

Landscapes in central-eastern Sierra Morena in Cordoba and the “Sierra de Cardeña y Montoro” Nature Park

Mr Rafael GARSÓN GARCÍA

University of Córdoba, Department of Geography and Sciences of the Territory, Spain

Mr Manuel RIVERA MATEOS

University of Córdoba, Department of Geography and Sciences of the Territory, Spain

A presentation of the area

The route through Sierra Morena in Cordoba and the singular Los Pedroches district, including the Sierra de Cardeña y Montoro Nature Park, is primarily designed to reveal the most representative landscapes of this area in the north-east of Cordoba province (Figure 1), from the medium-high Guadalquivir valley (to the south) to the beginning of the Castile plateau and the plains of Extremadura (to the north).

Key regional factors and major landscape units

Like most of the old Hercynian mountain system of Sierra Morena, the proposed route is a characteristic Mediterranean medium mountain area, with little population and considerable socioeconomic depression. The sustainability problems associated to traditional agrarian activities (primarily forestry and livestock breeding) and their landscapes have triggered profound functional and landscape changes in the last few decades.

The area considered here is part of the central-eastern sector of Sierra Morena in Cordoba as far as the granite plateau of Los Pedroches in the north. It is relatively different from other adjacent hill areas such as Sierra Morena in Jaen, to the east, or the Guadiato Valley and Sierra de los Santos, to the west, thanks to the territorial fragmentation derived from the land's orographic complexity, with hills and deep river valleys alternating as a result of the erosive effect of the principal tributaries of the Guadalquivir such as the Yeguas and Guadalmellato rivers (Figure 2).

In this area, we can distinguish four major types of landscape forming bands from the north-west to the south-east, which suddenly merge in the area in

general and in the “Sierra de Cardena y Montoro” Nature Park in particular, as the map clearly shows (Figure 3):

- built-up rural landscapes (urban units, particularly concentrated in the areas of transition between the Guadalquivir valley and the hills),
- medium mountain agricultural landscapes (particularly olive groves),
- mountain landscapes used for forestry, pasture land and hunting,
- *dehesa* landscapes.

There are also other singular, occasional landscape items in the region that are not major types in themselves but do enrich the diversity of the hills, such as the gallery forests in the deep ravines found in some river valleys or occasional rural buildings of agrarian origin (farmhouses, estate houses, mills, etc.), most of which are now abandoned or have been reconverted to perform recreational or tourist functions.

Rationale and interest of the route



Location of the route in the context of the province of Cordoba

This route provides a general overview of the large variety of Sierra Morena landscapes, with their different physical (geological, geo-morphological), environmental (vegetation, ecosystems, protected areas, etc.) and human occupation (land use and settlements) characteristics. In this area, we see everything from hillside olive groves around Montoro and Sierra Morena piedmont to the granite batholithic livestock dehesa of Los Pedroches, including intermediate forest and hunting areas on rougher ground with poorer, more fragile soil and steep slopes.

The “Sierra de Cardena y Montoro” Nature Park is of significant importance on this route, as it is affected by several factors: the size of the protected area (38,449 hectares); its low degree of direct humanisation, the preservation of most traditional agrarian uses and the diversity of its landscapes; its magnificent environmental conservation and the importance of its vegetation and wildlife; and the fact that it borders on other protected areas (“Sierra de Andújar” Nature Park, in Jaen to the east, and “Sierra Madrona y Valle de Alcudia” Nature Park, in Ciudad Real to the north).



Figure 2 : Basic geographic contextualisation of the route in the eastern sector of Sierra Morena in Cordoba and the Los Pedroches district

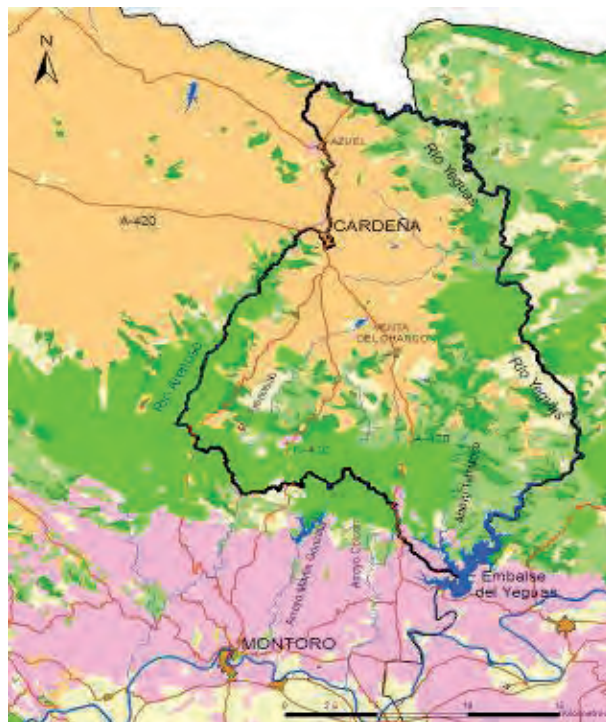


Figure 3 : Major plant formations of landscape-related significance in the “Sierra de Cardena y Montoro” Nature Park and its surroundings

Built-up rural landscapes: Montoro and its surrounding area

After travelling east for 50 kilometres on the A-4 motorway, we reach Montoro, where we make the first technical stop on our route, due to its geographic specificity and picturesque landscapes.

- A strategic position → a town located between Sierra Morena and the Guadalquivir valley, making a living from the forest, livestock and hunting land of the hills and the fertile crop land in the Guadalquivir plain.
- Catalogued as a medium-sized Andalusian town that acts as the main centre of the Alto Guadalquivir district in Cordoba.

- A very interesting geological substrate red or reddish-brown soil on Triassic sandstone. The rock in this substrate is popularly known as “*pedra molinasa*” with its unmistakable reddish colour.
- Unlike other sections (where it passes through the Tertiary Depression), in this part of the route, the Guadalquivir river flows very close to the hills of Sierra Morena, and in this medium-high, narrow context, the river forms interesting meanders, a spectacular example of which can be seen as it passes through Montoro.
- Montoro also has a protected historic centre, which was declared of cultural interest in 1969 in acknowledgement of its architectural and physiographic values: perfect adaptation to the layout of the land, although now with difficult access, use of “*pedra molinasa*” in buildings, including houses (alternating with the traditional white of most constructions in Andalusia), St Bartholomew’s Church (15th century) and “The Damsels’ Bridge” (15th century), and the deteriorated condition of numerous old houses with habitability problems.
- Driving around Montoro to the north, in Sierra Morena piedmont areas, we find the hillside olive groves introduced at the end of the 19th century, most of them on Triassic sandstone (rock that has been used to build the dividing walls that still dot the landscape and most of the rural buildings).

Accessing the “Sierra de Cardeña y Montoro” Nature Park from the south: hillside olive groves and forest-hunting landscapes

Hillside olive groves

- Olive groves spreading over the Sierra Morena piedmont area, with a progressive geological, geomorphological, functional and landscape-related transition.
- An initially rolling terrain which becomes increasingly intricate.
- From a geological perspective, the olive groves closest to the Guadalquivir valley are on Triassic sandstone, whereas to the north (closest to the hills and forests themselves) they are based on carboniferous material (essentially slate).
- The Triassic groves are better adapted to their setting and more productive (with a better quality oil), but the higher trees are on steep slopes, which explains their limited development, and there are recurring soil erosion processes because of a

lack of protection, the work of the growers and the reduced depth of the subsoil, so all agricultural work has to be done by hand in these marginal groves.

– The trees concerned are quite old (over 100 years on average), and difficult to replace, with limited cost-efficiency, although the cheap immigrant hand labour that has become available in the last few years, the medium-high quality of the oil obtained, and the fact that the *Montoro-Adamux Extra Virgin Olive Oil Designation of Origin* has recently been granted, are maintaining sustainability expectations for these crops.

– The rural buildings that dot the landscape also enrich its diversity: we can see farmhouses and outbuildings, mills and old post houses among the olive groves, creating a striking red and white colour contrast to the north of Montoro and Adamux where walls are whitewashed and red “*pedra molinasa*” is used on the cornices, corners and skirting of these buildings. In the transition area close to the batholithic granite of Los Pedroches, however, granite and quartz materials are used for building purposes.

The mountain landscape of forest-hunting vocation

– Characteristic Appalachian relief: abrupt and intricate, with a continuous succession of mountain alignments and valleys in a predominantly NW-SE and N-S (Armorican) direction.

– Strong engagement of the numerous water courses flowing towards the Guadalquivir river, caused by the effect of the water on the softer materials (basically, carboniferous slate) that alternate with greywacke masses and limestone in the hills.

– Steep slopes, in spite of the area’s modest altitude (a maximum of around 2,250 ft) and its aged, rounded peaks.

– The road network is adapted to the layout of the area: the three N-S roads between Montoro and Cardeña (N-420, A-420 and CO-510) are practically parallel.

– Reduced demographics in this mountain area, with a small population limited nearly entirely to the buildings associated to large farm operations (predominantly private estates ranging from 500 to 1500 hectares).

– Extensive forest areas. There has been widespread reforestation (artificial) since the mid-20th century, primarily involving species of the *Pinus* genus (*Pinus pinaster* and, to a lesser extent, *Pinus pinea*).

– Repopulation processes covering large areas of land, generally monospecific and with high density values with evident environmental risks: weakening of the tree stock, greater exposure to forest infestations, high risk of fire, less biodiversity, etc.).

– In some sectors there are clearly exotic species: *Pinus canariensis* and *Eucalyptus* (especially in trough lines close to water courses).

– Frequent establishment of consortia between the old public forestry administration and landowners for reforestation purposes. Most of these consortia are still valid and are used by the regional environmental agency to plan silvicultural treatments that are ultimately aimed at recovering the original Mediterranean woodland (clearing pinewood stock and regeneration of *Quercus* units).

– Based on this initiative, an environmental and landscape requalification process is underway in large sectors of the central-southern strip of the protected area, which has enabled the emerging consolidation of mixed *Pinus-Quercus* clumps in some areas previously occupied solely by pines.

– Another factor of interest is the conservation (particularly in more complex areas) of traces of autochthonous Mediterranean vegetation, especially thicket made up of strawberry trees, mastic trees, kermes oaks, rockrose and briar, with some holm oaks and, very occasionally, cork oaks and gall oaks.

– The forest areas are largely used for hunting (an activity that is compatible with the silvicultural treatments aimed at improving the zone), with a predominance of large game hunting grounds, with widespread use of fencing with a great impact on the landscape.

– Here, however, hunting is not as consolidated and traditional as in other parts of Sierra Morena (Sierra de Hornachuelos, Cordoba, and Sierra de Andújar, Jaén), although it has grown considerably in the last thirty years.

In the central sector of the “Sierra de Cardeña y Montoro” Nature Park: Los Pedroches arcade and splendid “dehesa” landscape

– *Los Pedroches* is a large natural and historic district (approximately 3,500 km²), covering the entire northern strip of the province of Cordoba. Indeed, it is the northernmost part of the region of Andalusia.

– Geologically, it presents a great intrusion of granite materials (batholith), which is visible in the typical round blocks or balls of granite (*pedroches*), especially in the eastern part of the district, that are a characteristic feature of this landscape.

- From a geomorphological perspective, it is a gently rolling plateau, at medium altitude, with a gentle slope from the east (around 2,100-2,400 ft) to the centre-west (1,500-1,200 ft). It is nearly entirely surrounded by mountain ranges.
- The degree of direct urbanisation is reduced (few towns or villages, relatively distant from each other) but has a considerable degree of humanisation with regards to the agrarian landscape of *dehesa* (livestock grazing land under cleared woodland, with scattered trees) .
- Splendid *dehesa* landscape in the eastern half of the *Los Pedroches* district (primarily in the boroughs of Cardeña and Villanueva de Córdoba).
- Extraordinary degree of territorial continuity shown by this “hollow forest” and its associated agrarian uses.
- Young, very dense trees (always more than 40 units per hectare), well generated due to the conservation and selection of *Quercus* for subsequent plantation purposes.
- A tree stratum comprising nearly exclusively holm oaks (*Quercus ilex*), with the very occasional presence of other species such as wild oak (*Quercus pyrenaica*) inside the “Sierra de Cardeña y Montoro” Nature Park (location in different disperse clumps in the proximity of “Venta del Charco” and along the sides of the A-420 road), as this is the highest sector of *Los Pedroches* and therefore has relatively greater rainfall.
- Greater atomisation of property relative to forest-hunting areas to the south of *Los Pedroches*.
- This land is used for largely extensive livestock grazing (with pigs in the wooded areas). Nonetheless, there is recent evidence of growing intensification, especially in the smaller businesses, with supplementary feed being provided to the animals at some times of the year.
- Greater density of original Mediterranean vegetation in the most intricate areas (generally close to river valleys: Yeguas, Arenoso, Matapuercas, etc.), where traditional livestock use is often compatible with hunting.
- Traditional granite walls (important feature of the landscape).
- Closely-knit network of livestock trails (one of the few public domains in Sierra Morena in Cordoba and the *Los Pedroches* district), although they are now only used for tourist-recreational purposes.

– El Cereso: ancient post house, now uninhabited, of granite buildings, around 7 kilometres to the east of Cardeña, on the old way between Fuencaliente (Ciudad Real) and the Guadalquivir valley, strategically positioned on a site of extraordinary beauty. It has been partially rehabilitated and subsequently reconverted into rural tourism accommodation.

The “Montes Comunes” of Adamus: magnificent example of publicly owned land in Sierra Morena (Cordoba)

– The altitude of the “Montes Comunes” ranges from 1,200 to 1,950 feet, typically alternating in this area between valleys and hills, with lithological features characterised by slate and carboniferous greywacke.

– This is one of the most representative forest areas in this part of Sierra Morena. Of special interest is the number of pines planted in reforestation processes, with reduced density and important signs of recovery of original Mediterranean *Quercus* woodland.

– There are different clumps of Mediterranean wood combining *Quercus* (especially holm oaks) with dense thicket with a large variety of species (mastic trees, strawberry trees, thyme, rosemary, etc.). In some parts of the estate, there are also some occasional, disperse plantations of other artificial species such as cypress or ailanthus and, above all, eucalyptus.

– Communal nature: this is one of the few remaining examples in Sierra Morena of the important masses of communal land dating from medieval and modern times (owned by the local residents, who used the land to obtain basic natural resources such as wood, fruit, grasing land, game, etc.).

– Present functions of the “Montes Comunes” of Adamus: multifunctionality, combining basic uses (big game with plenty of deer and wild pigs and, in the last ten years, facilities designed for rural tourism and environmental education purposes).

The Matapuercas River and its riverside woodland: a singular landscape of ecological significance

This is a very characteristic valley of Sierra Morena, created by the Matapuercas river, which borders the “Montes Comunes” area to the south. Most of the original riverside woodland is well preserved, dominated by species such as alders, willows, oleanders and ashes.

- Element of landscape enrichment and diversification: frequent linearity in the landscape, considerable in the case of the Mediterranean mountains, due to the greater altitude of the riverside vegetation and its darker green colour compared with the browner or duller tone of typical *Quercus* woods.
- Ecological significance of this water course and its valley. The riverside woodland itself acts as a refuge for an interesting wildlife community linked to the river (grey herons, mallards, kingfishers, otters, water snakes, etc.).
- Significant potential as an ecological river corridor (connectivity between remote habitats): the permanence of the water course (even during the summer and periods of drought), the good development of the riverside tree formations, their territorial continuity and their good relationship with other adjacent or nearby plant formations. It introduces an element of ecological connectivity between the “Sierra de Cardeña y Montoro” area (an ecological site of the first order) and the Guadalquivir valley, further to the west.
- Interest for conservation of the Iberian lynx, the most endangered feline species in the world. This species is endemic to the Iberian Peninsula and its most important population is found on the “Sierra de Cardeña-Sierra de Andujar” axis, although attempts are being made to foster its presence in the Guadalquivir area as part of the European Union LIFE-Lynx project.

Descending towards the Guadalquivir valley through the Sierra Morena piedmont of Adamus and Villafranca de Córdoba

The Sierra Morena piedmont is seen as a gentle slope descending towards Adamus, with the Guadalquivir valley and its adjacent countryside in the distance.

Adamus is in a small hollow after the first line of Sierra Morena hills that separates this borough from Villafranca de Córdoba, a characteristic mixed Hill-Valley borough. A little before arriving in Villafranca, we can see on the right a forest mass of *Pinus*, on a publicly-owned hill known as *Fuente Agria*, where a Peri-urban Park has been installed. This is very characteristic type of protected area in Andalusia, designed to respond to demand for recreational facilities in the countryside by nearby urban populations.