

NATURAL TOURISM IN NATIONAL PARKS: EXPLORATORY ANALYSIS FOR ACCOMMODATION CAPACITY

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1. Introduction

In recent years, the interest of the community toward the observation and research of contact with nature has been growing; in particular, protected natural areas offer the opportunity not only to restore physical and mental wellbeing in areas of outstanding beauty, but also, above all, to progressively deepen the responsibility to protect unique ecosystems. Italy has the highest number and density of species of both plants and animals among EU countries (Ministero dell'Ambiente e della Tutela del Territorio e del Mare, 2009). Particularly interesting is the public's attention to the agricultural products of the companies located in those areas; many have stressed the importance of branding in the park. Among the main reasons for visiting such places are the desire to play sports such as biking, trekking, and hiking; animal watching, especially whale watching; relaxation, food and wine, research traditions (Ecotur, 2012). The sustainable management of tourism in these places may therefore constitute a vital economic resource for the enhancement of the environment and at the same time the tightness and development of the socioeconomic fabric of the community (Cassola, 2005; Marino, 2014).

The Italian Natura 2000 network includes more than 6 million hectares, about 20% of the national territory (Ministero dell'Ambiente e della Tutela del Territorio e del Mare, 2012). Of such an extension, the national parks will occupy about 1,600,000 hectares, and about 70 % extends into the South and the islands.

In 2011, the capacity of the Italian national parks is represented by 9,021 accommodations approximately 6% of the total accommodations in Italy, which correspond to 362,892 beds, more than 7% of the total beds. Comparing 2011 with 2007, thus before the advent of the crisis, the increase accommodations in national parks is truly remarkable: +46%; same beds increased by 6.2%. The growth in the number of accommodation establishments in the national parks of the commercial business is driven by the other collective accommodations equal to +71% (mainly rented accommodation, B&Bs and farmhouses), while hoteliers are recorded a

variation of + 1.9%. Instead, the percentage increase in the number of beds is 6.3 for hotels and 6.1 for Other collective accommodations. In 2011, the number of commercial business of other collective accommodation is around 75% of the total national parks, with a corresponding portion of the beds of about 63%.

The paper focuses on the natural tourism in the Italian national parks. The aim is to draw cognitive maps for analyzing accommodation capacity as an indicator of attractiveness of the parks. In section 2, we describe data and methods; in section 3, we illustrate the main results and the conclusions.

2. Data and methods

We use the ISTAT survey “capacity of collective tourist accommodation establishments” (Istat, 2012) that is a census of tourist accommodation and collects the number of establishments, number of rooms and beds for each category of hotels, and other collective accommodations (Table 1).

Table 1 – *Indicators used to analyze the Italian parks – percentages of beds of on total beds in hotels and other collective accommodations*

Indicators	
1	<i>Hotels 5-4 stars / Total Hotels</i>
2	<i>Hotel 3 stars / Total Hotels</i>
3	<i>Hotels 2-1 stars / Total Hotels</i>
4	<i>Tourist campsites / Total Other collective accom</i>
5	<i>Holiday dwellings / Total Other collective accom</i>
6	<i>Farmhouses / Total Other collective accom</i>
7	<i>Youth hostels / Total Other collective accom</i>
8	<i>Hut / Total Other collective accom</i>
9	<i>B&B / Total Other collective accom</i>
10	<i>Tourist dormitories / Total Other collective accom</i>
11	<i>Total Hotels / Total Other collective accom.</i>

We selected the municipal districts where the Italian parks are located, using 11 indicators (Table 1). We apply principal component analysis (Jolliffe, 2002) for reducing the numbers of indicators and for detecting latent variables (feature reduction). After this process, we use several clustering methods (Iezzi, 2012; Iezzi & Mastrangelo, 2014) to classify the offers of the Italian parks. Particularly, we

employ the fuzzy *c*-means algorithm (Bezdek, 1981) because the parks form overlapping groups. The analyses are performed with R software, packages FactoMineR, fclust, e1071, clValid, and RankAggreg.

3. Results

Principal component analysis allows obtaining four latent dimensions. The first component (31.92%) identifies the opposition between the hotels of three, two, and one stars (positive axis) to four and five stars and B&B (negative axis), and the second component (23.56%) detects tourist campsites (negative axis) and holiday dwellings and farmhouses (positive axis).

Figure 1 – Plane of the first two axes from the PC of tourism capacity accommodation.

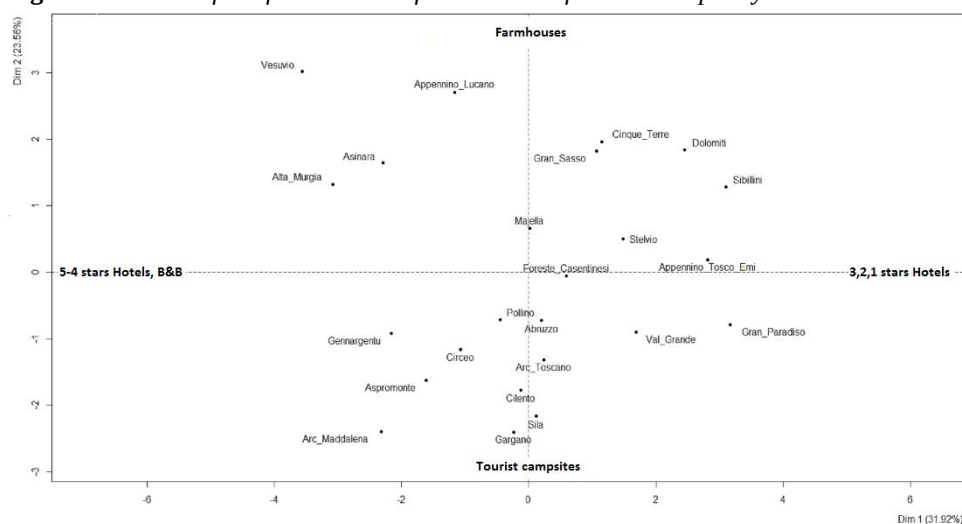
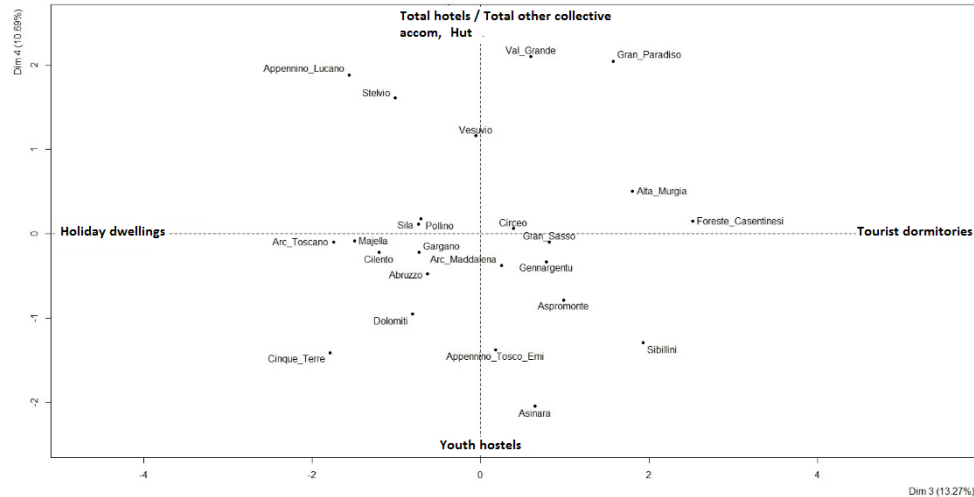


Figure 1 shows that the parks Stelvio, Gran Paradiso, and Appennino Tosco-Emiliano are placed in the vicinity of the first axis in the area of the three-star hotels; Gennargentu and Circeo in the area of the four- and five-star hotels; Gargano, Sila, and Cilento in the area of tourist camps; and Gran Sasso and Appennino Lucano in the area of holiday dwelling and farmhouses. It is evident that there are no well-defined groups, but there is a certain overlap as shown in Figure 2. The third and fourth dimensions identify, respectively, holiday dwellings and youth hostels and huts.

Figure 2 – Plane of the three and four axes from the PC of tourism capacity accommodation.



We apply several hard clustering methods (hierarchical, *k*-means, partition around medoids), tested from two to six clusters. By three internal validation indexes (connectivity, Dunn, and Silhouette), we obtained the optimal number of groups and method. However, Table 2 shows that each internal validation index suggests a different partition. Connectivity index 2 clusters, using a hierarchical algorithm (complete method), Dunn 6 clusters operating the *k*-means algorithm, and Silhouette 4 groups using the *k*-means algorithm.

Table 2 – Internal validation measures

Validation measures	Score	Method	Clusters
Connectivity	6.617	hierarchical	2
Dunn	0.465	<i>k</i> -means	6
Silhouette	0.349	<i>k</i> -means	4

This results point out that the methods used are unreliable.

We use the principal components of the fuzzy *c*-means algorithm (FKM) and the fuzzy *k*-medoid. For each of those methods, the comparison to reach the optimal partition, where a number of clusters included in a range is from 2 to 6, is done through the Xie and Beni index (XB) that measures compactness and separation of clusters.

Table 3 – Validation index Xie and Beni for the FKM, and FKM_MED

Number of clusters	FKM	FKM_MED
6	0.185	1.802
5	0.251	2.146
4	0.399	2.669
3	0.261	3.705
2	0.621	5.663

The optimal number of clusters is when the value of index is minimized. The comparison shows that the FKM has the minimum value of the index (0.185) for six clusters (Table 3).

The analysis of the membership degree highlights that although the majority of the parks can be associated to a specific group, it also presents a number of parks not easily classifiable because their degree of membership is not high for any group. However, it was decided to assign each of these parks to the group to which it has the greatest degree of membership (Table 4).

Table 4 – Membership degree matrix – FKM for 6 clusters.

National Park	Cluster	Clus1	Clus2	Clus3	Clus4	Clus5	Clus6
Gennargentu	1	0.90	0.01	0.01	0.02	0.02	0.04
Aspromonte	1	0.88	0.01	0.02	0.02	0.01	0.05
Circeo	1	0.68	0.03	0.04	0.06	0.03	0.17
Arc_Maddalena	1	0.66	0.03	0.04	0.06	0.04	0.16
Appennino_Tosco_Emi	2	0.03	0.75	0.06	0.08	0.02	0.06
Sibillini	2	0.05	0.65	0.11	0.09	0.04	0.06
Dolomiti	2	0.04	0.55	0.08	0.22	0.04	0.07
Gran_Sasso	2	0.08	0.39	0.12	0.26	0.07	0.08
Val_Grande	3	0.02	0.03	0.88	0.03	0.01	0.04
Gran_Paradiso	3	0.04	0.08	0.77	0.05	0.02	0.05
Foreste_Casentinesi	3	0.19	0.20	0.25	0.14	0.08	0.14
Majella	4	0.02	0.02	0.02	0.87	0.02	0.05
Cinque_Terre	4	0.07	0.22	0.07	0.48	0.06	0.10
Stelvio	4	0.07	0.14	0.26	0.31	0.06	0.15
Vesuvio	5	0.02	0.01	0.01	0.03	0.91	0.02
Alta_Murgia	5	0.19	0.06	0.06	0.10	0.51	0.08
Appennino_Lucano	5	0.10	0.09	0.09	0.28	0.33	0.11
Asinara	5	0.24	0.11	0.07	0.19	0.27	0.12
Cilento	6	0.02	0.01	0.01	0.01	0.00	0.95
Sila	6	0.06	0.02	0.03	0.04	0.01	0.84
Gargano	6	0.10	0.03	0.04	0.05	0.02	0.77
Arc_Toscano	6	0.06	0.04	0.04	0.11	0.02	0.74
Abruzzo	6	0.10	0.06	0.05	0.18	0.03	0.57
Pollino	6	0.15	0.04	0.05	0.16	0.03	0.56

Maddalena Archipelago, Gennargentu Circeo, and Aspromonte belong to group no. 1. They are characterized by the prevalence of percentages of beds in hotels of high category. Compared to the total other collective accommodations, the first cluster is characterized also by significant parts of the beds of campsites (60% to 78.5%) and substantial shares of B&B (from 7.5% to more than 13%). Circeo and Gennargentu differ from the other two national parks because of the prevalence of the number of hotel beds exercises on other collective accommodations. Three of those parks overlook the sea, but the flow of tourists in Aspromonte is considerably influenced as well, being located partially in the vicinity of the Ionian and Tyrrhenian. Tuscan-Emilian Apennines, the Sibillini Mountains, Belluno Dolomites, and Gran Sasso belong to cluster no. 2. They are located in mountainous areas and accommodations are distinguished based on in less number of high-class hotels, and a preponderance of the number of beds in other collective facilities. Val Grande, Gran Paradiso, and Foreste Casentinesi belong to cluster no.3. Although these parks are located in mountainous areas and linked by a strong presence of the beds with hotel lower categories, the first two do not reach the levels of the previous cluster, ranging from 62% to 78%. The share of beds in the holiday homes is important in all the parks and oscillating between 11% and 21%.

In this group, as for the second, there is a majority stake in the beds of other collective accommodation facilities. Majella, the Cinque Terre, and the Stelvio belong to cluster no. 4. These parks have a high share of beds in three-star hotels and rental accommodation but, unlike the previous cluster, hardly present the holiday homes that are generally associated with lower hotel categories. The beds in the hotels are numerically higher than those of the other collective accommodation with the exception of the Cinque Terre. The fifth cluster is composed of Vesuvio, Alta Murgia, Appennino Lucano, and Asinara. They are characterized by considerable share of the beds of higher hotel categories, with the exception of Appennino Lucano that has the majority share for the three-star hotels. In this cluster, the low weight of campsites and shares important for farmhouses, apartments for rent, and B & B could be noticed. Except for Asinara, the number of beds in hotels are far superior to that of other collective accommodations, oscillating between 120 and 500 beds for every 100 beds of other collective accommodations. Cilento, Sila, Pollino, Gargano, Abruzzo, and the Archipelago Toscano belong to cluster no. 6. The three-star hotels are predominant, with shares ranging between 54% and 63% of the total hotels, and the campsites are present in all parks, except for the Parco Nazionale d'Abruzzo and the Pollino, where the ratio is slightly in favor of the hotels.

4. Conclusions

The national parks over the years constitute a growing attraction for tourists, as certified by the increased number of tourists in accommodation establishments.

The analysis conducted on hotels and other collective accommodations, depending on the category and type, shows groups of parks with different characteristics, probably related to the different needs of customers and the consequent promotion of initiatives by the park authorities and/or local communities. Even the altitude and the cost road, which may vary within the same park, if extended, seem to influence the profile and the classification of these areas. Not all parks are immediately associated to a specific group, though a hard clustering and fuzzy classification allow us to capture differences otherwise undetectable. The difficulty of aggregating some parks to a specific group seems to indicate the proximity of these areas to an average profile.

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SUMMARY

Natural Tourism in National Parks: Exploratory analysis for Accommodation Capacity

The expression "natural tourism" means all the types of tourism for which one of the basic motivations of the trip is the observation and appreciation of nature and traditional cultures.

In this paper, we focused on the natural tourism in the Italian parks. The aim is to draw cognitive maps for analyzing accommodation capacity, and to measure attractiveness of the national parks.

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