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Toponyms related to plants in transitional vegetation areas: How diversity is conveyed by place-names

1. Introduction

In this study we select a set of territorial cases as empirical examples of areas in which vegetation ecotones are reflected in place-names. More particularly, we include references to spatially close plant covers that otherwise occupy separate biogeographic zones or different bioclimatic and altitudinal levels. Such occurrences are not uncommon in transitional regions, as exemplified here by many territorial zones of the Iberian Peninsula. Our contribution focuses on single vegetation types as alluded to by place-names, rather than whole ecosystems or landscapes, and on types which furthermore require a more in-depth analysis to determine whether toponymic references are direct or indirect.

We adopt a case-study approach in order to show the relevance of the use of place-names as preliminary indicators for the 'reading' of landscapes using toponymic-referenced maps, prior to field surveys or image photointerpretation focused specifically on the vegetation cover. In short, it is our contention that place-names may provide an understanding of shifts in plant cover in specific geographical contexts at different scales.

2. Transitional vegetation areas: ecotones

The classical definition – one that is already 'old' in Ecology – states that an *ecotone* (from the Greek roots *oikos* 'home' and *tonus* 'tension') is a zone of transition, an edge environment, between two or more distinct adjacent ecological units that meet and integrate. Diverse forest and shrub communities, belonging to different bioclimatic levels or allocated to distinct potential physiognomic types, grow in narrow fringes or occur together in a given area. Moreover, ecotones may commonly involve biodiversity hotspots due to the concurrence of elements. Ecotones are essentially dynamic. They behave as filters and their permeability – related to the degree of contrast – depends on the characteristics of the systems present and the type of boundary, which can facilitate, hinder or be neutral for the flows of species, genes, water, nutrients, energy or disturbances. The mortality rate may increase for some species while, at the same time, pioneer recruitment may also be higher. Plant communities and taxa that occur in ecotones may not be the only ones on both sides, we

are also likely to find other highly adaptable, communities able to colonize transitional zones (especially, if we are contemplate them at the large scale).

Depending on the scale, different units may be blended or be in spatial contact, such as biomes, landscapes, ecosystems, habitats (that is, plant communities) or botanical taxa. Since the definitions first outlined by LIVINGSTON (1903) – "stress lines connecting points of accumulated or abrupt change" – and CLEMENTS (1905), who viewed ecotones as abrupt lines between two systems, the concept of the ecotone has evolved: "zones of tension between biogeographical regions" (CURTIS–MCINTOSH 1951) or "broader landscape elements with more dynamic, somewhat unstable characteristics" as defined by VAN DE MAAREL (1990), who also argues that there should be a distinction between *ecoclines* (zones with higher species richness) and *ecotones* in the strict sense (zones with similar or lesser species richness). This argument is also supported by more recent research (LLOYD et al. 2000, WALKER et al. 2003, SENFT 2009).

Boundaries and zones of intergradation may be very sharp, abrupt or contrasted, derived from drastic changes in environmental conditions *(limes convergens)* (MARGALEF 1974, TERRADAS 2001). Or, in contrast, they may show a gradually blended interface area *(limes divergens),* where the superior competitors spread out as far as they are able to. Also, they may be narrow or wide, local or regional, depending on the scale. Traditionally, the study of ecotones has been developed at three somewhat different scales: local edges, mountain timberlines and at wider scales (regional, continental).

The type of ecotone, therefore, is dependent on multiple factors: be they current or historical, natural or derived from human action.

Ecotone research has increased greatly since the 1980s, resulting in a variety of scientific studies. The delineation and interpretation of ecotones have emerged as core tasks in some approaches to Ecology. But, as far as the transversal concept of landscapes is concerned, each related discipline provides its own relevant information. The starting point for this study is the consideration of ecotones as areas in which geobotanical research, supported by place-name indicators can make a noteworthy contribution to a more comprehensive understanding of complex, multifunctional landscapes as defined by NAVEH (2001). In this context, place-names belong to our *noospheric* knowledge and there is a need for primary approaches to identify indicators of ecotonal situations.

Additionally, in these transitional belts, the Onomastic Sciences can furnish highly valuable information, either about morphosyntactic traits or, more particularly, about the lexicon and semantics (local common names of botanical species or plant communities and their possible meanings). Moreover, place-names may indicate the spatial location where certain taxa become rare at the

local or regional scale, regardless of just how extensive they are in adjacent territories: the basilar performance of the 'edge effects'.

Boundaries attract even greater interest if they are also transition areas for language traits (dialectal transitions). In this regard, it is not uncommon, especially in mountain landscapes of complex relief, to find that geographic barriers have historically become local limits for the spread of language varieties at a distinct level, as the case studies below illustrate.

3. Biogeographic regions and mountain ranges as ecotonal zones and even language boundaries: the case of Spain

As discussed above, the variety of plant species or communities can be quite remarkable in mountain ranges compared to that found in the surrounding landscapes. On the Iberian Peninsula, especially within Spanish territory, we witness the meeting of two great biogeographic regions: the Eurosiberian/ Euroatlantic and the Mediterranean (Figure 1). The line across the northernmost quarter of this map of Spain represents the boundary between the two regions. The Pyrenees Range, although primarily Alpine –linked to the European central massifs – is usually included within the Euroatlantic region since their dominant plant species are similar to a large degree.

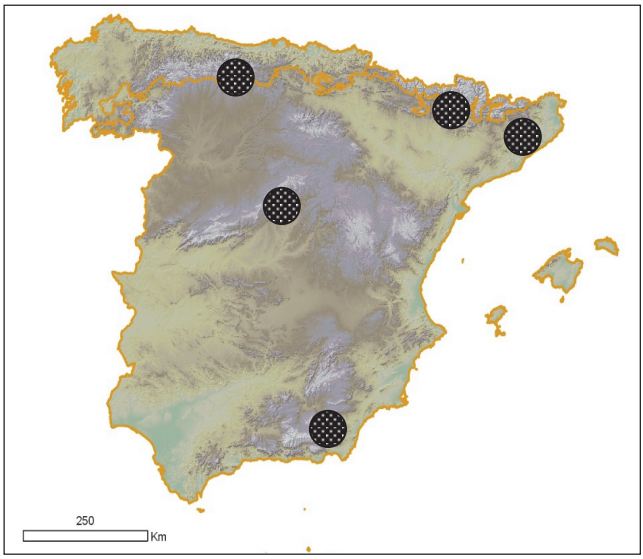

Figure 1: Spanish territory (without the Canary Islands) and the approximate division line between the main biogeographical regions: Euroatlantic (north) and Mediterranean (south). Circles represent the approximate locations of the five areas studied
(Source: Own mapping based on RIVAS-MARTÍNEZ 1987 and the Digital Elevation Model; www.cnig.es)

Nevertheless, the boundary is not entirely clear and, apart from local controversies concerning its real limits, there is, in fact, a wide/narrow strip (depending on the scale) where a transition is evident when we compare the composition of the plant covers and the different patches in the landscape mosaic. Slight differences in altitude, gradient and, most significantly, in aspect (shady-sunny hillslopes) can result in the occurrence of highly diverse plant communities. A further notable feature on the Peninsula is provided by the mountain massifs in southernmost Spain, with the coexistence of Euroatlantic and Mediterranean (including transitional or Submediterranean) ecosystems. This is made manifest by a wide range of introgression categories, ranging from constricted plant populations to widespread types of blended plant covers.

Mountain belts are quite typically often related to language current or historical domains, as shown in the map in Figure 2.

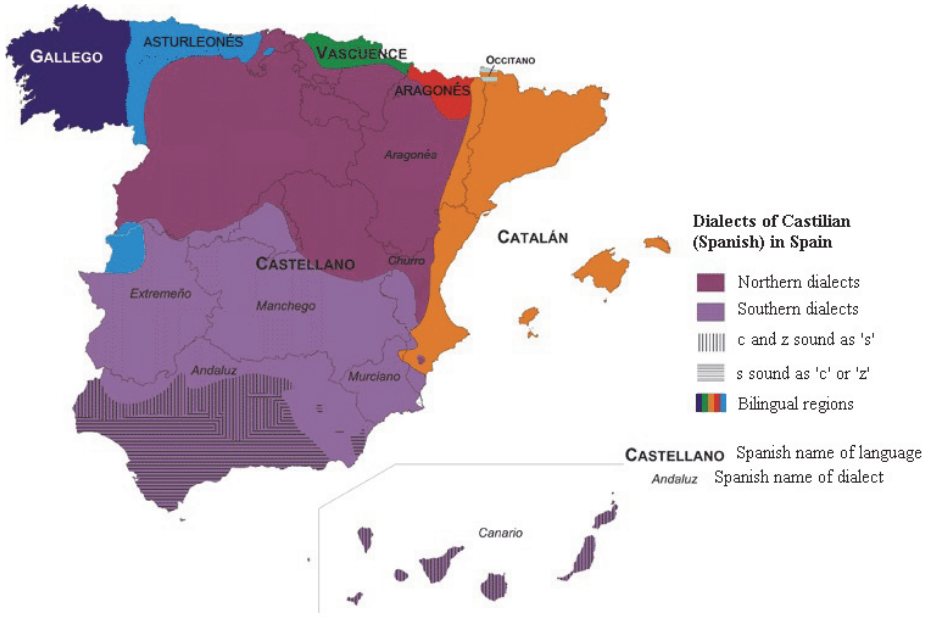

Figure 2: Spanish territory and the current geographic distribution of languages and dialects
(Source: Martorell 2006 based on García Mouton 1994)

The scale is a crucial factor for evaluating transitional or ecotonal indicators in place-names, determining, if the contrasts are noteworthy and, above all, if they can be considered local or regional. Likewise, scale in place-name mapping may be a relevant trait for the location and extension of such a site, along with such features as distribution, frequency and density. Moreover, the

scale conditions the type of place-name (be it urban or rural) recorded on maps, taking into account dialectal considerations (often, with highly blurred limits).

4. Case studies in the Iberian Peninsula

For our case study, and for an initial reflection, which seeks to identify regularities in ecotonal hotspots where the edge effect is at its highest expression, we have selected five areas that correspond to mountain ranges in the Iberian Peninsula, as illustrated in the map included here as Figure 1.

Our data bases and maps are derived from the Iberpix viewer made available by the *Instituto Geográfico Nacional* (Spain) at http://www.ign.es/iberpix2/ visor/. We have implemented consecutive use of different zooms to identify the most diverse toponymy (at a scale of 1 : 25,000).

4.1. Montseny

Montseny is a mountain massif integrated in the Catalan Pre-coastal Range, lying in the province of Barcelona, in Catalonia. In some of its traits, it represents a marginal area of the adjacent, albeit somewhat distant, Pyrenean Range. In fact, it presents conifer forests of silver fir *(Abies alba),* representing the southernmost samples in the Iberian peninsula. The unique and dominant language of its toponymy is Catalan. From the point of view of potential vegetation types, the Montseny represents a convergence core of occurring ecosystems based on conifer forests, deciduous and semideciduous forests, along with even sclerophyll vegetation in what is quite a small area (Ruiz de la Torre 1990–1998).

The place-names selected are highlighted and located in Figure 3: to the west, *Fageda Gran, Passavets* and *Els Ginebrons;* in the central-eastern section, *Auleda Gran.*

Fageda refers to the presence of *Fagus sylvatica,* the collective name for the catalan phytonym *faig* being *fageda.* The beech is one of the best exponents of the Eurosiberian vegetation type, requiring as it does a wet climate, or at least a high degree of relative humidity. *Font de Passavets* bears the Catalan name of the silver fir, 'avet', a species similarly associated with a wet climate and mountain areas. Both place-names could be taken as indicators of exceptional or even unique forests in the surrounding regional area (excluding the neighbouring Pyrenees) and, above all, the *Abies alba* forests, so that their presence can be explained in terms of the exceptionality principle (Tort-Donada 2010).

In the nearby area, the disappearance of most of the mature forest has led to the development of shrubland communities, such as *Juniperuscommunis (ginebre),*

as alluded to by the place-name *Pla dels Ginebrons.* Today, however, the site is almost totally covered by forests.

The biodiversity and the richness of the Montseny ecotone are highlighted by neighbouring toponyms: at a distance of just 4.5 km, we find *Auleda Gran,* indicative of the presence of a more Mediterranean forest of *Quercus ilex ilex,* a collective stand of which is known in Catalan as an *aulet* or *auleda.* The scale factor also has to be taken into account here, since, at the local level, beech forests may be considered common.

The toponym allows us to delimit the area in relation to the dominant species, while considering the other interstitial plant communities as mixed components, secondary or ancillary species or simply inclusions or introgressions in a mapped polygon of current vegetation, and especially for its potential, or historical, vegetation. Logically, image interpretation is always essential, but toponymy turns out to aid in this task.

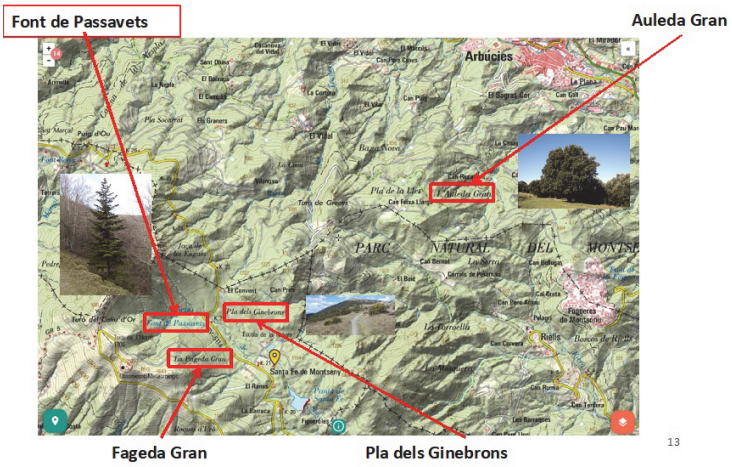

Figure 3: Some place names related to vegetational traits at the Montseny Massif (Barcelona, Catalonia, Spain) and their mutual spatial proximity showing ecotonal transition between eurosiberian and mediterranean elements
(Source: MTN = Mapa Topográfico National de Espana / National Topographic Map of Spain at scale 1:25.000)

4.2. Pre-Pyrenean range

The area surveyed belongs to the pre-Pyrenean range, lying primarily in the province of Huesca (Aragón), although we discuss other place-names in the adjacent province of Lleida (Catalonia). The pre-Pyrenean range constitutes a lower mountain range parallel to the main Pyrenees, but it also presents highly complex structural characteristics. The territory is located in a transitional fringe

between two floristic domains: the Euroatlantic and the Mediterranean, so that it includes alternating, and blended vegetation covers in a highly broken mosaic pattern. Its climate is Submediterranean, even Mediterranean on its sunny hillslopes, where summer dryness is more acute due to evapotranspiration.The dominant language in the toponymy is western Catalan with a strong influence of Castilian/Aragonese. From the point of view of potential vegetation types, Submediterranean semideciduous forests are dominant in the area, along with their substitution communities in which maturity is not achieved. This means that the main arboreal vegetation consists of oak forests *(Quercus faginea, Q. humilis),* although the occurrence of the evergreen oak *(Quercus ilex ballota)* is also very common. This can, therefore, be interpreted as a very gradual ecotone, which has adapted to the small differences in physiographic aspect.

Two nearby place-names show this concurrence: *Lo Coscollar* and *Rouredes de Sas. Coscolla* refers to *Quercus ilex* while *roure* is the Catalan name for deciduous *Quercus.* Another interesting occurrence is the nearby presence of two names that refer to the same plant cover: *roure* (Catalan) and *cajigo/quejigo* (Castilian) lie just 7 km from each other.

Two other place-names refer to structural traits of vegetation communities: *bosc* and *selva* allude to original arboreous, dense and comparatively large forests (Figure 4). A high density of trees can be considered the main characteristic of these locations, making it a significant feature. It should be borne in mind that *bosc* is a frequently occurring name, particularly for *Quercus ilex.*

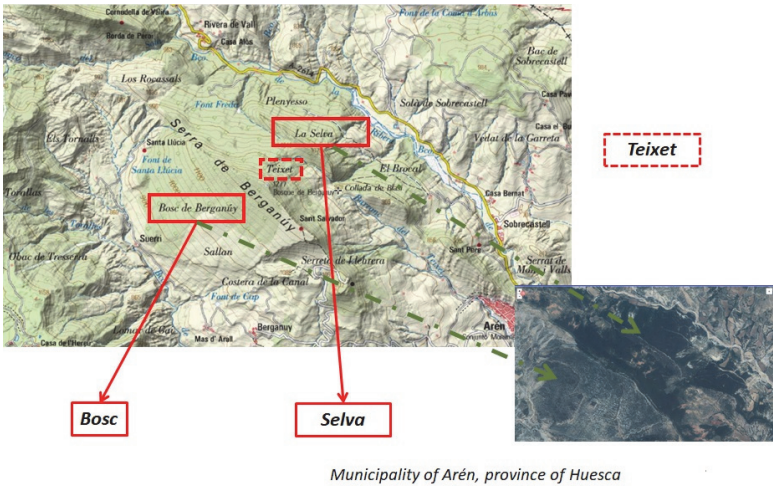

Figure 4: Examples of place names related to vegetation units. Sierra de Berganuy (Arén/Areny, Huesca, Aragón, Spain). Ecotonal contact between submediterranean and subsclerophyll forests and sites of remnant taxa (Source: MTN = Mapa Topográfico National de Espana / National Topographic Map of Spain at scale 1:25.000)

In contrast, we find a singular place-name referring to a mountain peak: *Teixet.* This alludes to *Taxus baccata* (cat. *Teix,* yew), a tree that today is in regression, hidden away in inaccessible sites and commonly represented by scattered or unique examples. The diminutive suffix *-et* indicates the occurrence of what was probably a temporarily small tree. Toponyms can be an eloquent way of conveying the degree of gregariousness and, therefore, the diversity of patterns of plant species and their insertion in the landscape.

Eighteen kilometres from the municipality of Arén in the north-northeast, another interesting place-name and indicator of ecotonal site can be found: *La Faiada de Malpàs*. This refers to a deciduous forest of *Fagus sylvatica,* associated with a wet local climate on a site located on shady hillslopes, representing a medium-scale exception within the whole.

4.3. The southern slopes of the Cantabrian Range

The area surveyed belongs to the Cantabrian Range, in the provinces of Palencia and Burgos (Castilla y León region). The southern slopes of this large range adjoin the Duero basin and present an outstanding ecotonal transition from the highest altitudes, that is, from its northernmost strip, due to the south facing aspect of the hillslopes. The floristic domain is mostly Eurosiberian/Euroatlantic passing to wet Submediterranean in what is a very narrow transition. The dominant language of the toponymy is northern Castilian. The local *comarcas* (district or supramunicipial areas) studied are La Pernía-Alto Carrión (Palencia) and Merindades (Burgos). From the point of view of potential vegetation types, Euroatlantic and Submediterranean deciduous forests are dominant in the area. There is a direct transition from these two types and the shrublands and grasslands of the high mountain vegetation, above the timberline.

Only in a few small and scarce sites do we find natural, spontaneous samples of pine forests, which would have been more extensive in early periods before gradually disappearing in the late Holocene and, over the last 5,000 years, as a result of the management of pastures by human populations. Hence, the occurrence of place-names related to ‘pine’ *(Pineda, Valdepino)* (Figure 5) is noteworthy. Although the hypothesis that the reference might be to ‘pino’, an adjective meaning ‘steep slope’, should not be rejected, the reference to *Pinus sylvestris* is more likely, taking into account that one of the Cantabrian relic pine forests is located 24 km far away, in Velilla de Río Carrión. As such, this could be evidence of a historical ecotonal shift within the Cantabrian mountains.

A further example of an ecotone indicated by place-names lies in Las Merindades (Burgos). Three toponyms concentrate in a small area between the municipalities of Soncillo and San Martín de las Ollas (Figure 6). *Argomedo,* collective phytonym derived from ‘árgoma’ (uncertain origin), may refer to

any gorse species of the *Fabaceae* family, but only to those occurring in wet or sub-wet climate regions, such as the tree alluded to in *El Rebollar, Quercus pyrenaica.* However, close to *Argomedo,* the place-name *El Encinar* is an evident indicator of a stand of *Quercus ilex,* a much more typical Mediterranean species.

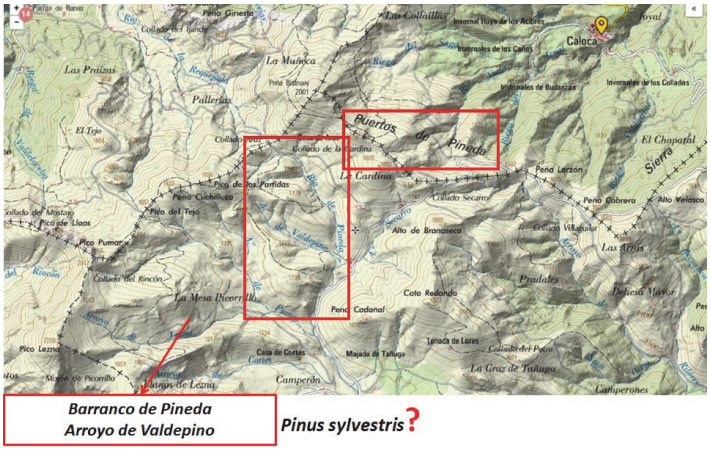

Figure 5: Past occurence of needleleaved forests within current prevailing deciduous forests domain in some sites in de Cantabrian Range (northern Spain) (Source: MTN = Mapa Topográfico National de Espana / National Topographic Map of Spain at scale 1:25.000)

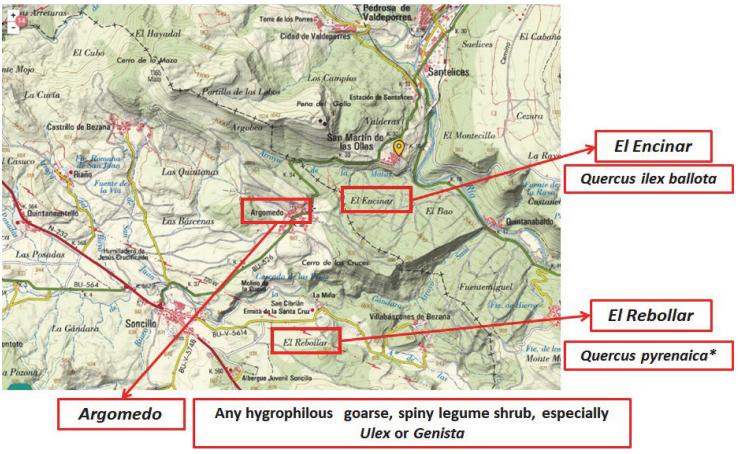

Figure 6: Some place names related to transitional physiognomies between sclerophyll and subsclerophyll (=submediterranean) forests, along with allusions to shrub communities linked to the euroatlantic floristic elements (Source: MTN = Mapa Topográfico National de Espana / National Topographic Map of Spain at scale 1:25.000)

4.4. The Central System

In an area surrounding the municipality of Riaza (province of Segovia), we find one of the scarce beech forests *(Fagus sylvatica)* of the Central System of the Iberian Peninsula. The area concentrates the principal traits of this mountain range: continentality, due to its location, a mountain climate and an ecological transition of its potential arboreal vegetation (excluding the highest levels). At the sites surveyed, we find samples of marginal, interstitial deciduous Euroatlantic forests, particularly of *Fagus sylvatica,* mixed with Submediterranean sub-wet communities, along with *matrix* pine forest of *Pinus sylvestris,* especially common in this eastern half of the Central System.

The place-names selected in the surveyed area are transparent in meaning (Figure 7): *El Pinarejo:* a diminutive collective phytonym of *Pinus sylvestris; Siete Robles:* a plural phytonym, *"seven oaks"; El Avellano:* a singular toponym alluding to the presence of an individual of *Corylus avellana,* a subarboreal species occurring mostly in Euroatlantic forests; *Hayedo de Riofrío de Riaza:* a place-name alluding to a collective unit of vegetation *(symphytotoponym)*.

The main feature of all these place-names, taken as a whole, is their proximity to one another in a relatively small area. Another feature that stands out is the mixture of conifer, broadleaved deciduous and semideciduous forests and their potentiality if the climate conditions remain as they are.

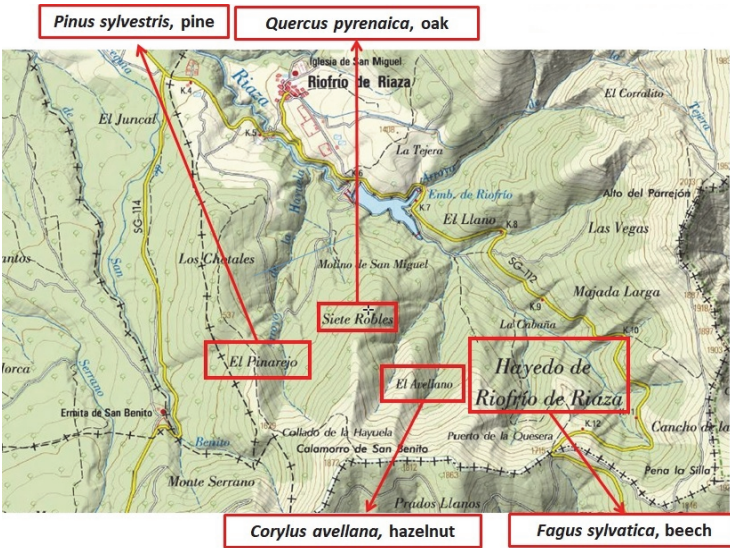

Figure 7: Remnant mesophile deciduous forests in the eastern Central Range (Spain) and several vegetational place names alluding to some typical species of transitional areas
(Source: MTN = Mapa Topográfico National de Espana / National Topographic Map of Spain at scale 1:25.000)

4.5. East of Sierra Nevada

Finally, heading south, the highest peaks of the Iberian Peninsula are found in the Penibaetic range. The area surveyed corresponds to the eastern massifs, principally the Sierra de los Filabres, in the foothills of Sierra Nevada. The vegetation of the Sierra de los Filabres presents marked contrasts at the medium-large scale. From the Submediterranean vegetation of the highest altitudes, there is a spatial succession of plant cover types of primarily xerophilic species, with a dominant level corresponding to a typical potential Mediterranean vegetation type: sclerophyll.

At the small scale, there are few place-names related to the transitional vegetation. *Carrasca* and *Carrascalillo* point to the presence of *Quercus ilex ballota,* the evergreen oak, known in other regions as *encina,* while *Piedra de los Castaños* refers to the *Castanea sativa,* the deciduous, broadleaved chestnut (Figure 8). *Carrasca* is the dominant phytonym for the abundant Quercus ilex in the eastern half of the Iberian Peninsula, including Aragon, part of Castile, Valencia, La Mancha, Murcia and Eastern Andalusia.

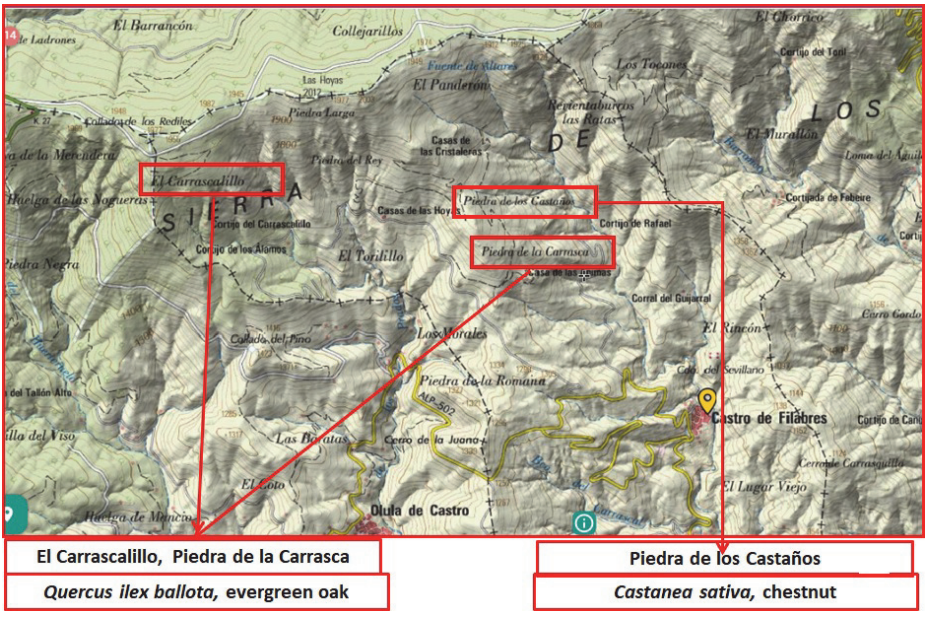

Figure 8: Toponyms in Sierra de Filabres (Eastern Andalusia, Spain), representing collective names of two plant species characteristic of two physiognomic types of vegetation: evergreen and deciduous-submediterranean. The sector of the images is located very close to semiarid and arid areas (Desierto de Tabernas, province of Almería), hence being a sharp transition at larger scales (Source: MTN = Mapa Topográfico National de Espana / National Topographic Map of Spain at scale 1:25.000)

The Desierto de Tabernas lies less than 20 km from the aforementioned toponyms. This ecotone is perhaps one of the most striking and most abrupt transition areas in the whole of Spain, at least from the point of view of its vegetation structure: forests (scarce or open), at one extreme, and an almost total lack of vegetation, at the other, corresponding to hyper-xerophilic landscapes.

5. Concluding remarks

1. Ecotones are areas of biodiversity, across which the complexity of vegetation cover may increase. Place-names related to the vegetation cover in such enclaves tend to be transparent (this is, the names can be interpreted in their proper sense). However, in many cases a consideration of the exceptionality principle might be relevant, in particular, to gain a better understanding of the biogeographical changes in these places over long periods of time.

2. In mountainous countries, especially in areas of transition, where altitude, slope and aspect determine variations in the landscape units, the toponymy can reveal interesting information about the distribution and features of vegetation and the importance of the plant cover based on the local inhabitants' perceptions over time.

3. Here, we selected a number of areas with these characteristics in the Iberian Peninsula (Spain) to illustrate how links between natural and cultural landscapes are forged and how place-names are subsequently coined. The areas selected and surveyed present their ecotonal features due to their boundary strip locations and also as a result of diverse circumstances related to the history of their management.

4. Above all, the 'scale factor' appears to be highly relevant in being able to interpret the toponymy of these areas correctly.

5. As primary indicators, toponyms may provide useful tools for locating and understanding current plant covers in transitional areas, and for determining whether the boundaries are sharp *(limes divergens)* or gradual *(limes convergens)*. This has an immediate application in vegetation mapping when the whole territory cannot be surveyed *in situ* and singularities, introgressions, etc. have to be accounted for.

6. A specific application of toponyms in vegetation mapping may be their delimitation of potential or historical areas of distribution. Analysing old locations, enclaves that have survived or disappeared, may reveal important features.

7. The core of the rural toponymy in an ecotone can be delimited by gathering place-names. In this regard, the greater the density of toponyms available, the

more accurate the analysis can be. Cadastral place-names, where present, can serve as an excellent source.

Acknowledgments

Sincere thanks are due to Iain Kenneth Robinson for his linguistic assistance. This paper has been prepared as part of the Research Project CSO2015-65787-C6-4-P, supported by the Ministerio de Economía y Competitividad, Government of Spain (MINECO/FEDER, UE), and within the research group GRAM (Grup de Recerca Ambiental Mediterrània), supported by the Generalitat de Catalunya (2017SGR1344).

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Abstract

Ecotones are areas of biodiversity, across which the complexity of vegetation cover may increase. Diverse forest and shrub communities, belonging to different bioclimatic levels or potential physiognomic types, grow in narrow fringes or meet and integrate in a given area. Place-naming related to the vegetation covering such enclaves tends to be strongly influenced by the toponymic principles of significativeness and exceptionality at a very small scale, although these principles may eventually become blurred. In mountainous countries, especially transition areas, in which altitude, slope and aspect determine variations in the landscape units, the toponymy can reveal interesting information about the distribution of the vegetation and the importance of the plant covers based on the local inhabitants' perceptions over time. We select a number of areas with these characteristics in the Iberian peninsula (Spain) to illustrate how links between natural and cultural landscapes are forged and how place-names are subsequently coined. We examine specifically the Montseny in Catalonia, some comarcas of the pre-Pyrenees, the northern province of Burgos, the southern slopes of the Cantabrian range in the province of Palencia, the sierras of the Central System and the ecotone formed by the deserts and adjacent mountains in Eastern Sierra Nevada. Above all, the 'scale factor' appears to be a highly relevant determinant of the toponymy of these areas.

Keywords: place-names and vegetation, natural and cultural landscapes, Iberian peninsula