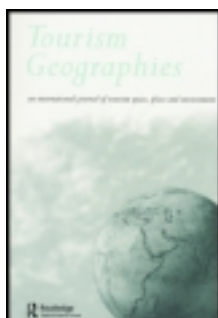


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Tourism Geographies: An International Journal of Tourism Space, Place and Environment

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rtxg20>

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Published online: 01 Nov 2013.

To cite this article: Dani Blasco, Jaume Guia & Lluís Prats , Tourism Geographies (2013): Tourism destination zoning in mountain regions: a consumer-based approach, Tourism Geographies: An International Journal of Tourism Space, Place and Environment, DOI: 10.1080/14616688.2013.851267

To link to this article: <http://dx.doi.org/10.1080/14616688.2013.851267>

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Tourism destination zoning in mountain regions: a consumer-based approach

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(Received 15 July 2012; accepted 7 January 2013)

This paper puts into question the conventional way of delineating tourism destination borders in terms of taken-for-granted administrative boundaries. Despite the fact that the literature on destination boundaries advocates for conceptual frameworks where customers' consumption patterns play a more fundamental role, instances of actual attempts of structuring tourism geographies into 'new tourism areas' are scant, and instances of zoning on the basis of visitors' consumption patterns are absent. A method for identifying alternative and more effective consumption-based tourism zones that combines geographical information system and hierarchical cluster analysis techniques, and that relies on time distances between attractions, is thus proposed, and implemented in the case of the Pyrenees mountain region. As a result the region is restructured into nine new tourism zones, which, compared to the original destinations, are more uniform in size and have a higher correlation index between attractiveness and accommodation intensity; they also have different levels of cross-border intensity and are very similar to historical regions; and the more they differ from the original destinations the higher their attractiveness, which supports the effectiveness of the new zoning technique. Four types of tourism zones ranging from higher to lower tourism intensity are also identified.

Keywords: destination boundaries; tourism zoning; within-destination travel patterns; mountain regions; Pyrenees

Introduction

Geography provides a range of recreational opportunities that can be harnessed for tourism development and management. In fact, the potential of a destination to attract tourists can be determined by the spatial distribution of attractions. Therefore, instead of taking tourism destinations for granted as a-priori areas delimited by administrative boundaries (Saraniemi & Kylänen, 2011), there is an opportunity to find and define tourism destinations a posteriori on the basis of the spatial distribution of attractions in a geographical region and the way tourists consume space (Chhetri & Arrowsmith, 2008; Ding, Wang, Zhang, Wu, & Tang, 2011; Van der Knaap, 1999; Vasiliadis & Kobotis, 1999; Zillinger, 2007).

We acknowledge that tourism consumption patterns of space are affected by the spatial distribution of resources, which includes distance to the attractions, their intensity and their specificity. For instance, areas with a greater concentration and uniqueness of attractions have a higher attractiveness potential. We also know that among the most common within-destination tourist movements (Lew & McKercher, 2006; McKercher &

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Lau, 2008), there is the hub-and-spoke or base-camp pattern (Chancellor & Cole, 2008; Smallwood, Lynnaeth, & Moore, 2012), particularly in areas where car-based movements are predominant (Zillinger, 2007) like in inhabited rural or mountain regions.

Mountains represent scenic beauty, wilderness, solitude, well-being and recreation opportunities and are prominent on global agendas because of their importance for tourism (Godde, Price, & Zimmermann, 2000). In addition, inhabited mountain areas provide a sense of rurality. Moreover, mountains are socially well-known physical features that in many occasions serve as a basis to establish administrative and political boundaries, both international and intranational.

On the basis of the above arguments, the paper proposes a method to delineate geographical areas or 'logical' tourism destinations in mountain regions, which contain attractions that are closest to each other in time distance and farthest away from attractions in other neighbouring tourism zones without any regard to administrative boundaries. Distance is measured in travel time instead of using the standard geodesic distance and, with this, the paper contributes to overcoming an important limitation of previous research on the topic. The proposed method is applied to a vast European mountain region, the Pyrenees. As a result we find that the region can be divided into nine 'logical' tourism areas or 'new' destinations, which significantly differ from, and are more effective than, the actual tourism destinations defined on the basis of national and regional administrative boundaries. The newly found tourism destination areas are then classified into four categories ranging from higher to lower tourism intensity. Finally, in the last section of the paper we discuss the findings and their implications for tourism destination management and marketing.

Tourist destination boundaries

Tourism destinations are the most appropriate unit of analysis in tourism research (Haywood, 1986). They have been studied from several perspectives (Saraniemi & Kylänen, 2011). In economic geography-oriented research, a destination is regarded as a defined geographical area, such as a country, island or town, towards which people travel and where they choose to stay for a while to experience certain perceived attractions (Leiper, 1995). Destinations are thus taken-for-granted, fixed territorial entities with administrative boundaries where tourist masses come and go via different routes (Saraniemi & Kylänen, 2011). In marketing management-oriented research a destination is seen as a traditional commodity product that consists of separate components and, therefore, an agglomeration of facilities and services designed to meet the needs of tourists (Cooper, Fletcher, Wanhill, Gilbert, & Sheperd, 2005). Now the destination is a geographical region that is considered by visitors as a unique entity, which is often given identity by its brand name. Emphasis is given on the managerial process aimed at managing tourism resources and products successfully. In customer-oriented research, emphasis is focused on the experience of the visitor. Here the destination is reduced as a service environment facilitating the experience. From this perspective service providers facilitate an experience but cannot deliver it without the consumer, who is seen as a co-creator with whom the service process is executed. A fourth perspective on destinations, which goes beyond the modernist dualism in terms of production and consumption, is also discussed by Saraniemi and Kylänen (2011). These authors consider the tourism destination as a dynamic and historical spatial unit that evolves over time and space. Destinations are thus not 'out there' (Allen, Massey, & Cochrane, 1998) but they are produced and reproduced through combinations of social, cultural, political and economic relationships. An

evolution from a pure supply-side or production-oriented definition of destinations towards more demand-side or customer-oriented perspectives can thus be observed, with the last approach transcending this dualism.

The boundaries of a destination are hard to define as they are constantly changing through complex practices and discourses: to some tourists, tourism companies, local people and other market actors, the destination may appear totally different in terms of shape, content and relationships. Destination boundaries are generally delimited by administrative boundaries (Dredge, 1999; Hwang & Fesenmaier, 2003; Vasiliadis & Kobotis, 1999; Weidenfeld, Butler, & Williams, 2010; Zhang, Han-Hua, & Zhuang, 2011; Zillinger, 2007). Nonetheless, we know that borders change due to historical, political and economic factors (Nilsson, Eskilsson, & Ek, 2010; Paasi, 1996; Prokkola, 2007; Sofield, 2006). Some works point out that pre-existing organizations and institutions often act as an obstacle to the development of new tourism destinations (Canally & Timothy, 2007; Ioannides, Nielsen, & Billing, 2006; Lovelock & Boyd, 2006; Timothy & Tosum, 2003) despite the fact that new and alternative conceptions of tourism destinations can have important implications in tourism destination planning and development, such as cross-border collaboration, policy-making, and marketing and management strategies. We acknowledge that this move towards conceptual frameworks where the customer plays a fundamental role in the definition of a destination has not been accompanied by a similar move by practitioners towards alternative configurations of tourism geographies that take the tourists and the way they consume space into account.

Within-destination tourist travel patterns

Understanding the movement patterns of visitors is important for a number of tourism management activities, such as attraction planning, development of accommodation nodes and transport links (McKercher & Lau, 2008). It has been argued that quantifying the movement patterns of visitors in terms of distance travelled or overlying data on movement patterns with other spatial datasets may enhance the quality of management outputs. We add that understanding the movement patterns of visitors is also important to defining and delineating 'effective' tourism zones or destinations. Fortunately, there is a growing recent literature on within-destination travel patterns (Lew & McKercher, 2006; McKercher & Lau, 2008), which can be imported into our discussion.

The complexity of visitors' movements within destinations entails a wide diversity of routes and attractions from which visitors can choose, and is affected by visitor and visit characteristics and by the spatial distribution of resources. In fact, tourism destinations operate as functional areas in terms of mobility of tourists for the consumption of a network of attractions (Jansen-Verbeke & Lievois, 2008; Russo, 2008; Shih, 2006). There are three main attributes derived from the spatial distribution of resources that affect space consumption patterns (Hunt & Crompton, 2008; Michael, 2007; Weidenfeld et al., 2010): distance or territoriality, intensity or number of attractions and specificity or uniqueness of the attractions.

In general terms, distance to and between attractions is a main determinant of the appeal of tourist areas (Blasco, Guia, Prats, & Saez, 2009; Hwang & Fesenmaier, 2003; Hwang, Gretzel, & Fesenmaier, 2006; Nicolau & Mas, 2006; Nyaupane & Graefe, 2008). Distance influences visitors, with numbers declining with increasing distance from the accommodation location to the attractions and from one attraction to another, which supports the concept of distance decay (Eldridge & Jones, 1991). Despite the fact that some authors have challenged this concept (Lee, Guillet, Law, & Leung, 2012; McKercher &

Lew, 2003), on the basis of new patterns of contemporary mobility, they do not apply in mountain regions. In addition, cognitive distance may play different roles for tourism mobility (Reynolds & McNulty, 1968; Smith, 1984), for example, adding artificial distance between attractions separated by some kind of real or perceived obstacle, such as natural or administrative borders. The distances travelled by base campers have been documented in only a few papers (Chancellor & Cole, 2008; Smallwood et al., 2012). In both cases, a rural mountain area and a nature-based tourism destination, the maximum distances covered by visitors were between 93 and 105 km, and between 1:20 and 1:40 hours in time.

Intensity in terms of number of attractions also affects consumption patterns with low intensity correlated with more fixed patterns of consumption and higher intensity with a higher variety. Finally, the existence of prominent or unique attractions will increase the consumption patterns of space with visitors being ready to travel longer distances to visit them (Nicolau, 2008; Nyaupane & Graefe, 2008; Zillinger, 2007).

Smallwood et al. (2012) found two characteristics within destination movement patterns: static and hub-and-spoke patterns. Static movement patterns imply staying at the accommodation location most of the time, while hub-and-spoke movements are characterized by daily trips to neighbouring attractions combined with exploration around the accommodation location. In fact, McKercher and Lau (2008) found that the most common movement style had a local exploration component combined with visits to one or more attractions within the destination. Similarly, Chancellor and Cole (2008) found that 93% of the visitors to Jackson County, a rural mountain area, were single-destination travellers, among which 71% were base campers and 12% were static. Godde et al. (2000) argued that people look to mountain environments to gain a sense of renewal. This is specifically the case of domestic tourism, which dominates over international tourism in most mountain regions. Although there is need for further research on this topic it seems reasonable to assume that the most common pattern of movement in inhabited rural and mountain areas is domestic tourism with second homes, and with a mobility pattern that is car-based and hub-and-spoke, or a combination of hub-and-spoke and static patterns. Additionally, hub-and-spoke or base-camp territoriality is compatible with a stop-over and secondary destination in multiple-destination patterns (Dredge, 1999; Hwang & Fesenmaier, 2003; Hwang et al., 2006; Lue, Crompton, & Fesenmaier, 1993), as it can be then taken as a module of the multi-destination trip.

Tourism zoning and mobility in mountain regions

There is a growing concern by researchers on the use of a variety of methods to analyse tourists' movement patterns, which can benefit further research on tourism. Most of this research to date has focused on the analysis of tourism movement patterns in small areas such as cities, counties, protected areas or theme parks (Chhetri & Arrowsmith, 2008; Connell & Page, 2008; Dietvorst, 1995; Pettersson & Zillinger, 2011; Shoval & Isaacson, 2007; Xiao-Ting & Bi-Hu, 2012).

In contrast, the analysis of tourism mobility patterns in larger areas is less explored. The few existing studies at a regional level place the emphasis on the itineraries taken by visitors (Van der Knaap, 1999; Zillinger, 2007), the catchment areas of particular tourism destinations (Chancellor & Cole, 2008; Nyaupane & Graefe, 2008; Zhang et al., 2011) and the spatial distribution of attractions within tourism destinations (Ding et al., 2011). Still fewer studies have focused on measuring the potential for recreational opportunity determined by the spatial distribution of attractions and the identification of zones or areas with highest potential (Vasiliadis & Kobotis, 1999). Here, the recreational potential

of an area is measured as the total number of recreational opportunities available from a given point or location and accessible within its geographical neighbourhood (Chhetri & Arrowsmith, 2008).

Regarding tourism zoning in mountain areas only one attempt has been found that focuses on the opportunities that can emerge from a different projection of tourist destinations in mountains (Zyryanov & Korolev, 2009). In a study carried out in the Pamir Mountains, the authors argued that alternative destinations can be conceptualized following tourism infrastructure and demand criteria, and found seven alternative destinations for sport tourism, which differ from the administrative regions. No accurate methods for zoning were provided, though, by these authors.

With this background we aim at contributing to this debate by proposing a method to identify consumption pattern-based tourism areas of high potential within larger areas such as regions, states, countries, groups of countries, and cross-border regions, and specifically in mountain regions, and without any regard to internal administrative boundaries. With the proposed method, larger areas can be divided into smaller 'local-like' tourism destinations, which could otherwise be difficult to detect. It is argued that these smaller areas have a range of within-destination distances, which, in the context of tourism development in mountain regions, better fit for the hub-and-spoke mobility pattern.

Hierarchical cluster analysis and GIS

We use hierarchical cluster analysis to find tourism zones within a region, following mobility patterns and distances to the attractions. The term cluster analysis encompasses a number of different algorithms and methods for grouping objects of similar kind into respective categories. It is an exploratory data analysis tool which aims at sorting different objects into groups in a way that the degree of association between two objects is maximal if they belong to the same group and minimal otherwise. In our case, the method clusters the attractions in the region into zones where the attractions within a zone are maximally close to each other and minimally close to the attraction in other zones. Although Kettenring (2006) argued that hierarchical cluster analysis is the most widely used form of clustering, and despite the fact that Vasiliadis and Kobotis (1999) proposed the nearest neighbour algorithm as a clustering mechanism with potential interest for finding tourism zones, no previous research has used this method for this purpose.

Moreover, as we are dealing with spatial data, the consideration of geographical information system (GIS) based techniques is essential. There is a number of GIS-oriented software that can run cluster analysis of spatial data. However, they have important limitations for our purpose. On one hand, the clusters can only be calculated on the similarity or dissimilarity of Euclidean or Manhattan distances between given points. Therefore, we use the statistical analysis software (SPSS) to obtain the geographical clusters, as it can cope with similarity or dissimilarity of all types of distances among variables, such as distance in time among all the attractions of the region. As explained earlier, the use of time distance as the relevant variable to analyse visitor patterns is an important contribution of our paper. On the other hand, the statistical software SPSS allows a broader range of clustering algorithms than the GIS-based software, as, for instance, the Ward algorithm (Ward, 1963).

Therefore, the results of the cluster analysis conducted with SPSS are fed into GIS software to generate the map representation of the resulting tourism zones and their geo-references. There is room, though, for GIS software developers to create an add-on with this cluster analysis functionality. The implementation of our method would be easier with this functionality embedded into GIS.

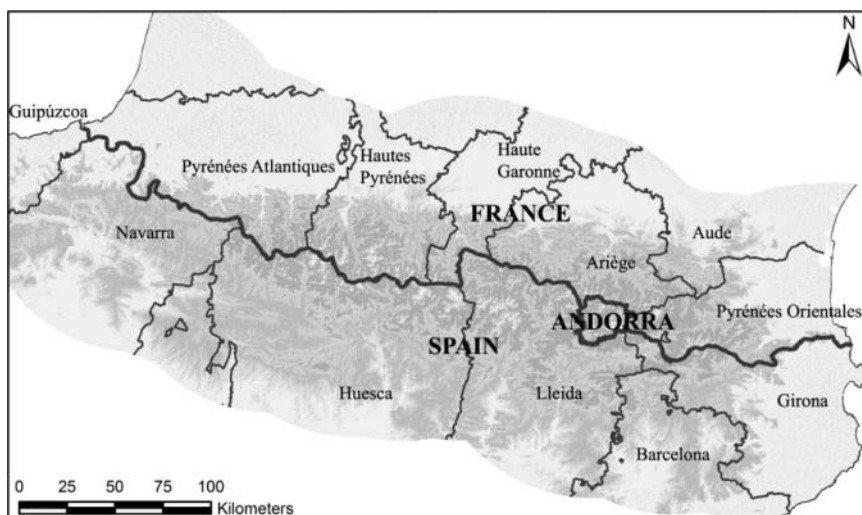


Figure 1. The Pyrenees mountain region.

The Pyrenees region

The Pyrenees is a mountain range over 400 km long and about 100 km wide. The mountain ridge with its high peaks divides the region into north and south with relatively few crossing points from one side to the other. At the two extremes the mountains reach the sea and are not as high as in the central area. No large cities are present, with San Sebastian, Pamplona, Perpignan, Girona and Pau being the most populated urban centres, all of them located in the periphery of the region close to the lower neighbouring flatlands.

It is important to remark that for tourism planning, management and promotional purposes, the Pyrenees region is divided into 13 different regions from 3 countries, which fully coincide with existing administrative divisions of the territory (see [Figure 1](#)). Regarding the attractions in the territory, they are relatively homogeneous throughout the whole mountain range and very characteristic of inhabited mountain or rural regions in general (Debarbieux, 1995; Godde et al., 2000), that is, there is a majority of nature-based and active tourism attractions, as well as cultural attractions, and a more limited number of other categories. Due to proximity to the sea on both sides of the mountain range, there are also a few ‘sun and beach’ centres and several second-home intensive areas.

The Pyrenees mountain range is a good example for the purpose of this study, as it exhibits the unique characteristics of mountain regions (Godde et al., 2000), which favours the hub-and-spoke consumption patterns. In addition, tourism destination boundaries in the region are drawn following administrative boundaries on the basis of natural features such as mountain ridges or rivers. We contend that an attraction-based approach to tourism destination boundaries can generate alternative tourism zones that better match tourists’ most common destination consumption patterns.

Research method

The application of the method and the empirical analysis of our case are conducted in four stages.

In the first stage, information about the existing attractions was gathered from published tourism guides of the Pyrenees region. About 50 guidebooks covering the Pyrenees were identified, from which 12 were selected on the basis of three criteria: being recently published, covering the whole Pyrenees region, and being addressed to both the general-purpose segment with emphasis on car routes and the more specific active or mountain sport tourists.

Within the selected guidebooks, a total number of 321 attractions were identified. Tourism attractions were then categorized according to two different criteria. On one hand, attractions were classified into those with higher level of attractiveness (level 1) and those with lower level of attractiveness (level 2) following a number of criteria, such as length of text written in the guides, format of text using bold fonts, inclusion of images and ranking of stars given by the editors to each attraction. In total, 23 attractions of level 1 and 298 attractions of level 2 were identified. On the other hand, attractions were also classified with regard to their nature in the following categories: cultural attractions, active tourism attractions, nature-based tourism, entertainment attractions, 'spa and wellness', and 'sun and beach'. The tourism attractions were located in a total of 187 municipalities.

The categorization was independently made by the authors and then compared and discussed to ensure reliability. The issue of lack of validity of data is addressed by many authors (Camprubi, Guia, & Comas, 2012; Holsti, 1968). Thus we considered Kassarian's (1977) directives to increase the objectivity and reliability of the results.

The second step focused on measuring the distances between attractions. Distances between these municipalities were calculated in time by road. In fact, in mountain areas, the use of geodesic distances could generate bizarre results, as in locations geodetically close to each other and in separate sides of the mountain ridge, geodesic distance is negatively correlated with time distance; in other words, the closer the geodesic distance, the farther the distance in time by road.

Third, we built a matrix with these time distances, which was then used for the identification of clusters, with the SPSS software. As mentioned above, the decision to use hierarchical cluster analysis is justified by the fact that it is the most widely used form of clustering (Kettenring, 2006) and because it copes with similarity or dissimilarity of all types of distances among variables, including time distance. The Ward algorithm (Ward, 1963) is the preferred method because it optimizes the minimal intra-group variance and hence adds less noise to the groups formed, in comparison to the original data (Aldenderfer & Blashfield, 1984; Cea, 2002; Ferreira & Hitchcock, 2009; Hair, 1998). This method also tends to form more similar-sized clusters (Kuiper & Fisher, 1975), or tourist zones in our case. The nine-cluster solution was chosen as the resulting areas have an average diameter of about 1–2 hours' drive time (see Figure 2) and thus are representative of the actual within-destination space consumption pattern of hub-and-spoke tourists.

In the last step we assessed both the new tourism zones and original destinations in terms of several criteria with regard to their tourism attractiveness and managerial implications: (1) *number of borders*, measuring the number of interregional and international borders within the area; (2) *number of beds*, measuring the number of hotel beds in the area; (3) *population*, measuring the number of inhabitants within the area; (4) *intensity of attractions*, measuring the number of attractions within the area; (5) *specificity of attractions*, measuring the level of attractiveness of the attractions, rating 1 for higher attractiveness and 2 for lower attractiveness; and (6) *variety of attractions*, measuring the number of existing attraction categories. We then calculated their correlation coefficients and compared their values for the new tourism zones and the original destinations. Finally, in the

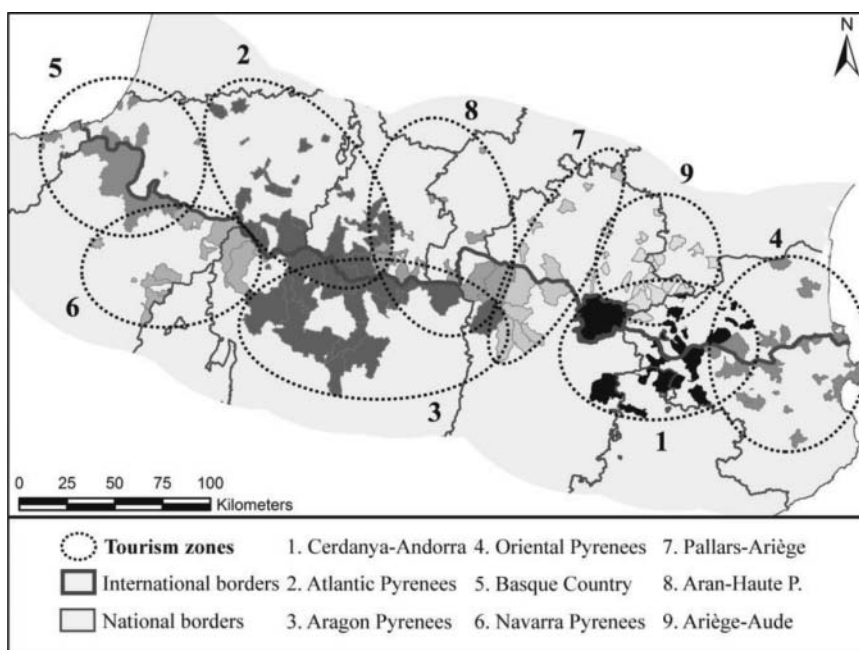


Figure 2. 'New' tourism zones in the Pyrenees.

last stage we classified the nine tourism zones into categories or types by using hierarchical cluster analysis in SPSS, with regard to the above same set of variables. Anova and Eta tests were conducted to measure the significance of all these variables in each of the tourism zone types.

Results

The tourism zones

In an attempt to find effective alternative tourism areas for hub-and-spoke tourist consumption patterns in the Pyrenees region, the cluster analysis results in nine tourism areas (see Figure 2).

When we compare these new tourism zones (Figure 2) with conventional administrative regions (Figure 1) we observe major differences. On one hand, the spatial extension of existing regional tourism destinations (administrative regions) is less uniform than in the 'new' tourism zones. The former coincide with administrative regions. In contrast, the tourism areas proposed in this paper have a more realistic scale for within-destination tourism consumption, with maximal internal distances ranging between 1–2 hours' drive time. On the other hand, all new zones are cross-border, five of them spreading over international borders and the remaining four over regional borders. We also observe (Table 1) how much the new zones are cross-border in terms of the percentages of space (number of municipalities) that belong to different administrative regions. So in one extreme we have Aragon Pyrenees as the less cross-border intensive area in that it coincides with Huesca Province in 93% and with Lleida province in only 7%. In the other extreme we find the Pallars-Ariège area with 46% of municipalities belonging to the Lleida province and 54% to the Ariège department. The distribution of the rest of the

Table 1. Percentage of municipalities in tourism zones belonging to administrative regions.

Administrative regions \ Tourism zones	Cerdanya–Andorra	Atlantic P.	Aragon P.	Oriental P.	Basque P.	Navarra P.	Pallars–Ariège	Aran–Haute P.	Ariège–Aude
Andorra	19	—	—	—	—	—	—	—	—
Girona	19	—	—	65	—	—	—	—	—
Lleida	8	—	7	—	—	—	46	15	—
Barcelona	14	—	—	—	—	—	—	—	—
Huesca	—	—	93	—	—	20	—	—	—
Navarra	—	—	—	—	50	80	—	—	—
Guipúzcoa	—	—	—	—	8	—	—	—	—
Pyrénées Atlantiques	—	60	—	—	42	—	—	—	—
Hautes Pyrénées	—	40	—	—	—	—	—	54	—
Haute Garonne	—	—	—	—	—	—	—	31	—
Ariège	—	—	—	—	—	—	54	—	72
Aude	—	—	—	—	—	—	—	—	24
Pyrénées Orientales	39	—	—	35	—	—	—	—	4

zones falls somewhere between these two cases with the case of Cerdanya–Andorra worth mentioning: 39% in Pyrénées Orientales department, 19% in Andorra, 19% in Girona province, 14% in Barcelona province and 8% in Lleida province.

We also observe that the ‘new’ areas are in fact very similar to historical regions, and hence there is a strong relationship between these territories and the cultural dimension of space. The strongest examples are found in the areas of Cerdanya–Andorra, Basque Pyrenees (Basque Country) and Oriental Pyrenees (Northern Catalonia). In all these cases, the maps depict the ‘natural’ shape of the cross-border historical and cultural regions, which still share common languages and traditions. Another interesting case is the Vall d’Aran county, a region of Spanish Catalonia that is geographically embedded on the northern slopes of the Pyrenees. Our results puts this region in a tourism zone together with other French departments that share the same Occitan language, thus depicting the actual historical and cultural region, now divided by modern borders.

Finally, the results strongly support our choice of time as the relevant distance criterion to identify the tourism zones. For instance, our method locates the municipality of Vall de Boí in the Aragon Pyrenees tourist area. If geodesic distances had been used it would have been located within the neighbouring Pallars–Ariège region (to which it belongs administratively). The presence of the Aigüestortes National Parks’ mountains between Vall de Boí and the rest of the Pallars region means that distances are longer in time, excluding Vall de Boí from this zone.

Attributes of the tourism zones and how they correlate

The main goal of the study was to find consumer-based tourism zones in a large region and compare them with the conventional administrative areas. Thus we also explore how the main tourism attributes of these zones and regions are correlated and how they compare.

Table 2. Correlation between relevant attributes in tourism areas.

Correlation	Borders	Beds	Population	Intensity	Specificity	Variety
Borders	–					
Beds	0.640 0.063	–				
Population	–0.056 0.886	0.247 0.522	–			
Intensity	0.748* 0.020*	0.913** 0.001**	0.140 0.719	–		
Specificity	0.778* 0.014*	0.902** 0.001**	0.179 0.646	0.996** 0.000**	–	
Variety	0.506 0.165	0.251 0.516	0.625 0.072	0.445 0.23	0.496 0.174	–

Note: * $p < 0.05$; ** $p < 0.01$.

Therefore, as seen above, variables representing the intensity of attractions in the area, their specificity and their variety are relevant to assess the potential differential attractiveness of the resulting zones. Variety is presented as the number of categories present in the area (nature-based, active tourism, cultural, spas, ‘sun and beach’ and entertainment attractions). In addition to these attraction-based attributes, we add three more general attributes of the zones that affect their characterization, mostly in terms of managerial challenges: number of beds, population and number of administrative borders within the tourism zone. For instance, zones with lower numbers of beds might have to focus on the management of growth strategies; the most populated tourism zones with important urban centres might benefit from short-term, short-distance breaks by inhabitants of the zone; and zones that cross both international and regional borders have major challenges in terms of cooperation and integration of joint tourism development and marketing strategies. A total of six variables were thus considered. The values of the correlation coefficient among these variables for both tourism zones and original destinations are displayed in [Tables 2](#) and [3](#).

Table 3. Correlation between relevant attributes in current destinations.

Correlation	Borders	Beds	Population	Intensity	Specificity	Variety
Borders	–					
Beds	–	–				
Population	–	0.040 0.897	–			
Intensity	–	0.266 0.379	0.351 0.240	–		
Specificity	–	0.296 0.327	0.379 0.201	0.995** 0.000**	–	
Variety	–	0.416 0.157	0.375 0.207	0.489 0.090	0.547 0.053	–

Note: * $p < 0.05$; ** $p < 0.01$.

Several important findings from the correlation tables are worth mentioning. Specificity and intensity of attractions are highly and significantly correlated ($r > 0.9$; $p < 0.0$), that is, in the areas where there are more first-class or specific attractions there are also a higher number of total attractions. It seems, then, as if the presence of first-class attractions fosters the development of other 'complementary' second-class attractions. This is so in the case of both tourism zones and current destinations.

Moreover, both attributes, specificity and intensity of attractions, are also highly and significantly correlated with numbers of beds in the case of tourism zones ($r > 0.9$; $p < 0.0$), which is also an important finding as it supports the idea that zones with high levels of attractiveness have a more developed tourism infrastructure in terms of accommodation availability. This is not, however, the case of the current destinations or administrative regions. This result supports the higher effectiveness of the tourism zones over the administrative regions in depicting the actual structuration and clustering of attractions and accommodation infrastructure.

We also observe that in the case of the tourism zones the number of administrative borders within the tourism zone is also highly and significantly correlated with intensity and specificity of attractions ($r > 0.8$; $p < 0.0$) and to a minor extent to the number of beds ($r > 0.6$; $p < 0.0$). This is a remarkable result as it proves that, at least in our case, the more the tourism zones differ from the administrative regions, the higher is their attractiveness.

Finally, as for the variety of attractions, we find no significant correlation with the rest of the variables except for, to a certain extent, population ($r > 0.6$; $p < 0.0$). This points at the idea that while all the zones have attractions belonging to most of the attractions' categories, only the more populated zones offer the whole variety of attractions. Local population living near tourism zones may consume some tourism products and attractions, and therefore it is reasonable to assume that tourism companies may consider closeness to highly inhabited areas as one of the factors when deciding their location. This is particularly the case for some products and services, which, for example, need an important investment in infrastructure when established, such as leisure parks or wellness centres.

Types of tourism zones

The values of the attributes for each of the nine tourism zones are shown in Table 4.

Now the results of the hierarchical cluster analysis conducted with these variables classify the nine zones into four types. *Type I* mountain tourism zone includes only one of

Table 4. Value of relevant attributes in the tourism areas.

Name	Cluster	Borders	Beds	Population	Intensity	Specificity	Variety
Cerdanya–Andorra	1	6	38.475	136.559	64	35	5
Oriental Pyrenees	2	1	15.739	383.139	39	21	5
Basque Pyrenees	2	2	10.491	325.226	33	18.5	5
Atlantic Pyrenees	3	1	29.198	145.966	44	23	3
Aragon Pyrenees	3	1	8.673	35.924	39	20	4
Navarra Pyrenees	4	1	2.875	207.221	21	11.5	4
Pallars–Ariège	4	1	2.392	17.749	19	9.5	3
Aran–Haute Pyrenees	4	2	5.506	16.593	31	16	4
Ariège–Aude	4	2	1.144	28.753	31	17.5	4

the areas, Cerdanya–Andorra. This type of tourism area is characterized by being highly cross-border (with up to six borders, both international and regional), by having the highest number of accommodation units, a medium-sized population for a mountain area and the highest level of intensity, specificity and variety of attractions. *Type II* mountain tourism zone is composed of Oriental Pyrenees and Basque Pyrenees tourism zones. This type of tourism zone is the most populated with the highest variety of attractions and medium values of intensity and specificity of attractions, accommodation units and cross-border intensity. *Type III* mountain tourism zone includes the areas of Atlantic Pyrenees and Aragon Pyrenees. This type is characterized by medium levels of accommodation units, intensity and specificity of attractions and low levels of population, variety of attractions and cross-border intensity. Finally, *Type IV* mountain tourism zone is composed of Navarra Pyrenees, Aran–Haute Pyrenees, Pallars–Ariège and Ariège–Aude, and is characterized by very low levels of all attributes.

Thus we observe that Type I tourism zones have the highest level of tourism intensity, followed by both Type II and Type III with medium values and with Type IV representing the zones with lowest levels. In fact, Type II and Type III zones have a similar level of accommodation units, intensity and specificity of attractions, thus only differing by the higher population of Type II zones. In the case of the Pyrenees the geographical distribution of zones depicts the Type I zone somewhere near the central area of the mountain range around the Andorra and the Cerdanya valley; the Type II areas are in the two extremes of the range where the mountains are lower and reach the sea and where there are more urban centres and transport infrastructure; the Type III zones are near the centre of the range where the peaks are higher and ski resorts are abundant; and the Type IV are found between the central range and the peripheral Eastern and Western lower areas.

We also observe that in terms of international cross-border intensity, the central Cerdanya–Andorra tourism area is the most relevant, followed by Basque Pyrenees, Aran–Haute Pyrenees and Ariège–Aude. The rest of the zones only have one border, being international in the cases of Oriental Pyrenees and Pallars–Ariège and national in the other two cases. This result is important in that some of the most tourism-intensive zones, such as Cerdanya–Andorra, Basque Pyrenees and to a certain extent Oriental Pyrenees, are cross-border areas. Engaging in tourism cross-border cooperation, in order to size on the opportunities offered by the new zoning poses a challenge for the Destination Management Organizations on the other side of these borders.

Conclusions and implications for destination management

This study contributes to a greater understanding of destination boundaries and tourism zones, which, to date, have received little research attention, particularly from the perspective of the consumer. Instead of taking tourism destinations for granted as administrative regions (Saraniemi & Kylänen, 2011), there is an opportunity to define tourism destinations on the basis of tourism mobility patterns across tourism attractions (Chhetri & Arrowsmith, 2008; Ding et al., 2011; Van der Knaap, 1999; Vasiliadis & Kobotis, 1999; Zillinger, 2007).

One of the most common within-destination tourist movements (Lew & McKercher, 2006; McKercher & Lau, 2008) is the hub-and-spoke or base-camp pattern (Chancellor & Cole, 2008; Smallwood et al., 2012), particularly in car-based movement areas (Zillinger, 2007), such as in rural or mountain regions. In our research we concluded that areas containing important tourism attractions, where their distances fall within a certain standard range for hub-and-spoke patterns of visitors' consumption, may have more

attractiveness potential than traditional administrative-based destinations. With these premises we proposed a method to delineate 'tourism zones'.

We have then implemented the method in the Pyrenees, which exhibits unique characteristics of mountain regions (Godde et al., 2000). We found nine tourism zones which differ from the current tourism destinations. They are more uniform in size than the administrative regions; all of them are cross-border either interregionally, internationally or both, and they are very similar to historical regions, thus sharing common cultural artefacts like language, despite being divided by current borders.

The results also show a high and significant correlation between the intensity and specificity of attractions and, in the case of tourism zones, the significant correlation between these and the number of accommodation units. Thus, the results indicate that unique first-class attractions go together with high numbers of lower level attractions nearby and that all together they foster the growth of accommodation units. However, the correlation between intensity/specificity of attractions and accommodation units does not occur in the case of administrative regions and, therefore, tourism zones are more effective than administrative regions in representing the actual tourism structuration of space. The results also suggest that the more the tourism zones differ from administrative regions the higher their attractiveness, indicating that around administrative borders the accumulation and relevance of attractions are higher.

Four types of mountain tourism zones were finally identified, ranging from high to low tourism intensity. Some of the most tourism-intensive types were located in the central and peripheral coastal regions of the mountain range and have the highest international cross-border intensity. These results can inspire further research on the identification of tourism zones in other regions of the world and in all types of geographical settings (i.e. mountain areas, rural areas, urban areas or cross-border areas) and whether the higher relevance of tourism zones over administrative regions is also manifested in them.

The results also have major implications for the management of destinations. On one hand, current destinations should be aware of the way they belong to or are divided into tourism zones. This awareness must be the basis for neighbouring destinations to strategically initiate cross-border collaboration agreements, integrate their tourism policies and even create new tourism destination brands, which can be more meaningful for visitors and more satisfying for the travel patterns they seek. We can already see some moves in this direction in the coastal area of Basque Pyrenees and in the area of Cerdanya. The valley of Cerdanya is divided into two administrative regions, one belonging to France and the other to Spain. It is a historical, cultural region, with a common language and shared traditions and certain tourism functionalities. For example, accommodation, mostly placed on the Spanish side, also serves the ski resorts on the French side. In fact, cross-border initiatives in the Cerdanya have led to the development of cross-border management and promotion actions, such as the creation of cross-border promotional material. These examples suggest interesting perspectives for research in the field of tourism policy and planning. The creation of new tourism zones in cross-border regions entails important political challenges. Tourism stakeholders face additional impediments to cross-border development and their role seems to be crucial in the performance of cross-border collaboration strategies. In this sense, some stakeholders may play a more subservient role, while others play a more dominant role. Policy integration processes are needed between different regions sharing tourism zones, and marketing strategies need to be amended to address specific market niches, which may vary, to a certain extent, from previous conceptions of tourism space. For example, newly found tourism zones may

have to become involved in multiple positioning strategies rather than in one single strategy. In addition, specific marketing strategies should be fostered if cognitive distance issues play a negative role for tourism mobility (Reynolds & McNulty, 1968; Smith, 1984), for example, adding artificial distance in cross-border tourism zones between attractions that are located on different sides of the border. On the other hand, the correlations found among destination attributes and the identification of four types of mountain tourism zones can inform destination managers about the reality of both their territories and that of their neighbours, which should give them an advantage to manage and develop tourism in their territories.

Finally, despite the fact that in this study tourism zoning is considered in terms of within-destination hub-and-spoke consumption patterns, an important number of tourists are involved in multi-destination trips (Dredge, 1999; Hwang & Fesenmaier, 2003; Hwang et al., 2006; Lue et al., 1993). Tourism zones can also be seen as stages within the multi-destination itinerary. This also poses challenges for destination managers in neighbouring tourism zones if they plan to size on the opportunities of this tourism segment.

Further research should thus focus on analysing the actual behaviour of destination managers whose territories are within different types of mountain tourism zones, in order to know better how they see and manage cross-border issues, intensity and specificity of attractions, accommodation and local population matters and also to know their reaction when faced with the identified tourism zones. Finally, the results of this research would also benefit from further research on the actual consumption of these types of areas by actual tourists. By tracking tourists in these identified tourism areas we could check whether their travel patterns fit the premises taken in this study and thus confirm the relevance of tourism zones, and what the reasons were for a lack of fit, if that was the result.

Acknowledgements

We would like to thank the anonymous referees for their constructive comments on this paper.

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