

# 11 CONSTRUCTED AND DEGRADED? - A CASE STUDY ON ORIGIN AND DEVELOPMENT OF *DEHESAS* IN TWO SPANISH MUNICIPALITIES

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## INTRODUCTION

Human intervention has shaped Mediterranean vegetation and landscapes over thousands of years (Le-Houérou, 1981). Still, divergent stories have been told about the consequences of this impact on the environment. The traditional view is that a widespread and long-lasting “overexploitation” of natural resources in the Mediterranean, especially by grazing and cultivation, has left behind “ruined landscapes” (Grove & Rackham, 2001) of wastelands, devastated forests, and degraded soils. Thirgood summarized this viewpoint by stating: “Worldwide, the history of range use has been one of resource depletion and nowhere more so than in the Mediterranean” (1981: 68).

More recently, the paradigm of the Mediterranean as a “lost Eden” was reversed and a counternarrative formulated. Representatives of this view such as Perevolotsky & Seligman (1998) argue that traditional heavy grazing is far from being destructive to the environment, but is in fact an efficient and ecologically sound form of land use in the Mediterranean. Hence, Mediterranean human-nature interactions are now even interpreted as a “10000-year love story” (Blondel & Aronson, 1999) that has generated resilient ecosystems with a high species diversity, productivity, and utility to society.

The focus of this study is on the construction of Mediterranean *dehesas*, an agroforestry system with scattered holm oak (*Quercus ilex*) and cork oak (*Quercus suber*) stands covering around 3.1 million ha on the Iberian Peninsula (Fig. 1). *Dehesas* are praised as positive example of a rational and stable land use system in the Mediterranean (see for example Le-Houérou, 1990; Smith, 1916). They are presumed to be able to maintain themselves over time, as the roots of the *dehesas* have been dated to Medieval times and further back by pollen analyses and written documents (Joffre, Rambal, & Ratte, 1999; Stevenson & Harrison, 1992). It is commonly expressed that this considerable temporal continuity was displaced by massive changes in the 1950s with a transition from the “traditional” to a “modern” *dehesa* system (Campos-Palacín, 1984; Elena-Rosselló, Bureau & López-Márquez, 1980).

A number of authors, however, has suggested that most *dehesas* may be younger than generally thought (Grove & Rackham, 2001) and pointed out that the traditional *dehesa* system has never been static, but that it has always been in evolution (Linares-Luján & Zapata-Blanco, 2002).

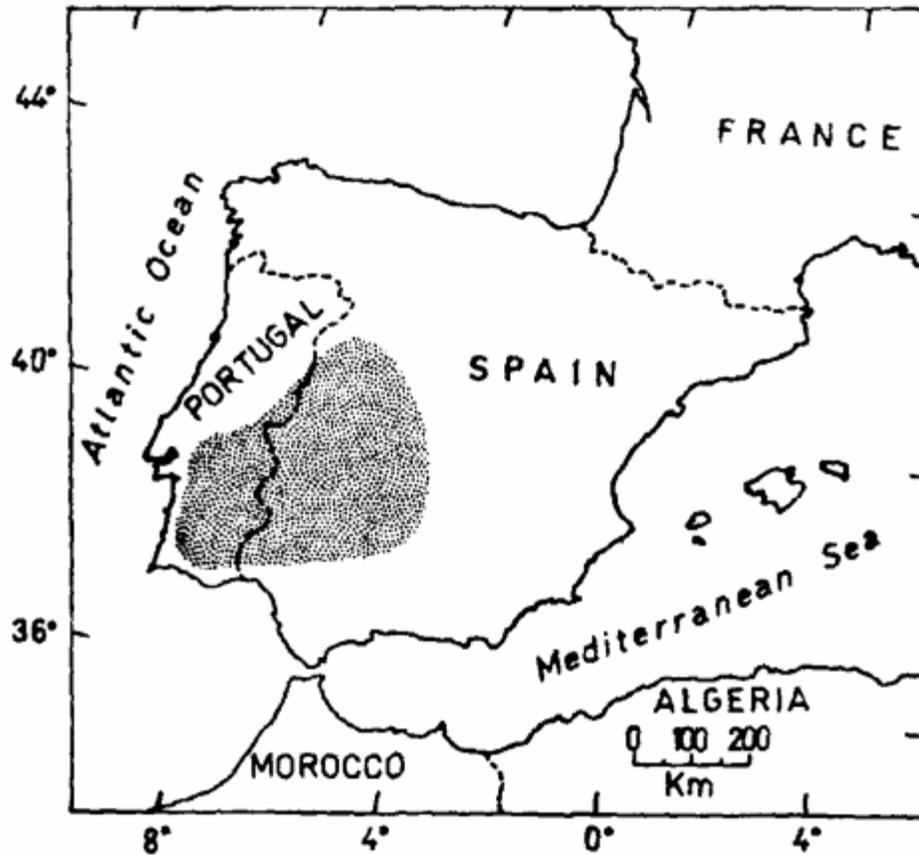


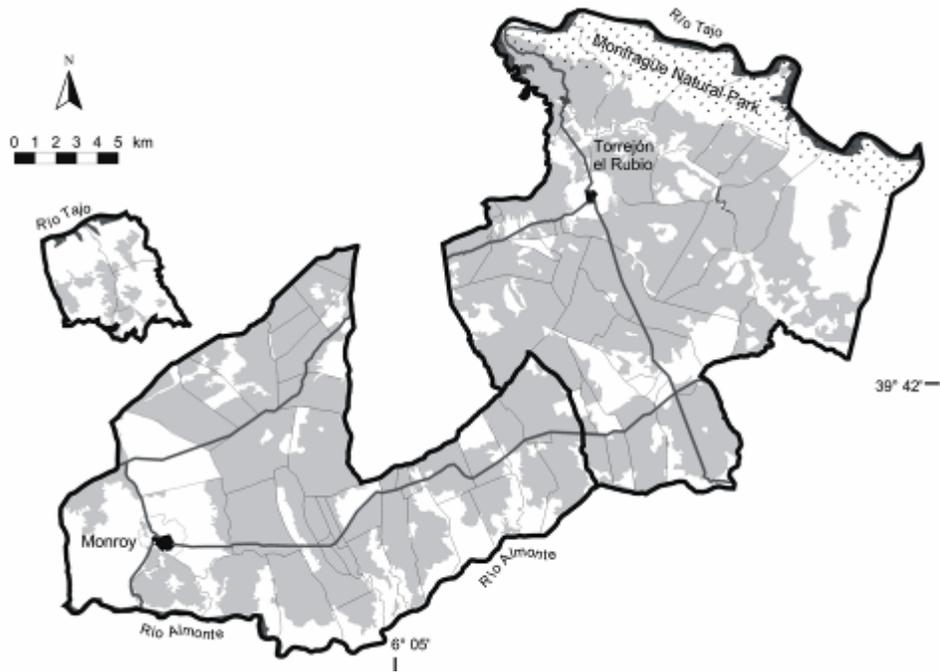
Figure 1: Distribution of dehesas on the Iberian Peninsula (graph: Teodoro Marañón).

Interest in the land use history of *dehesas* has emerged with the concern about a widespread regeneration failure of holm and cork oak stands (Pulido, Díaz & Hidalgo-Trucios, 2001). The interpretation of the origin of the *dehesa* system, whether it is the exploitation of residual woodland or the result of a long and continuous history of management, has implications on the assessment of its sustainability. Depending on the view, the driving forces (“traditional” vs. “modern” management) and temporal scales (“old” vs. “recent” problem of *dehesa* land use) of regeneration failure, and the whole character of the land use system (“ephemeral” vs. “perpetual”) will be seen differently. Hence, there is a need for historical information on land use and development.

Environmental histories contribute to the understanding of the dynamic nature of landscapes and can thus guide future ecosystem management (Black *et al.*, 1998; Swetnam, Allen & Betancourt, 1999). Comprehensive historical studies about population, land use, and land property in Southwest Spain have been carried out over different periods (Sánchez-Marroyo, 1993; Zapata-Blanco, 1986), and some authors specifically explored questions of the origin and the historical development of the

*dehesa* system (Gallego-Fernández & García-Novo, 1997; Linares-Luján & Zapata-Blanco, 2002). However, the explanatory power of such historical information for the assessment of present conservation and management issues has not been used so far.

The objective of this paper is to define the historical social construction of *dehesa* management in two municipalities that are considered typical of rural lowland communities in the Cáceres province in regard to land-uses, landscape structure, and demography. Insights will be derived from the study of historical evidence about *dehesa* establishment, population, land ownership structure, and land use. Implications for present *dehesa* management will be discussed.



**Figure 2:** The Monroy and Torrejón el Rubio study areas. Shading represents 1998 *dehesa* cover. Solid lines delimit *Latifundio* estates.

## STUDY AREA

The townships of Monroy and Torrejón el Rubio (Fig. 2) extend over 204.45 km<sup>2</sup> and 221.88 km<sup>2</sup> in the Extremadura region in south-western Spain and are situated in a large contiguous area of holm oak and partly cork oak *dehesas* within the lowlands around the province capital, Cáceres. The Cáceres province only covers about 1/5 of the total *dehesa* area, but is considered the heart of Spanish *dehesa* country (Huntsinger, Sulak, Gwin & Plieninger, 2004).

Both Monroy and Torrejón el Rubio are bordered by the Tagus River in the North and the Almonte River in the South. Elevations range from 220 m in the river valleys to 540 m along a small mountain chain. Geomorphologically, the area is characterized by

plains or gently rolling lowlands with slopes from 0-9°. The prevailing geological formations are sedimentary cambrian and precambrian schists. Soils emerging on this ground are shallow, acid, and nutrient-poor, and have a small water-holding capacity.

The climate is highly variable Mediterranean-type with mild, humid winters and hot, dry summers. Temperature averages 27.8 °C in December-February and 7.6 °C in July-August; the annual average is 16.5 °C. Mean annual rainfall is around 570 mm, with a monthly maximum of 84.5 mm in December and a monthly minimum of 7.8 mm in July (CAM, 2001). According to the UNESCO aridity index, the climate of the study side is semi-arid and has a mean dry period from May to October (León-Llamazares, 1991).

Dominant land cover types are agroforestry areas (*dehesas*), transitional woodland and shrub (*matorral*), and open pastures and old fields. According to EU criteria, both municipalities are considered less-favoured areas due to a backlog in economic development and a high risk of rural depopulation. This area is especially interesting for a landscape historical analysis as studies on ecological and economic aspects of *dehesa* management are available (e.g., Ceballos, Cerdà, & Schnabel, 2002; Mariscal-Llorente & Campos-Palacín, 2000; Pulido *et al.*, 2001).

The roots of Monroy reach back up to 1309 when the dominion over the village was granted to H. Pérez-de-Monroy through the Castilian crown. Due to its geographically important location, half way between the cities of Plasencia and Trujillo, Torrejón el Rubio was settled as early as around 1200 with the aim of developing and populating the left bank of the Tagus river. Further strategic importance arose through its proximity to one of the most important livestock routes in Spain.

## METHODS

This study combines multiple lines of evidence on the level of single farms and on a township-level, an approach suggested by Edmonds (2001) and Schweineköper (2000). The period studied spans from 1700 to 2000, a time for which abundant written evidence is available. The study is based on the complementary analysis of qualitative, quantitative, and spatially explicit data from cartographic, written, and oral sources. Historical evidence was gathered in archives and libraries, and compiled in a narrative database. Data search was done in the stacks of the Provincial Historical Archive (PHA) (Cáceres), the archive of the former Institute of Agrarian Reform (IAR) (Madrid), the National Library of Spain (NLM) (Madrid), the General Archive of Simancas (GAS) (Valladolid), the local land registry office of the Spanish Ministry of Finance (SMF) (Cáceres), and in diverse public and private archives. Prominent sources were a) township descriptions, specifically the *Catastro del Marqués de la Ensenada*, the *Interrogatorio de la Real Audiencia de Extremadura*, and the reports of Tomás López and Pascual Madoz, b) agricultural lease contracts, c) land registers and other fiscal documents, d) the register of expropriable farm operations, and e) interviews with active and retired land managers. Table 1 gives an overview of the main sources used that will be referred to in the text by the code specified in the right column.

**Table 1:** Most prominent sources used (archive codes are explained in text).

SOURCE	YEAR	SPATIAL LEVEL	ARCHIVE	SECTION	CODE
Agricultural lease contracts	1732-1859	Estate	PHA	Protocolos notariales	[1]
Catastro del Marqués de la Ensenada	1752-1761	Township, Estate	GAS	Rentas, 1a remesa	[2] [3]
Real Audiencia de Extremadura	1791	Township	PHA	Real Audiencia	[4]
Descriptions of Tomás Lopez	1798	Township	NLS	Manuscritos y Documentos	[5]
Catalog of national property sales	1843-1889	Estate	PHA	Hacienda	[6]
Pascual Madoz, Hist.-geogr. dictionary	1849	Township	NLS	Reference	[7]
Land registers	1920-1995	Estate	PHA, SMF	Hacienda	[8]
Register of expropriable property	1933-1935	Estate	IAR	Informes técnicos	[9]
Farm managers (active / retired)	1950-2000	Estate	-	-	[10]

Township descriptions were systematic surveys about all towns in Extremadura or in Castile, and covered aspects of geography, demography, and economy. Descriptions for the township Corchuelas were included besides those of Monroy and Torrejón el Rubio, as its territory was assigned to Torrejón el Rubio after its depopulation at the beginning of the 19<sup>th</sup> century (Sánchez-Marroyo, 1993). The *Catastro del Marqués de la Ensenada* survey, established to prepare a new system of taxation, provides information on the ownership regime on estate level for Monroy. Township descriptions are considered of extraordinary value for the study of local and regional history (Rodríguez-Cancho, 1991). Further information on agricultural and pastoral land uses was read from 124 lease contracts that were noted down in notary protocols. These contracts are one of the most exhaustive and reliable sources in Spanish agricultural history (García-Pérez, 1994). The land register (*Catastro de la Riqueza Rústica*) of Monroy and Torrejón el Rubio, completed in 1920, gives the first spatially explicit and reliable overview of the extent of parcels, names and residence of owners, land uses, and quality of land. Additional fiscal documents on specific estates were used, e.g., the 19<sup>th</sup> century catalogs of national property sales (*Catálogo de Ventas de Bienes Nacionales*). Information on farm structure and land uses during the second Spanish Republic in the 1930s was taken from the inventory of “expropriable property”. The inventory had been intended as the statistical basis for the implementation of a land reform that was never carried out due to a *coup d’état* and subsequent civil war. Additional farm-level insights were gained from in-depth interviews of managers of three farms in Monroy and two in Torrejón el Rubio. Questioning was done by using a multiple narrator approach of oral history (Fogerty, 2001). The site-specific historical information was complemented with

secondary literature in order to tackle potential errors in the interpretation of historical information.

## **LAND USE SYSTEMS: MONTE PARDO - DEHESA**

In the literature, the development of *dehesas* is conceptualised as transition from one silvopastoral land use system to another, from *monte pardo* to *dehesa* (Martín-Bolaños, 1943; Zapata-Blanco, 1986).

### **Monte pardo**

*Monte pardo* is transitional shrubland and woodland, in which holm oaks are accompanied by woody species such as *Arbutus unedo*, *Pistacia lentiscus*, and *Cistus sp.* (Martín-Bolaños, 1943). Dominant growth form of holm oaks is shrub (regionally named *mata*, *carrasco*, or *maleza*) rather than tree, and a herbaceous layer is hardly developed. *Monte pardo* is not necessarily untouched by humans, but often used for episodic or seasonal sheep and goat grazing, apiculture, firewood and charcoal production, and hunting. Sometimes local people are permitted to clear small areas and to cultivate two harvests of crops, but shrub encroachment is largely uncontrolled (Gallego-Fernández & García-Novo, 1997). The dense shrub layer competes with adult trees and the herbaceous layer for water, soil radiation and nutrients, and is an obstacle for cultivation and livestock husbandry. Estates rarely include buildings, as they are difficult to access and far away from settlements. The real estate value is generally low (Sánchez-Marroyo, 1991). Wildfires occur frequently. The unsystematic type of use is probably favored by a diversity of usufructuary rights that can be conflicting with uses from other rightholders.

### **Dehesa**

*Dehesa*, or *monte hueco*, is a formalized and coordinated system of livestock rearing, crop cultivation, shrub removal, and forest management. Livestock raising is the dominant activity that determines all other uses (Campos-Palacín, 1984). Woody species richness is reduced to one or two species, and the fruit carrying species holm and cork oak are promoted (Fig. 3). Shrubs are almost nonexistent, and a layer of herbaceous annuals is pronounced. Being released from competition by shrubs and other trees, holm oaks grow prosperously and develop larger diameters. Acorns are an important commodity in the traditional *dehesa* economy. Thus, holm oaks are thinned and pruned, and the resulting acorn productivity is some 11 times larger than in the *monte pardo* (Pulido, 1999). Still, holm oak regeneration is hampered by a lack of safe sites for seedling establishment and by destruction through browsing and soil tilling so that tree stands thin out by-and-by (Pulido *et al.*, 2001). Estates are covered by numerous farm buildings and roads. Important products are meat, grain, cork (in cork oak areas), and charcoal (Zapata-Blanco, 1986). Thus, uses *per se* are similar to *monte pardo*, but acorn, grass, and crop productivity is much higher due to systematic vegetation management (Martín-Bolaños, 1943).



**Figure 3:** Holm oaks in a *dehesa* in Torrejón el Rubio (photo: Martin Holzer).

The basic differences between *monte pardo* and *dehesa* are contrasted in Table 2.

**Table 2:** Comparison of key characteristics of *monte pardo* and *dehesa*.

PROPERTY	MONTE PARDO	DEHESA
Woody species richness	High	Low
Woody species cover	High	Low
Herbaceous species cover	Low	High
Holm oak regeneration	High	Low
Agricultural productivity	Very low	Low
Land use intensity	Low	High
Wildfire hazards	High	Low
Overall biodiversity	High	Possibly higher

## RESULTS AND DISCUSSION

### Process of *dehesa* construction

The evaluated oral [10] and written [1] sources largely agree with the little published literature (Costa-Martínez, 1912; Martín-Bolaños, 1943; Teijón-Laso, 1948) that *dehesas* were mechanically formed out of *monte pardo* in a process named *adehesamiento*, which was a complex, difficult, and long-lasting task. At its time it was considered an “agricultural conquest” or a “war on shrublands” (Hernández-Pacheco, 1899). *Dehesa* creation required three steps of vegetation management. First, all woody

species except oaks had to be cleared on small pieces of land. Shrubs were cut or eradicated by hand in the rainy seasons, and the assembled dead biomass was burnt (Martín-Bolaños, 1943). Second, the qualitatively best and most vital holm oak shrubs were chosen and left at a defined distance to the next oak shrub, while older and less productive oaks and dense groups of oaks were removed (Teijón-Laso, 1948). Lease contracts prescribed that care had to be taken, so that the selected holm oaks were not damaged. A minimum radius of eight steps had to be tilled around each thinned oak. This had to be controlled by the guards of the owner before fire was laid, and a fine for every burnt or cut tree was enforced: “For every stool of holm oak that is cut or burnt, they have to pay 30 *Reales* to his excellency for the damages they caused to his forest, albeit the commission can sue them according to the Royal forest and plantation” [1].

Third, the selected holm oaks were shaped and pruned. One terminal shoot of the saplings was released as future trunk. Later, a so-called cross was established in 3-4 m altitude where three to five lateral branches form out a characteristic wide treetop (Rupérez-Cuéllar, 1957). Finally, the stratification of vegetation into a dotted, uniform tree layer and a pronounced herbaceous layer was achieved (García-Martín, 1992). The soil was ploughed, and cereals were seeded. The newly created *dehesas* were often enclosed by stonewalls and developed with buildings. Irujo-Ollo (1934: 6) described a mode (found in many 18<sup>th</sup>, 19<sup>th</sup>, and 20<sup>th</sup> century lease contracts) of how landowners had their estates converted into a *dehesa*: “In the year 1922, Don José Collado took charge of the finca and handed it over to farmers in order to have it uprooted. As compensation these were permitted to sow the cleared parcel. This is a form applied by many landowners to convert a landholding of woodland into farmland without financial contribution.”<sup>1</sup>

Most 18<sup>th</sup> century agricultural lease contracts contained passages such as this: “In all fallows the leaseholders have to clear and prune the holm oak brushes that exist on this land’ [1].

As the holm oaks were often the first stand generation having experienced intensive *dehesa* vegetation management, there was no necessity for systematic regeneration. “We simply did not care for the oak canopy”, said a retired farm manager [10]. In contrast, saplings would hamper agricultural uses, reduce acorn productivity of the mature trees, and increase wildfire hazards [10]. Still undeveloped *monte pardo* served as buffer that provided further *dehesa* surfaces (Martín-Bolaños, 1943). No evidence was found in any of the local sources for active holm oak regeneration by acorn seed or planting before EU afforestation schemes were introduced in 1992. However, the literature disagrees about the role of human-induced regeneration. Joffre, Vacher, Los-Llanos, & Long (1988) and González-Bernáldez (1991) report about traditional acorn seed and oak plantation, while Costa-Martínez (1912) and Parsons (1962) conclude that holm oak plantations had been highly unusual in the Spanish *dehesas*.

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<sup>1</sup> Translations by the authors.

### **Agents determining *dehesa* establishment**

Township descriptions and contemporary authors specify that the main objective of clearing the original vegetation was to prepare the land for agricultural purposes [4] (Hernández-Pacheco, 1899). In addition, it was done to increase acorn production of holm oaks, to improve pasture quality, and to facilitate livestock movements (Martín-Galindo, 1966). Prerequisites for the development of *dehesas* were the availability of cheap workforce, a tenure system of landowners interested in profits, and economic incentives from Spanish and international markets for increased cereal production (Zapata-Blanco, 1986). The two basic determinants, population and land ownership, will be highlighted below. The process of *dehesa* establishment was accelerated by advances in mechanization in the 19<sup>th</sup> and 20<sup>th</sup> century (Baumeister, 1997).

### **Population development**

The two townships used to be sparsely populated with around 250-500 inhabitants each until 1800 (Fig. 4, Blanco-Carrasco, 1999). Since then there was a steady population growth, and population numbers peaked in the 1940s and 1950s. Since then population has decreased continuously and has reached today less than 50% of its 1950 numbers. This was a consequence of the emigration of rural people to cities and industrial regions in Spain and central Europe. The negative population trend still continues, but has slowed down today. Population densities ranged around 1.6 persons km<sup>2</sup> (1712), 10.0-13.7 persons km<sup>2</sup> (1950), and 3.3-6.1 persons km<sup>2</sup> (1998). Although a large proportion of the 1752 active population made their living from farming (31% in Monroy, 55% in Torrejón el Rubio [2]), population densities seem low for realizing an area-wide clearing and the management of *dehesas*. Hence, population growth was a prerequisite necessary for large-scale *dehesa* creation. Contemporary foreign writers often deplored this situation, for example Laborde: “Spain does not possess power by any means adequate to the culture of her lands; nor will she be able, without calling in the aid of foreigners, or paying the most pointed attention to the increase of her population” (1809: 42).

Social disparity within rural areas was considerable and even grew wider with an increasing number of landless inhabitants. But population growth was also a stimulus for the conversion of wastelands and pasturelands into crop fields as the rising demand for food could only be met by an extension of crop cultivation on formerly uncultivated land (Leco-Berrocal, Sánchez-Martín & Jurado-Rivas, 1998).

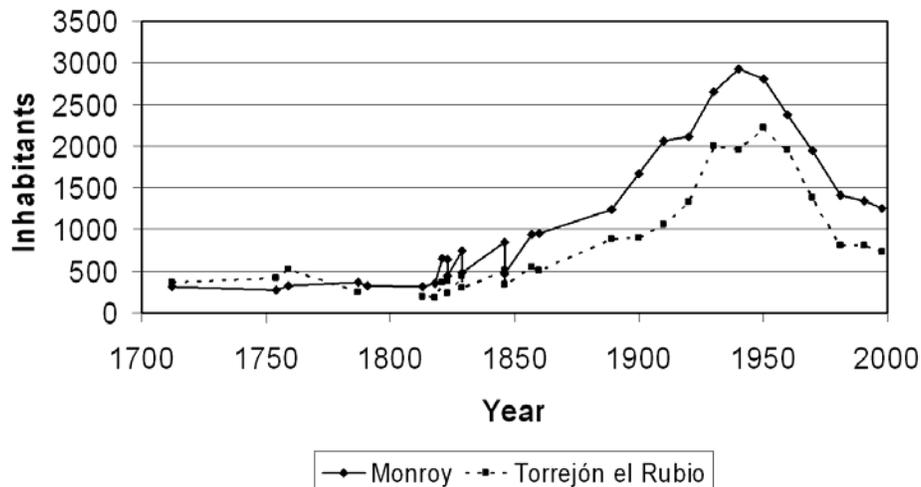


Figure 4: Population growth, 1712-1998 (source: Blanco-Carrasco, 1999; Instituto Nacional de Estadística).

### Ownership structure

Ownership structure is suggested as another determinant of *dehesa* development (Baumeister, 1997). In the 18<sup>th</sup> century, the largest part of both municipalities belonged to the aristocracy, local communities, and ecclesiastic institutions. Two categories of land ownership dominated: small-parcelled properties (*parcelado*) and large estates (*latifundios*) [3]. The *parcelado* consisted of small, clearly delimited old fields, pastures and orchards surrounded by stone walls and was situated either in a circle around the villages or embedded into some of the large landholdings.

The concept of land property experienced significant changes through a comprehensive modernization program in the 19<sup>th</sup> century, the “Liberal Agrarian Reform”. In 18<sup>th</sup>-century Spain, a system of so-called *majorates* had guaranteed the transfer of the territorial, political, and administrative dominion from the aristocratic landlord to his eldest son. This system was abolished in 1841 as part of the liberal reform. The aristocracy finally profited by this, as they received full property titles over lands that had previously been burdened with usufructual uses of numerous rightholders, and as these lands could now be subdivided and alienated. Local peasants, in contrast, lost substantial land use rights without compensation (Bernecker & Pietschmann, 1993).

Another liberal project that became integrated in the political agenda of the 19<sup>th</sup> century was the disentailment of clergy and communal land (*desamortización*). Under the ownership structure prevailing before, landowners had been interested in their lands as indicator of power and wealth, but not in an efficient agricultural production (García-Martín, 1992). The political goal was to reach a more productive use of the land and to establish a new class of landowners bound to the liberal system. Fiscal considerations were also decisive, as the national government needed revenues to prevent an impending national bankruptcy (Bernecker & Pietschmann, 1993).

Estimates about the dimension of the disentanglement between 1836 and 1900 range from 4.5-10.0 million ha (9-20% of the Spanish land area). The Cáceres province was among the most impacted regions, with the disposal of some 740000 ha (García-Pérez, 1994). Development of ownership from that period until today has been characterized by heritages, assignments, and sales. Two new classes of large landowners had established by 1920: locals from the villages and city dwellers living outside or within the province (Table 3). Wealthy local farmers and the urban bourgeoisie profited most from the disentanglement in the whole province. Objectives to acquire land were the extension of their farm operations for the former and land speculation for the latter group. A common event was that urban landowners initially leased their land to local farmers and then sold these lands to farmers some 30-50 years later (García-Pérez, 1994).

**Table 3:** Percent distribution of the number of landowners, the number of parcels, land area, and crop yields across several landowner categories (source: [3]).

	% OF LANDOWNERS	% OF PARCELS	% OF LAND AREA	% OF CROP YIELDS
Landlord	1.64	4.90	92.61	69.10
Inhabitants	62.30	52.94	3.33	13.25
External Owners	13.11	5.88	0.61	1.02
Religious Institutions	22.95	36.27	3.45	16.63

The ownership changes caused by the liberalization of the land market implied not only a legal transfer of property rights, but an enhancement of the process of converting Mediterranean shrubland or woodland to a crop-livestock operation (Sánchez-Marroyo, 1991). Having invested money in the land, the new owners were interested in generating returns on their investments by increasing agricultural productivity. A contemporary agronomist described this link in 1875: “Since the extensive woodlands have come into the hands of private owners as effect of the disentanglement, the use of pastureland and trees has improved notably on a large part of the lands in the province.” (Paredes, cited according to Zapata-Blanco, 1986: 976).

As a consequence of ownership change and *dehesamiento*, the return of farms in the Cáceres province increased by the factor 1.46-4.27 from 1833 to 1872 (Sánchez-Marroyo, 1991). Altogether more than 1 million ha crops are estimated to have been put into operation from 1900 to 1931 in Extremadura, which greatly reduced existing woodlands and wastelands and created new *dehesas* (Zapata-Blanco, 1986). Ownership changes implying the construction of *dehesas* are documented in the register of expropriable property for five landholdings in the area, e.g., for the “Berzalejo” estate: “Since he acquired the *finca*, the owner farms it directly. According to our information this *finca* was pure grazingland with rockroses and a very dense wood cover; it was opened up sufficiently in order to be able to realize a livestock and farming operation’ [9].

### **Agriculture and pastoralism in the 18<sup>th</sup> and 19<sup>th</sup> century**

The township descriptions of the 18<sup>th</sup> century defined livestock husbandry and crop cultivation as the most important economic sectors [2, 4, 5]. Two forms of livestock raising, sedentary and migrant livestock husbandry were distinguished. Livestock of the local population grazed year-round on the rangelands. Important species were cattle, and donkeys as working animals, goats for milk production, and pigs for the production of meat, ham, and sausages. Local sheep raising was rather marginal [2, 4, 7]. The 1798 Tomás López description reported that livestock numbers were strongly limited by the pasturelands available for the local people: “There are some goats and sheep, but they are few, as the inhabitants of this town do not have lands to maintain them, and likewise they lack fruit and harvests” [5].

The second form of livestock were the sheep flocks of the migrant livestock raisers that had leased winter pastures in the area [1]. Although exact data on historic livestock stocking levels are not available, it can be assumed that they were considerably lower than today, especially in the inaccessible hinterlands. Stocking levels varied seasonally, as migratory livestock was absent in winter. The spatial range of the two forms of livestock husbandry partly coincided, but their centres were separated: Relatively intensive and year-round grazing by goats, cattle, and pigs was concentrated in the adjacencies of the villages, while periodic and extensive sheep grazing was dominating in the periphery [1, 3].

The 1752 Ensenada register suggests that, although crop cultivation was a significant activity for the local population [2], a large part of the township was cultivated in a highly extensive way or entirely uncultivated: “There are uncultivated lands in the immediate surroundings of this town, which are commons of the city of Plasencia and its district’ (about Torrejón el Rubio [4]).

**Table 4:** Types of landowners in Monroy and Torrejón el Rubio, 1920 (source: [8]).

	MONROY		TORREJÓN EL RUBIO	
	% OF LANDOWNERS	% OF LAND AREA	% OF LANDOWNERS	% OF LAND AREA
Nobility	20	30	22	42
Urban Bourgeoisie	10	19	22	23
Landowners From Within Province	70	33	55	35
Communal Property	10	18	0	0

Small-scale cultivation of fodder, wheat, and olives was widespread around the villages, while large-scale, low-intensity cultivation of cereals dominated in the remoter areas. In Monroy, crop fields owned by private landowners other than the landlord covered only 4% of the surface, but represented 75% of the landowners and contributed 14% to the whole agricultural production (Table 4). Differences between nearby and remote cultivation were mainly in extent and intensity. In Torrejón el Rubio fields adjacent to the village covered only 48 ha, while fields in the large estates extended over 1291 ha [2]. The former were tilled and seeded every year or every other year, while cultivation

in the latter was practiced in long rotation cycles of ten to fifteen years [2]. Main species cultivated were wheat and barley, to a smaller amount rye, oats, chickpeas, broad beans, and flax [2, 4, 5, 7]. Fields close to the villages were privately owned or leased, while cultivation of the remote estates was often an usufructuary right of the local people and organized by an allocation of lots through the local landlord [3, 4]. Infrastructure did not extend beyond the villages, and no farmhouses existed outside the villages: “Outside of it [Monroy] there is no farmhouse, nor cottage in the municipality” [2].

Further important businesses were apiculture, hunting, fishery, and horticulture [2, 4, 5]. In most cases, different uses (such as crop cultivation, acorn use, winter grazing, summer grazing, and stubble grazing) took place on the same surface, but were leased separately, often by submission [1]. Rights for crop cultivation, and summer and stubble grazing were predominantly leased by local people from the village itself or from surrounding municipalities, while winter grazing rights were leased by transhumant sheep owners from Northern Spain (Table 5). Users of acorn mast and farmers were forbidden to cut principal branches, branches from the crown area, or complete trees in order to maintain acorn production. Still, cutting of branches from holm oak shrubs or from wild olive trees was allowed for fuel use and for the construction of pens for the pigs and shacks for the herdsmen. In the uncleared *monte pardo*, cutting of young holm oaks was completely forbidden as they were intended to be pruned to wide-crowned holm oak trees later: “They must not cut branches or tree crowns of holm oaks to build enclosures; they have to make these enclosures out of shrubs, and not out of crowns of holm oaks” [1].

**Table 5:** Contents of lease contracts concerning different land use rights on the same land in Monroy, 1732-1859 (data source: [1]).

	CROP CULTIVATION	ACORN MAST	WINTER PASTURE	SUMMER PASTURE	STUBBLE GRAZING
N Contracts	67	26	14	12	5
N Lease-Holders Per Contract	2-60	1 or collective	1	1-2	Village community
Origin Of Leaseholders	Monroy and surrounding villages	Monroy and Cáceres province	Burgos, La Rioja, and Segovia	Monroy and surrounding villages	Monroy
Use Period	3 to 8 years	29.09.-30.11.	29.09.-25.04.	25.04.-29.09.	20 days
Livestock Admitted	Working animals	Pigs	525-670 sheep and goats	Goats, cattle, sheep	Pigs
Oak Conservation Instructions	+	+	-	-	-
Oak Pruning Obligations	+	-	-	-	-

### Land use in the dehesas of the 1930s-1950s

The extent of *dehesas* probably reached its climax during the “golden era” of the 1930s-1950s (Linares-Luján & Zapata-Blanco, 2002). In 1934 *dehesas* were described as the characteristic landscape impression in the plains of Cáceres and Trujillo, which includes the study area (Instituto de Reforma Agraria, 1934). Farm-level data about the 1788 ha “Berzalejo” estate in Torrejón el Rubio are contained in the 1933-1935 “inventory of expropriable property” [9, 10]. On this landholding, 1500 sheep, 100 cattle, 200 goats, and 300 pigs were kept in wintertime. In summertime, only pigs and goats remained on the estate while sheep and cattle were moved to the Gredos mountain range by transhumance. Grazing was managed by numerous herders and took place without fenced paddocks. Crop cultivation was organized in five management units covering 74% of the landholding. One unit was ploughed, another one was cultivated, and three were left fallow for the recovery of the poor soils in a rotating system so that one unit was cultivated once every five years. Units were grazed in fallow years. [9]

Regeneration by plantation or acorn seed was not realized, but naturally occurring saplings were pruned to reach a wide crown. All mature trees were pruned in five-year intervals between October and December, simultaneously with soil tillage. Wood was used as firewood and for charcoal production. The land was kept free from vegetation by regular clearing, except in the pure grazing land near the farm buildings where a certain density of *Retama* shrubs was desired as windshield for the livestock. [10]

The estate comprised one house for the landowner and 13 additional houses for permanent workers. The estate even had its own school for the children of the workers of Berzalejo and surrounding estates. Additionally there were facilities such as warehouses, barns, and granaries. Around ten salaried employees worked permanently on the estate, each living with 5-6 family members that also helped out. Up to 20-30 day laborers came seasonally on the estate. [10]

### **Current land uses**

Interviews with land managers showed that significant modernization had been taking place between the 1950s and the current period. Most operations specialized on beef and lamb production, which includes the abandonment of the once common diversity of pastoral, agricultural, and forestry uses. Modern high-performance breeds were introduced, and basic nutrition is provided not only by grazing, but also by supplementary fodder (such as barley, corn, and soy mixes). Perevolotsky & Seligman (1998) emphasize, however, that increased animal numbers combined with additional feed inputs tend to decrease the actual grazing pressure on the rangeland, especially when traditional herding methods are abandoned. The spatial distribution of grazing is now either completely uncontrolled, or livestock grazing rotates in a system of 2-15 paddocks per landholding. Concurrently with land use diversity, the high abundance and diversity of specialized workforce vanished. Today most estates are managed by one or two employees. Large parts of the traditional infrastructure such as farm buildings, stonewalls, or drovers’ roads have lapsed. Labor-intensive practices including

transhumance and pruning have frequently disappeared. Cultivation, if there is any, takes place on small parcels only; shrub encroachment is less managed. An increasing number of estates convert from a livestock to a hunting operation. [10]

### **Temporal and spatial dynamics of the dehesa establishment**

The interpretation of local information coincides with the literature view that *dehesa* establishment spread out from the 18<sup>th</sup> to 20<sup>th</sup> century, although first *dehesas* had been put into operation early in the Medieval period (García-Martín, 1992; Montero, San-Miguel, & Cañellas, 1998). Ponz (1988 [1784]) crossed the study area in 1784 and described vast areas of both *monte pardo* and holm oak *dehesas*. Another writer gives indication that *monte pardo* (described as wastelands, shrublands, and woodlands) was dominant in the Cáceres province at the end of the 19<sup>th</sup> century: “But the true character that vegetation produces in the provinces of Extremadura is given by the shrublands that invade it on a large part, especially in Cáceres province, which is almost completely a shrubland of rockroses, lavender, rosemary, strawberry tree, Erica species, mastic, retama, broom, heath, Quercus, and above all Crimson spot rockrose” (Hernández-Pacheco, 1899: 364).

Landholdings such as “La Jara” in Monroy and “*Dehesa Boyal*” in Torrejón el Rubio were specified to consist of extensive *monte pardo* as late as 1859 and 1889: “Nearly all the soil is covered with shrubs, *monte pardo* of holm oaks, strawberry trees, mastic, heath, *escoba*, some ashes, and the few and small trees are distributed in some groups toward the eastern part; in the northern and western part, there is the true *monte pardo*, hills full of Crimson’s rockroses, strawberry trees etc.’ (about the “*Dehesa Boyal*”, Torrejón el Rubio) [6].

Oral and written evidence specifies that “Berzalejo” was converted to *dehesa* in 1919, nearby “Malueñillos” in Jaraicejo in 1920, “Monte Almeida” in Cáceres in 1922, and “Don Gil” in Torrejón el Rubio in 1934 [9, 10]. Gallego-Fernández & García-Novo (1997) found a similar pattern in *dehesas* of the Badajoz province, where livestock grazing had been recorded since the 16<sup>th</sup> century. The introduction of crop cultivations, however, had taken place from the late 18<sup>th</sup> to the early 20<sup>th</sup> century.

Still, areas close to villages had already old and typical *dehesas* in the 19<sup>th</sup> century, as reported for example in the catalogs of national property sale for the “Mariagüe”, “Corchito”, “Cumbres y Arcianos”, “Términos de Abajo” and “*Dehesa Boyal*” estates in Monroy [6]. Thus, *dehesa* creation probably shifted gradually from areas close to settlements to remoter areas. An alternative explanation might be that soils are better near the villages than farther away. Differences in stand ages and densities along the village-periphery gradient are visible today, e.g., in Monroy.

### **CONCLUSIONS**

This study presents an interpretation that many *dehesas* are relatively recent constructs. *Dehesas*, understood as savanna-like landscape systematically and intensively used for

grazing, farming, and forestry, existed around the villages in the 18<sup>th</sup> century, but, unlike today, rarely in the remote hinterlands of the townships. Hence, the “traditional” *monte pardo-dehesa* landscape of the 18<sup>th</sup> century was quite different from the “traditional” *dehesa* landscape of the 1950s. The extent of *dehesa* construction increased parallel to population numbers and was further pushed forward by ownership changes, especially the disposal of former communal, church, and nobility lands, and the combination of formerly divided usufructuary rights on the same surface to one landowner. Hardwood rangelands in South-western Spain were stamped by a trend toward a more intensive land use (expressed as the extent of the *dehesa* surface) from the 18<sup>th</sup> to mid 20<sup>th</sup> century, and this intensification often took place in pushes.

This study suggests that the “traditional” *dehesa* system of the 1950s was not a century-old system, but a climax in intensity of agroforestry land uses. Land use trends became polarized following a socio-economic crisis of traditional agriculture and a decline of rural population in the 1960s and 1970s: some *dehesas* were further intensified in such a way that the agroforestry system was replaced by irrigated arable fields. On the majority of estates in the study area, however, land use moved back in intensity.

Table 6 contrasts the relative importance of several land uses in the 18<sup>th</sup> century, the 1950s, and today. It can be speculated whether the *dehesa* landscape tends to resemble 18<sup>th</sup> century pre-*dehesa* landscapes rather than the “traditional” *dehesa* of the 1950s.

**Table 6:** Relative importance of land uses and management characteristics in the 18<sup>th</sup> century, c. 1950, and c. 2000. (+ high, ++ very high, – low).

	1700-1800	C. 1950	C. 2000
Crop cultivation (extent and intensity)	–	+	–
Soil tillage (extent and intensity)	–	+	–
Livestock (numbers)	+	+	++
Acorn use	–	+	–
Oak pruning for firewood/charcoal	–	+	–
Hunting (intensity)	+	–	+
Systematic combination of uses	–	+	–
Infrastructure on estates (roads, buildings)	–	+	–
Farmworkers (numbers)	–	+	–
Rural population (numbers)	–	+	–

*Dehesas* are an exemplar in the debate about the integration of land use and biological conservation (Dawson & Fry, 1998). This study suggests a differentiated perspective on the sustainability of traditional land uses. There is no doubt that traditional agriculture and pastoralism in Europe support extraordinary biodiversity levels by providing habitats for many rare plant and animal species (Bignal & McCracken, 1996). In the *dehesa* system, this biodiversity is believed to be superior even to that of pristine holm oak woodlands (Díaz, Pulido & Marañón, 2001). The perspective of many *dehesas* being relatively recent, however, reveals a central dilemma of their conservation: agricultural uses both create and threaten the *dehesa*, as practices for the regeneration of

holm oaks were not provided historically. In fact, the system could be understood as very long-term swidden cultivation where primeval land is developed, cultivated, and later abandoned in a treeless, “degraded” state. Hence, it is not enough to simply restore traditional land uses. The challenge is to advance the system under current socio-economic conditions, especially to develop “modern” sustainable regeneration practices, while maintaining its “traditional” ecological amenities.

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