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# EXPLOITATION OF GEOSITES IN TOURISM DEVELOPMENT, THE CASE OF GHAR DJEMAA WILAYA OF GUELMA

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**ABSTRACT**

Geotourism is based on three fundamental principles: education, conservation and sustainable development. Geotourism promotes natural sites such as caves by encouraging their preservation through appropriate facilities (walkways, lighting and regulation of visits) designed to maintain their climatic and geological stability.
This article highlights the Ghar Djemaa cave in Guelma, a geological, historical and scientific gem that is still under-exploited. It highlights the urgent need to design appropriate facilities to protect this exceptional heritage, while boosting the local economy and ensuring that it is passed on to future generations.

**KEYWORDS**

Geotourism, Geosite, Cave, Preservation, Ghar Djemaa

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## Introduction.

The strong growth of the tourism economy worldwide is driving unprecedented regional development. Because of its multi-dimensional nature, tourism encompasses various sectors of activity and plays an essential role in improving the level of development of territories.

Geotourism is a fast-growing sector that is increasingly asserting itself as a form of sustainable tourism that enhances geological landscapes while respecting the environment. This type of tourism stands out for its educational and responsible approach, enabling visitors to discover the geological wealth of a region while helping to preserve it. Geotourism offers considerable potential for promoting sustainable development, provided that its implementation is guided by one overriding priority: the conservation of geological sites.

The aim of this article is to explore the concept of geotourism, which promotes geodiversity and enables visitors to discover remarkable geological sites. Using the example of the Ghar Djemaa cave, one of the emblematic sites of geotourism, although not specifically designed for this purpose, we will analyse its characteristics and its current state. The article will also highlight the importance of responsible management of these natural sites to ensure their long-term protection and transmission to future generations.

**1. Definition of Geotourism.**

Geotourism is a fast-growing tourist activity. It is defined as a form of tourism based on a territorial resource, the geological and geomorphological heritage (Nathalie Cayla, 2010). This form of educational tourism goes beyond simple contemplation, encouraging visitors to become actively involved in understanding local geology. It allows visitors to discover and appreciate the geological features of a region while encouraging their preservation (Newsome and Dowling, 2010).

Geotourism is based on three major principles: education, conservation and sustainable development. It aims to enrich the tourism experience by learning about the Earth sciences, thereby helping to raise visitors' awareness of the importance of protecting geological sites (Dowling and Newsome, 2018). It creates a link between nature and local communities, enabling visitors to gain a better understanding of landscapes and communities to benefit from geological heritage (Hose, 1995).

Geotourism is a powerful lever for sustainable development, particularly in rural areas. It contributes to economic diversification and reduces the dependence of rural communities on industrial activities by offering alternatives based on sustainability (Farsani, Coelho and Costa, 2011).

Different geotourism products make up the territories' offer. Some may be of natural origin (caves, gorges or canyons) or man-made, such as former exploitations like mines or quarries. (Nathalie Cayla, 2010).

**2. Geotourism and Resource Conservation.**

The majority of geotourists look for destinations with a high level of environmental quality, they like to visit attractive, clean places that are neither polluted nor congested (Schlüter, T, 2018). Geotourism is different from other natural attractions. This tourism applies conservation principles in accordance with the rules of ecotourism, so geotourism is considered to be both environmentally friendly and sustainable tourism (Setiadji, P, 2022).

Although geotourism offers undeniable benefits, it also poses challenges in terms of resource management and conservation. The increase in the number of visitors to certain geosites can lead to degradation of the soil, ecosystems and geological formations. Strategies to regulate tourist flows are therefore essential to avoid negative impacts on the environment (Dowling & Newsome, 2010).

Protective measures need to be adopted, such as limiting visits, building protected trails and educating visitors to minimise impacts. Local, participatory management is also crucial to ensuring the long-term future of geotourism sites.

**3. Caves.**

Caves are exceptionally rich environments in terms of geochemistry, mineralogy, biology, fauna, palaeontology and archaeology, but they are also extremely fragile. They can be decorated with a variety of formations, known as ‘decorations’, generally composed of limestone. These take a variety of forms, including stalactites, stalagmites, aragonite needles and cave pearls.

Their mystery and beauty arouse fascination and curiosity. Whether limestone, sandstone or subglacial, these caves come in many shapes and forms, often sheltering a variety of life forms and, for a long time, serving as a special refuge for mankind.

The stability of internal climatic parameters, particularly temperature, plays a crucial role in the conservation of caves. Initially, these caves enjoyed exceptional climatic stability, favouring the conservation of fragile remains. This stability is mainly linked to exchanges of air,$CO_2$, heat and water with the surrounding karstic system (Yves Coppens, 1999). However, some of them have suffered irreversible damage as a result of poor management.

**3.1 The Development of Cave Tourism.**

Over more than two centuries, underground tourism has evolved considerably, and has considerably diversified its offering. A variety of geotourism products characterise the offer in these areas, which may be of natural origin, such as caves, gorges or canyons, or of artificial origin, such as former exploitations like mines or quarries. (Cayla N, 2010).

During the second half of the 19th century and the early 20th century, caves became an important part of the tourist industry. Thanks to the first scientific explorations and development work, these natural curiosities attracted growing interest from visitors. (Stéphanie Quériat, 2007).

A tourist cave is an underground cavity, either natural or man-made, fitted out inside and out to facilitate public access for guided tours. Access is generally subject to specific opening times and days, and an entrance fee.

Today, more than 800 caves around the world attract millions of visitors every year, generating considerable revenue and creating many direct and indirect jobs.

### 3.2. Development of Tourist Caves.

Conservation, enhancement and transmission involve various types of development depending on the nature of the property, its vulnerability, its memorial potential and the tourist activity it supports. (Malgat Charlotte, 2012). Caves have been designed to allow people to move around without risk and without damaging the ground in all the accessible areas of the cave.

The development of caves for tourism involves various conceptual categories of facilities (primary, secondary and tertiary facilities), the nature of the materials used (resistant to corrosion and bioclimatic alteration), and the practical implementation of the structures, based on the principle of reversibility.

Tourist caves, i.e. caves with iron walkways, staircases to go down or up between rooms and a reception building at the entrance housing the ticket office or a souvenir shop, are a recognised sector of the leisure and tourism industry (André Suchet, 2010).

The development of caves for tourists is designed to ensure safe circulation while protecting the ground in all accessible areas. This includes taking into account the different categories of equipment (primary, secondary and tertiary), the choice of materials that are durable in the face of corrosion and bioclimatic alterations, and the practical implementation of installations, based on the principle of reversibility. On the other hand, poorly controlled, ill-conceived or badly designed installations can cause irreversible damage to the cave's natural environment.

The development may therefore result in changes to the cave site, such as :

- The construction of footbridges, staircases, the creation of an artificial lake, the opening of new galleries, etc.
- The layout of entrances and exits to the cave, which will have repercussions on the cave's relationship with the outside world (ventilation, light, etc.)
- Climate change due to changes in temperature, lighting, ventilation, humidity and carbon dioxide levels.
- Impact of visitors on the cave: ‘thermal increase’, which requires very precise calculations of the number of visitors in the cave at any one time,

The excessive introduction of energy, whether through the presence of visitors or lighting, disturbs the stability of the cave and increases the risk of degradation. By identifying the periods and causes of instability, it is possible to define a maximum acceptable energy threshold. By optimising closures and lighting systems and regulating visitor numbers, it is possible to design appropriate facilities and set visitor capacity in line with optimum conservation conditions.

## 4. Ghar Djemaa Case Study

Our case study concerns the ‘Ghar Djemaa’ cave, located in the wilaya of Guelma. This cave, rich in curiosities, attracts many visitors despite its abandoned state. This situation highlights both the importance of the cave and the need to protect it.

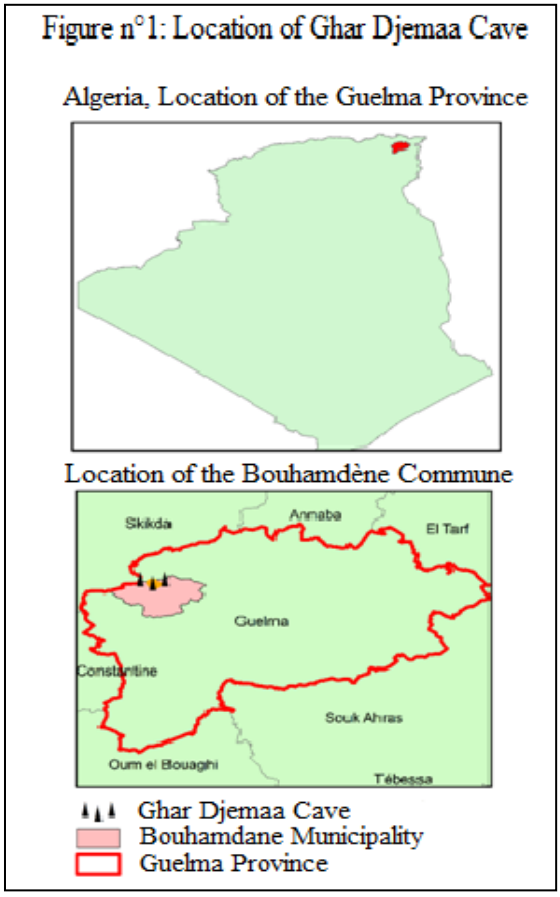
It is recognised as one of the most fascinating and mysterious tourist areas in the Guelma region, thanks to its picturesque raindrop formations and the strange secrets it holds. These mysteries, buried down through the ages, date back to pre-Christian times.

### 4.1 Location of the Ghar Djemaa Cave

The Ghar Djemaa cave is located in north-east Algeria, in the commune of Bouhamdan, in the north-west of the wilaya of Guelma, close to the border with the wilaya of Skikda. It is 38 km from the wilaya's main town and can be reached by national road no. 27, which links the communes of Hammam Dbagh and Bouhamdan.

Geographically, the commune of Bou Hamdan is characterised by its mountainous environment. Mountainous areas are renowned for their wealth of water resources and clean air, due to the absence of polluting industrial activities and gas emissions. They are also home to numerous cave and cavern formations. The Ghar Djemaa cave is located on Djebel Taya, the highest mountain in the region, culminating at 1199 m altitude. This mountain is made up of rocky masses and is rich in water.

Figure n°1: Location of Ghar Djemaa Cave




### 4.2. History of the Ghar Djemaa Cave

The Ghar Djemaa cave is considered to be one of the greatest symbols of the Roman presence in eastern Algeria. Around 210 AD, it served as a temple dedicated to the Roman god Bakas, to whom the Romans, coming from Tebilis (now Salawa Anunah), would go to venerate him and offer him gifts and offerings, particularly in the spring during celebrations and ceremonies. These visits were immortalised in inscriptions engraved on the walls at the entrance to the cave, which can still be seen today.

The cave has been the subject of several excavations and explorations by French researchers, including General Faydherbe. Later, the scientist Burqina, a specialist in molluscs, visited the region to study the dolmen tombs. His friend Lutogno, impressed by the beauty of the site, told him about it, describing it as one of the most extraordinary wonders he had ever seen. This prompted Burqina to visit the cave on 23 May 1867, followed by a second visit in July of the same year, during which he was able to cover a length of more than 1,200 metres and penetrate to a depth of more than 400 metres, where he discovered numerous bones of various animals living in the cave and dating back to more than 800 BC (21 species of animals, the most important of which is from the bear family). He also analysed the existing writings (64 in all), most of which are located at the main entrance to the cave and inside. He confirmed his findings in an 1870 book entitled 'The History of Mount Taya, Cave of the Great Mosque', where he included a detailed plan of all the areas and rooms he had explored.

The French continued to visit, some of them engraving their names and the dates of their visits to the cave. These inscriptions can still be seen today, most of them dating from 1894 - 1907 - 1921 - 1938 - 1946. These inscriptions can be found in the Salle des Cascades, engraved on the occasion of the Fête du Pardon, as evidenced by the writings on the walls. The site continued to attract French visitors, particularly amateurs and explorers, and aroused the interest of the French authorities. During the deliberations of the Guelma town council in 1935, a development project for the cave was proposed, along with a request to the Governor General of Algeria for the construction and development of the road leading to it.

### 4.3. Composition of the Cave.

The explored part of the cave extends for approximately 1,200 metres. The entrance is in the form of a cylindrical rock tunnel, 38 metres long, no more than 3 metres wide and no higher. This passage leads directly to a first chamber.

The Ghar Djemaa cave contains several chambers, six of which are accessible.

**1.** ***The descent hall :*** This hall, estimated to be 200 metres long, is characterised by its steep downward incline. As it progresses, its width and height gradually increase, until it reaches a ceiling of around 15 metres. It ends in several branches and corridors leading to other rooms. From here onwards, stalagmites and stalactites appear everywhere, in various shapes and sizes, some taking on the appearance of sharp, shiny limestone needles. The room is plunged into total darkness, making it impossible to progress without lighting, amid rocky outcrops and a slippery floor.

**2.** ***The waterfall chamber:*** Also known as the Thibilitains chamber, this is the largest and most important chamber in the cave. It is filled with stalagmites and stalactites, with a huge limestone wall at its centre made up of intensely shiny limestone filaments. A narrow passageway leads up to the Triangle room.

In the Salle des Cascades, you can still see the inscriptions left by the aforementioned visitors.

**3.** ***The Triangle room:*** Also known as the Djemaa room, it is located directly above the Cascades room, with the Terrasses room to its right.

**4.** ***The Terrace Room:*** Also known as the Millot Room, this is a large hall. To the south of this, another vast hall is accessible through a small opening from which a draught emanates. This hall has a number of upper corridors with dazzling white floors and small white limestone basins.

**5.** ***The pool room:*** Also known as the Blue Coal Room, it is located near the Waterfalls Room and consists of small limestone pools filled with water, decorated with arches and columns on the limestone surface. It is no more than a metre and a half high. The end of this room is difficult to access due to its downward slope and lack of oxygen. A second passage rises to the top, consisting of earthen pits in the form of small, very narrow galleries, which lead directly to an intact room with a remarkably shiny floor.

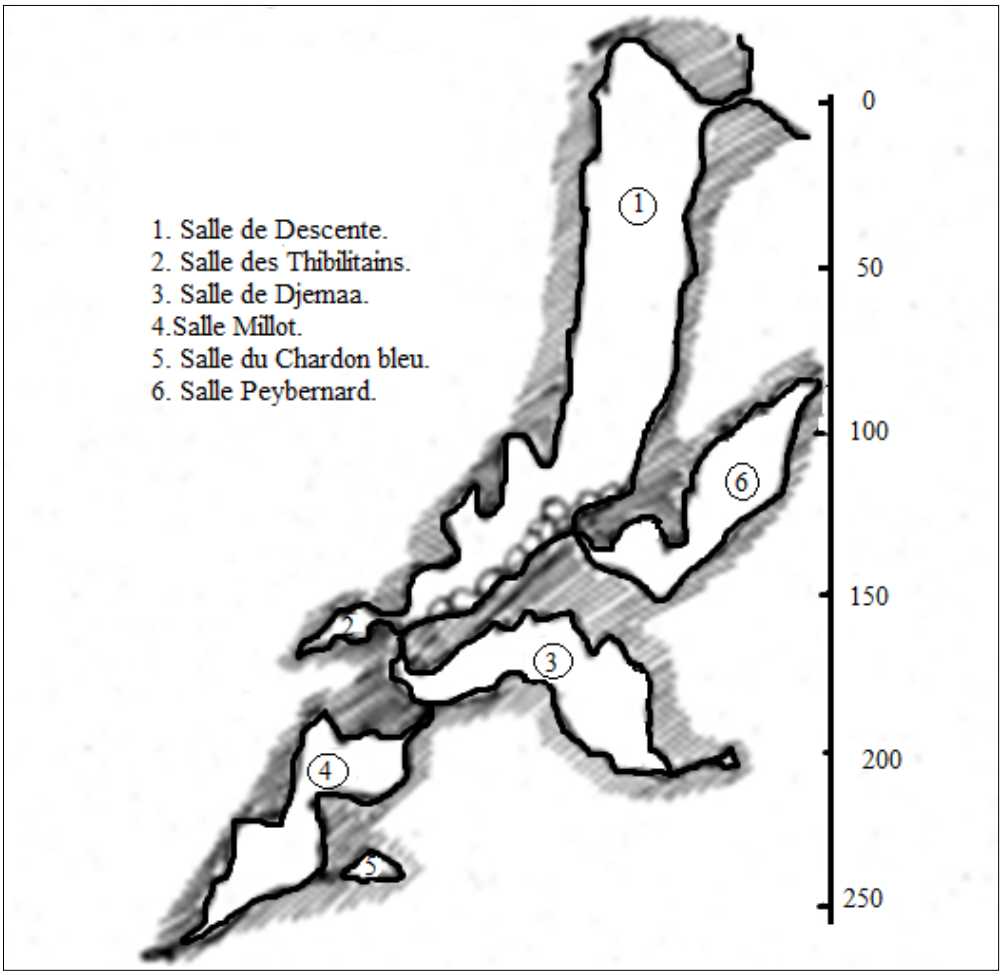



*Fig. 2: Djemaa cave, schematic vertical section*
*Source: R. Barone, 1944*

**6.** ***Community Room:*** Also known as the Peybernard Room, it is located 300 metres from the entrance. Access to this room is via a corridor that descends into a vast space around 100 metres long and 50 metres wide, with a ceiling over 10 metres high and enormous stalactites hanging from it.

Figure 3: The Entrance to Ghar Djemaa Cave

source : boughrira amir, bahloul aymen. 2022

Figure 3: The Entrance to Ghar Djemaa Cave

source : boughrira amir, bahloul aymen. 2022

**4.4. Classification of the Cave.**

In view of its richness and importance, the Djemaa cave is a natural archaeological site classified as a historical monument in Algeria under Resolution no. 3586/1952 of 10/02/1952 issued by the Governor General of Algeria.

It was also classified as a natural site on 19/12/1927 under the name of grotte du djebel taya in accordance with Ordinance no. 67-281 of 20/12/1967 relating to excavations and the protection of historic and natural sites and monuments, published in Journal Officiel no. 07 of the People's Democratic Republic of Algeria on 23/01/1968.

**4.5. Current State of the Cave.**

The cave has not been exploited and has remained in its natural state. The only work carried out on the cave was the aforementioned excavations by French researchers. Since then, no further work has been carried out, apart from the construction of the road that makes it accessible and the addition of a small iron gate to block the entrance, probably for safety reasons. The interior of the cave is very dark, making it impossible to progress without lighting. What's more, the floor, particularly in the first room, is slippery due to the high humidity.

As a result, the site remained out of sight of the authorities despite the influx of visitors in the 70s and 80s. However, an association bearing the name of the cave was set up with the aim of protecting the site and encouraging the authorities to look after it, as well as publicising it by all possible means. This mission began to bear fruit thanks to the increasing media coverage of the cave and the growing number of visitors from all over the country, albeit in an unregulated manner. This popularity has attracted the interest of the local authorities, as evidenced by the visit of the Wali of Guelma on 28 May 2015, followed by that of the Minister

of Culture on 20 June 2016. Despite all this, no projects have been put in place to exploit this wealth, either scientifically or for tourism activities, and no protection initiatives have been launched.

**Conclusions.**

All in all, the Ghar Djemaa cave is particularly rich in palaeontological, prehistoric and historical traces, making it a site of great scientific and heritage value. However, the cave has not yet been sufficiently explored, and few studies have been carried out on its subject. What's more, no enhancement or protection projects have been undertaken, which exposes the site to the risk of degradation, particularly due to unsupervised visits that can damage its natural features.

The cave could be developed as a profitable tourist attraction, provided that a thorough geological and geotechnical study is carried out, together with an environmental impact assessment. It would also be necessary to develop the entrance and interior of the cave, by installing secure passageways and staircases, while ensuring the safety of visitors. Finally, appropriate lighting, using cool, environmentally friendly lights, should be installed to preserve the integrity of the site while ensuring the safety of users.

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