has been carried out as well. The Pearson's correlation coefficient reflects the strong relationship between the scientific/educational values (i.e., representativeness and scientific knowledge) and touristic values (promotion, number of visitors, interpretative panels, hostelry services, restaurant services, touristic infrastructure). These coefficients express the importance of the dependence of additional values in the development of geotourism at protected sites.

Key words: Geodiversity, geoheritage, protected area, GAM model, SPSS analyses

1. Introduction

Evaluation and protection of natural diversity is amongst the key elements of sustainable development (Gill, 2016). Natural diversity comprises both living and non-living elements (i.e., biodiversity and geodiversity); however, biodiversity has received more attention through time. In order to recognise the importance of geological, geomorphological, hydrological and pedological features in biodiversity, it is of crucial importance to manage and conserve both elements simultaneously. According to Gray (2004 p.8, 2013 p.12), geodiversity is defined as, "the natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (land form, processes), soil and hydrological features. It includes their assemblages, structures, systems and contributions to landscapes". A selection, based on scientific value, of the most representative elements of geological nature that are worthy of preservation for present and future generations is known as geoheritage (Brilha, 2020b). Geological heritage, or geoheritage, refers to (i) *in-situ* occurrences of geodiversity elements of high scientific value, and (ii) *ex-situ* geodiversity elements that, in spite of being displaced from their natural location of occurrence, maintain high scientific value (Brilha, 2016, 2020a).

Grandgirard (1999) and Ruban (2010) recognised several types of geosites, such as mineralogical, geomorphological, hydrological, structural, pedological, economic, seismic sites, and more. The present paper focuses on geomorphological and hydrological sites in the Divjakë-Karavasta National Park of Albania. Geomorphological sites or geomorphosites are landforms or processes that have acquired scientific, cultural, historical, aesthetic and/or social/economic values on account of human perception or exploration (Panizza, 2001; Panizza & Piacente, 2005; Reynard, 2005; Reynard & Panizza, 2005; Piacente, 2005; Reynard et al., 2007, 2016). Hydrological and hydrogeological sites are those of geological activities of both superficial and underground processes with scientific, educational, historical, aesthetic or economic values (Zorina & Silantiev, 2014). As a result of their values, geosites could become touristic attractions for educational purposes, climbing, passage, photography etc. A new form of tourism that is linked specifically with the scientific values of geodiversity is geotourism. This term has been used by Hose (1995, 2005, 2011), Newsome & Dowling (2010), Hose et al. (2011) and is now widely accepted globally. A new definition of modern geotourism was given by Hose & Vasiljević (2012, p. 38–39), "The provision of interpretative and service facilities to enable tourists to acquire knowledge and understanding of the geology and geomorphology of a site (including its contribution to the development of the Earth science) beyond the level of mere aesthetic appreciation".

In other words, geotourism could be a special form of tourism, provided that the tourists have prior scientific knowledge of geoheritage. In spite of being considered a small country, Albania, has a rich geodiversity. Researchers of the Albanian Geological Survey have identified, categorised, classified and mapped 1,239 geosites (geomonuments)[1] (Moisiu et al., 2021). Most Albanian geosites have been studied for their geotouristic potential (Serjani et al, 2003; Qiriazi & Sala, 2006; Durmishi et al., 2018; Dollma, 2019; Pazari & Dollma, 2019; Braholli & Menkshi, 2019, 2020, 2021; Serjani, 2020, Qiriazi, 2020). The aim of the present paper is to estimate and analyse the geotouristic potential of the Divjakë-Karavasta National Park, as an area in Albania with numerous tourist movements.

2. Study area

The Divjakë-Karavasta National Park is a large natural area alongside the Adriatic coastline. According to the International Union for the Conservation of Nature (IUCN), national parks present the third category of protected areas, where specific human activities are permitted (Dudley, 2008). The park area is divided into four zones: the core zone, the sustainable use zone, the traditional use zone and the recreational centre (Fig. 1). In the two last-named, human activity is permitted, such as settlements, agriculture, farming, hotel and restaurant services, hunting, fishing, timber harvesting and recreation. On account of their natural products, plus restaurants and hostelry services, a national park is a touristic destination with a growing number of tourists *per annum*.

A. Koci (pers. comm., May 2022), head of the National Park, has informed us that the number of visitors in the park in 2021 amounted to 500,000, while the number of scientific activities and training was merely 31. These touristic and scientific activities are focused on the marked biodiversity of the park and, in part, on its geological features.

Inside the park there are a single urbanised area (town of Divjaka) and twelve rural settlements with a total population of 53,372 inhabitants who are involved in the activities mentioned below (Fig. 1). The territory of the park has some cultural monuments as well, such as the church of St Thanasi (village of Karavasta), the church of St Kolli (village of Xengu) and the antique settlement of Bishçukë; all of these are touristically interesting. According to the most recent administrative/territorial division (Shqipëria, 2014), the park belongs for the greater part to the municipality of Divjaka, and for smaller portions to the municipalities of Fier and Rrogozhina. It is managed and monitored from the municipal institution and from the Fier Regional Agency of Protected Areas (ARZM-Fier), dependent of the National Agency of Protected Areas (AKZM). Divjakë-Karavasta is a Ramsar site (https://www.ramsar.org/wetland/albania), being an ecosystem for European breeding populations of the Dalmatian pelican (*Pelecanus crispus*), Little Tern (*Sterna albifrons*) and Collared Pranticole (*Glareola pratincola*). The park is a habitat of the white-tailed eagle (*Haliaeetus albicila*), otters (*Lutra lutra*), the greater horseshoe bat (*Rhinolopus ferrumequinum*) and about 45,000 migrant birds (Dhimitri et al., 2015). About 5 per cent of the park is covered by pine (*Pinus pinaster*) and wild pine (*Pinus halepensis*). The Divjakë-Karavasta National Park covers an area of 22,230 ha, extending from the Shkumbin River in the north, all the way to the Seman River in the south, to the Divjaka hills in the east and the Adriatic Sea in the west (Shqipërisë, 1990; Qiriazi, 2019, 2020; Dhimitri et al., 2015; Dedej et al., 2015) (Fig. 1). Tectonically, the National Park is located in the Pre-Adriatic Depression/Albanian Sedimentary Basin, which represents a foredeep depression filled with Miocene and Pliocene molasses and

[1] In Albania, usage of the term "geomonument" is according to IUCN (http://www.gsa.gov.al/ZbuloGjeologjine/monumentet.html),

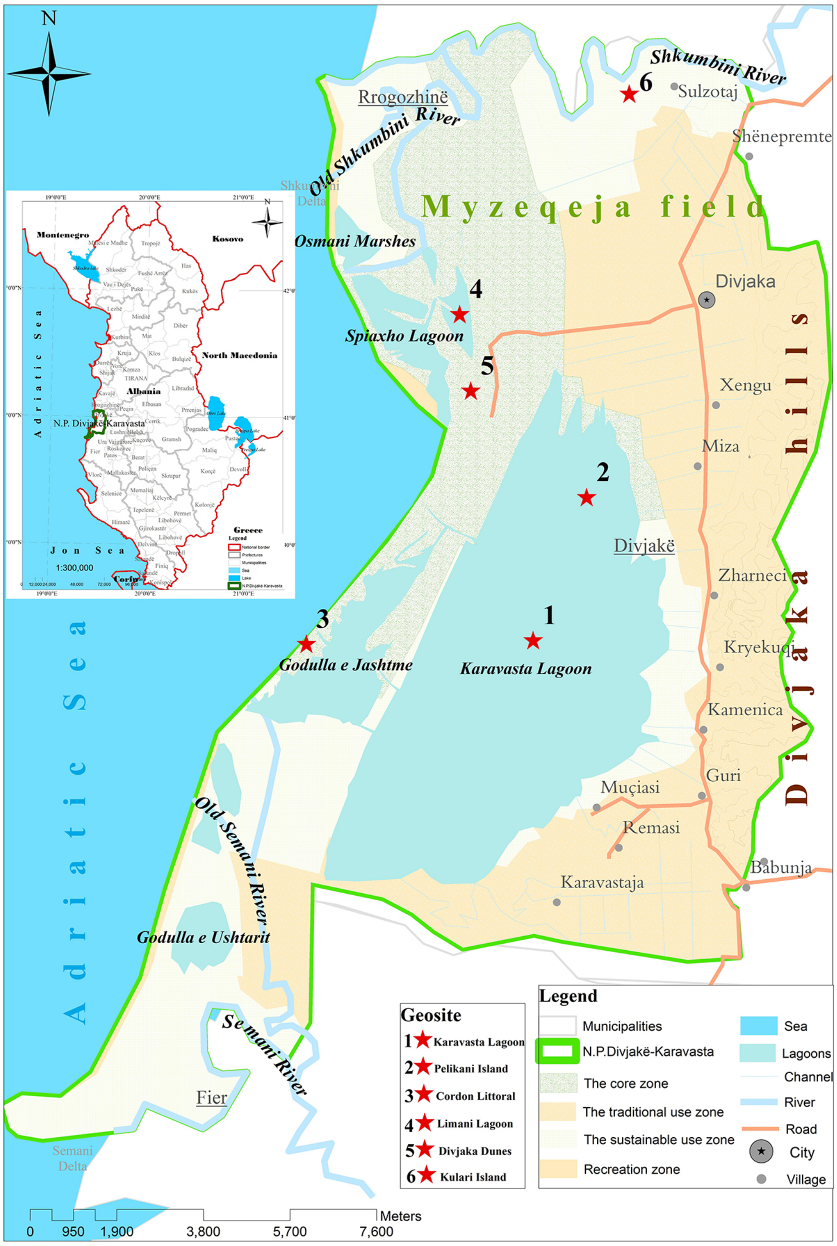

Fig. 1. The position of the Divjakë-Karavasta National Park in Albania and distribution of its geosites.

covered by Quaternary deposits (Frashëri et al., 1977, 1991; Simeoni et al., 1997; Kabo, 1998; Balla & Gruda, 2015; Pano et al., 2015). According to Brew (2003), the configuration of the present-day Adriatic coast developed during Holocene, some 6,000 years ago, when sediments brought by rivers began to dominate in the coastal morphodynamic regime. The coast line changed in the long and short terms, affected by small tidal, wave-dominated sediment discharges and by faulting and folding in a seismically active region (Koçiu, 1996; Mathers et al., 1999). The position of the deltas of the Seman and Shkumbin rivers have changed many times over the last 100 years. The alluvial sediments discharged by the rivers and impacted by wave action formed several new lagoons in the western part of the National Park (Ciavola et al., 2000).

Nowadays, elements of geodiversity (landscape) of the National Park are the following: five lagoons (Karavasta, Spiaxho, Godulla e Jashtme, Godulla e Ushtarit and Godulla e Pishes – Limani), the Osmani swamp, two river deltas (Shkumbin and Seman), two islands (Pelikani and Kulari), the Cordon Littoral of New Lagoon of Karavasta and the dunes of Divjaka. The classification of geological features, based on the formation and scientific level of significance, irrespective of scale, includes:

– the Karavasta Lagoon; hydrological features under international protection (Fig. 2);

- the Spiaxho Lagoon; new hydrological features with no scientific value;
- the Godulla e Pishes/Limani Lagoon; hydrological features with national values;
- the Godulla e Ushtarit Lagoon; hydrological features with no scientific value;
- the Godulla e Jashtme Lagoon; hydrological features with no scientific value;
- the Osmani marshes; new hydrological features with no scientific value;
- the Shkumbin delta; a geomorphological feature created by the discharge of the Shkumbin River;
- the Seman delta; a geomorphological feature created by the discharge of the Seman River;
- Pelikani Island; a fragmentary sand ridge inside the Karavasta Lagoon;
- Kulari Island; a sedimentary area created in one of the meanders of the Shkumbin River, with national value;
- the Cordon Littoral of New Lagoon of Karavasta; created from the former mouth of the Seman River with national value;
- the Divjaka dunes; geomorphological features created by aeolian activity with national value.

According to the Albanian Geological Survey and Agency of Protected Areas, the Divjakë-Karavasta National Park comprises six geosites with perspective geotouristic potential, namely the Karavasta and Pisha/Limani lagoons, Pelican and Kulari islands, Cordon Littoral of the New Lagoon of Karavasta and the Divjaka dunes. The Karavasta Lagoon (Figs. 1, 2) is the largest lagoon of the Albanian Adriatic coastline (Pano et al., 2015), with a maximum length of about 10 km, a width of 4.3 km and maximum depth of 1.5 m (Ciavola & Simeoni, 1995; Brew et al., 1995; Brew, 2003; Qirjazi et al., 2014). According to Pano (2015), Karavasta was formed after the 16th century by narrow alluvial belts of potamogenic and thalassogenic origin.

During the last two decades, water exchange between Karavasta Lagoon and the open sea have taken place mostly through the tidal channel in the south. This channel connects the Karavasta and Godulla e Jashtme lagoons; the latter has recently been created by the growth of a former mouth of the Seman River (Ciavola & Simeoni, 1995). It has been noted that, as the northern channel is blocked from the sea and deviated to the south, entering the Godulla e Jashtme Lagoon (Fig. 3), water exchange is reduced and the lagoon is in danger of eutrophication in the near future. The chemical and thermal properties of the lagoon offer shelter to about 50,000 individuals of waterfowl, and it is therefore considered to be an area of special importance for birds

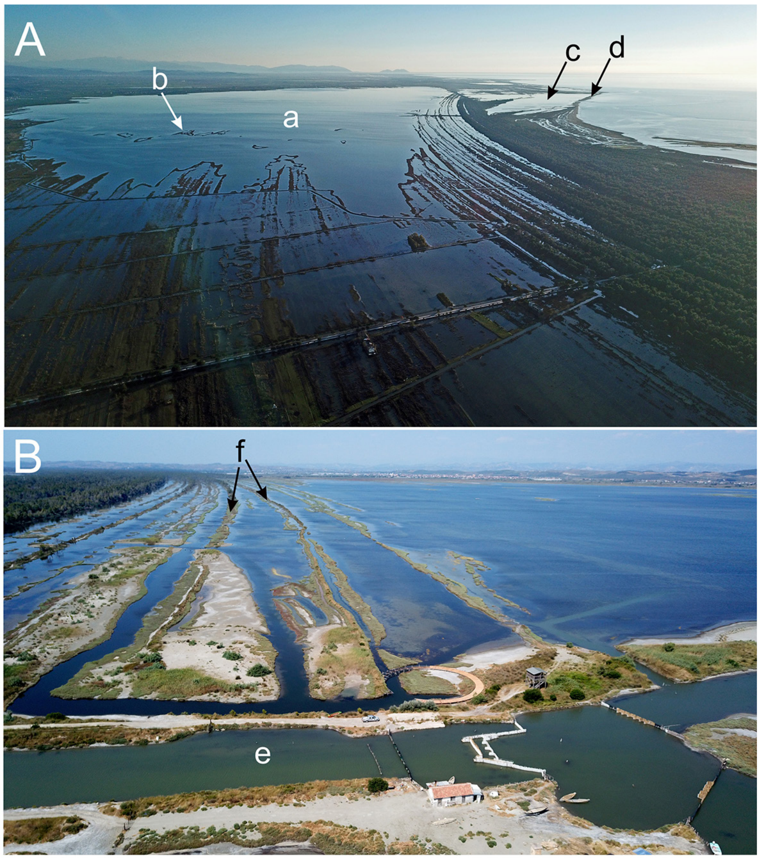

Fig. 2. A – The northern part of the Karavasta Lagoon. a – Karavasta Lagoon, b – Pelican Island, c – Godulla e Jashtme, d – Cordon Littoral of New Lagoon; **B –** South-to-North view of the Karavasta Lagoon. e – the northern channel of Karavasta Lagoon, f – the Karavasta Lagoon ridges. Source: Fotjon Prençe, 2021.

(IBA). To the northwest of the Divjaka pine forest is the Pisha/Limani Lagoon (Fig. 4), of 1.8 km in length and 400 m in width. This lagoon has a small areal extent and is surrounded by dunes and pine and shrub forests (Qiriazi & Sala, 2006). The Tërbuf emissary is to the west of the lagoon.

Pelican's Island formed in the northern part of the Karavasta Lagoon (Fig. 5); this is a fragment of an elevated ridge, at about 0.5 m above the lagoon level. The island covers an area of 1,500 m^2, and has a rich biodiversity. Here nests the Dalmatian pelican (*Pelecanus crispus*), Europe's largest endangered bird.

To the north of the Divjaka-Karavasta Park, along the valley of the Shkumbin River, near the village of Sulzotaj, Kulari Island formed (Fig. 6) by accumulation of alluvial strata with a height of 2 to 3 metres above sea level, in one of the meanders of the river (Qiriazi & Sala, 2006). According to Pano (2015), the island came into existence during the last 100 years, is surrounded by two tributaries of the river and covered with shrubs, wild poplars, various herbaceous species etc. The Cordon Littoral of the New Karavasta Lagoon lies to the west of the Godulla e Jashtme Lagoon. The littoral cordon embraces sand masses of a height of 0.5 m above sea

Fig. 3. Water exchange between the Karavasta and Godulla e Jashtme lagoons and the Adriatic Sea. Sources: sketch – Google Earth, northern channel photograph – F. Prence, central channel and sea-lagoon exchange photograph – A. Hilla, southern channel photograph – J. Hilla.

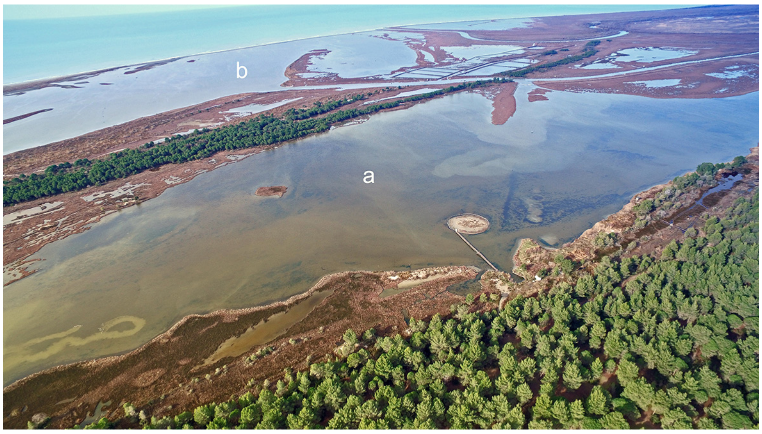

Fig. 4. Aerial image of the Pisha/Limani Lagoon geosite (a) and Spiaxho Lagoon (b). Source: Fotjon Prençe 2021.

Fig. 5. An aerial image of Pelican Island. **A –** flock of pelicans. Source: Fotjon Prençe, 2021.

Fig. 6. Geosite of Kulari Island. Source: Fotjon Prençe, 2021.

level, of a length of 2 km and a width of about 30 m. This cordon formed in the last 30 years by accumulation activity of wave action, depositing sand masses eroded by the tongue of the Seman River. The presence of herbaceous plants and rare shrubs is indicative of soil formation.

The Divjaka Dunes are located to the east of Divjaka beach. They are considered as low dunes, with a length of 600 m, a width of 15–25 m and a height of about 3 m (Qiriazi & Sala, 2006). According to Ciavola & Simeoni (1995), they are active dunes, composed of light-brown, fine sand and fixed dunes vegetated by pine trees. The dunes of Divjaka grow at an average speed of about 6 m/s by south-westerly wind. The rapid geomorphological evolution of geosites requires continuous scientific research and sustainable use.

3. Methods

The geotouristic assessment of geosites in the Divjaka-Karavasta Park requires a review of the scientific literature, fieldwork and conversations with specialist geographers, geologists and the head of the park. Seeing that the concept of geotourism is familiar only amongst academics, the assessment of geosites is carried out by these professionals. The present study uses the Geosites Assessment Model (GAM) created by Vujičić et al. (2011) and applies statistical analyses using SPSS, version 20.

Even if the GAM method was modified by Tomić & Bozić (2014) and Antić & Tomić (2017) as the M-GAM model, where tourist opinions are

Table 1. The structure of Geosites Assessment Model. Source: Vujičić et al. (2011).

Indicators /Subindicators	Description
Scientific/educational values (VSE)	
Rarity ($SIMV_1$)	Number of closest identical sites
Representativeness($SIMV_2$)	Didactic and exemplary characteristics of the site due to its own quality and general configuration (Pereira, 2007)
Knowledge on geoscientific issues ($SIMV_3$)	Number of written papers in journals, theses, presentations and other publications
Level of interpretation($SIMV_4$)	Level of interpretive possibilities on geological and geomorphological processes and level of scientific knowledge
Scenic/aesthetic (VSA)	
Viewpoints($SIMV_5$)	Number of viewpoints accessible by pedestrian pathway. Each must present a particular angle of view and be situated less than 1 km from the site
Surface($SIMV_6$)	Whole surface of the site. Each site is considered in quantitative relation to other sites
Surrounding landscape and nature ($SIMV_7$)	Panoramic view quality, presence of water and vegetation, absence of human-induced deterioration, vicinity of urban area, etc.
Environmental fitting ($SIMV_8$)	Level of contrast to the nature, contrast of colors, appearance of shapes, etc.
Protection (VPr)	
Current condition($SIMV_9$)	Current state of geosite
Protection level($SIMV_{10}$)	Protection by local or regional groups, national government, international organization etc.
Vulnerability ($SIMV_{11}$)	Vulnerability level of geosite
Suitable number of visitors ($SIMV_{12}$)	Proposed number of visitors on the site at the same time, according to surface area, vulnerability and current state of geosite
Functional (Vfn)	
Accessibility($SIAV_1$)	Possibilities of approaching to the site
Additional natural values($SIAV_2$)	Number of additional natural values in the in radius of 5 km (geosites also included)
Additional anthropogenic values ($SIAV_3$)	Number of additional anthropogenic values in the in radius of 5 km
Vicinity of emissive centers ($SIAV_4$)	Closeness of emissive centers
Vicinity of important road network ($SIAV_5$)	Closeness of important road network in the in radius of 20 km
Additional functional values ($SIAV_6$)	Parking lots, gas stations, mechanics, etc.
Touristic values (VTr)	
Promotion ($SIAV_7$)	Level and number of promotional resources
Organized visits ($SIAV_8$)	Annual number of organized visits to the geosite
Vicinity of visitors center ($SIAV_9$)	Closeness of visitor center to the geosite
Interpretative panels ($SIAV_{10}$)	Interpretative characteristics of text and graphics, material quality, size, fitting to surrounding, etc.
Number of visitors ($SIAV_{11}$)	Annual number of visitors
Tourism infrastructure ($SIAV_{12}$)	Level of additional infrastructure for tourists (pedestrian pathways, resting places garbage cans, toilets, wellsprings, etc.)
Tour guide service ($SIAV_{13}$)	If exists, expertise level, knowledge of foreign language(s), interpretative skills, etc.
Hosterly service ($SIAV_{14}$)	Hostelry service close to geosite
Restaurant service ($SIAV_{15}$)	Restaurant service close to geosite

taken into account, this assessment is only in the initial stages in Albania. Therefore, the present study considers application of the GAM method, in which each geosite is composed of two groups of values: main values and additional values. Main values comprise three indicators: scientific/educational values, scenic/aesthetic values and protection values, each of with four subindicators. Additional values include two indicators: functional values and touristic values, with a total of 15 subindicators. In Table 1, all subindicators are listed and explained. Each of these subindicators receives a value between 0 and 1, with five levels of evaluation, such as 0.00, 0.25, 0.50, 0.75 and 1.00. Table 2 includes all levels of grading of each of the subindicators.

Table 2. Levels of grading for each subindicator. Source: Vujičić et al. (2011).

	0	0.25	0.5	0.75	1
$SIMV_1$	Common	Regional	National	International	The only occurrence
$SIMV_2$	None	Low	Moderate	High	Utmost
$SIMV_3$	None	Local publications	Regional publications	National publications	International publications
SIMV4	None	Moderate level of processes but hard to explain to non-expert	Good example of processes but hard to explain to non-expert	Moderate level of processes but easy to explain to common visitor	Good example of processes and easy to explain to common visitor
$SIMV_5$	None	1	2 to 3	4 to 6	More than 6
$SIMV_6$	Small	–	Medium	–	Large
$SIMV_7$	–	Low	Medium	High	Utmost
$SIMV_8$	Unfitting	–	Neutral	–	Fitting
$SIMV_9$	Totally damaged (as a result of human activities)	Highly damaged (as a result of natural processes)	Medium damaged (with essential geomorphologic features preserved)	Slightly damaged	No damage
$SIMV_{10}$	None	Local	Regional	National	International
$SIMV_{11}$	Irreversible (with possibility of total loss)	High (could be easily damaged)	Medium (could be damaged by natural processes or human activities)	Low (could be damaged only by human activities)	None
$SIMV_{12}$	0	0 to 10	10 to 20	20 to 50	More than 50
$SIAV_1$	Inaccessible	Low (on foot with special equipment and expert guide tours)	Medium (by bicycle and other man-powered transport)	High (by car)	Utmost (by bus)
$SIAV_2$	None	1	2 to 3	4 to 6	More than 6
$SIAV_3$	None	1	2 to 3	4 to 6	More than 6
$SIAV_4$	More than 100 km	100 to 50 km	50 to 25 km	25 to 5 km	Less than 5 km
$SIAV_5$	None	Local	Regional	National	International
$SIAV_6$	None	Low	Medium	High	Utmost
$SIAV_7$	None	Local	Regional	National	International
$SIAV_8$	None	Less than 12 per year	12 to 24 per year	24 to 48 per year	More than 48 per year
$SIAV_9$	More than 50 km	50 to 25 km	25 to 5 km	5 to 1 km	Less than 1 km
$SIAV_{10}$	None	Low quality	Medium quality	High quality	Utmost quality
$SIAV_{11}$	None	Low (less than 5000)	Medium (5001 to 10 000)	High (10 001 to 100 000)	Utmost (more than 100 000)
$SIAV_{12}$	None	Low	Medium	High	Utmost
$SIAV_{13}$	None	Low	Medium	High	Utmost
$SIAV_{14}$	More than 50 km	50 to 25 km	10 to 25 km	10 to 5 km	Less than 5 km
$SIAV_{15}$	More than 25 km	10 to 25 km	10 to 5 km	1 to 5 km	Less than 1 km

Based on the GAM method, we have determined the numerical values (from 0.00 to 1.00) of subindicators for each geosite. To assess the main values of the geosites it is necessary to summarise the total value of scientific/educational, aesthetic/scenic and protection values. The sum of the main values would be:

$$MV = VSE + VSA + VPr = \sum_{i=1}^{12} SIMV_i$$

$$0 \leq SIMV_i \leq 1.$$

The additional values are determined by summaries of the functional and touristic values. The equation would be:

$$AV = VFn + VTr = \sum_{i=1}^{15} SIAV_j$$

$$0 \leq SIAV_j \leq 1.$$

The sum of the main and additional values is shown in a single graph, where the X-matrix has the main values, and the Y-matrix the additional values. The X-axis contains 12 units and Y-axis 15. The graph is divided into nine zones, indicated as: Z_{11}, Z_{12}, ... Z_{33}. The major gridlines that create zones for the X axis have a value of 4 and for the Y axis of 5 units. According to this assessment, each geosite will be plotted in the field of the matrix. Passing through the Z_{11} zone to the Z_{33} zone, there is an increase in the main and additional values of geosites.

Other statistical analyses focus on the Pearson correlation coefficient between the main and additional values. These reflect the relationship direction and strength of dependence between the main and additional values. The p-values must be less than 0.05 for correlation to be statically significant. Also, the relationships between subindicators of scientific/educational values (representative and scientific knowledge) and touristic values (promotion, number of visitors, interpretative panels, hostelry services, restaurant services, touristic infrastructure) are evaluated. Such are undertaken for a better understanding of the scientific impact of these geosites for tourism and *vice versa*. They are performed with the SPSS program, version 20.

4. Results and discussion

These findings constitute a quantitative evaluation for each geosite in the Divjakë-Karavasta National Park. The numerical values for each of the subindicators of the main and additional values are shown in Table 3. According to these data, the Karavasta Lagoon has the highest scientific and educational values, due to the fact that it is the most representative geosite of the National Park, which has been discussed in a large number of international scientific papers (Ciavola et al., 1999; Brew, 2003; Pano et al., 2015).

The lowest scientific and educational values are with Kulari Island, Limani Lagoon and Cordon Littoral of the New Lagoon of Karavasta, due to the limited representativeness of the park and difficulties in explanations of their geological features to non-experts. Based on Table 3, Karavasta Lagoon has the highest scenic/aesthetic values, as a result of its large water surface, presence of vegetation and wildlife diversity. The Pelican Island is situated inside the Karavasta Lagoon. The island of Kulari has the lowest scenic/aesthetic values as a result of the small surface area and lack of vegetation; moreover, tourists consider it to be of difficult accessibility. The Divjaka's dunes are distinguished by the highest level of protection, because typical vegetation is shielded from both natural and human damage. As Pelican Island is more vulnerable to natural and human influence, it is strictly forbidden for tourists during the Pelican breeding season. The level of protection of the geosites is above average, because they are located inside the national park. The functional values are below average, because of the great distance to the national road network, the low number of additional cultural values and low number of additional functional values. In tourist terms, the lagoon of Karavasta, the Pelican Island and the Pisha/Limani Lagoon, are the most frequently visited due to the small distance from the visitors' centre, inclusion in organised visits, and extensive promotion at national and international levels.

On the island of Kulari, in the dunes of Divjaka and in the Cordon Littoral of the New Lagoon, there are no organised visits due to a lack of interpretative panels, low promotion or even lower aesthetic values. In view of the fact economic activities are allowed in the parks, there are restaurants and hotels very close to the geosites which offer a cuisine with local products, especially fish from lagoons and the Adriatic Sea. Kulari Island is located in the northern part of the park, further away from the information centre and the central part of the park, which is less commonly visited and consequently is the geosite with the lowest tourist values.

Table 4 shows calculations of main values and additional values for each of the geosites in the National Park of Divjakë-Karavasta. The Karavasta Lagoon has the highest main and additional values; the lowest main and additional values are found for Kulari Island. The position of geosites in Figure 7 shows that the Karavasta Lagoon is part of Zone $_{32}$, with a medium main value and high additional value. The other geosites are positioned within Zone $_{22}$, with medium main and additional values.

The position of geosites in Zone$_{32}$ and Zone $_{22}$ expresses that they have geotouristic potential. To promote geotourism, it is necessary to raise the level of scientific interpretation through new inter-

Table 3. Geosite assessment of the Divjakë-Karavasta National Park.

Indicator/ subindicator	Values of geosites (0.00–1.00)					
Main values (MV)	Karavasta lagoon	Pisha/ Limani lagoon	Pelikani Island	Kulari Island	Cordon Littoral of New Lagoon of Karavasta	Divjaka Dunes
I. Scientific/educational values (VSE)	GS 1	GS 2	GS 3	GS 4	GS 5	GS 6
Rarity ($SIMV_1$)	0.75	0.50	0.50	0.50	0.50	0.50
Representativeness ($SIMV_2$)	1.00	0.50	0.75	0.25	0.25	0.50
Knowledge on geoscientist issues ($SIMV_3$)	1.00	0.50	1.00	0.75	0.75	0.75
Level of interpretation ($SIMV_4$)	0.50	0.50	0.75	0.50	0.50	0.50
II. Scenic/aesthetic values (VSA)						
Viewpoint ($SIMV_5$)	1.00	1.00	0.25	0.00	1.00	1.00
Surface ($SIMV_6$)	1.00	0.50	0.00	0.00	0.50	0.50
Surrounding landscapes and nature ($SIMV_7$)	1.00	0.75	0.75	0.25	0.50	0.25
Environmental fitting of sites ($SIMV_8$)	1.00	0.50	1.00	0.50	0.50	0.50
III. Protection (VPr)						
Current condition ($SIMV_9$)	0.50	0.50	1.00	1.00	0.50	0.75
Protection level ($SIMV_{10}$)	0.75	0.75	0.75	0.75	0.75	0.75
Vulnerability ($SIMV_{11}$)	0.50	0.50	0.25	0.75	0.50	0.75
Number of visitors ($SIMV_{12}$)	1.00	1.00	0.00	1.00	1.00	1.00
Additional values (AV)						
I. Functional values (VFn)						
Accessibility ($SIAV_1$)	1.00	0.50	0.50	0.75	0.50	0.50
Additional natural values ($SIAV_2$)	0.75	0.75	0.75	0.00	0.25	0.50
Additional anthropogenic values ($SIAV_3$)	0.00	0.00	0.00	0.25	0.00	0.00
Vicinity of emissive centers ($SIAV_4$)	0.25	0.25	0.25	0.25	0.25	0.25
Vicinity of important road network ($SIAV_5$)	0.75	0.75	0.75	0.75	0.75	0.75
Additional funcional values ($SIAV_6$)	0.25	0.25	0.25	0.25	0.25	0.25
Touristic values (VTr)						
Promotion ($SIAV_7$)	1.00	0.75	1.00	0.50	0.50	0.50
Organized visits ($SIAV_8$)	1.00	1.00	0.50	0.00	0.25	0.25
Vicinity of visitors centers ($SIAV_9$)	0.50	1.00	0.50	0.50	0.50	1.00
Interpretative panels ($SIAV_{10}$)	0.75	0.00	0.75	0.00	0.25	0.25
Number of visitors ($SIAV_{11}$)	0.75	0.75	0.25	0.00	0.50	0.25
Tourism infrastructure ($SIAV_{12}$)	0.50	0.50	0.50	0.25	0.50	0.50
Tour giude service ($SIAV_{13}$)	0.50	0.50	0.25	0.25	0.50	0.50
Hostelry service ($SIAV_{14}$)	1.00	1.00	1.00	0.75	0.75	1.00
Restaurant service ($SIAV_{15}$)	0.75	0.75	0.75	0.50	0.75	0.75

Table 4. Classification of geosites in certain fields, based on the Geosite Assessment Model.

	Main values (VSE + VSA + VPr)	Additional values (VFn + VTr)	Zone
Karavasta Lagoon (GS_1)	3.25 + 4 + 2.75 = 10	3 + 6.75 = 9.75	Z_{32}
Pisha /Limani Lagoon (GS_2)	2 + 2.75 + 2.75 = 7.50	2.50 + 6.25 = 8.75	Z_{22}
Pelikani Island (GS_3)	3 + 2 + 2 = 7	2.50 + 5.50 = 8	Z_{22}
Kulari Island (GS_4)	2 + 0.75 + 2.50 = 5.25	2.25 + 2.75 = 5	Z_{22}
Cordon of Littoral of the New Lagoon of Karavasta (GS_5)	2 + 2.50 + 2.75 = 7.25	2 + 4.50 = 6.50	Z_{22}
Divjaka's Dunes (GS_6)	2.25 + 2.25 + 3.25 = 7.75	2.25 + 5 = 7.25	Z_{22}

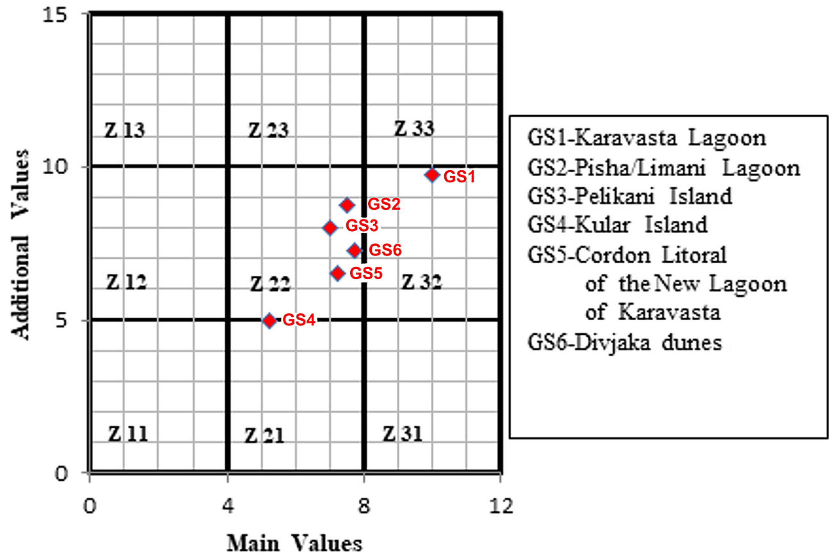

Fig. 7. The position of the Divjakë-Karavasta geosites in the Geosite Assessment Model – matrix.

pretative panels and preparation of professional guides. Seeing that geotourism is still unknown to stakeholders, this form of tourism is not yet part of the management strategies of the Divjakë-Karavasta national park. It is necessary to include geotouristic activities in the management programme of the park, such as geoeducation (guided tours) for local people, pre-university students and for tourists in general. Growing geoeducation efforts will enable calculations of the Im factor on the Modified Geosite Assessment Method (M-GAM) in future. These methods need to be applied in all protected areas of Albania, in order to create a national management strategy, through the co-operation of academics, managers of the park and external financiers. Geotourism should be part of both short-term and long-term management planning at local and national levels.

Because geotourism could be developed at geosites with functional and touristic values, it is important to analyse the relationship between some subindicators. Further statistical analyses reflect the relationship, direction and strength of dependence between the main and additional values, as well as

Table 5. Pearson correlation coefficient of main and additional values.

		Main values	Additional values
Main values	Pearson correlation	1	0.833*
	Sig. (2-tailed)		0.039
	N	6	6
Additional values	Pearson correlation	0.833*	1
	Sig. (2-tailed)	0.039	
	N	6	6

* correlation is significant at the 0.05 level (2-tailed).

between some of their subindicators. Table 5 shows the correlation coefficient between variables of the main and additional values, and the strength and direction of this relationship. It shows that the correlation is statistically significant at $p < 0.05$. This correlation is a positive or direct one. It appears as a very strong relationship ($r_{\text{main values-additional values}} = +0.833$, $p = 0.039$) (Salkind, 2000). The more attention and interest are paid to the main values, the more important additional values become and *vice versa*. Figure 8 also supports this dependence, where the fit line has a positive slope, $r^2 = 0.69$.

Table 6 is a correlation matrix that documents the correlation coefficients between representativeness ($SIMV_2$), knowledge of geoscientist issues ($SIMV_3$), promotion ($SIAV_7$), organised visits ($SIAV_8$), interpretative panels ($SIAV_{10}$), number of visitors ($SIAV_{11}$), hostelry service ($SIAV_{14}$) and restaurant service ($SIAV_{15}$), strength and direction of these relationships. For this matrix only these subindicators have been selected because their correlations are statistically significant (at $p < 0.05$ and at $p < 0.01$). The correlations are positive ones. A very strong relationship (Salkind, 2000) is seen between $SIMV_2$ and promotion of touristic values ($SIAV_7$) ($r = 0.899$, $p = 0.015$) and interpretative panels (SAV_{10}) ($r = 0.835$, $p = 0.039$). Educational values of geosites have increased the touristic promotion and interpretative characteristics of these. Additionally, the increase of touristic interest enhances the scientific knowledge of geosites.

Moreover, the growth in tourist interest increases the interest of further scientific and didactic knowledge of these geosites. This conclusion is reinforced by the very strong correlation between the subindicator of knowledge of scientist issues *vs* that

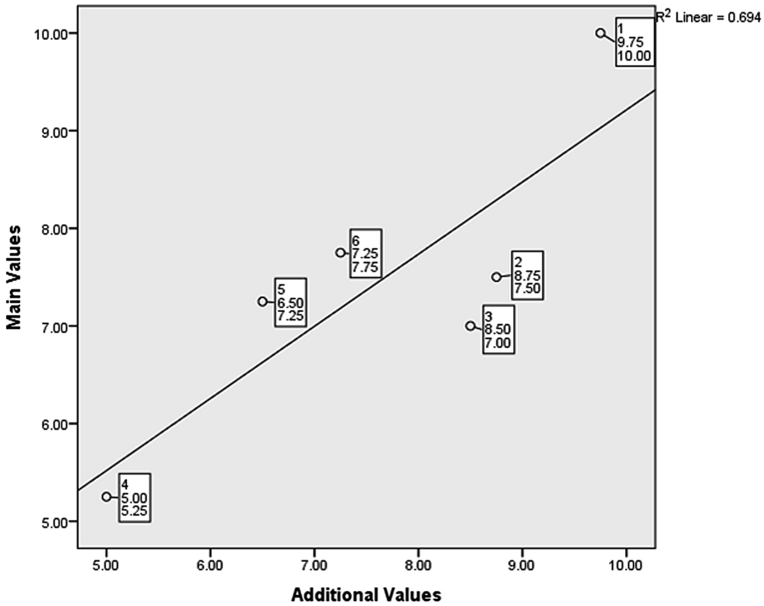

Fig. 8. Relationship between main and additional values for each geosite.

Table 6. Correlation matrix between subindicators of scientific/educational values (main values) and subindicators of touristic values (additional values).

		Representativeness $SIMV_2$	Geoscient. knowledge $SIMV_3$	Promotion $SIAV_7$	Visitors $SIAV_{11}$	Panels $SIAV_{10}$	Hostels $SIAV_{14}$	Restaurants $SIAV_{15}$	Organiz. visits $SIAV_8$	Tourism infrastr. $SIAV_{12}$
$SIMV_2$	Pearson corr.	1	0.644	**0.899***	0.471	**0.835***	0.773	0.489	0.716	0.489
	Sig. (2-tailed)		0.168	**0.015**	0.346	**0.039***	0.071	0.325	0.110	0.325
	N	6	6	6	6	6	6	6	6	6
$SIMV_3$	Pearson corr.	0.644	1	0.585	−0.146	**0.907***	0.171	0.108	0.000	0.108
	Sig. (2-tailed)	0.168		0.222	0.782	**0.012**	0.745	0.838	1.000	0.838
	N	6	6	6	6	6	6	6	6	6
$SIAV_7$	Pearson corr.	**0.899***	0.585	1	0.448	**0.794**	0.657	0.415	0.729	0.415
	Sig. (2-tailed)	**0.015**	0.222		0.373	**0.059**	0.157	0.413	0.100	0.413
	N	6	6	6	6	6	6	6	6	6
$SIAV_{11}$	Pearson corr.	0.471	−0.146	0.448	1	0.201	0.426	0.674	**0.888***	0.674
	Sig. (2-tailed)	0.346	0.782	0.373		0.702	0.399	0.142	**0.018**	0.142
	N	6	6	6	6	6	6	6	6	6
$SIAV_{10}$	Pearson corr.	**0.835***	**0.907***	**0.794**	0.201	1	0.472	0.478	0.350	0.478
	Sig. (2-tailed)	**0.039**	**0.012**	**0.059**	0.702		0.344	0.338	0.497	0.338
	N	6	6	6	6	6	6	6	6	6
$SIAV_{14}$	Pearson corr.	**0.773**	0.171	0.657	0.426	0.472	1	0.632	0.694	0.632
	Sig. (2-tailed)	**0.071**	0.745	0.157	0.399	0.344		0.178	0.126	0.178
	N	6	6	6	6	6	6	6	6	6
$SIAV_{15}$	Pearson corr.	0.489	0.108	0.415	0.674	0.478	0.632	1	0.586	**1.000***
	Sig. (2-tailed)	0.325	0.838	0.413	0.142	0.338	0.178		0.222	**0.000**
	N	6	6	6	6	6	6	6	6	6
$SIAV_8$	Pearson corr.	0.716	0.000	0.729	**0.888***	0.350	0.694	0.568	1	0.586
	Sig. (2-tailed)	0.110	1.000	0.100	**0.018**	0.497	0.126	0.222		0.222
	N	6	6	6	6	6	6	6	6	6
$SIAV_{12}$	Pearson corr.	0.489	0.108	0.415	0.674	0.478	0.632	**1.000****	0.586	1
	Sig. (2-tailed)	0.325	0.838	0.413	0.142	0.338	0.178	**0.000**	0.222	
	N	6	6	6	6	6	6	6	6	6

* correlation is significant at the 0.05 level (2-tailed).
** correlation is significant at the 0.01 level (2-tailed).

of interpretive panels of tourist values (r = 0.907, p = 0.012). The park is an area of importance in scientific research.

Very strong positive links are presented by subindicators of tourist values between themselves. The number of visitors has a very strong relationship with the number of organised visits (r = 0.888, p = 0.018). This means that organised tourism is more educational and affects the protection of geoheritage. There are organised visits by groups of visitors at geosites with different levels of accessibility. Thus, Pelican Island is a very important geosite where the Dalmatian pelican nests have low accessibility and are limited in visiting time. Accessing Kulari Island tends to be more difficult in comparison to the other geosites. Local guides can lead the visitors up close to these two sites, but groups of visitors are generally smaller. The lagoons and littoral cordons or the dunes of Divjaka can be more easily reached by common visitors.

Table 6 shows a very strong correlation between tourism infrastructure and restaurant services (r = 1, p = 0.000). In fact, most of restaurants inside the National Park are located less than 5 km away from the geosites, so in the same time the development and improvements of restaurant quality contribute to supporting the tourism infrastructure, expressed in pedestrian pathways, resting places, litter bins etc.

The combination of the two methods enables an understanding of the relationship of dependence between some of the main and additional subindicator values. Future studies will be required to see if it will change this relationship from a tourist point of view. The purpose is to increase the attention for protection and conservation of geosites from all people, as part of their local, regional and national identity.

5. Conclusions

The geoheritage of the Divjakë-Karavasta National Park could become a destination for geotourists. Protection and conservation of the total area of the National Park could help in rapid development of geotourism and geoeducation for general tourists. It is very important that the national park is protected and promoted with regard to its geodiversity in much the same way and commitment as with its biodiversity. The six geosites offer good opportunities to encourage development of geotourism. Large geosites have the most potential for geotouristic use. According to our findings, the natural or human fragility of geosites hinders the development of geotourism, so it is crucial that geotourism focuses mostly on highly protected geosites.

All indicators of the main and additional values are important in encouraging the development of geotourism. Special attention should be paid to the scientific/ education subindicators, because this type of tourism is directly related to geoeducation. Especially, the level of depth of scientific knowledge and didactic characteristics is essential to a high level of geosite promotion by means of text, graphics, materials, etc. Increased attention to scientific and interpretative panels at geosites with moderate geotouristic potential could encourage geotourism in the long term.

References

Antić, A. & Tomić, N., 2017. Geoheritage and geotourism potential of the Homolje area (eastern Serbia). *Acta Geoturistica* 8, 67–78.

Balla, A. & Gruda, G., 2015. Evolucioni morfologjik në sektorin bregdetar Shkumbin-Vjosë. [The morphologic evolution of Shkumbin-Vjosa coastline] *Studime Gjeografike* 18, Tiranë, 37–45.

Braholli, E. & Menkshi, E., 2019. Geotouristic assessment of Dardha Village (Korçë, Albania) by GAM Method. *European Journal of Social Science* 58, 186–193.

Braholli, E. & Menkshi, E., 2020. *Geotouristic potential in Mokra's Maintain Area*. [In:] S. Avdullahi (Ed.): International Multidisciplinary Geosciences Conference, University of Mitrovica "Isa Buletini", 55–63.

Braholli, E. & Menkshi, E., 2021. Geotourism potential of geosites in Durrës municipality, Albania. *Quaestiones-Geographicae* 40, 63–73.

Brew, D., 2003. Geomorphology of the Albanian Adriatic coast: A study of short and long-term changes at Karavasta Lagoon and their implications for coastal management. *Geography* 88, 88–98.

Brew, D.S., Ciavola, P., Mantovani, F. & Simeoni, U., 1995. *Coastal change in Albania: A case study from Karavasta Lagoon*. [In:] International Oceanographic Commission. Proceeding of Coastal Change, Bordeaux, 473–482.

Brilha, J., 2016. Inventory and quantitative assessment of geosites and geodiversity sites: a review. *Geoheritage* 8, 119–134.

Brilha, J., 2020. *Geoparks and geological heritage as promotors of sustainable development.* Rabat, Hassan II Academy Press, 141–146.

Brilha, J., 2020. *Geoheritage*. [In:] S.Elias & D. Alderton (Eds): Encyclopaedia of Geology (second edition). Elsevier, Amsterdam, 569–578.

Ciavola, P. & Simeoni, U., 1995. *A review of the coastal geomorphology of Karavasta Lagoon (Albania): Short term coastal change and implications for coastal conservation*. [In:] M.G. Healy & P. Doody (Eds): Directions in European coastal management. England, 301–316.

Ciavola, P., Mantovani, F., Simeoni, U. & Tessari, U., 1999. Relation between river dynamics and costal changes in Albania: an assessment integrating satellite imagery with historical data. *International Journal of Remote Sensing* 20, 561–584.

Ciavola, P., Tessari, U., Mantovani, F., Marzotto, M. & Simeoni, U., 2000. *Coastal zone geomorphological mapping using Landsat TM imaginary: An application in Central Albania.* [In:] Buchroithner M.F. (Ed.): Remote sensing for environmental data in Albania: A strategy for integrated management. NATO Science Series, Series 2 Environment Security, 72, Springer, Dordrecht, 153–163.

Dedej, Z., Kromidha, G., Dragoti, N., Zuna, V. & Dodbiba, E., 2015. *Zonat e mbrojtura detare e bregdetare në Shqipëri*. [*Marine and submarine protected areas in Albania*]. [In:] Agjensia Kombëtare e Zonave të Mbrojtura [United Nations Development Programme] 1–32.

Dhimitri, J., Sinani, A. & Todi, J., 2015. The landscape of Divjakë-Karavasta National Park in information among youth. *Agriculture and Agriculture Science Procedia* 4, 158–166.

Dollma, M., 2019. Geotourism potential of Thethi National Park (Albania). *International Journal of Geoheritage and Parks* 7, 85–90.

Dudley, N., 2008. *Guidelines for applying protected area management categories*. Gland, Swizerland, 1–143.

Durmishi, Ç., Daja, Sh., Ago, B., Dindi, E., Sinomeri, A., Nazaj, Sh., Qorri, A. & Muçi, R., 2018. Synthesis of geological, hydrogeological, and geo-touristic features of the Vjosa Watershed. *ActaZooBot Austria* 155, 41–61.

Frashëri, A., Avxhiu, R., Kasapi, S. & Alikaj, P., 1977. Results of a marine geoelectrical survey experiment. *Permbledhje Studimesh* 4, 33–40.

Frashëri, A., Papa, A., Lubonja, L., Leci, V., Hyseni, A. & Kokobobo, A., 1991. *The geology of Adriatic Sea shelf*. National Symposium Coastal Area of Albania, Academy of Science of Republic of Albania, Tirana, 1–6.

Gill, J.C, 2017. Geology and the sustainable development Goals. *Episodes* 40, 70–76.

Grandgirard, V., 1999. L'évaluation des géotopes. *Geologia Insubrica* 4, 59–66.

Gray, M., 2004. *Geodiversity, valuing and conserving abiotic nature.* John Wiley & Sons Ltd, 1–450.

Gray, M., 2013. *Geodiversity: Valuing and conserving abiotic nature.* Wiley-Blackwell, 512 pp.

Hose, T.A., 1995. Selling the story of Britan's stone. *Environmental Interpretation* 10, 16–17.

Hose, T.A., 2005. *Geo-tourism-appreciating the deep time of landscapes.* [In:] Nice tourism. Butterworth-Heinemann, London, 27–37.

Hose, T.A., 2011. The English origins of geotourism (as a vehicle for geoconservation) and their relevance to current studies. *Acta geographica Slovenica* 51, 343–360.

Hose, T.A., Markovic, B.S., Komac, B. & Zorn, M., 2011. Geotourism – A short introduction. *Acta Geographica Slovenica* 51, 339–342.

Hose, T.A. & Vasiljevic, D.A., 2012. Defining the nature and purpose of modern geotourism with particular reference to the United Kingdom and South-East Europe. *Geoheritage* 4, 25–43.

Kabo, M., 1998. Gjeneza e kënetave të ultësirës bregdetare. [Genesis of coastal lowland swamps]. *Studime Gjeografike* 5, 179–197.

Koçiu, S., 1996. *Some aspects of coastal management: Case studies in Albania*. [In:]: J. Taussik & J. Micheli (Eds): *Partnership in coastal zone management.* Cardigan, UK, 95–101.

Mathers, S., Brew, D.S. & Arthurton, R.S., 1999. Rapid Holocene evolution and neotectonic of the Albanian Adriatic coastline. *Journal of Coastal Research* 15, 345–354.

Moisiu, L., Neziraj, A. & Avxhi, A., 2021. *Mapping geosites in Albania*. [In:] G. Lozano, J. Luengo, A. Cabrera & J. Vegas (Eds): 10 th International ProGEO Online Sympozium. Segovia, Spain, 39–40.

Newsome, D. & Dowling, R.K. (Eds), 2010. *Geotourism: The tourism of geology and landscape.* Goodfellow Publishers, Oxford, 1–245.

Panizza, M., 2001. Geomorfosites: Concepts, methods and examples of geomorphological survey. *Chinese Science Bulletine* 46, 4–6.

Panizza, M. & Piacente, S., 2005. Geomorphosites: A bridge between scientific research, cultural integration and artistic suggestion. *Italian Journal of Quaternary Sciences* 18, 3–10.

Pano, N., 2015. *Pasuria ujore e Shqipërisë* [*Albania's water wealth*]. Akademia e Shkencave të Shqipërisë, Tiranë, 1–634.

Pano, N., Simeoni, U., Frashëri, A. & Abdyli, B., 2015. *The principal aspects of the limniological regime of Karavasta Lagoon system*. University of Bari Press, 41–48.

Pazari, F. & Dollma, M., 2019. Geotourism potential of Zall Gjocaj National Park and the area nearby. *International Journal of Geoheritage and Parks* 7, 103–110.

Piacente, S., 2005. Geosites and geodiversity for a cultural approach of Geology. *Italian Journal of Quaternary Sciences* 18, 11–14.

Qiriazi, P., 2019 (Ed.). *Gjeografia fizike e Shqipërisë* [*Physical Geography of Albania*]. Tiranë, Mediaprint. 580 pp.

Qiriazi, P., 2020. *Trashëgimia natyrore e Shqipërisë (Vlerat, rreziqet dhe menaxhimi).* [*Natural heritage of Albania (values, hazards and managements)*]. Akademia e Shkencave e Shqipërisë, Tiranë, 1–390.

Qiriazi, P. & Sala, S., 2006. *Monumentet e natyrës të Shqipërisë*. [*Natural monuments of Albania*]. Ministria e Mjedisit, Pyjeve dhe Administrimit te Ujrave Tiranë, 1–84.

Qirjazi, I., Kromidha, G., Kadiu, V. & Mitro, M., 2014. *Ditari i Natyrës* [*Nature Journal*]. Tiranë, 1–8.

Reynard, E., 2005. Geomorphological sites, public policies and property rights. Conceptualization and examples from Switzerland. *Italian Journal of Quaternary Sciences* 18, 323–332.

Reynard, E. & Panizza, M., 2005. Geomorphosites: definition, assessment and mapping. *Géomorphologie: relief, processes, environment* 3, 177–180.

Reynard, E. Coratza, P. & Hobléa, F., 2016. Current research on geomorphosites. *Geoheritage* 8, 1–3.

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

Ruban, D.A., 2010. Quantification of geodiversity and its loss. *Proceeding of the Geologists' Association* 121, 326–333.

Salkind, J.N., 2000. *Statistics for people who (they think) hate statistics*. Sage Publication, London, 408 pp.

Serjani, A., 2020. *Geoheritage and geotourism in Albania*. [In:] B.N. Sadry (Ed.): The geotourism industry in the 21st century (the origin, principles, and futuristic approach). New York, 169–188.

Serjani, A., Neziraj, A., Wimbledon, P.A., Onuzi, K., Hallaci, H. & Bushati, S., 2003. *Gjeomonumentet dhe gjeoturizmi në Shqipëri* [*Geomonuments and geotourism in Albania*]. ProGEO-Albana, Tiranë, 1–306.

Shqipëria, 2014. *Ligji nr. 115/2014 Për ndarjen administrativo-territoriale të njësive të Qeverisjes Vendore në Republikën e Shqipërisë.* [*Law 115/2014 for administrative-territorial division of local government units in the Republic of Albania*]. Fletore Zyrtare, Tiranë, 1–26.

Shqiperisë, 1990. *Gjeografia Fizike e Shqipërisë, vol II* [*Physical geography of Albania, vol. 2*]. Qendra e Studimeve Gjeografike, Tiranë, 1–589.

Simeoni, U., Pano, N. & Ciavola, P., 1997. The coastline of Albania: morphology, evolution and coastline management issues. *Bulletin de l' Institute océanographique, Monaco* 18, 151–168.

Tomić, N. & Bozić, S., 2014. A modified Geosite Assessment Model (M-GAM) and its application on the Lazar Canyon area (Serbia). *International Journal of Environmental Research* 8, 1041–1051.

Vujičić, D.M., Vasilevic, A.D., Markovic, B.S., Hose, A.T., Hadzic, O. & Janicevic, S., 2011. Preliminary Geosite Assessment Model (GAM) and its application of Fruska Gora Mountain, potential geotourism destination of Serbia. *Acta Geographica Slovenica* 51, 361–377.

Zorina, O.S. & Silatiev, V.V., 2014. *Geosites, Classification of*. [In:] Encyclopedia of Mineral and Energy Policy, 1–4.

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