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# The Educational Values of Guaku spring, Bogovë Waterfall, and Pirogoshi Cave, from Landscape to Learning Natural Heritage

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**Abstract**

Natural monuments, as important elements of natural heritage, offer not only scientific, aesthetic, conservation, and touristic values, but above all, they carry significant educational potential.

This paper aims to examine the role of natural monuments as important educational resources for environmental and scientific education, focusing on three selected sites: Guaku spring, Bogovë waterfall, and Pirogoshi cave. All three natural monuments are located within the territory of Skrapar municipality and represent diverse examples of landform features. Guaku spring effectively illustrates karstification processes and the value of water resources within ecosystems. Bogovë waterfall represents the dynamics of erosive processes in mountainous landscapes, while Pirogoshi cave serves as an environment for studying internal landform morphology and speleological formations. The study is based only on the analysis of scientific and educational values as defined through the GAM method (Geosite Assessment Method, Vujičić et al., 2011), which was developed to comprehensively evaluate the values of various geosites. This method includes five groups of values, each with its own set of indicators. Field observations, literature review, and interviews with experts in the field, conducted in accordance with the GAM method, highlight that these natural monuments function as natural laboratories for understanding geological, geomorphological, and geographical processes. Moreover, they contribute to raising awareness and promoting education on environmental protection and conservation. Meanwhile, the physical geography curriculum in pre university education includes learning outcomes related to natural heritage, enabling a connection between educational demand and the illustrative, demonstrative, and

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cognitive potential of local geography. Field-based didactic practices at these sites help build sustainable and easily comprehensible knowledge, especially for pre-university students, whose educational institutions are located near these high-value natural sites.

**Keywords**: *Educational Values, Field-Based Learning, Natural Heritage, Curriculum Education, Learning Outcomes*

## Introduction and study area

Guaku spring, Bogovë waterfall, and Pirogoshi cave are located within the municipality of Skrapar. The municipality of Skrapar, with a surface area of 775 km² and an average altitude of 788 meters above sea level, is situated in the northeastern part of Albania's southern region (Bashkia Skrapar 2020). The total area of the municipality of Skrapar is 83,327 hectares (Bashkia Skrapar, 2020). The administrative boundaries generally follow the ridgelines of mountain ranges. The area is traversed by the valleys of Osum and Tomorrica rivers and includes notable mountain passes and gorges, such as Kulmak pass and Gjarpri pass (in the Tomorrica area), as well as the Devri gorge (Bashkia Skrapar, 2020). The relief of Skrapar is predominantly mountainous and hilly, ranging from 140 meters to 2,416 meters above sea level. Major elevations include Tomorr mountain (2,416 m), Kulmaka mountain (2,173 m), and Potom region. The lower areas extend along Osum valley, with the lowest point located in Poliçan at 140 meters above sea level. The mountain ranges are generally oriented northwest to southeast and rest on anticlinal structures composed primarily of limestone. The relief is characterized by a high degree of horizontal dissection, ranging between 3–5 km² and 5–7 km². In terms of altitude distribution, the territory is presented as: 4.2% of the territory lies below 399 m, 66.5% lies between 400–999 m, 27.5% between 1,000–1,999 m, and 1.9% position above 2,000 m (Plaku, 2010, pg. 673). The variety of hypsometry provides effective opportunities to demonstrate classroom-acquired knowledge through field observations.

The climate of Skrapar is mediterranean, with hilly and mountainous influences. Data from Ujanik meteorological station shows an average of approximately 1,600 sunshine hours from April to October. The most characteristic local wind is the *stoçeni*, a strong and cold northeastern and southeastern wind, especially prevalent in winter, particularly in Tomorrica and Potom areas. Wind directions are influenced by the orientation of the mountain ranges and river valleys.

Skrapar is part of a region rich in water resources, including rivers, streams, and natural springs. The main river is the Osum, which passes through several settlements such as Çorovodë, Malind, and Staraveckë, with both its upper and lower courses running through the area. The hydrographic network also includes important natural springs, such as Guaku spring, Ujanik springs, Faqekuq springs, Varishtës spring, Uji i Zi spring, and Bogovë spring. Some of these water sources are used for hydroelectric energy production (in Bogovë, Ujanik, and Guaku), potable water supply, and irrigation purposes (Plaku, 2010, p. 136).

The administrative center of the municipality is the town of Çorovodë. From a demographic perspective, according to the Population and Housing Census (Instat, 2023), the

municipality of Skrapar has a population of 10,750 inhabitants. In 2011, the population was 12,403, representing a decrease of approximately 13% over a 12-year period. The demographic structure reflects an aging population (1133 inhabitants (10.5%) belong age 0-14, 7033 inhabitants (65.4%) belong aged 15-64, 2584 inhabitants (24.1%) belong age 65 and over) with a considerable proportion of elderly individuals (Bashkia Skrapar, 2020). This situation is partly due to population migration toward more developed urban centers as well as emigration abroad. These demographic data serve as an important tool for educating students about the relationship between local natural heritage and human presence over time. Understanding population decline and aging in areas encourages reflection on preservation, and revitalization of local natural and cultural landscapes.

The economy of Skrapar is primarily based on agriculture and livestock farming. In recent years, tourism has begun to play an increasingly important role in the economic development of the area. Natural attractions such as Osum canyons, Tomorr mountain, and the Bogovë waterfall are drawing a growing number of tourists from around the world. Elements of the natural landscape often become an important component of geographic education related to the natural environment.

In the curricula of lower and upper secondary geography (Tables 1, table 2 and table 3), there are learning outcomes connected to elements of natural heritage, including the natural monuments (geosites in this studies) of Albania and its regions. Tables 1, 2, and 3 present the knowledge, skills, and values that geography curricula aim to develop in students regarding the understanding and protection of local natural and cultural heritage.

Table 1. Geography Curriculum for Grade VI (Level III), ASCAP, 2018, p. 26

| **Knowledge** | **Skills - The student identifies:** | **Attitudes / Values - The student:** |
|---|---|---|
| The natural and cultural heritage of the local environment and its protection | • the cultural and natural heritage monuments of the area;<br>• the touristic values of the cultural and natural heritage monuments of the area;<br>• the natural and anthropogenic threats that endanger the values of the | • Accepts and respects the natural, social, and cultural diversity of their local area.<br>• Demonstrates care and sensitivity toward natural resources and their preservation.<br>• Objectively evaluates data results compared to those of peers. |

| | | |
|---|---|---|
| | area's cultural and natural heritage. | • Respects the ideas and experiences presented by others. |

Table 2. Geography Curriculum for Grade IX (Level IV), ASCAP

| Knowledge | Skills - The student identifies: | Attitudes / Values - The student: |
|---|---|---|
| The natural and cultural heritage of the Republic of Albania and the development of tourism<br>National natural heritage (protected areas). | • Identifies the categories of protected natural areas (p. 34)<br>• Evaluates the natural and cultural heritage of the Southern Region (p. 40) | • Applies and demonstrates soft skills<br>• Shows appreciation for natural and cultural heritage<br>• Demonstrates responsibility in the use and preservation of natural and cultural heritage |

Table 3. Geography Curriculum for Grade XI (Level V), ASCAP, 2018, p. 27

| **Knowledge** | **Skills - The student identifies:** | **Attitudes / Values - The student:** |
|---|---|---|
| Albania's natural heritage – a highly asset for specific regional developments<br><br>The natural and cultural heritage of the Southern Region | • **Identifies some of the natural heritage sites of our country** (p. 34)<br>• **Investigates various information sources about the country's protected areas, their resources, and their impact on tourism development** (p. 34)<br>• **Evaluates the natural and cultural heritage of the Southern Region and its significance** (p. 42) | • Demonstrates interest and curiosity about the natural features of our country<br>• Shows sensitivity and care for the quality of the natural environment<br>• Appreciates sustainable management and efficient use of natural resources<br>• **Appreciates the natural, social, and cultural diversity of Albania's regions** |

In this context, the presence of natural heritage sites near school facilities gains even greater practical and didactic importance in subject demonstrations and the acquisition of sustainable knowledge. But what kinds of values should be considered and evaluated as

appropriate for educational purposes? To help answer this question, the classification of values provided by the GAM (Geosite Assessment Model) is used, where particular emphasis is given to scientific and educational values, along with their four key indicators.

## Methodology

This study presents the partial application of the GAM (Geosite Assessment Model) methodology, developed by Vujičić et al. (2011), to assess selected geosite Bogova waterfall, Guaku spring, and Pirogoshi cave by offering insights into their educational value potential. This method is applied in some studies in Albania (Braholli & Dhimitri, 2022; Braholli & Menkshi, 2019; Braholli & Menkshi, 2021; Zdrava, 2024; etc.). Overall, GAM model comprises two main groups of values: **main values (Scientific/educational values (VSE), Scenic/aesthetic values (VSA), Protection values (VPr)),** and **additional values (Functional values (VFn), Touristic values (VTr)** divided into 12 and 15 indicators respectively. Each sub-indicator is evaluated on a five-point numerical scale**: 0.00, 0.25, 0.50, 0.75, and 1.00.** This classification reflects two broad types of value: **main values**, which are derived from the natural characteristics of microforms, and **additional values,** which are primarily influenced by human activity and the degree of site use and modification by visitors.

Scientific and educational values are considered fundamental for the classification of abiotic geosites and are composed of **four sub-indicators rarity, representativeness, knowledge on geoscientific issues, and level of interpretation.** This study focuses exclusively on the group of indicators related to **scientific and educational values,** highlighting their specific indicators and their significance in the evaluation process. These quantitative assessments are presented in **table 5**.

## Findings and discussion

***Pirogoshi cave*** is situated on the right-hand slope of the Gradec Canyon, in the southern extension of Kulmaka mountain, at an elevation of **500 m a.s.l.** and **60–70 m above the riverbed,** close to the village of **Radësh** and only **3 km from the town of Çorovodë.** Over the years the cave has attracted considerable interest from both Albanian and foreign scholars and has been explored by numerous international speleological teams as well as residents (Serjani et.al., 2003). Access is via the **Çorovodë–Pirogoshi motor road (7 km) or the Berat–Çorovodë–Pirogoshi route (57 km),** followed by a **350 m footpath.** Inside the cave the path rises gently northward, alternating narrow passages, spacious halls, and slender galleries. The

ceilings host abundant large calcite stalactites and stalagmites, flowstone columns, stone "waterfalls," cave pearls, and other speleothems (ADZHM Berat, 2024; Akademia e Shkencave e Shqipërisë, 2009). The cave splits into two branches. **The left branch** terminates in two water shafts with siphons. The **right branch** contains the "Hall of Concretions" and the "Corridor Hall". After 100 m it follows a tectonic line and leads to an additional branch. A shaft ~35 m deep marks the end of the explored passage, giving a **total surveyed length of 1 252 m** (Plaku, 2010, p. 732). The cave's vantage point is remarkable, offering views of the **Radësh Stream waterfall** and the lush riparian vegetation. Although local inhabitants had long been aware of the site, a full scientific survey was first carried out by Italian speleologists in **1985**, accompanied by local Albanian teachers, yielding several significant discoveries. The imposing entrance lies beside a canyon carved into Cretaceous limestones. The main passage is **1252 m long, 30 m wide, and 5 m high**, forming an underground labyrinth inhabited by sizeable bat colonies (Serjani et. al., 2003). The first (lower) entrance, which offers a modest external terrace suitable for habitation, has yielded fragmentary Neolithic ceramics; far fewer finds were recovered at the upper entrance, which lacks a comparable outer living space. Accordingly, Pirogoshi cave is recognized as a geomonument of **high scientific, ecological, geomorphological, geological, archaeological, didactic, and geotouristic value (**Serjani et. al., 2003).

Figure 1. Pirogoshi cave (Photos: Krenar Xhaferri)

*Guaku spring* is located near the town of Çorovoda, at an altitude of 120 meters a. s. l. It is a large karst spring that emerges at the lithological contact between Mesozoic limestone rocks and Paleogene flysch formations. It is one of the largest springs in the entire Osum River basin. Its maximum discharge in January reaches 1.94 $m^3/s$, the minimum in September is 0.57 $m^3/s$, while the long-term average is 1.28 $m^3/s$. The water is clean, cold, and of high quality, suitable for drinking. (Serjani et.al., 2003). Guaku spring is active for a six-month period, from

the end of November to May. It has scientific, geological, hydrogeological, cultural, educational, and geotouristic importance at the national level. It has been declared a protected natural monument by Decision of the Council of Ministers No. 676, dated 20.12.2002. To visit it, one follows the Çorovodë–Gradec road, and without taking the uphill path, one reaches the beautiful surroundings of the spring. (ADZHM Berat 2024)

Figure 2. Guaku spring (Photo: ADZHM Berat)

Bogovë waterfall, as a natural monument, is increasingly ranked among the most visited attractions by both local and foreign tourists. It is located within the national park at an altitude of 315 meters above sea level. This waterfall holds significant touristic value due to its stunning beauty, attracting visitors in almost all seasons of the year. With a height of 20 meters and a pool depth of 10–12 meters, it is a natural gem surrounded by diverse vegetation. (ADZHM Berat 2024)

It holds scientific, geological, geomorphological, hydrogeological, educational, and geotouristic importance. It was declared a protected site by Decision of the Council of Ministers No. 676, dated 20.12.2002 (DCM, 2002). It can be accessed via the Berat–Çorovodë road to Bogovë–Ura e Sirakës, followed by a footpath. (Serjani, et. al., 2003)

The Bogovë spring also serves as a water supply source for the city of Berat. (Plaku 2010, p. 136)

| Indicator | Description | Scores |
|---|---|---|
| **Scientific/Educational Values** | | **0/0.25/0.5/0.75/1** |
| **Rarity (SIMV1)** | **Number of Identical Nearby Sites** | |
| **Representativeness (SIMV2)** | **Didactic and Exemplary Characteristics of the Site Based on Its Quality and Overall Configuration** | |
| **Knowledge on Geoscientific Issues (SIMV3)** | **Number of Published Works in Journals, Theses, Presentations, and Other Publications** | |
| **Level of Interpretation (SIMV4)** | **Level of Interpretative Opportunities Regarding Geological and Geomorphological Processes and the Degree of Scientific Knowledge** | |

Figure 3. View of the Bogovë Waterfall (Photo: Xhuliana Zdrava, November 2024)

All three natural monumeents remain with the same protection status, based in DCM, 2019. Meanwhile, **table 4** presents the **indicators of scientific-educational values** according to the **GAM (Geosite Assessment Method).** For each indicator, a **description** is provided, and a **score ranging from 0.00 to 1.00** is assigned based on the level of presence or significance of the respective indicator.

Table 4. Indicators of Scientific/Educational Value and Their Descriptions According to the GAM Method, Vujičić et al. (2011)

Table 5 highlights the grading of each sub-indicator according to Vujičić et al. (2011).

Table 5. Grading of Indicators According to 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 |

The grading of indicators relates to the interpretation of the significance and rarity of natural monuments, ranging from basic local importance to those with high international relevance or that are unique (SIMV1). The second indicator ranks the degree of representativeness, while the third evaluates the knowledge available on geoscientific issues, ranging from minimal information to publications in international journals. The fourth indicator assesses the level of interpretability of geological and geomorphological processes for non-expert visitors—whether these processes can be easily identified or not.

The evaluation of educational values based on specific indicators for each natural monument selected in this study, is presented in table 6.

Table 6: Evaluation of the educational and scientific values of Bogova waterfall, Guaku spring, and Pirrogoshi Cave

| **Sub-indicators (Main group values) Scientific/Educational Values** | Expert-assigned values | | |
|---|---|---|---|
| | Bogova Waterfall | Guaku Spring | Pirrogoshi Cave |
| **Rarity (SIMV1)** | 0.75 | 0.25 | 0.75 |
| **Representativeness (SIMV2)** | 0.75 | 0.5 | 1 |
| **Knowledge about Geoscientific Issues (SIMV3)** | 0.75 | 0.5 | 0.75 |
| **Level of Interpretation (SIMV4)** | 0.5 | 0.25 | 0.75 |
| **Total** | 2.75 | 1.5 | 3.25 |

Table 6 estimates that Bogovë waterfall and Pirrogosh Cave have high rarity values, being represented at an international level. Representativeness is also higher in these two natural monuments. Numerous publications are found for these two natural monuments

compared to the Guaku spring (Serjani, Jozla, & Neziraj, 1998; Eftimi, & Zojer, 2015; Eftimi, 2020; Dhimitri & Zdrava, 2024; Zdrava, 2024; etc.). All three analyzed natural monuments can serve for demonstrations of geological processes, but the degree of presentation and explanation of these processes varies, with Pirrogosh cave ranked highest, followed by Bogovë waterfall, and then Guaku spring. This is related to the causes and origin of their formation, the possibility of exposing the processes, and the ability to conduct direct observations or measurements.

Considering the learning outcomes of subject curricula for grades VI, IX, and XI, and the indicators of educational and scientific values, they represent important didactic elements for teaching or learning about natural heritage. They help in identifying their category, assessing the importance of understanding them, and fostering sustainability in their preservation, protection, or management. From an educational perspective, natural monuments represent an irreplaceable resource for understanding geological processes, climate, the impact of human activity on the environment, and the evolution of the Earth. Field observation, reviewing various literature, and meeting with field experts and local authorities responsible for the monitoring and protection of these natural monuments will support and facilitate teachers' work in schools in achieving learning outcomes by making use of the natural landscape.

Natural monuments offer direct opportunities for field-based learning, where students can observe and analyze real natural structures beyond theoretical knowledge. They can be used to illustrate concepts such as erosion, sedimentation, tectonics, landscape formation, and the water cycle. Learning through field experience encourages observation and data-recording skills, critical and analytical thinking, as well as teamwork and the ability to make interpretations based on natural evidence. Meanwhile, they serve as ideal centers for interdisciplinary education that link nature, culture, and science, integrating ecology, history, and heritage. Studying their educational values contributes to raising awareness about nature conservation and the risks of anthropogenic impacts.

## Conclusions and Recommendations

This study examines the importance and educational values of three natural monuments in Albania: Bogovë waterfall, Guaku spring, and Pirogoshi cave. **Bogovë waterfall** holds educational value in physical geography education, illustrating erosion processes and the formation of waterfalls in various terrains. It offers opportunities for studying biodiversity and ecosystems linked to waterfalls. Teachers can apply **field education,** especially local one, and

use this waterfall as a tool to help students understand the importance of preserving aquatic ecosystems and the human impact on them, and functioning of atmosphere, hydrosphere and geosphere systems.

**Pirogoshi cave** offers scientific and educational value in physical geography education, **geomorphology** by demonstrating cave formation processes and related geological structures. By taking **field work**, students can learn about the importance of preserving natural formations and Albania's natural heritage.

**Guaku spring** is a karst spring emerging from the limestone massif. Its educational values include phusical geography, where it demonstrates karstification processes and the formation of natural springs. Students have direct possibilities to study on karst processes and the importance of karst water sources in local ecosystems and abiotic areas.

Together, these natural monuments act as **natural laboratories** that enhance both theoretical and practical knowledge in natural sciences, especially in geography and related fields. The study, however, indicates that Pirogoshi cave (3.25) possesses the greatest educational values, followed by Bogove waterfall (2.75) and lastly, Guaku spring (1.5). **Education about natural monuments promotes more responsible environmental behavior** and increases awareness of the negative impacts of human interference. Visits to these sites can be used to fulfill learning outcomes of school geography curricula and awareness-raising activities, combining scientific knowledge with hands-on experience. Based on geography curricula and their outcomes these sites remain important scientific and education resources, especially to students and schools' teachers near and natural monuments areas.

**Conserving these natural monuments is essential** for protecting natural heritage and supporting sustainable local development. According to DCM, 2019 they have the same protection status as DCM 2002. Increasing their educational value provides greater opportunities for involving educational institutions in conservation programs. To **maximize the educational potential** of these natural monuments specific teaching materials should be developed and training sessions should be organized for teachers on these topics. **Collaboration between scientific and educational institutions, and local communities is important** to achieving educational and conservation goals.

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