

Hearn, K. P. (2021). Mapping the past: Using ethnography and local spatial knowledge to characterize the Duero River borderlands landscape. *Journal of Rural Studies*, 82, 37–53.
<https://doi.org/10.1016/j.jrurstud.2021.01.024>

Mapping the past: Using Ethnography and Local Spatial Knowledge to characterize the Duero River borderlands landscape

The Duero River borderland between Spain and Portugal is a region marked by historic geographic isolation and more recently by economic marginalization. Acknowledged for not only its biodiversity, the cultural landscape is also distinguished by its archaeological, historic, and ethnographic heritage. Due to massive socioeconomic outmigration and a prevalent cultural disdain for the countryside, there is a developing disconnection of the collective memory among village residents with the cultural landscape and its agropastoral past. In this study, the principles of the Historic Landscape Characterization methodology and the ideals established by the European Landscape Convention of 2000 are implemented due to their goals of community engagement and awareness raising of the value of cultural landscapes. A strong ethnographic component has been applied to this research whereby residents in interviews characterize the landscape through the recollection of its toponyms and past agropastoral land use. The data acquired from the interviews are input into a GIS as ethnographic layers to complement the empirical landscape analyses. This aggregation of information is placed into a final series of maps for residents and regional authorities to access, use, and learn from the unique landscape history of the region. The value of the analysis is twofold: (1) it contributes to the interpretation of the historical development of the Duero River transborder landscape; and (2) it demonstrates the role of incorporating an ethnographic approach into an archaeological landscape analysis.

Keywords: Landscape Characterization, Participatory mapping, Local spatial knowledge, Traditional ecological knowledge, Landscape Memory

1. Introduction

This study is part of a greater archaeological research program funded and developed by the *Social Structure and Territory Landscape Archaeology* (EST-AP) group of the Spanish National Research Council (CSIC) in Madrid. At the heart of the study is the concept of landscapes as defined by the six sections of Article I of Chapter I of the *European Landscape Convention* (ELC, Council of Europe) of 2000. In Article 1 of the document, landscape is defined as “an area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.” Extremely relevant to this study are also the tenets of *Landscape protection* that seek to conserve “characteristic features of a landscape justified by its heritage value,” and *Landscape management* which advocate sustainable development of landscapes in the face of socioeconomic and environmental processes; and finally *Landscape planning* which promotes a “forward looking action to enhance, restore or create landscapes.”(European Landscape Convention, 2000, 2).

The EST-AP group has developed a comprehensive model of integrated research that it established in the Las Médulas Roman mining landscape now recognized as World Heritage by UNESCO.¹ Applicable to many regional contexts (Ruiz del Arbol et al., 2001), CSIC’s team uses this model to analyze sites to show their potentiality as both a cultural landscape and as a contemporary sustainable resource from different perspectives: archaeological, historical, geological, environmental, and ethnographic (Alonso, 2010; Sánchez-Palencia, 2000) . More recent research has continued along the Duero borderland region documenting Iron Age and Roman settlement (Lemos and Martins, 2012; Romero, 2015; Sánchez-Palencia and Currás, 2010). Important to this integrated research model is an ethnographic component of community valorization and development of sustainable use of the cultural resources (Ruiz del Arbol et al., 2001).

¹ <https://whc.unesco.org/en/decisions/2902/> [Accessed 15/10/2020].

Unlike in the Las Médulas region, several cultural and demographic factors have stymied EST-AP's valorization attempts in the Duero region. This borderland area has been marked as a region lacking a connection with its archaeological patrimony, as well as lacking a strong connection between archaeological resources and the relatively recent internationally protected natural park zone that comprises much of the borderland area (Sánchez-Palencia, 2012: 213). To address this situation and improve the valorization efforts in the region, researchers have recommended engaging the small communities in the area to reconnect with their natural and archaeological heritage by combining the existing public's knowledge and perceptions of the landscape with scientific and empirical landscape research to better inform the stakeholders in the region (Alonso, 2010: 196-197). Based on these recommendations, the aim of this study is to integrate local public (ethnographic) knowledge of the landscape with historical and empirical data to characterize and map the temporal development of this agropastoral landscape. In doing so, the outcome expected is the prevention of the loss of landscape knowledge by revealing to diverse stakeholders different tangible and intangible historic attributes of the region.

2. Study Area and the Current State of the Landscape

The Duero river with its headwaters in Soria province in north central Spain crosses the northern third of the country until it flows south where it forms part of the border with Portugal. It then continues south, forming the western borders of Zamora and Salamanca provinces with the eastern border of the district of Braganza in Portugal (Fig. 1). This borderland area is marked by a deep river canyon system known as *Los Arribes* in Spain. Within this narrow strip of land, a microclimate has formed that has allowed for not only numerous unique species of plant and wildlife but has also permitted local communities to cultivate warm climate Mediterranean crops in the river valley in an otherwise dry continental

climate with very harsh extreme temperatures between summer and winter (Vicente, 2010: 218-219).

While the environmental and geological aspects of the region have undoubtedly affected the climate and hydrology of the region, it has been the anthropic influence and interaction with the environment that has contributed to the unique cultural landscape recognized today. Since the late Iron Age until the late 20th century, this region was best described as an agropastoral landscape (Romero, 2015). By the end of the 20th century, this landscape of the Duero River forming the borderlands, shaped, used, and altered heavily by humankind, has received considerable attention for its ecological singularity by both the Portuguese and Spanish governments. It received protected status in Portugal under the name of *Parque Nacional do Douro Internacional* in 1998 and *Parque Natural Arribes del Duero* in Spain in 2002 forming a cross border protected area. In 2015 a superimposed protected area, the *Meseta Iberica Biosphere Reserve* as part of the UNESCO Man and Biosphere (MAB) program was declared, designating 11, 326 km² of the region as protected.²

This once cultivated and pastured landscape is now suffering from an ongoing depopulation. Beginning in the 1950s, whole communities began to emigrate to more industrial parts of the Iberian Peninsula and abroad for better economic opportunities (Blanco Rodríguez, 2011: 234; Marques, 2011: 116; Vilar, 2000: 132). With agricultural wages for farming and livestock grazing low and general poor soil quality needed for high productive yields, there has been little incentive for a permanent return to these villages to reactivate the local agricultural economies (Vaca Lorenzo, 1995: 486-487).

The depopulation of Los Arribes region has had both an environmental and social impact in the region. With the abandonment of the pastoral and agricultural lands, vegetative growth has increased covering the once grazed and plowed landscape. Environmental laws

² Source: www.biosfera-mesetaiberica.com/es/es/territorio [accessed 15/06/2019]

established with the creation of the new national parks have restricted the remaining citizens from clearing brush without permission with the threat of steep fines for infraction. As a result, the landscape, for centuries a cultivated and pastured one, is returning to a wilder state. The protection of the ecological distinctiveness of the landscape desired by the Portuguese and Spanish governments is now facing its greatest threat from increased vegetation that had previously been suppressed and the consequent destructive wildfires (Alfonso et al., 2020: 111; Marino Alfonso et al., 2017: 113). Thus the park objective of preserving a landscape for all to appreciate is continuously in danger because the landscape is lacking what had made it originally singular, the people dedicated to the agropastoral system of land management.

With a small year around permanent resident population, much of the knowledge of the development of cultural landscape from its archaeological heritage to its contemporary history, as well as its traditional use, is disappearing as its older residents are dying every year and taking this precious knowledge with them. The part-time summer residents, who are often much younger and of working age, are unable to invest the time and effort to maintain the lands. Often, they tend to view the agropastoral lifestyle of their elders with disdain, seeing it as backwards. Consequently, they increasingly lack the knowledge of the villages' agropastoral land management that was common among their now deceased or elderly forebears.

For this article, two representative municipalities of the region were selected as case studies from the greater research in the area (Fig. 1). One village was selected in the county of Miranda do Douro in Portugal and one village in the county of Sayago, Zamora in Spain. The villages selected meet several important criteria. They:

1. Were located within internationally protected natural areas – the Meseta Ibérica Biosphere Reserve and the Duero International Park Zone.

2. Possessed intact (or well preserved) examples or remnants of potentially medieval to definite modern period rural architecture used for power generation (watermills) clustered into specific zones within the municipalities and/or a documented archaeological record as a result of survey and/or excavation.
3. Possessed representative examples of the local style of communal agricultural land management and organization in the region in the form of field rotation and toponyms (Prada Llorente, 2005: 345; Sánchez Gómez, 1991).
4. Had suffered a marked decline in population over the past two decades and had less than 200 year-round permanent residents.

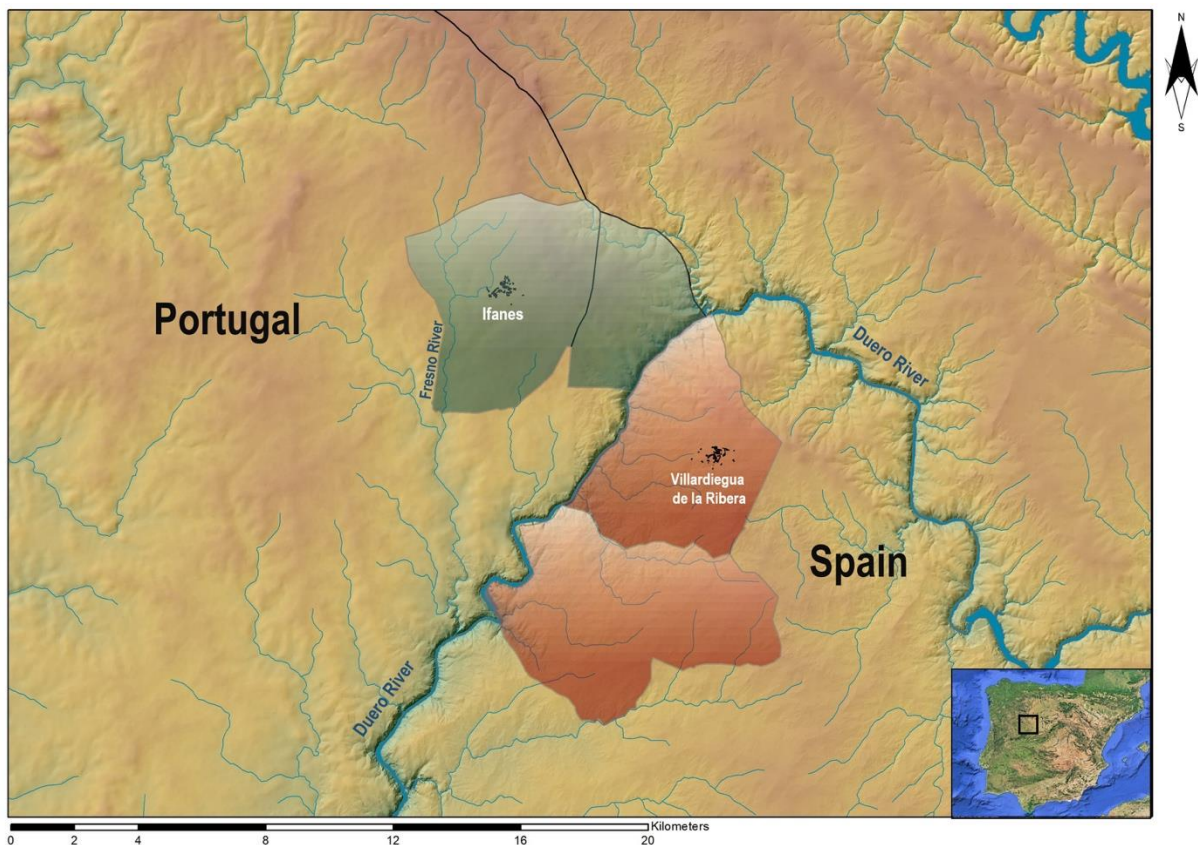


Fig. 1. Study area and municipalities discussed in this study

3. Methodological Overview - Community perceptions of landscape, Participatory Mapping of Local Spatial Knowledge, and essential archival sources for NW Iberian historical research

This study is an ethnographic and historical landscape analysis that is influenced by the principles of Historic Landscape Characterization (HLC). In addition, it incorporates the

aspects of toponomy and vernacular architecture as part of landscape history that are found in Stephen Rippon's Historic Landscape Analysis (HLA) (Rippon, 2013, 2012a, 2012b). HLC was created in the United Kingdom for the purposes of analyzing landscapes diachronically by identifying the many historic attributes on the landscape by utilizing various archaeological, historical, and contemporary sources that describe the historic dimension (Aldred and Fairclough, 2003; Clark et al., 2004; Fairclough, 2019; Fairclough and Møller, 2008; Herring, 1998; Olwig et al., 2016). The use of Geographic Information Systems (GIS) software is essential in order to map these attributes. An applied archaeological methodology, HLC can provide people with the tools to create "new narratives and perceptions" with regards to the continued evolution of their landscape.

Historic Landscape Characterization values people's perspectives of the landscape (Fig. 2). Influenced by HLC, this study employs a defined ethnographic approach to directly value, engage and assess stakeholders' "cultural perceptions and association of places" (Crow et al., 2011: 118). Castillo also asserts that when conducting heritage research it is critical to carry out perception studies with community members directly implicated in the study. These perception studies are important before engaging in more participatory activities (Castillo et al., 2016: 296).

Unlike HLC which focuses on the tangible aspects of landscape, to develop a better and more profound understanding of landscapes in the Spanish context, Orejas calls for a synthetic analysis of the landscape which incorporates an integration of "all possible sources" including intangible ones such as local traditions, literature, and iconographic elements (Orejas, 2008: 79-80). Orejas also emphasizes the importance of highlighting the social processes involved in the creation of the landscape which include the dynamic interactions with the environment, both in the past and in the present (Orejas and Reher, 2012: 36). Complementing the social aspect of the development of the landscape asserted by Orejas, de

Groot discusses the importance of traditional knowledge systems (TK) and their role in regional sustainable development, especially in the case of agriculture. The loss of TK can have a negative environmental impact on the integrity of ecosystems (de Groot et al., 2005: 457).

To effectively characterize the historical development of a cultural landscape requires the engagement with the local populace through participatory mapping to access, map, and document its rich local knowledge (Álvarez Larrain and McCall, 2018). Local Spatial Knowledge (LSK), a facet of TK, has incredible value to research conducted on a landscape. In the fields of Geography and Urban Planning, Environmental Science and Archaeology, the inclusion of LSK has allowed researchers to reveal nuanced aspects of landscapes unnoticeable by empirical studies to solve problems (Arnassant et al., 2018; Debolini et al., 2013; Duin et al., 2014; Fagerholm et al., 2013; Preto et al., 2016; Reilly et al., 2018). The inclusion of LSK is fundamental as a component to this study (Fig. 2).

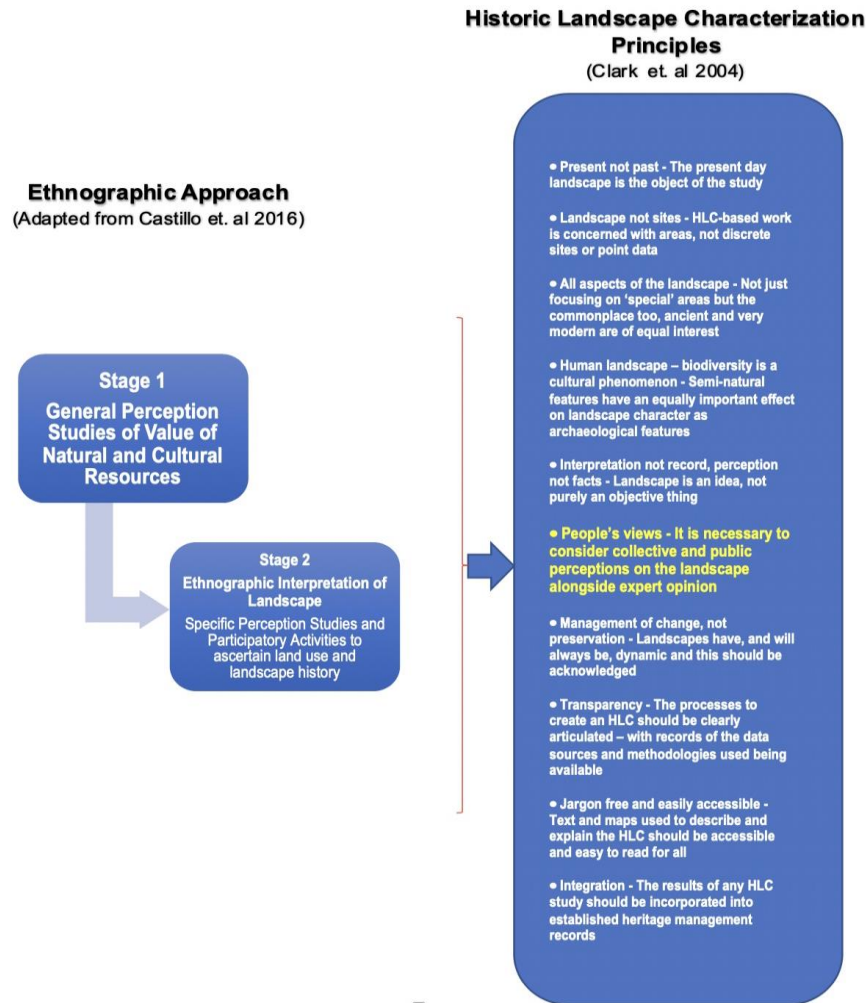


Fig. 2. Where ethnography interfaces with Historic Landscape Characterization methodology (See Castillo et al., 2016; Clark et al., 2004)

In the context of the northwestern quadrant of the Iberian Peninsula, there are several key historical primary sources that are vital to consult in order to effectively conduct landscape research in Spain. Despite these sources, however, many researchers in both archaeology and history focusing on the Protohistoric, Roman, and Medieval periods have all commented on the dearth of primary information or previous excavations in this region. Fortunately, these few existing sources help to establish a degree of time depth for regional towns and villages, the location and/or description of regional landscape features such as toponyms, types of land use, means of agricultural production, and in some cases even provide detailed information as to the types of economic production. Moreover, they are a useful component to the ethnographic record in that they can provide further historical context

beyond the living memory of the informants. Among the most important and cited often in this study is the *Catastro del Marques de Ensenada*, a mid-eighteenth century census and cadaster conducted in Spain that was composed of forty questions posed to each village detailing the properties, the economy, and its geographic location in relation to other locales³. The writings and maps of Pascual Madoz continue the historic geographic information down to the local level into the mid nineteenth century with the multi-tome work titled, *Diccionario Geográfico Estadístico Histórico de España y Sus Posesiones de Ultramar* (Madoz, 1984). Apart from these essential collective works are the regional and municipal historical archives found in Portugal and Spain that provided information on land use, land tenure, and toponyms.

4. Methodological Application in the Duero River Borderland Region

4.1. Participatory activities to access and document Local Spatial Knowledge

The initial perception studies conducted in 2017 and their interpretation allowed for a continued, more in-depth participatory study the following year that involved the identification, documentation, and participatory mapping of specific attributes of the cultural landscape and their time depth in the villages in this study. In 2018, following the perception study, more participatory activities were begun. These consisted of open ended interviews with the focus being exclusively on the local inhabitants of the target villages in both this and the greater study. In these interviews, the objective was to obtain informant based knowledge on the past, present, and potential future use of the lands pertaining to the municipal entity.

Due to different social, political, geographic and cultural dynamics between the Portuguese context and the Spanish context, informants were recruited in different ways. In the parish of Miranda do Douro, where one of the villages is located in this study, a more centralized form of recruitment was permitted. In this case, the primary informant was well-

³ This extensive information is found online at, <http://pares.mcu.es/Catastro/>. [accessed 16/2/2019]

known to the target village, knowledgeable of cultural heritage management, and dedicated to the protection of cultural heritage in the parish. Initial contact informants were made in the village and then through network sampling additional informants were recruited and participated in the interviews individually, in pairs, or in small group workshops. In Spain, however, although the target village is in the Sayago county, there is no unifying large regional government body (as in the case of the large town of Miranda do Douro in Portugal) to utilize as a base for the recruitment of a primary informant. As a result, primary informant recruitment started with the vice mayor of the local municipal government.

4.1.1. Activities and interview procedure

To facilitate a warm-up discussion for interviews in all cases, two types of visual aids were implemented. The first were past or present photos of the village. Photos consisted of several themes: the significance, use and management of the land. These photos formed the initial questions to ascertain informants' opinions, feelings, and knowledge of the landscape and its development. The second visual aid implemented was the use of large color maps ranging from A3 to A2 in size of each village and its surrounding municipal lands. Tracing paper was placed over each map and informants were able to name local toponyms, describe land use, and discuss the history and change of the local landscape. Interviews were recorded when possible or note taking was used optionally. In cases where informants, due to advanced age, were unable to see and/or interpret the large maps well, notes were taken from directional information provided during the interviews. In some cases, a few informants walked or drove me to indicated specific sites and toponyms in which case GPS readings were taken from a Garmin GPS 64s device to be later placed into the GIS software (ArcGIS 10.3.1). For Portugal, maps were printed from Google Maps/Google Earth at sizes ranging from 1:500 to 1:20000 and in Spain, maps were printed from the Junta de Castilla y Leon web page for cadaster and were printed on A2 paper. The scale varied but did not extend beyond 1:20000.

Using a chain sampling method, discrepancies in naming and map description were later dispelled after saturation was determined once a number of interviews had been completed and informants began to share and confirm much of the same information. In Portugal, using the chain sampling method, the primary informants facilitated interviews with their knowledge of the small villages and the residents living in them. All informants gave oral consent to be interviewed. Variation sampling was also implemented on the criteria of gender diversity. Chain referencing sampling was ideal in this context due to the small population of the villages and remaining knowledgeable informants that could answer the semi-structured interview questions about the aforementioned themes and historic landscape.

4.1.2. Landscape attributes chosen for characterization

Three particular aspects of the landscape were gleaned from the perception studies and became the focus for this article; local field and place names, the field system of crop rotation called *hoja* in Spanish and *folha* in Portuguese, and old zones of watermills (*molinos* in Spanish and *moinhos* or *azenhas* in Portuguese) in intermittent streams in each municipality.

All three characteristics relate to the villages' use and organization of the landscape - an agropastoral subsistence economy and its key processes from planting to harvest to milling and the management of grazing animals during the entire process (table 1). These attributes fit within a greater context of European agropastoral Medieval to Modern period landscape organization encompassing communal woodlands, fields, and pastures, small private enclosures for horticulture and grazing animals, and the communication infrastructure of roads and bridges (Fernández Mier and Quirós Castillo, 2015; Rackham, 1986; Watteaux, 2005).

Their time depth varies, but archaeological evidence (in Villardiegua de la Ribera) demonstrates evidence of an agropastoral landscape evolving from the protohistoric period and consolidating in a consistent form from the Modern Period to the early 20th century,

possible evidence of watermills in the Medieval Period but definitely in the Modern Period, and although occasionally nebulous and potentially erroneous, evidence of types of land use and landscape management through the toponyms (both place and field names) found on the landscape (Fernández Mier, 2006).

These attributes were chosen because:

- The informants interviewed during the perception studies stated that these elements were significant to their landscape history. Although gradually disappearing from the collective memory, their existence, location, use, or prior use are still in the memories of the older residents in the villages.
- Both the tangible and intangible attributes are representative elements of the historical agropastoral landscape and its system of land management in the description and/or use of the terrain.
- They provide a temporal dimension to the landscape. Primary archival sources confirm the existence and convergence of these elements in the Modern Period with some elements even dating to the Medieval Period.

Landscape Attribute	Type of Attribute/Tradition	Rationale
Mapping of Local Toponyms	Intangible	(Portugal and Spain) Knowledge of many place names and field names lie only in oral traditions and in the collective memory of the people. Revealing aspects of landscape history and character, to date no attempts have been made to map or expand the knowledge of these singular historical aspects of the landscape. (Spain) Although cadastral information is quite extensive, historical archives and ethnographic testimony indicate place-names for settlements no longer found on current maps. (Spain) Historical studies in both countries have provided a temporal dimension to their existence with some toponyms being dated in the Middle Ages.
Area of Water Mills	Tangible	In both countries, these mostly decaying landmarks provide landscape history of towns with pre-mechanized agriculture with a definitive dating in the Modern Period with possible but vague references to their existence in the Middle Ages. With their gradual decay, knowledge of their location is disappearing. Mapping these iconic landmarks facilitates current municipal interest in restoration.
Traditional Systems of Crop Rotation	Intangible	With massive depopulation in of the region, the loss of local knowledge of land management and its use is having a drastic effect on the regional ecosystem with increased wild growth, the introduction of invasive plant and animal species, and a greater propensity for wildfires.

Table 1. Attributes chosen for characterization in study

4.1.3. Toponyms

As this study has been conducted over a transnational area, this has presented some unique challenges, namely the different types of recording of land use and ownership between Portugal and Spain. Despite occasional inaccuracies in spelling and geographic placement, Spain uses a cadastral mapping system to show the field-names, designations, land use and geographic distribution on maps. This detailed information is all available online. Portugal, on the other hand, has a very limited use of cadastral mapping and it is not used in this area.

In the Portuguese *concelho* (county) of Miranda do Douro where one of the case studies is presented, a land register system, dating back to the late nineteenth century called *Matrices Prediais Rusticas* (MPRs), has been used to record rural land ownership under the name of the owner, provide general information as to how the land would be used (such as the planting of cereals), and most importantly, give the local field-name for the rural plot. No corresponding official maps accompany this information and the majority of the field-names

mentioned in the records are not registered on any official maps.⁴ After conferring with the Braganza district archive director, it was made clear that these local toponyms and their delimitations are known only in the collective memories of the town inhabitants.

Mapping toponymy has both advantages and challenges. Place and field names can be used to identify how people have interacted with the land through socioeconomic use, types of property as well as be descriptive of the morphology of the local landscape. Moreover, toponymy can be an indicator of a precise moment or period in time. Difficulties arise, however, when attempting to achieve a high level of precision with the etymology or to detect the chronological development of these geographic entities. Rippon, a strong proponent of toponymy as an additional feature of landscape characterization, distinguishes field-names from place-names stating that the latter have a less likely chance of changing over time than field-names (Rippon, 2012a: 80). Other researchers in toponymy have also commented on the difficulty in knowing the motivation for the naming process, particularly in Old World toponymic studies where, due to the antiquity of many toponyms, information indicating their origins are often lost in time (Frieria Suárez, 1992; Tent, 2015; Tent and Blair, 2011). Fernandez Mier (2006), while acknowledging a trend in archaeology away from the use of toponymy due to incongruencies between place names and their historical references to information provided by archaeological research, strongly advocates for their use in landscape analysis as a tool to better understand the evolution of spatial organization of agrarian landscapes. In both Landscape Architecture and Medieval studies others have emphasized the importance of toponymy for understanding territorial organization, occupation and time depth (Atik and Swaffield, 2017; Barrios García, 1982; García de Cortázar, 1988; Martínez Ochoa, 1977; Moreno, 1990; Settia, 1996).

⁴ Although not comprehensive, the Portuguese *mapas militares* (military maps) of the 1950s and 1990s do show some field-names, but their exact delimitations cannot be determined as they would on a cadastral map.

With the partial and disjointed information given on both sides of the border there are gaps in the historical development of the cultural landscape that could be better elucidated through the use of ethnography and GIS. Municipal field-names in Portugal from the *Matrices Prediais Rusticas* were shown to informants along with a large print map. Informants worked in pairs or groups and labeled the information from the MPRs onto the print maps. Labeling occasionally resulted in the hand drawing of polygons, but more often were simply labels written over a geographic area on the map.

An important element to the field and place names in the Portuguese context is the role of the Mirandese language. The second official language of Portugal, Mirandese is a Romance language from the Astur-Leonese language family. Its impact on the toponyms in the region is without doubt, but over time the influence of the dominant Portuguese and Spanish languages has altered spellings and even the pronunciation of various field and place toponyms. Ethnographic interviews with some local residents revealed spellings and pronunciation that were of obvious Mirandese origin and raised questions as to their date of origin. Because of the absence of extensive pre-nineteenth century records with field names, dating the toponyms with a level of precision beyond this period would verge on a Sisyphean task and is beyond the scope of this study. What the field names do provide are more of a cultural dimension to the land use and relationship that the local people have with the land (Rippon, 2012b: 27-28). Moreover, with the use of the MPR, they can provide some definitive temporal context of many of the field names to the nineteenth century. In the Portuguese context of this study, field name toponyms were found to reference the following categories in their characterization: pasturing, hydrology, communication, topography, flora, fauna, and social/religious aspects.

While local contemporary field-names were abundantly documented in the Spanish context, a different situation emerged from informants, that of place-names of disappeared

settlements that no longer appear on modern maps. These settlements, for various reasons, have been absorbed over time by several of the municipalities but still remain in the collective memories of the older informants. In addition, field-names found in the Spanish cadaster maps possessing referent names to the pre-existing locales as well as ethnographic information from local experts provided additional context to their location and boundaries. Using GIS, polygons were used to approximate their location and size based on what the archival information and ethnographic interviews, however limited, provided.

4.1.4. Field rotation system

The Spanish *hoja* and Portuguese *folha* are biennial field rotation systems where each village community delineated and divided the arable land of the municipality into parts *hojas/folhas* – one fallow and the other to be planted with a cereal crop such as rye, wheat, or barley depending on the soil quality according to informants from the region. This line is a delineation of the land that has been passed on through time by oral tradition in the villages (Prada Llorente, 2011a: 36). Dating the earliest use of the two *hoja* system is difficult due to the scarce information from this region from the Middle Ages. Crop rotation in the greater European context in the Medieval Period, however, was not unknown (Bakels, 2005; Fernández Mier and Alonso González, 2016; Hamerow et al., 2020, 2019). Due to the lack of medieval sources detailing land tenure, Martín Viso asserts that this borderland region was on the periphery – a less developed, thinly populated region subject to both geographic limitations and grazing interests (Martín Viso, 2000: 174). While there is some evidence of biennial crop rotation in northern Castile from as early as the 9th century and other examples in western Castile from the 13th century, (Martínez Ochoa, 1977; Rodríguez Fernández, 1990: 165) many contend that community wide biennial crop rotation, called *año y vez* in Spanish, did not become consolidated until the late Medieval or early Modern Period (Álvarez Vázquez, 1995; García Fernández, 1964; Riesco Chueca, 2015). With this type of field

rotation, each village community arrived at an agreement to rotate the crops not within individual disconnected tracts, but instead divided the entire arable part of the municipality into halves, *hojas/folhas* in order to alternate the crops. The community would decide on the interval on which to alternate the *hoja/folha* and often the following year the other side would be cultivated while the other left fallow. In the fallowed lands villagers were able to herd their livestock (ovine, caprine or bovine) (Sánchez Gómez, 1991: 48-49). Attesting to the commitment of community level collaboration, Ferreira, in describing the *folha* in Portugal, states that divides were “respected religiously” (Ferreira, 2013: 216).

Although maintained in some villages on the Spanish/Portuguese border, knowledge of the *hojas/folhas* locations is disappearing in others as the village population has migrated to live permanently in cities both domestically and abroad. While detailed descriptions of the types of *hojas*, crops and livestock used in them have been documented extensively, this knowledge of the dividing lines in each municipal landscape has been scarcely mapped. Using the large print maps in interview sessions, informants discussed and aided in the drawing of the *hoja* dividing line. This information was then placed into the GIS with a dividing line followed by two polygons indicating the alternating sides of the field system in Spain and a dividing line in Portugal.

4.1.5. Zone of watermills

Rippon adds to the establishment of the time-depth characteristics of a landscape by emphasizing the importance of vernacular architecture (Rippon, 2013, 2012b). He describes this as a means to show the cultural and architectural distinctiveness and identity found in the regional landscape. The series of watermills used for milling grain along the brooks and streams of the villages of this study represent a period of time depth through not only their architecture, but also to the informants of the villages surveyed as part of their villages’ history. While most of the stone built watermills suffer from decay, abandonment, and disuse

today, in some villages their historical patrimony and architecture serve a new purpose and benefit the communities through cultural tourism. In several towns of the Sayago county, some watermills have been restored and have been advertised as ‘Traditional Architecture of Sayago’ and have been promoted as tourist routes to see and learn about their history.

The dating of the watermills in the region is a subject of debate. The technology is definitely considered to have been used in Europe and in the Iberian Peninsula well before the Modern Period (Bloch, 1935; Glick, 2007; Kirchner, 2012; Pedrero Alonso, 2000; Peris Albentosa, 2015). The date of construction of the watermills in this region, however, is uncertain. Although some researchers have considered them to be from the medieval period, no archaeological excavation or historical archives can confirm the construction of the mills discussed in this study in the Middle Ages (Vaca Lorenzo, 1995: 482). Despite the current inability to confirm the precise construction period of many of the hydraulic mills in the region, they remain an excellent indicator of time depth due to their first definitive mention by individual name in the CME from the mid eighteenth century. At the time of CME in the early 1750s, one fact is certain: that the watermills were both preexisting and numerous. From the ethnographic record it is known that their use ceased by the beginning of the twentieth century with the arrival of electricity and combustion engines used to grind the various cereals cultivated.

Vaca Lorenzo and others indicate that the watermills were an important but expensive industry to build and maintain. Their construction required either the direct investment from a lord, the Catholic church, or the pooling of financial resources of a village in order to construct them (Glick, 2007: 482; Vaca Lorenzo, 1995: 162). With all informants of an age old enough to remember their use, the discussion of the watermills evoked a sense of nostalgia and detailed ethnographic information was given about their use and eventual decline. All informants replied that they were of the time of their great-great grandparents. In

all cases, the number of watermills comprised a zone along a stream that maintained sufficient *volume* at certain times of the year to provide the force to move the grinding stones to mill the cereals after harvest. From the CME and the ethnographic record, the mills were known to have local ownership. Ownership of them was passed down through inheritance as some informants mentioned specific *molinos* as belonging to their families. Informants mentioned that the use of the watermills was regulated by the communities and the mills' owners.

The series of watermills is represented as line data in this study. Two methods with some crossover were used to map these areas and ultimately place them as line data in the GIS. The first method was through interviews with the informants where the number and location of the mills were documented on the large print maps. The streams were labeled followed by a listing of the names of the specific mills, if remembered, and finally the line of the zone of watermills was hand drawn onto the corresponding print maps. The other method was completed through pedestrian survey and a GPS device. An informant led the survey where, with a Garmin 64s, GPS readings and photos were taken of each watermill in the series that would eventually compose the line data. This series of GPS point data was then ported into the GIS to be mapped as line data.

5. Results

5.1. Portugal case study: Ifanes

Important to note about the rural villages involved in this study, is the very low population of permanent residents. As this study required the knowledge and memory of the landscape and its use, there are very few remaining residents that possess this knowledge in a decreasing pool of informants.

Ifanes (permanent approximate population of 160 from 2011 census) is a village located within the international park zone. It does not possess territory along the Duero river. Located west of the river, its direct line distance from the waterway to the village center is

just over 5 km at the closest distance and slightly more than 6 km at the greatest distance.

Historically, it was a village and former parish of the same name. Seven men and one woman were interviewed. Ages of informants ranged from fifty-five to mid-eighties. All informants currently work part time and/or worked in agriculture in the village in their youth. Pasturing was largely bovine with some ovine.

5.1.1. *Toponyms*

The *Matriz Predial Rustica* was consulted for the field-name toponyms of Ifanes. Ifanes is a parish in the county of Miranda do Douro that was joined with the neighboring parish of Paradela to form a new parish called, Freguesia de Ifanes e Paradela. As the *Matrices* correspond to Ifanes well before this union, the field-names pertained exclusively to this pre-2013 reorganization. With no specific geographic reference available other than that of the name of the parish, an index of the MPR for Ifanes was used. From the list, informants located twenty-three new field-names on the print maps that were not on the Portuguese *mapa militar*. A greater density of toponyms was found at the core of the parish. The outlying agricultural lands provided less detail from the interviews with field names representing larger tracts of land than near the center (Fig. 3.).

The field-names noted by the interviews revealed two significant aspects related to the importance of field-name toponyms and the characterization of the Douro river borderland landscape: 1) that field names represent the people's historical to contemporary relationship with the landscape which was through its history of agriculture and pastoralism, and 2) the role and significance of the endangered regional language of Mirandese in many of the place names (Ferreira, 2013). In table 2 the field-names have been categorized into seven different categories with an additional category of field-names that could not be defined.

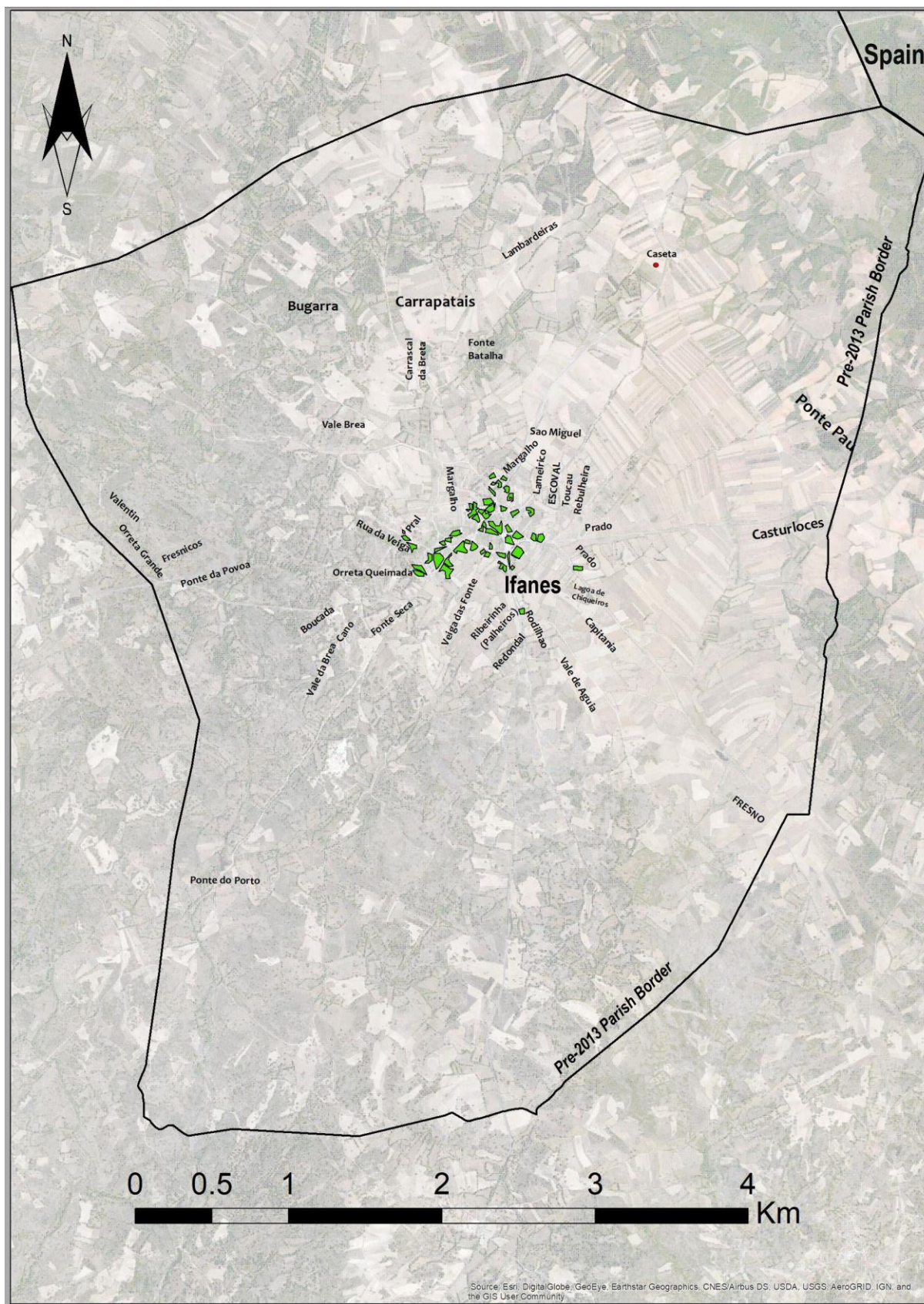


Fig. 3. Map of Ifanes Municipality, Portugal demonstrating the field name toponyms

Pasturing	Hydrology	Communication	Topography	Flora	Fauna	Social/Religious	Unclassified
Bugarra	Fonte Seca ⁵	Ponte Pau	Redondal	Carrascal da Breta	Vale de Aguia	Capitania	Casturloces
Lameirico	Lagoa de Chiqueiros	Ponte do Porto	Ribeirinha	Escoval	Carrapatais	São Miguel	Lambardeiras
Orreta ⁶ Grande	Veiga das Fonte	Ponte da Povia	Rebulheira	Fresnicos		Valentin	Toucau
Orreta Queimada	Fonte Batalha	Vale da Brea	Margalho	Fresno			
Palheiros	Cano	Rua da Veiga					
Prado							
Pral							
Rodilhao							

Table 2. Field name toponyms by category in Ifanes, Portugal

5.1.2. Dividing line of field rotation system

Following an east west trajectory passing through the center of the parish, the *folha* line separated Ifanes into halves. Informants stated that the *folha* was no longer in use because the population is too low to maintain it (fig. 4). Informants shared that the best fields for grain crops (rye and wheat) were to the immediate north and south of the village on opposite sides of the *folha*. Due to the terrain being more level than in municipalities with territory on the Duero River, cattle grazing predominated here with some ovine. To the west, the soil, they explained, was very rocky and was mostly left for the collection of firewood and rough pasturing. In the extreme south, near the border with neighboring municipality of Pena Branca, they used the word *monte*, as in Spain, to describe the terrain. *Monte* does not refer to elevation in this case, but to the concentration of arid scrub and oak forest. Before electricity arrived in the region villagers collected firewood here for heating and cooking. To the east,

⁵ The term *fonte* (*fuonte* or *fuenta* in other variations) is another field name found commonly on the agropastoral landscape of the region. Derived from the Latin *fons*, the term refers to natural springs on the landscape that provide water to livestock and/or people. In many cases they have been reinforced with stone or masonry to facilitate the capture of water. Riesco Chueca cites many ethnographic sources where the toponym serves in memory as not only a source to quench thirst, but also holds a folkloric value on the landscape (Riesco Chueca, 2012: 119-120). Ferreira also notes the similarity of meaning between what he cites as the pre-Roman toponym *ourrieta* with the Latin derived Mirandese *fuonte* (Ferreira, 2013: 442).

⁶ The term *orreta* is a common field name toponym found throughout Duero borderland region. Its spelling varies (*ourrieta*, *orrieta*, *orrieta* or *rita*) on both sides of the border. Ferreira (2013), in his work on Mirandese toponyms asserts two points regarding the distribution of the toponym from his research: 1) the toponym is most commonly found in areas where the Astur-Leonese language was spoken and 2) the greatest density of the toponym is found in Miranda do Douro county where Mirandese is spoken and in the villages near the Duero River opposite Miranda do Douro in Spain. Regarding the etymology and meaning of the toponym, Alvarez Maurin considers the toponym's origin to be pre-Roman and used to describe a humid place (such as a natural spring) on the landscape (Maurin Alvarez, 1994: 196). The term, Ferreira acknowledges, has evolved through time to mean a fertile pasture or arable land (Ferreira, 2013: 480).

both north and south of the *folha* was ideal for grazing. Despite this, informants explained that the number of head of cattle has declined significantly since most of the population has emigrated and now only lives there part time in the summer.

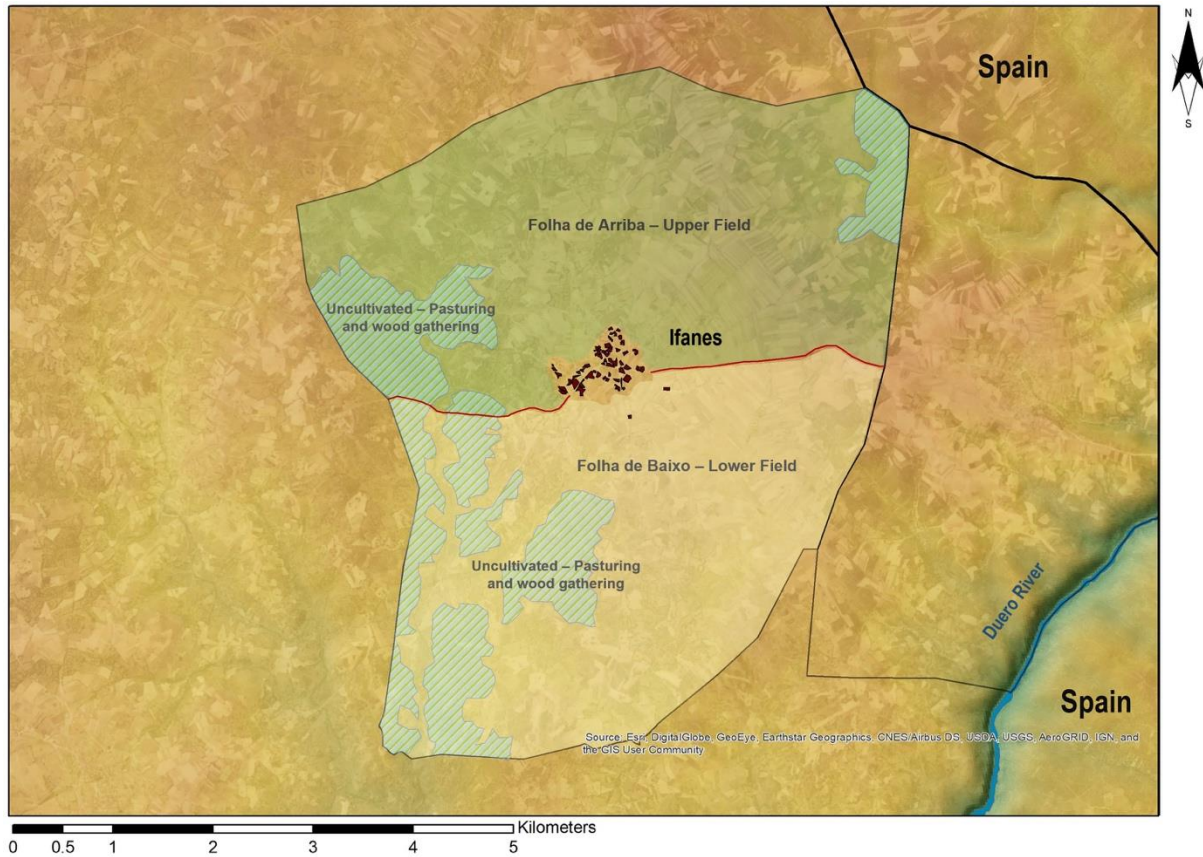


Fig. 4. Map of Ifanes Municipality field rotation system

5.1.3. Zone of watermills

Both pedestrian survey with informants with use of a GPS device and participatory mapping yielded three zones of watermills within the municipality – one zone in the northwest and two zones in the southwest. In the northwestern zone two watermills were located (fig. 5) and there were another 6 in the two southwestern zones of the municipality. All were in various degrees of deterioration and completely abandoned (fig. 5a) These mills collectively were entered as line data in the GIS.

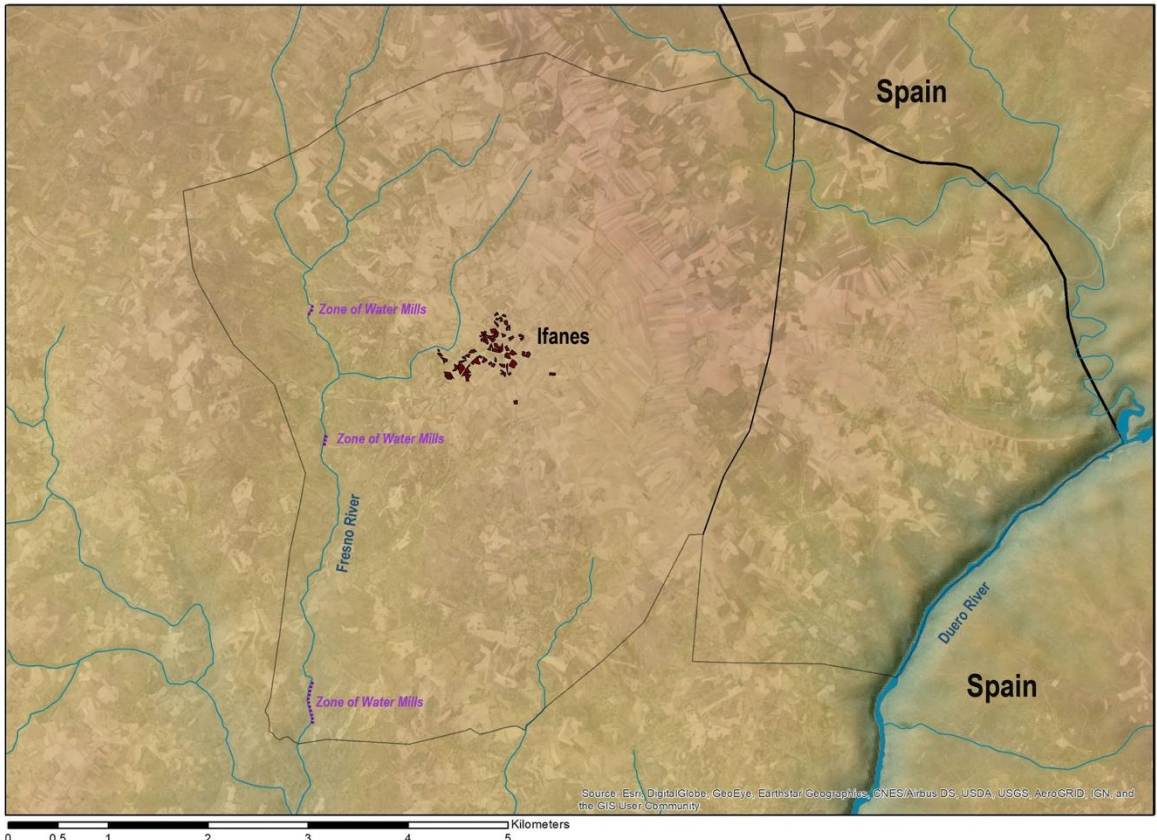


Fig. 5. Map of watermill zones in Ifanes Municipality



Fig. 5a. Ruined stone watermill in southwest Ifanes municipality

5.2. Spain case study: Villardiegua de la Ribera, Zamora

Villardiegua de la Ribera is a Spanish village in the *comarca* (county) of Sayago in the province of Zamora in the autonomous region of Castile and Leon. As of 2018 its permanent population is 126. Ten people were interviewed in the village, seven men and three women. Ages ranged from forty to ninety. All currently work part time in agropastoral activities or did so in their youth.

5.2.1. Toponyms

As discussed earlier, field-names are found with greater detail and accuracy in the cadaster official website. Interviews did yield, however, a place-name toponym of a settlement that existed in history and that does not appear on current maps in Villardiegua de la Ribera. The *Dehesa de Bozón* was mentioned by several informants as existing in the extreme southwest of the municipality overlapping with the border of the neighboring Torregamones municipality.

The frequency of Bozón as a field-name and its spelling variants (e.g. Bouza or Voza) is common in the northwest of the Iberian Peninsula and particularly in the transborder study area of this article. Its etymology variably refers to scrubland often community owned, of poor quality for cultivation but used instead for rough grazing (Krüger, 1950: 241; Riesco Chueca, 2018: 417). A variety of primary sources confirm this definition and land use designation in Villardiegua de la Ribera. The planimetric maps of the area in 1909 display it as an uncultivated woodland. From the aerial photo of the *Vuelo Americano* of 1956 it is clearly a woodland.⁷ Ground truthing in 2019 also confirmed the dense vegetation of much of the area.

The word *dehesa* has several meanings which apply to its description, use, and historical context. According to the Royal Spanish Academy dictionary of the Spanish

⁷ This information was retrieved from the Centro Nacional de Información Geográfica. <http://centrodedescargas.cnig.es/CentroDescargas/index.jsp> [Accessed 27/3/20]

language, a *dehesa* is “*tierra generalmente acotada y por lo comun destinada a pastos*” (generally bounded land used for pasturing). Fra Paleo defines it as “a cultural landscape; a savannah-like wood pasture that is the result of prolonged human action. It works as an extensive and integrated agrosilvopastoral system where agriculture, forestry and grazing are combined in a sustainable manner” (Fra Paleo, 2010: 152). Martín Viso puts the concept of *dehesa* into an historical context arising from the Middle Ages. He describes it as part of a “trilogy” of feudal settlement types, the *villa*, being the largest followed by the *aldea*, and finally the smallest, the *dehesa*. The *dehesa*, he states, was a grazing landscape inhabited by a few families that managed and raised cattle. Part of the feudalization of the landscape, the land was owned by a feudal lord and the families paid a rent to work the land (Martín Viso, 1996: 139). Some *dehesas* developed into minor communities with a small church or chapel. These *dehesas* date back to the twelfth and thirteenth centuries. By late Modern Period, these small settlements began to disappear as their populations declined. In the Modern Period, much of Castile and Leon suffered from a crisis of land use with the Spanish crown granting favoritism to powerful pasturing interests to exact rents (Garcia Sanz, 1985: 175). Increasing populations in Castile and Leon, desiring more agriculture, had their needs impeded and the *dehesas*, many now depopulated and open for occupation for agriculture, became dominated by the pasturing interests and Spanish nobility and crown to profit from the rents (Simpson, 1995: 64). The liberal reforms throughout the nineteenth century led to land confiscations (*desamortizaciones*) from the Catholic church and the Spanish nobility, which saw the demise of the early feudal based *dehesas*. With their confiscation in the nineteenth century, these now uninhabited lands were sold off to neighboring villages and incorporated into their municipalities. The sale of *dehesas* continued into the early twentieth century where they took on a new form of land use that became defined by the preexisting communal traditions

common in the Sayago region⁸ (fig. 6) (Sánchez Gomez, 1993: 57). Dating the *Dehesa de Bozón* place-name has been difficult as much information has been lost over time. It appears in historical documentation in the mid sixteenth century, the eighteenth century in the *Catastro del Marques de Ensenada (CME)*, shortly after in the 1760s, and in a land dispute in 1789 (Álvarez Vazquez, 1984; Faya Díaz, 1994; Timoteo y Monasterio, 1789).

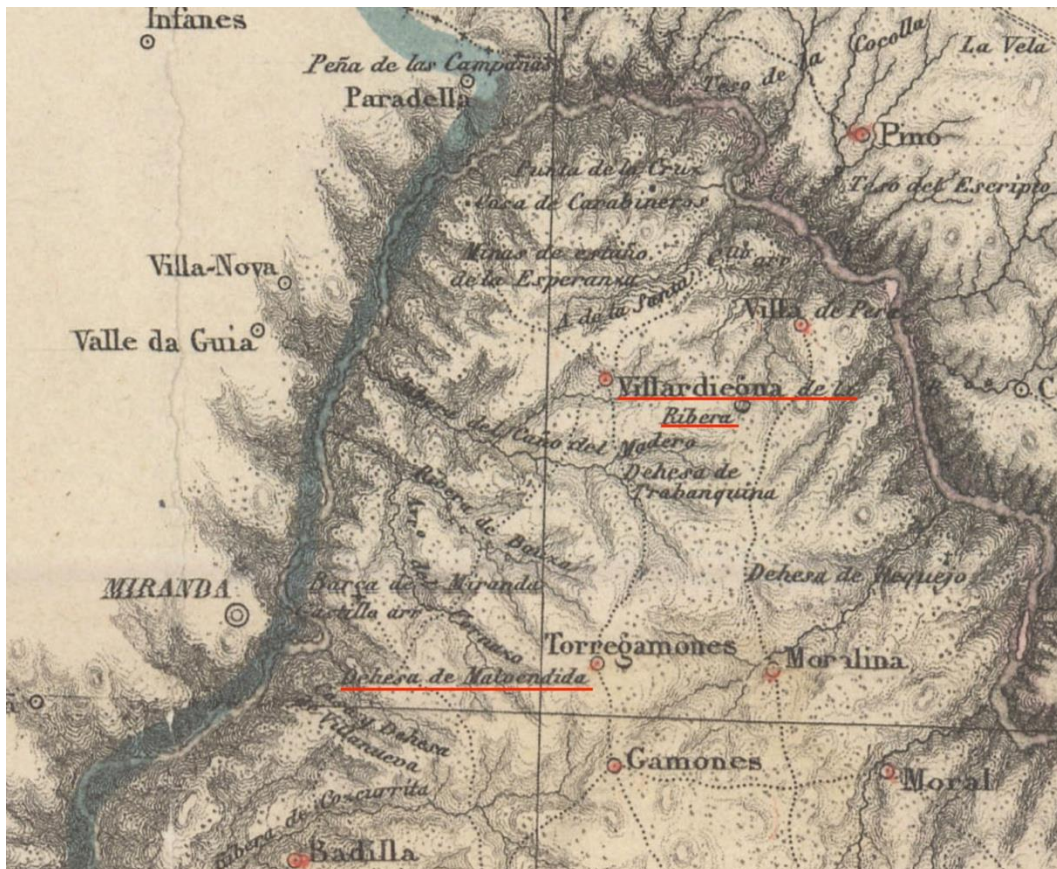


Fig. 6. Detail of 1863 map highlighting Villardiegua de la Ribera and the *Dehesa de Bozón* referred to as 'Malvendida'. Source: used with permission from the Instituto Geográfico Nacional, Madrid, <https://www.ign.es/web/catalogo-cartoteca/resources/html/001807.html> [Accessed 27/3/20].

Figures 7a, 7b, and 7c are screenshots that show the entries for three different settlements with a geographic reference to the *Despoblado de Bozón* in the CME.⁹ Highlighted in red are the mentions of the *Despoblado de Bozón* for each entry. In each entry a simple map was created to place the settlement in a geographic location in reference to nearby settlements and natural features such as the Duero river in this case. Using the CME

⁸ In the map of Madoz's 1863 work (fig. 6), in the geographic location where Bozón should be, the name *Dehesa Malvendida* is in its place. *Malvendida* is Spanish for something sold for a poor price. No entry for the dehesa is presented (Madoz, 1984).

⁹ Martín Viso describes *despoblados* as places that at one time had a sedentary population. In this part of northwestern Spain however, he states that it was found that from the eighteenth century, the term *despoblado* was used interchangeably with *dehesa* (Martín Viso, 1996: 142).

with its location of the settlement as a reference and combining it with the residents' testimonies, it was possible to map this lost settlement. Never before mapped, (fig. 8) shows the approximation of the location of El Bozón, using a polygon function in the GIS software, straddling the border based on the archival and ethnographic data available. Informants stated that the *despoblado* extended from “river bank to river bank”. They also specified which streams formed the northern, southern and eastern borders. The online official Spanish cadaster also provided several field-names with the name Bozón which provided further reference and confirmation.

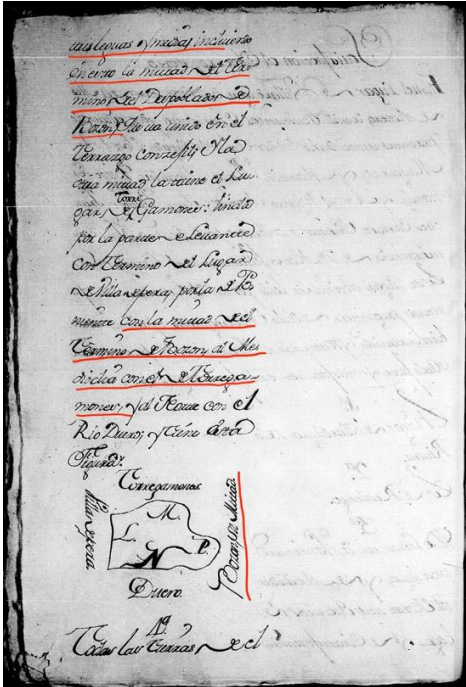


Fig. 7a. Entry for Villardiegua de la Ribera in the CME

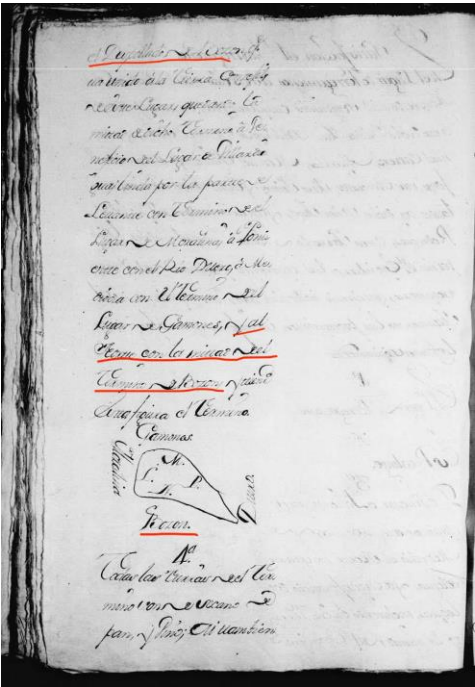


Fig. 7b. Entry for Torregamones in the CME

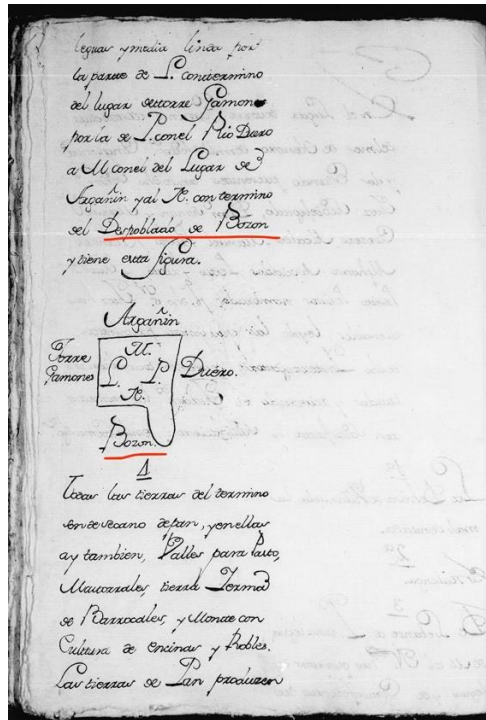


Fig. 7c. Entry for Dehesa de Villanueva de la Malsentada
 Source: used with permission from the Portal de Archivos Españoles, Catastro de Ensenada, <http://pares.mcu.es/Catastro/servlets/ServletController> [Accessed 27/3/20].

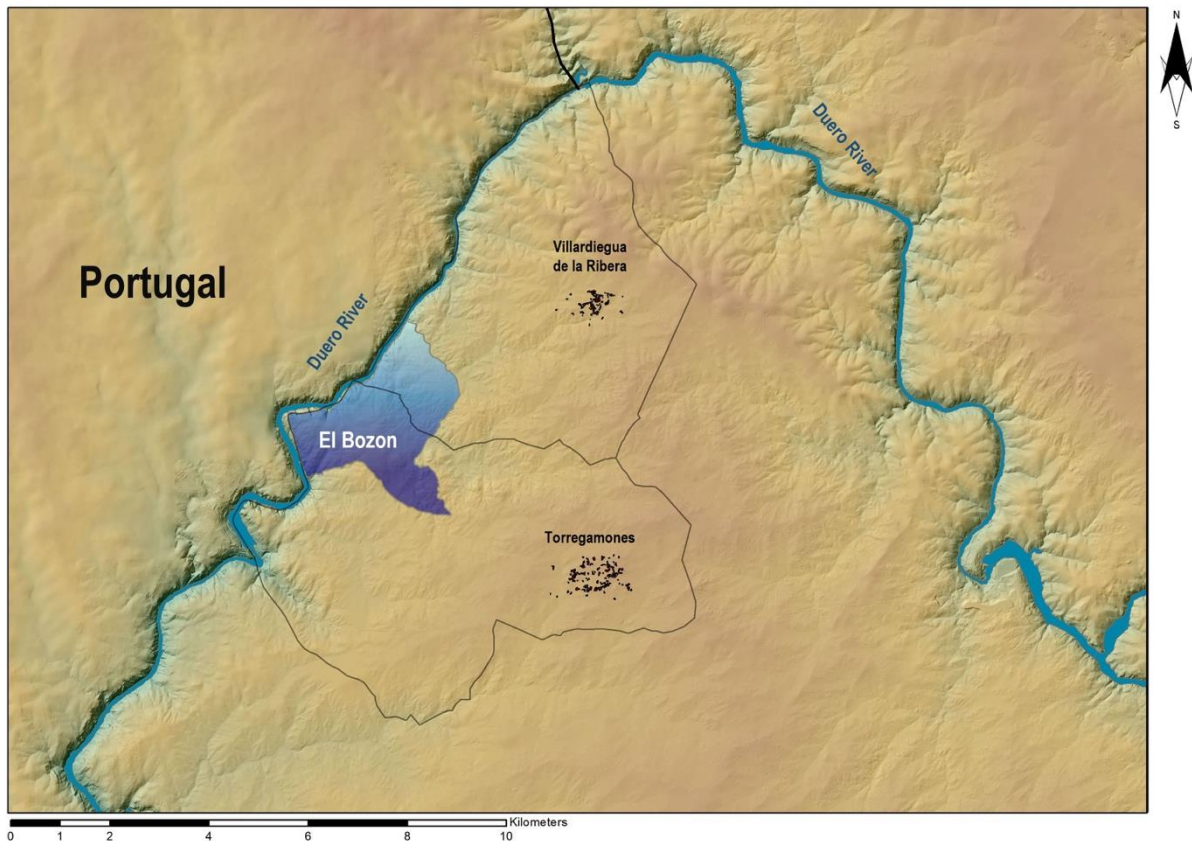


Fig. 8. The Desplazado de Bozón based on informant accounts and the Catastro del Marqués de la Ensenada

5.2.2 Dividing line of field rotation system

Informants explained that the *hoja* in Villardiegua de la Ribera was a system of quadrants. North and south quadrants were alternated for planting and pasturing between the east and west quadrants in (Fig. 9). Going clockwise in the municipality from the north each quadrant had a name based on a toponym from that region. Informants shared that the *hoja* fell out of use due to the loss of population in the 1990s. Figure 9 shows the *hoja* in Villardiegua de la Ribera.

Upon viewing figures 8 and 9, it is clear that the field rotation system in Villardiegua de la Ribera does not include the limits of the former Dehesa de Bozón. Informants from Villardiegua stated that this area was communal land. The crop rotation system bypass around the former *dehesa* and the etymology of the toponym Bozón as a communal land for rough pasturing would likely date the field rotation system to at least the Modern Period.¹⁰

¹⁰ A legal land dispute over the dehesa between Villardiegua and Torregamones in 1789 simply refers to the area of the dehesa separating the two municipalities as ‘ancient’ (Timoteo y Monasterio, 1789).

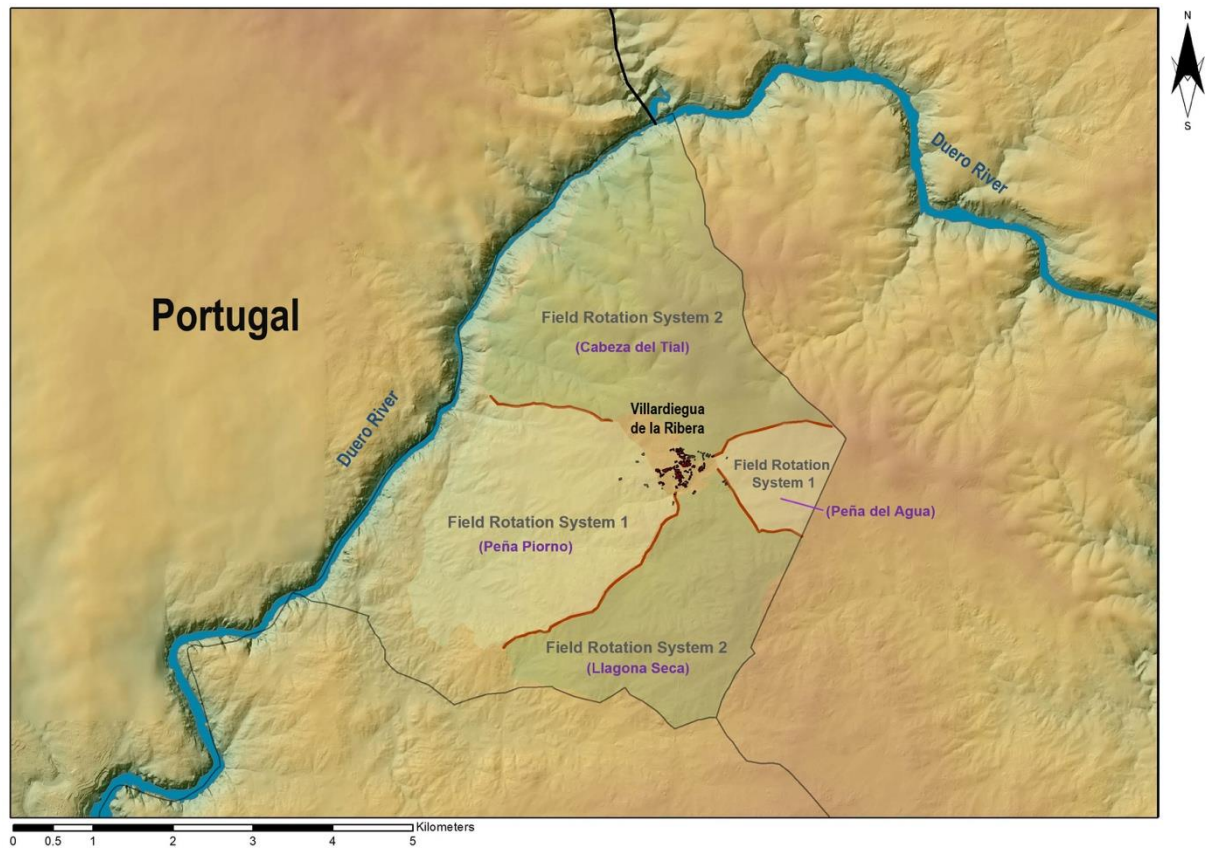


Fig. 9. Map of Villardiegua de la Ribera Municipality field rotation system. Local names of quadrants in parenthesis

5.2.3. Zone of watermills

The watermills in Villardiegua de la Ribera were the most numerous in all the villages of this study. The watermills, although not in use, are a source of pride and represent an important aspect of the historical patrimony of the village dating with certainty from the mid-eighteenth century. Some efforts have been made to restore some the mills for tourism which have fallen into ruin (Fig. 10). The *Catastro de Ensenada* mentions twenty-one watermills in the municipality. Informants in the village recalled eighteen in existence by their location and could name fourteen divided between two municipal streams. Figure 11 shows the location of the watermill zones and table 3 shows the comparison between the informants' testimony and the *Catastro de Ensenada*.



Fig. 10. Restored watermill in Ribera de Pontón in Villardiegua de la Ribera, Zamora Spain

<u>Informant Interviews</u> <u>2018</u>	<u>Catastro de Ensenada</u> <u>1754</u>	<u>Catastro de Ensenada</u> <u>1754</u>
Zone 1 Names of watermills in Ribera de Pontón remembered – From high ground to low ground	Names of watermills from the CME that match current names	Unreferenced watermills to informants' testimony
1. Sapo – Starting at the bridge.		1. Ponton
2. Margoza		2. Retanja de afuera
3. Farizo	El de Farizo	3. El de Diego
4. Location remembered but not name		4. El de Crespo
5. Calvo	El de Calbo	5. El de Vicente
6. Churenzo/Ramos		6. Sierra la Yeguas
7. Carrero	El de Carrero	7. El Franzes
8. Dos Mielgos (Twin watermills)	El Mielgo	8. El de los Belascos
9. Lluengo	Luengo	9. El de Benettos
10. Dolores		10. El [N]uevo*
		11. Retanja de adentro
Zone 2 Names of watermills remembered in Ribera de Abajo/Ribera de Muriegos – Near Peña Redonda		
1. Recatan	Recattan	
2. Tadeo		
3. Ciervo	Cierbo	
4. Ciervilla		

Table 3. Names of watermills from memory and those listed in the *Catastro del Marqués de la Ensenada* of 1754. Columns one and two compare the informants' information with the CME. The third column includes of the names of watermills that cannot be referenced to contemporary testimony. * Indicates an illegibility

Informants explained that there were three more watermills on the banks of the Duero river; these were lost due to the rising waters when one of the regional dams on the Duero was constructed in 1952. The *Catastro de Ensenada* states that there were five along the banks of the Duero.

The two zones of watermills from high ground to low ground are indicated in the map below (Fig. 11) with lines demonstrating the locations in the two streams.

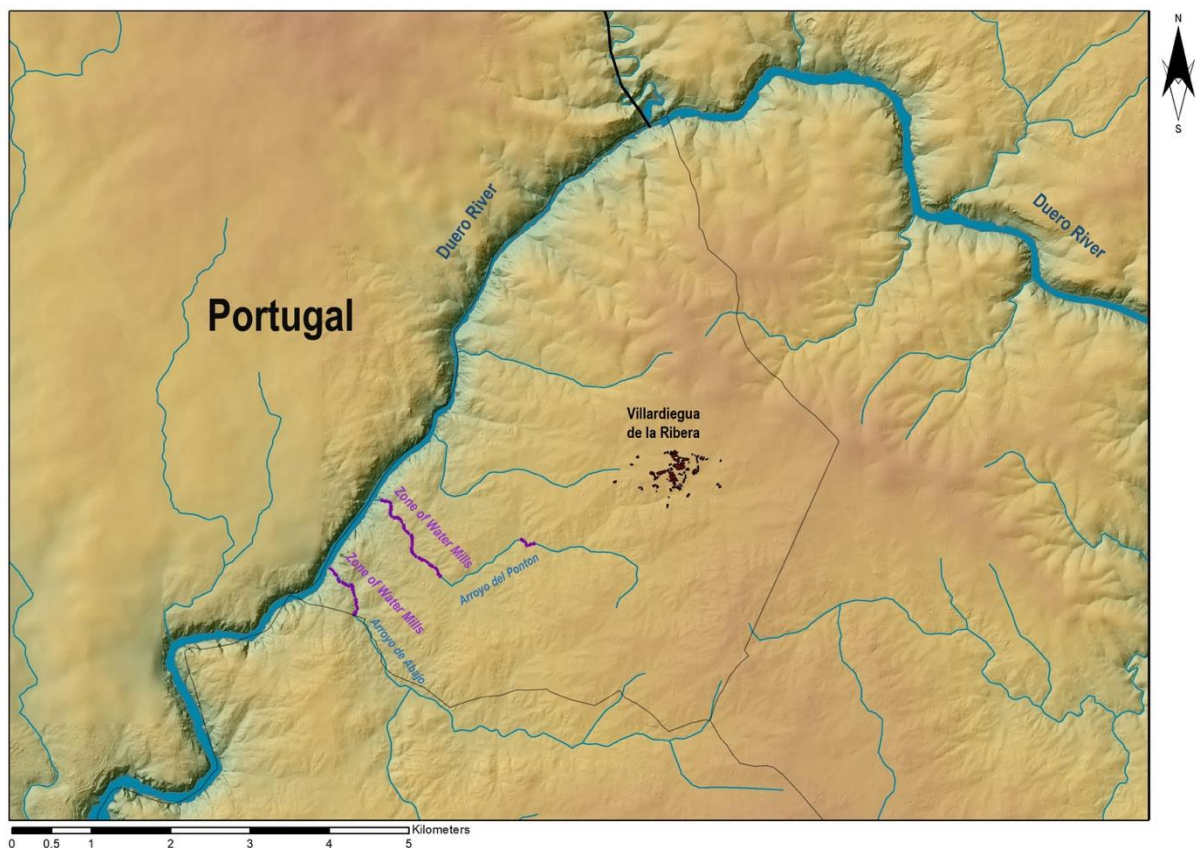


Fig. 11. Map of watermill zones for Villardiegua de la Ribera

6. Discussion

This study has taken a qualitative integrated approach to the acquisition of data for identifying, dating, and mapping of specific attributes on the cultural landscape of the Duero River borderland region. To provide a more bottom-up perspective to landscape characterization, both tangible and intangible aspects were considered based on initial perception studies and subsequent interviews of the communities in the two case studies. In both Spain and Portugal these cultural/historical aspects were: the disappearing management

of agropastoral lands through the use of the historic field rotation system, the fading memory of both field-name and place-name toponyms that have marked the development of the landscape, and the literal crumbling of numerous architectural examples of pre-industrial productivity, the watermills. Acquiring the data to make the maps required a combination of methods: stakeholder perception analysis for a general understanding of the landscape as well as developing trust with the communities followed by participatory mapping of Local Spatial Knowledge as part of a greater ongoing Historic Landscape Characterization project.

Starting with contemporary ethnographic perceptions of a landscape and finally joining these with the mapping of Local Spatial Knowledge unlocks previously little known or unknown aspects of a cultural landscape to the larger society and opens it to further research. This study utilized the integration of approaches to characterize a cultural landscape in the Iberian context recommended by Orejas (Orejas, 2008). Moreover, it demonstrated its relevance as a valuable ethnographic component to better inform an Historic Landscape Characterization project (Crow et al., 2011: 119).

7. Implications

This study, by having a clear strong ethnographic component, addresses a criticism of HLC in that it lacks a human focus from the ground up (Williamson, 2007: 71). Although not an HLC of the Duero River borderlands landscape, it incorporates contemporary human memory, Local Spatial Knowledge, which can complement an HLC project. It uses local knowledge in a GIS and is also participatory in that during the process of the map design from its initial stages to the generation of the final product, it consults with the original informants for verification and accuracy. Equally important, the results of this study bring to light and aggregate parts of the northwest Iberian Peninsula landscape history that while known by some in individual villages on both sides of the border, have not often been formally acknowledged beyond regional avenues. Researchers focusing on this region in Archaeology,

in Medieval Agrarian History, and in Landscape Architecture have commented on the paucity of research and attention given to this region (Lemos and Martins, 2012: 63; Martín Viso, 1996: 102; Prada Llorente, 2005: 5; Romero, 2015: 45).

8. Conclusion

The Arribes del Duero region is undoubtedly a singular region for not only its aesthetic natural beauty, but also for its centuries of human-environment interaction. This historic fragile landscape and ecosystem directly influenced and maintained by the human hand, is now under threat through its abandonment. While attempts have been made to protect and recognize its distinctiveness through the creation of international park zones and biosphere reserves, residents and specialists alike have recognized that the primary issue is not one of preservation, but of the decline in people and their grazing animals – the historic, local agropastoral system. The attributes analyzed in this study reflect the adaptation of the agropastoral system to the regional topography, the availability of water, and the soil conditions. Moreover, they are inseparable from the social aspects of the cultural landscape in terms of its use, access, management, and the community organization of agricultural labor.

As in many countries, frontiers, hinterlands, outbacks, backcountries, and often rural interior borderlands are undervalued when compared to the larger more cosmopolitan cities that offer greater economic opportunities. The U.S. concept of fly-over states is one such example of this type of derision. Casting more attention on the plight of these regions through more published research outside the local, regional, and even national public sphere is essential to addressing this cultural and ecological problem. In Spain and Portugal the abandonment of these lands has led to drastic environmental consequences with wildfires devastating numerous hectares of the landscape (Marques, 2018). Residents' knowledge of the historic use of landscape, which maintained an equilibrium, plays an essential role in understanding its development, its continued maintenance, and ultimately in creating a greater

appreciation and value for the landscape as a whole. The memory of the landscape is fading with its abandonment. An informant in Portugal, frustrated with the plight of his rural environment captured the sentiment, when he stated, “*Everything here is disappearing - animals, plants [due to the wildfires], and even the people.*” Research like this, underscoring and acknowledging the unique historic dimension of the use of the Duero River landscape can empower the stakeholders through a reawakening of their regional distinctiveness.

Communities could benefit and recognize value in this landscape heritage analysis by: 1) using the maps, toponyms, photographs, and coordinates of the watermills provided to promote tourism in the construction of interpretive hiking trails¹¹, and 2) upon receipt of the maps of toponyms and field rotation systems and database with GPS coordinates, residents and local and regional authorities will be able to use them as a tool for planning, education, and preservation of the disappearing knowledge of these tangible and intangible attributes of the landscape. For the present and future, the traditional knowledge of maintaining this landscape, in some form, will be crucial for preserving the environmental and cultural integrity of the Duero River borderlands.

Acknowledgements

The research for this project was undertaken with assistance and funding from the research project titled, *Paisajes Rurales Antiguos del Noroeste Peninsular: Formas de Dominación Romana y Explotación de Recursos*, CORUS (HAR2015-64632-P; MINECO/FEDER) of the Social Structure and Territory Landscape Archaeology (EST-AP) group of the Spanish National Research Council Center for History and Social Sciences (CSIC-CCHS) in Madrid, Spain and a pre doctoral fellowship award from Universidad Pública de Navarra with the Institute for Advanced Social Research (I-COMMUNITAS). I am grateful for the interest and

¹¹ Precedents have already been established in villages nearby such as Aldeia Nova, Portugal, and Badilla and Pino del Oro, Spain where attributes of the historic/archaeological landscape have been promoted by the local authorities to generate tourism revenue (Sánchez-Palencia et al., 2010: 53-58).

invaluable support from my doctoral supervisors Dr. Almudena Orejas of the Spanish National Research Council and Dr. Eloísa Ramirez of the Universidad Pública de Navarra. I also wish to thank Dr. Javier Sánchez Palencia, Dr. Inés Sastre, and Dr. Damian Romero also of the Spanish National Research Council. In Portugal, I would like to thank Monica Salgado of the Câmara Municipal of Miranda do Douro for her valuable technical support in the field. Special thanks go to Iñaki Martín Viso, Esther Prada Llorente, Brais Currás, and J.L. Pecharromán for their technical advice throughout this study. Special thanks also go to Karen Elliott for the careful editing of this manuscript. Finally, I wish to express my warmest gratitude to the residents of Ifanes, Portugal and Villardiegua de la Ribera, Spain for opening their doors and sharing their knowledge.

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Author Statement

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.