

SIERRA DE ESPADÁN

2021



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**FUNDACIÓN DE LA C.V. PARA UNA ECONOMÍA BAJA
EN CARBÓN & IES JÉRICA-VIVER**
Lucía Toledo and Silvia Clemente



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Authors:

Silvia Clemente (IES Jérica-Viver)

and

Lucía Toledo (Fundación de la Comunitat Valenciana para una economía baja en carbón)

Activity carried out by:

Linguistic field: M. Carmen Pérez and M. Pilar Domenech

Scientific field: M. Carmen Gamón y Susana Tejadillos

Environment field: Herminia Salvador, Beatriz Herrera y Víctor Miguel

Biology and geology field: Silvia Clemente

IES Jérica-Viver

NATURE

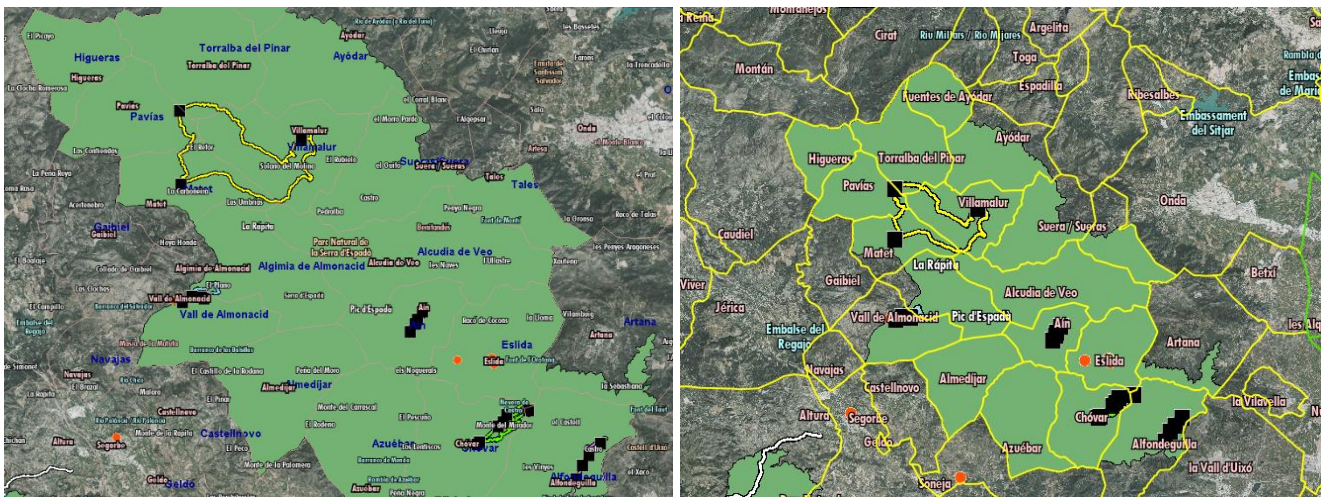
The natural park

The Natural Park of Sierra de Espadán, declared on the 29th September, 1998, is the second most extensive protected area of the Valencian Community, in the province of Castellón, with a total of 31,180 hectares and 60 kilometres long. Only 14% of its area is public, while the other 86% is private land.

In this mountain range, we find one of the few sandstone outcrops in the Valencian territory, forming an abrupt and broken relief, made up of peaks and ridges accompanied by deep ravines and wadis, where we can find numerous springs and lush forests of cork oaks, unique in their geography.

These characteristics give it an exceptional landscape value, accompanied by an extraordinary botanical and faunistic richness, which is evident in the large number of endemic species and singularities existing in its territory.¹

“Exceptional landscape value, with botanical and faunistic richness.”



Source: Institut cartogràfic Valencià (2021). Visor de Cartografia. Accessed from [https://visor.gva.es/visor/?capasids=Espacios Protegidos:10,11,9,7,6,8&extension=689225,4393928,762855,4447144&idioma=es](https://visor.gva.es/visor/?capasids=Espacios%20Protegidos:10,11,9,7,6,8&extension=689225,4393928,762855,4447144&idioma=es)

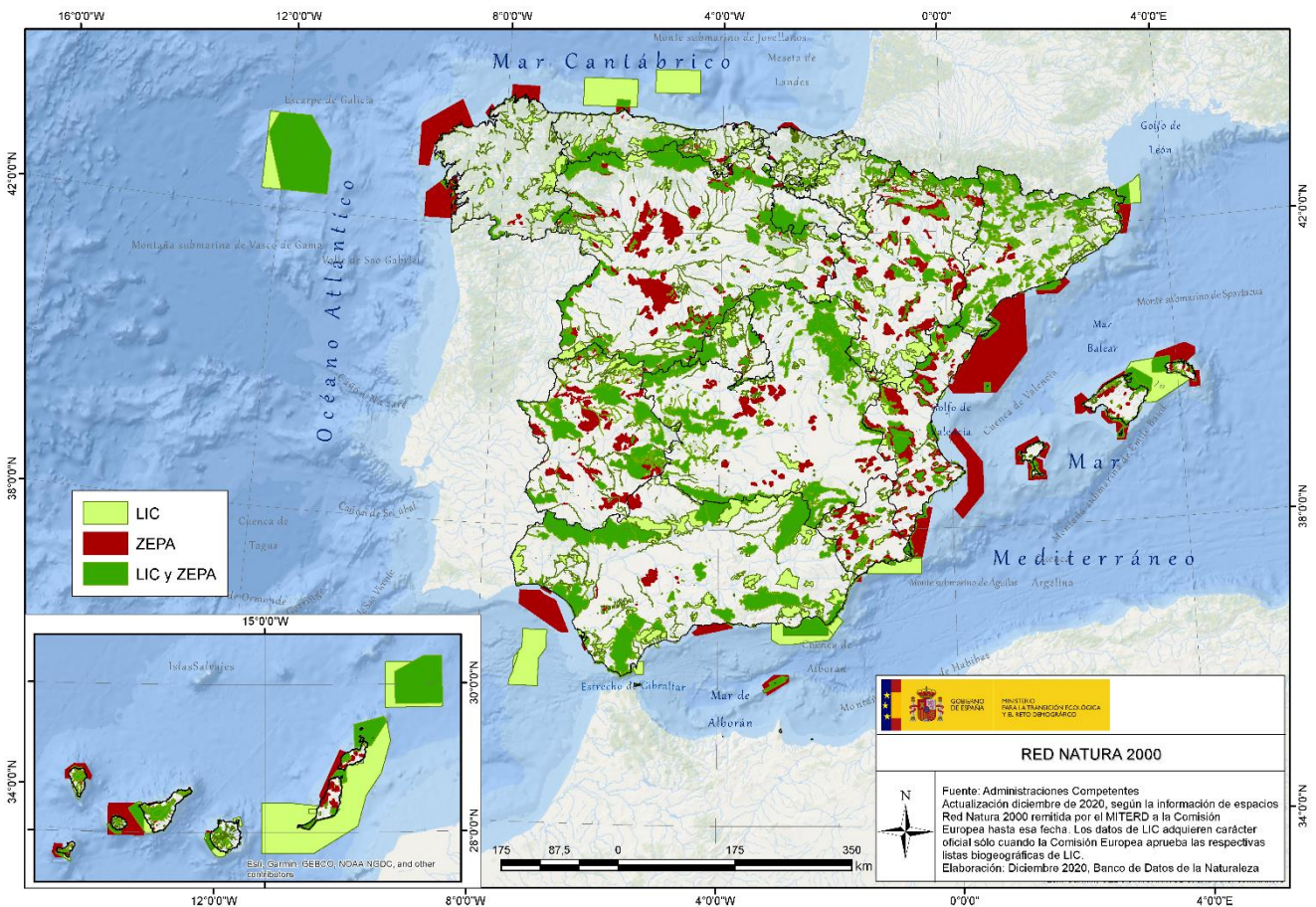
¹ Generalitat Valenciana (2021). Serra d'Espadà. Retrieved from <https://parquesnaturales.gva.es/es/web/pn-serra-d-espada/conocenos>.

This is a mountain range in the foothills of the Iberian System with about 60 km long and 1200 km² of extension. It does not have a very high altitude since its highest mountains barely exceed a thousand meters. The highest peaks of the park are:

- Pico Espadán, with 1.099 metres
- Pico Pinar, with 1.101 metres
- Pico Rápita, with 1.106 metres

The park is part of the Nature Network 2000 because it fulfills the following values (Red Natura 2000)²:

Mountain area of great environmental value that stands out for its geological uniqueness as well as the whole cortege of formations associated with it, in which there are several endemic species of great interest. It is home to nesting populations of 22 species of birds and the area is of special importance for the conservation of rupicolous birds of prey such as the Bonelli's eagle, the griffon vulture, the golden eagle, the Egyptian vulture, the peregrine falcon and the eagle owl.



Gobierno de España (2020). Red Natura map of Spain. ³

² <http://natura2000.seo.org/destinos/sierra-de-espadan.html>

³ Retrieved from https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/rn_dic20_elaboraenero21_tcm30-200149.pdf

The park, as it happens in all the parks of the Valencian Community, are directly managed by the *Generalitat Valenciana*, the Regional government of the Valencian Community. This means that the park does not have legal status. It also affects to the budget of the parks, as there is not a determined account for each park. Instead, the *Generalitat* manages the budget of all the parks.

Related to the different levels of protection of the park, there is the Spanish legislation that, according to the management plans, regulates the protection areas with the different levels of protection. The law 42/2007, of 13 December, on Natural Heritage and Biodiversity classifies the following protected natural spaces in: a) parks, b) natural reserves, c) marine protected areas, d) natural monuments, and e) protected landscapes. In case of the specific situation of the park, it has three figures of protection: 1) Natural park since 1998; 2) Place of community importance (LIC, *Lugar de importancia comunitaria*); and 3) Special protection area for birds (ZEPA, *Zona de especial protección para las aves*).

Geology

The Sierra is a triassic mountainous alignment with acid-based alternation in the geological materials and soils. Its abrupt ridges and softer, rounded hills go from sea level to the 1,106 m (peak of La Rápita).

The three elements of the Triassic terrain – sandstones, limestones and marls – are the dominant components of the Sierra. Sandstones appear in superimposed layers, permeable and of variable thickness, in an oblique position. Meanwhile, marls create screes and give the mountains a brightness and reddish, yellowish or purplish color because of their gypsum crystals and limestones appear on top of the sandstones forming seams or walls.



Marls



Claystones



Limestones and dolomites

Source: Generalitat Valenciana (2021). *Geología, en Serra d'Espadà*, retrieved from <https://parquesnaturales.gva.es/es/web/pn-serra-d-espada/geologia>

Habitat

The natural park offers the visitor a wonderful diversity in terms of ecosystems. It is possible to find pine forests, riverside woodland, rural areas, the typical Mediterranean forest of holm oaks and Aleppo pines and interesting peculiarities such as small forest of chestnut trees.

Flora and vegetation

The vegetation of the Sierra de Espadán includes, among its most representative species, some endemic species that can only be observed here. The **cork oak** (*Quercus suber*) groves represent the potential vegetation in siliceous soils. It is resistant to fire, which gives a great ecological value. Its resistant bark, the cork, exploited in a sustainable way, constitutes an economic resource for the populations of the Sierra.

The maritime pine (*Pinus pinaster*), used in ancient times for the extraction of resins, is characterised by its needles and cones being larger than those of the Aleppo pine (*Pinus halepensis*), which is found sharing limestone soils with holm oaks (*Quercus ilex* ssp. *rotundifolia*).



Source: Josep Antoni Nebot

Thickets can also be found in the sierra, made up of various rockrose species such as the white rockrose (*Cistus albidus*) or the rockrose (*Cistus clusii*); heather, such as the white heather (*Erica arborea*) or the winter heather (*Erica multiflora*), Rhamnus species such as the aladern (*Rhamnus alaternus*) and the black hawthorn (*Rhamnus lycioides*). Also very characteristic are juniper (*Juniperus oxycedrus*), black juniper (*Juniperus phoenicea*), gorse (*Ulex parviflorus*), mastic (*Pistacia lentiscus*), kermes oak (*Quercus coccifera*) and gorse (*Dapne gnidium*).

Within the lianoid stratum we find very abundant species such as ivy (*Hedera helix*), sarsaparilla (*Smilax aspera*), clematis (*Clematis flammula*), different subspecies of rubia (*Rubia peregrina* subsp. *peregrina* and *R. peregrina* subsp. *longifolia*), honeysuckle (*Lonicera implexa*) and wild asparagus (*Asparagus acutifolius*).

These mountains are perfumed with aromatic plants such as rosemary (*Rosmarinus officinalis*), thyme (*Thymus vulgaris*), lavender (*Lavandula stoechas*) and, more rarely, savory (*Satureja montana*).

Fauna

Starting with the amphibians, we can find several species such as the common toad or the common toad. But the most interesting species is the Iberian ribbed newt most commonly known as **gallipato** or venancio (*Pleurodeles waltl*), which finds its habitat in the irrigation ponds.



The reptiles are represented by various species such as the *fardatxo* or ocellated lizard, the *colilarga* lizard, the ladder snake and the bastard snake.

As for the birdlife, the birds of prey are undoubtedly the most outstanding. The scarce and endangered **Bonelli's eagle** (*Aquila fasciata*) lives in the mountains and in the wooded areas and it has been declared in potential local extinction. Meanwhile the short-toed eagle, the booted eagle and the goshawk find a suitable habitat. Among the nocturnal birds of prey, we can find the tawny owl, the long-eared owl and the eagle owl.

Other typical birds of this mountain range are the jay, the nuthatch, the robin, the wryneck, the chaffinch, etc.

The mastofauna is represented, among others, by the wild boar, fox, marten, genet and badger.

Finally, it is worth mentioning that there are some 16 species of bats, some of them of great importance and in serious danger of extinction.

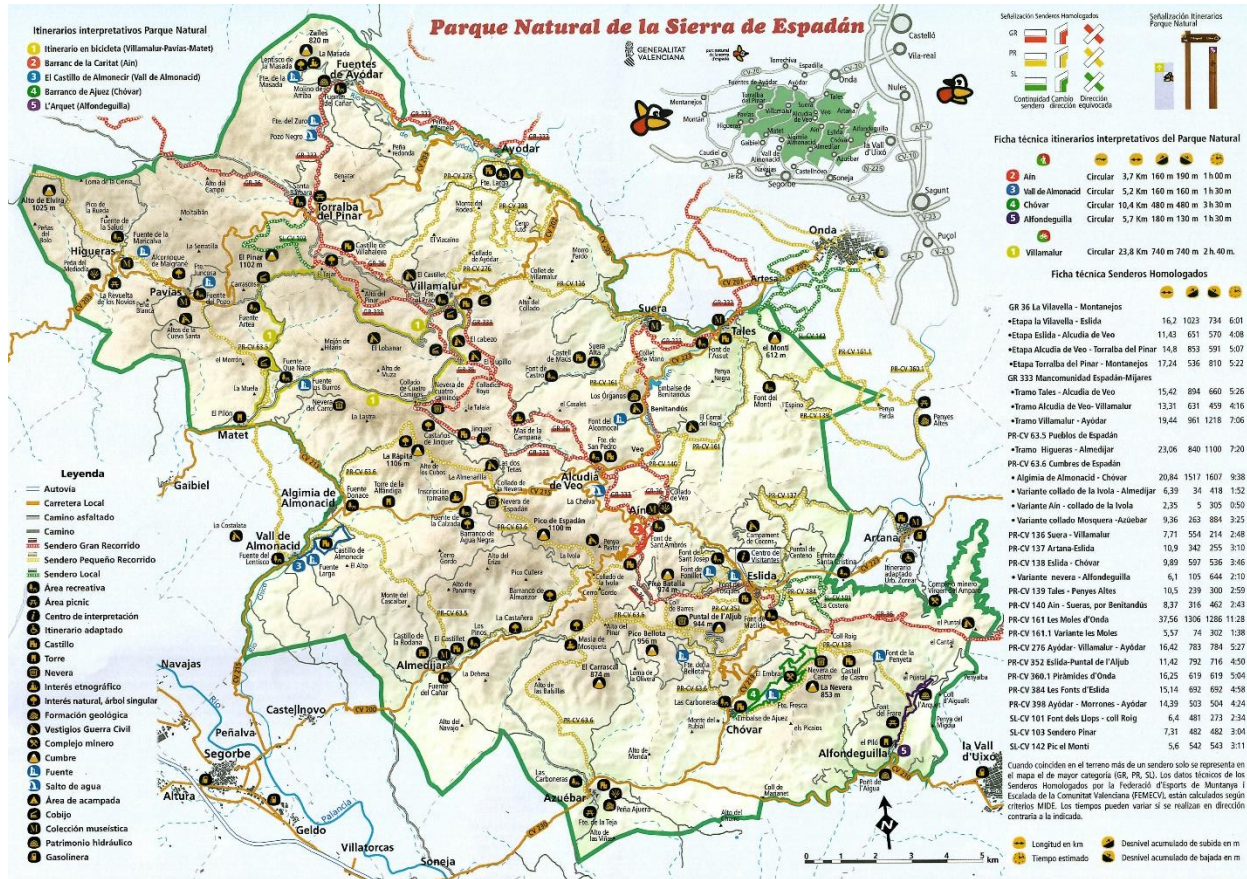
Hiking options

The parking includes multitude of trekking routes, such as the Green route in Chóvar⁴, with a total distance of 10.4km and elevation of 480m; the Red route in Aín, with a total distance of 3.7km and elevation of 160m; the Blue route in Vall de Almonacid with a total distance of 5.2km and elevation of 160m; the Yellow route in Villamalur-Pavías-Matet with a total distance of 23.5km and an elevation of 320m; and the Purple route⁵ in Alfondeguilla⁶ with a distance of 5.7km and an elevation of 180m.

⁴ It is possible to download the route (GPX and KML) for your devices from in this website: <https://parquesnaturales.gva.es/es/web/pn-serra-d-espada/ruta-verde-descarga-tu-ruta>

⁵ It is possible to download this route (GPX and KML format) from this website: <https://parquesnaturales.gva.es/es/web/pn-serra-d-espada/descarrega-la-teua-ruta>

⁶ This route is the closest to the location of the Low Carbon Economy Foundation, in La Vall d'Uixó.



The routes of the park Sierra de Espadán.

Source: Centro de interpretación parque Sierra de Espadán (2022)

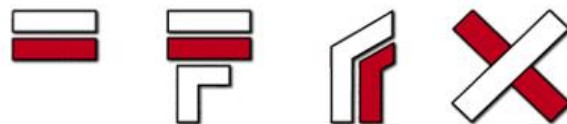
Apart from these main routes, there are several other in different localities within the Sierra d'Espadà. Nineteen municipalities make up the 31,180 ha of the natural park – Aín; Alcudia de Veo; Algimia de Almonacid; Alfonso de Guilla; Almedijar; Artana; Ayódar; Azuébar; Chóvar; Esllida; Fuentes de Ayódar; Higuera; Matet; Pavías; Tales; Torralba del Pinar; Suera; Vall de Almonacid; and Villamalur.

Type of certified signposting in the Spanish trails

Long-distance trails

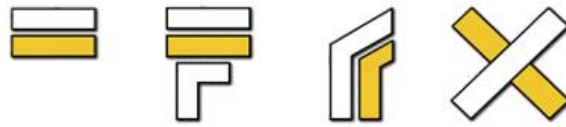
White and red colours signals. It marks that the trails are at least 50km long. Labeled with the initials G and R, *Gran Recorrido*.

The hiking trails marked with this sign are part of a European network of paths present in Spain, France, the Netherlands and Belgium.

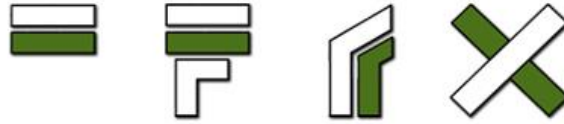


Short-distance trails

White and yellow colours. These trails are between 10 and 50 km long. Labeled with the initials P and R, *Pequeño Recorrido*. Some trails are "circular trails", starting and finishing at the same point.

**Local trails**

Identified with the colours white and green and with less than 10 km long. The letter by which those trails can be recognised are S and L, *Senderos Locales*.



Source: Columbus® (2016), *Señalización de senderos. ¿Qué significan?*, retrieved from <https://www.columbus-outdoor.com/blog/senalizacion-de-las-rutas-de-senderismo/>

HISTORY

The different landscapes in the Sierra de Espadán are a reflection of the uses of resources and environmentally friendly activities that have been developed in this territory. The socio-economic activities of the area have focused on the traditional use of natural resources, such as the exploitation of cork oak forests for the extraction of **cork**.

The most common crops are carob, almond, olive and cherry trees. Due to the orographic characteristics, mountain agriculture is more notable for its quality than for the volume of its production.

Beekeeping is another highly developed activity in the area, with a large number of beehives that provide, in addition to excellent honey, other products such as royal jelly, pollen and wax.

The water that flows from the mountain range is ideal for human consumption, due to its low lime content, which is why there are several bottling plants in the park.

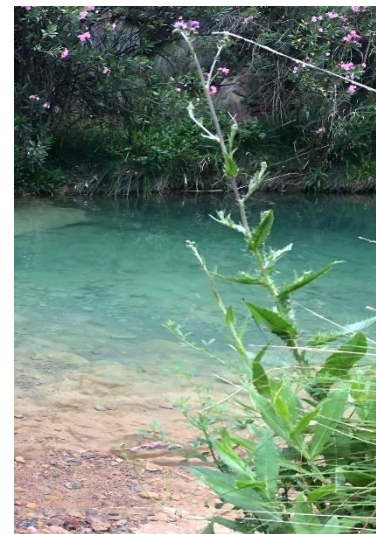
Another resource is the manufacture of canes or "**gaiatos**" (walking sticks) from the branches of the hackberry tree or "**lledoner**", also known as "**latonero**".

The resources of the Sierra have been exploited since ancient times and some of them are still in use today, such as the "**pous de neu**" (snow pits) or iceboxes for obtaining ice which was distributed to the towns of the Plana Baixa. An example of this is the use of the Castro icebox until the 18th century.

SURROUNDINGS

The Park, located in the Castellón province, has different localities inhabiting in it. In total, there are 19 municipalities that are: Ahín, Alcudia de Veo, Alfondeguilla, Algimia de Almonacid, Almedíjar, Artana, Ayódar, Azúebar, Chóvar, Eslida, Fuentes de Ayódar, Higueras, Matet, Pavías, Sueras, Tales, Torralba del Pinar, Sueras, Vall de Almoacid and Villamalur.

The most common routes in the park are those related with the cork tree, but in summer the water locations are the most visited, such as the Pozo Negro, located in Fuentes de Ayodar.



The Pozo Negro in Fuentes de Ayódar.
Source: Lucía Toledo (2020)

In the immediate surroundings, but not within the park area, there are other municipalities, such as Montanejos, Onda, La Vall d'Uixó, etc.

STAFF

The staff working in the park is divided among on field and offices personnel. Currently, there are four people working in the office, 2 technicians and two people hired from a public company who work on environmental education, customer service, dissemination and organization of trips with schools.

On the other hand, those working on field are part of the maintenance brigades, a total of 3 brigades counting with 12 people (4 per brigade). They are in charge of all the maintenance of the park, distributing 6 to 7 municipalities per brigade. They perform activities such as trails maintenance, fauna and flora activities, control of recreational areas, etc. All the tasks done by those brigades must be of public interest.



Additionally, the park does not have an official budget allocated to it, as it is managed by the regional government. Nonetheless, all the authorisations and reports are done by the park management (i.e., forestry use of the cork oak), and then sent to the park authorities.

ANNEX I: Practical activities in the Sierra de Espadán

Introduction to the activities

These activities were carried out at IES Jérica-Viver (Spain), during the year 21/22 in order to know about the natural park that surrounds the school. In order to carry out this interdisciplinary project, several classes, teachers and subjects were involved.

In the following lines, you will find the description of the participants, the subjects involved, the goals and the activities performed, together with a brief description of the development of the activities (with visual pictures) and a brief general assessment.

Research on the mineral and rocks of the Sierra de Espadán at IES Jérica-Viver

Participants

The **participants** were students from 1st ESO⁷ from the Linguistic (Valencian language/Spanish language), Scientific (Mathematics/Technology) and Knowledge of the environment (Geography and History/ Biology and Geology) fields.

Goals

The main **goals** of the activity were:

- Investigate the geology of the Sierra de Espadán Natural Park (Castellón) from different areas.
- Know and appreciate the history and nature of this natural park.

Activities

The **activities** carried out were:

- Studying in the classroom the types and characteristics of minerals and rocks.
- Carrying out practices in the geological identification laboratory: observation with a binocular loupe, determination of hardness, reaction with hydrochloric acid, etc. with the collection of the center.
- Designing and building a box to collect minerals and rocks.
- Taking a guided tour of the Sierra de Espadán, highlighting its siliceous rocks such as sandstone, minerals such as azurite, malachite, etc. and its cinnabar mines.
- Analysing some rocks collected in the Sierra de Espadán

⁷ ESO stand for Educación Secundaria Obligatoria, meaning Secondary Mandatory Education.

- Drafting of a guide with descriptions of the minerals and rocks typical of the Sierra de Espadán.
- Recording of a video relating the nature and history of the Sierra de Espadán.

Development

The **development** of the activities was performed as follows:

1. Dossier carried out by the departments of Geography and History and Biology and Geology for the preliminary study of minerals and rocks.

2. Students and teachers carried out practices in the geological identification laboratory such as: observation with a binocular loupe, determination of hardness, reaction with hydrochloric acid, etc. with the set lent by the center.





3. Boxes were built by the students with the purpose of collecting and placing the minerals and rocks. In order to create these boxes, the students had to design them, perform mathematical calculations, work with wood material in a workshop, etc.



4. Then, a guided tour of the Sierra de Espadán was carried out, highlighting its siliceous rocks such as sandstone; its minerals such as azurite, malachite, etc.; and its cinnabar mines.

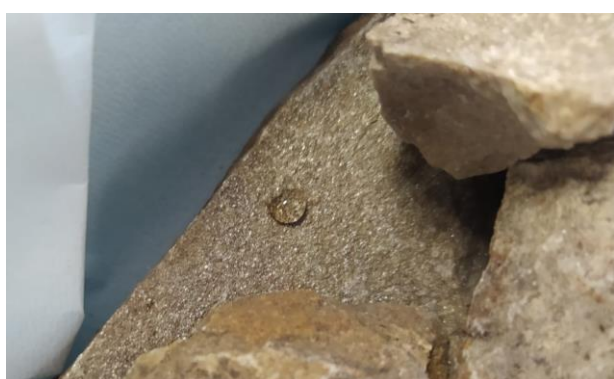


[Sandstone rocks and flora adapted to the siliceous soil and the abundant humidity of the gorge.]



[Wagons at the mouth of the cinnabar mine and explanation of the use of the cork oak.
Analysis of some rocks collected in the Sierra de Espadán]

5. Analysis of rocks collected from the Sierra de Espadán tour.



[Sandstone rocks do not react with hydrochloric acid, while limestone and marl do.]

6. Write a guide with descriptions of the minerals and rocks typical of the Sierra de Espadán.

ROCA ARENISCA/ SANDSTONE ROCK /ROCA GRES

DESCRIPCIÓN: La arenisca es una roca sedimentaria compuesta por fragmentos de minerales de cuarzo, mica y feldespatos, del tamaño de la arena. El color de esta roca depende del material cementador, pueden ser de color marrón café o rojizas, si presenta óxidos de hierro.

DESCRIPTION: Sandstone is a sedimentary rock composed of fragments of quartz, mica and feldspar minerals, the size of sand. The color of this rock depends on the cementing material, it can be brownish-brown or reddish, if it has iron oxides.

DESCRIPCIÓ: El gres és una roca sedimentària composta per fragments de minerals de quars, mica i feldspats, de la mida de la sorra. El color daquesta roca depèn del material cimentador, poden ser de color marró café o vermellores, si presenta òxids de ferro.



6) Record a video relating the nature and history of the Sierra de Espadán.

Assessment

The assessment required a lot of coordination and work from the teaching staff. Despite of that, it has been definitely worth it to know a natural park so close and valuable from a natural and cultural point of view, both from the teachers and the students perspective.

The students have been able to study it from different points of view and visiting it has served to appreciate it *in situ*, enjoy nature and improve coexistence.



Design and construction of a board game about the Valencian Natural Parks at IES Jérica-Viver

Participants

The participants of the project called "Design and construction of a game about the Valencian Natural Parks" were students from 1st Baccaureate that had the Biology and Geology class, together with their teacher.

Goals

The goals of the activity were:

- Investigate the 22 natural parks of the Valencian Community: natural characteristics (flora, fauna, ecosystems, geology) and geographical location.
- Design a board game to assimilate or disseminate this knowledge.
- Value the diverse Valencian ecosystems and the efforts to conserve their biodiversity.

Activities

In order to achieve the goals established, it was necessary to perform the following activities:

- Find information about the natural parks of the Valencian Community
- Design a board with a map of the Valencian Community and some cards to demonstrate the following knowledge: characteristics of its ecosystems, importance of its biodiversity, flora, fauna and location.
- Implementation of the game, self-assessment and proposals for improvement.

Development

The activities were developed as explained below:

1. Search for information on official pages



2. Use of the information to prepare the cards of flora, fauna, ecosystems, location, etc.



3. Board layout



4. Game, evaluation and proposals

Assessment

The students and teachers valued the activity very positively. Teamwork and cooperation have been promoted, the students have learned about the biodiversity of the Valencian Community and the need to protect it.

It has been a very complete job. Since it was performed, all the key skills have been developed, such as: linguistics and communication skills, mathematical and basic competences in science and technology, digital competence, learning to learn, social and civic competences, sense of initiative and entrepreneurship, awareness and cultural expressions.