eco.mont – Volume 11, Number 2, July 2019
ISSN 2073-106X print version – ISSN 2073-1558 online version: http://epub.oeaw.ac.at/eco.mont
https://dx.doi.org/10.1553/eco.mont-11-2s27

A method to determine the potential for flora tourism in mountainous regions: a case study of the Kackar Mountains National Park, Turkey

Derya Sarı

Keywords: flora tourism, mountain tourism, tourism potential, Analytic Hierarchy Process (AHP), Kackar Mountains National Park

Abstract

Various mountainous areas in the world are noted for their floristic diversity and the presence of endemic plants. However, no serious studies on the management of flora tourism in areas that have a serious potential for flora tourism have previously been conducted. The present study focuses on analysing the potential for flora tourism within the context of sustainable alternative tourism. In this context, the Analytic Hierarchy Process (AHP) method facilitates decision-making, and allows the consistency of assessment criteria to be measured and their degrees of significance to be determined. Nine main assessment criteria were identified (endemic-rare plant count, conservation and scientific value, floristic diversity, vegetation diversity, aesthetic plant communities, seasonal attractiveness, accessibility for visits, diversity of utilizable plants, services provided). The priority and consistency for these criteria were confirmed using AHP. Based on the results, the weight score for each criterion was converted to a percentage. The method was tested using the Kackar Mountains National Park (Turkey) as an example and the flora tourism potential of the area was calculated, resulting in an assessment scale for the sustainability of the flora in mountainous areas that could be applied easily in other areas.

Profile

Protected area

Kackar Mountains National Park

Mountain range

North Anatolian Mountains

Country

Turkey

Introduction

Due to improved standards of living and increasing environmental awareness, tourism and recreational demands in natural areas, including protected areas, are increasing continuously and globally (Newsome et al. 2002; Worboys et al. 2005). Alternative, nature-based forms of tourism are found in mountainous areas that inspire tourists. Mountainous areas often present unique landscapes, including valuable and sensitive ecosystems, in terms of biodiversity and different habitats (Sarı & Acar 2015).

Flora tourism, which is a subdivision of alternative tourism and eco-tourism, emerged with the growing public awareness of biodiversity (Irmak & Yılmaz 2011). Due to people's growing interest in experiencing wildlife and flora *in-situ* (Newsome & Rodger 2013; Folmer et al. 2016), the significance of flora tourism has been increasing.

Only a few studies have addressed flora as the main attraction in nature-based tourism destinations and protected areas (e.g. Lindemann-Matthies et al. 2010; Ballantyne & Pickering 2012). However, there are indications that floristic attraction can be at least as important as the attraction of the wildlife in such destinations (Pickering & Ballantyne 2013). Wildflowers are often the main attraction for spring visitors (Priskin 2003), while visitors may consider grassland attractive because of the plant diversity it offers (Lindemann-Matthies et al. 2010). More specifically, orchids attract visitors to a variety of protected areas (Folmer et al. 2016), including in India (Jalal et al. 2008), Italy and the UK (Pickering & Ballantyne 2013).

Around the world, protected areas have seen increased numbers of visitors who have been drawn by particular natural features (e.g. particular species of flora or fauna, or geological features) (Eagles 2007; Balmford et al. 2009; Siikamäki et al. 2015). Unorganized tourism, however, could lead to the destruction of natural resources and the extinction of plants and wildlife (Ghoddousi et al. 2018). The resources in high mountainous regions and their floristic values require sustainable preservation of the areas in which they are found (Sarı 2010).

In certain studies conducted on flower tourism, the travel cost method has been utilized (Turpie & Joubert 2004; Xie et al. 2005; James et al. 2007). However, the methods used to determine the potential of flora tourism in mountainous regions are quite limited. The present study aimed to develop a non-subjective method to determine the potential of flora tourism in mountainous areas in Europe and Turkey within the scope of alternative tourism, and to help facilitate the best planning decisions in flora tourism. An Analytical Hierarchy Process (AHP) was utilized to identify the criteria that could be used to determine the potential of flora tourism and to establish a suitable evaluation method in mountainous areas where sensitive decisions have to be made. The assessment scale included main and sub-criteria with confirmed consistencies.

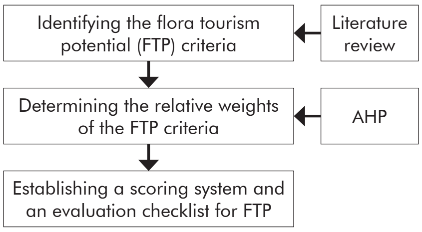

Figure 1 – Method flow chart.

Materials and Methods

The method was developed in order to facilitate field studies and planning decisions in areas of Turkey and Europe (or Eurasia) that have mountain areas with similar features. The methodological flow of the study included (a) identifying the criteria for determining the potential of flora tourism in mountainous areas; (b) determining the significance levels of the criteria; (c) construction of the flora tourism potential (FTP) assessment system (Figure 1).

Certain previous studies were reviewed to determine the FTP criteria in mountainous areas (Gülez 1990; Priskin 2001; Turpie & Joubert 2004; Knezevic 2008; Irmak & Yılmaz 2011; Pirselimoglu Batman & Demirel 2015; Yan et al. 2017). A total of nine criteria were identified (Table 1), which are grouped under the general topics of floristics, aesthetics and facilities.

In order to measure the potential for flora tourism in mountainous areas, the relative importance of the proposed criteria had to be determined. Thus, the questionnaire included questions on 36 pairwise criteria for comparison. It was sent to ten experts (academics from Turkey in botany and nature-based tourism), and the consistency of the results was determined using AHP. The percentage (weight) score for each criterion was determined, and the mountainous area FTP assessment table was developed.

Example Area

The method was tested using the Kackar Mountains National Park (Turkey) as a case study. The Kackar Mountains National Park (KMNP) lies between 40° 57’ 49”–40° 42’ 10” North and 40° 14’ 45”–40° 51’ 27” East in the Eastern Black Sea Region, northeast Turkey. It includes part of the mountain range that raises parallel to the shore in Rize province (Figure 2). The park was established in 1994 and has a total area of 51 550 ha. The lowest point in the National Park is the entrance to the Ayder plateau, at 1 150 m; the highest peak is Kackar Mountain, at 3 937 m (NCNP 2018). This is the only point where various species of Rhododendron grow above 3 000 m (RNTP 2014). Numerous activities take place within KMNP, including visiting cultural monuments, hiking, observing flora and fauna, camping, introduction to the highland culture, paragliding, rafting, mountaineering and climbing, and visiting glaciers and glacial lakes. Thus, the park has an important recreational potential (Temizkan & Yıldırım 2014).

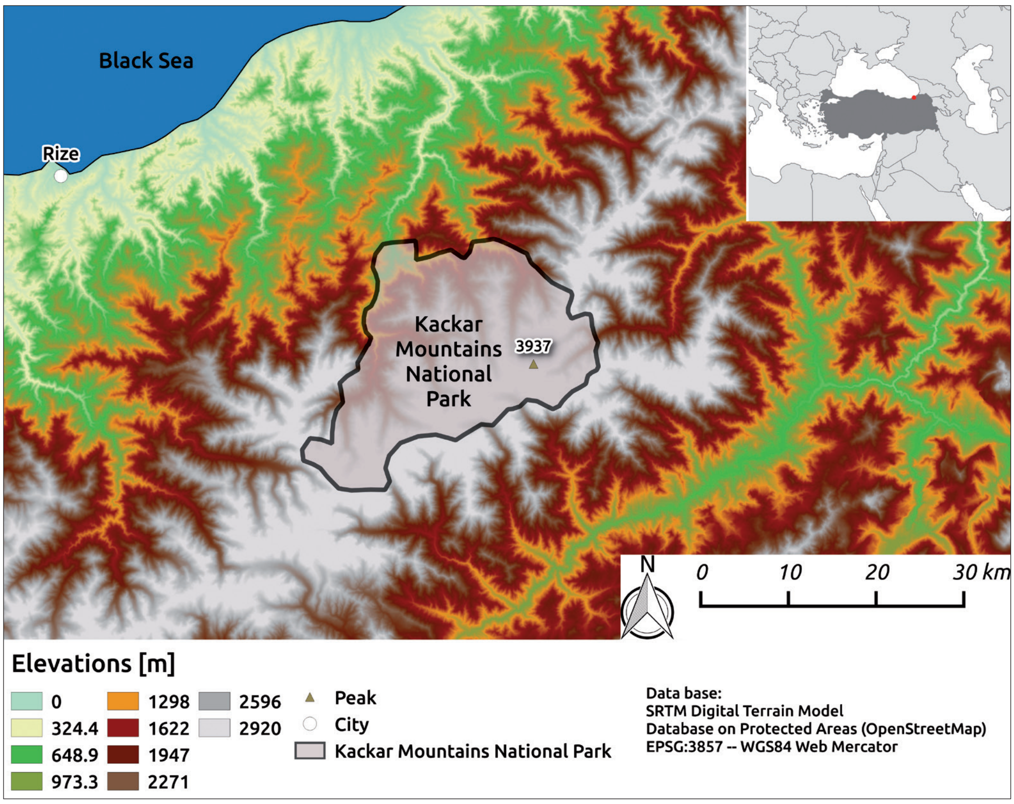

Figure 2 – Location of Kackar Mountains National Park.

Table 1 – Evaluation criteria.

	Criteria for determining the potential of flora tourism in mountainous areas
Floristic	Vegetation diversity (VD)
	Endemic-rare plant species count (EPS)
	Floristic diversity (FD)
	Diversity of utilizable plants (DUP)
Aesthetic	Seasonal attractiveness (SA)
	Aesthetic plant communities (APC)
Facilities	Protection (conservation status) and scientific value (PSV)
	Access facilities (AF)
	Services provided (SP)

Table 2 – 9-unit scale and pairwise comparisons (Saaty & Vargas 1991).

Scale	Degree of preference
1	Both attributes are equally important
3	Moderate importance of one attribute over another
5	Strong or essential importance
7	Very strong importance
9	Extreme importance
2, 4, 6, 8	Values for inverse comparison (middle value for above conditions)

AHP Application

Using AHP, a hierarchical model was developed. For each problem, the model included an objective, criteria, sub-criteria and options, and allowed the users to determine the weights of the criteria (Akıncı et al. 2013). In the process, the method actively uses the knowledge and experience of decision makers / experts, as Cox (2007) and Fernandes et al. (2018) have shown to be effective. Research in other fields, including hospitality, hotel management and tourism, has also shown that AHP is a highly suitable method for simulating decision making (Chow & Luk 2005), and for assessing the primary attributes of service quality and the key elements of sustainable development (Tsaur & Wang 2007; Sipahi & Timor 2010).

The first step in AHP is to conduct pairwise comparisons for all criteria. Comparison results for each pair of factors were defined as integer values from 1 (both factors were of equal value) to 9 (the factors were extremely different); a higher number means the factor is considered more important in comparison to the other factor with which it is paired (Saaty & Vargas 1991) (Table 2). The relative weight of each criterion was then calculated by normalizing the matched comparison matrix.

In the AHP method, inconsistencies may arise due to subjectivity. Therefore, the consistency of pairwise comparisons should be checked. The Consistency Ratio (CR) proposed by Saaty (1980) was used to measure the consistency of the decisions and was calculated using the equation $CR = CI / RI$. Here the equation $CI = \lambda max - n / (n - 1)$ was used to calculate the Consistency Index (CI) (λmax = maximum eigenvalue, n = number of criteria) (Choo et al. 2017). The consistency vector of each line in the matrix was calculated using row sum / row weight. The arithmetic

Table 3 – Pairwise comparison matrix of the criteria. See Table 1 for abbreviations of the criteria.

	Criteria								
	VD	**EPS**	**FD**	**SA**	**APC**	**DUP**	**PSV**	**AF**	**SP**
VD	1	0.6049	0.8089	1.2241	1.0126	1.6594	0.6773	1.4742	1.3875
EPS	1.6480	1	1.4901	1.8764	1.9207	2.6531	1.2953	2.1467	2.2985
FD	1.2349	0.6730	1	1.1104	1.1611	1.5768	0.6189	1.8305	1.9851
SA	0.8160	0.5307	0.8959	1	0.7411	1.0575	0.5667	0.9885	1.1355
APC	0.9854	0.5180	0.8568	1.3492	1	1.3741	0.5360	1.0470	0.8914
DUP	0.6013	0.3769	0.6341	0.9436	0.7291	1	0.3645	1.1222	1.2658
PSV	1.4704	0.7673	1.6172	1.7624	1.8558	2.7262	1	2.7729	2.9076
AF	0.6755	0.4648	0.5468	1.0095	0.9482	0.8884	0.3576	1	1.1962
SP	0.7127	0.4315	0.5026	0.8788	1.1184	0.7884	0.3411	0.8317	1
Column sum	9.1442	5.3671	8.3524	11.1544	10.487	13.7239	5.7574	13.2137	14.0676

Table 4 – Calculating the criteria weights. See Table 1 for abbreviations of the criteria.

	Criteria									Weights
	VD	**EPS**	**FD**	**SA**	**APC**	**DUP**	**PSV**	**AF**	**SP**	
VD	0.1094	0.1127	0.0968	0.1097	0.0966	0.1209	0.1176	0.1116	0.0986	0.1082
EPS	0.1802	0.1863	0.1784	0.1682	0.1831	0.1933	0.2250	0.1625	0.1634	0.1823
FD	0.1350	0.1254	0.1197	0.0995	0.1107	0.1149	0.1075	0.1385	0.1411	0.1214
SA	0.0892	0.0989	0.1073	0.0897	0.0707	0.0771	0.0984	0.0748	0.0807	0.0874
APC	0.1078	0.0965	0.1026	0.1210	0.0954	0.1001	0.0931	0.0792	0.0634	0.0955
DUP	0.0658	0.0702	0.0759	0.0846	0.0695	0.0729	0.0633	0.0849	0.0900	0.0752
PSV	0.1608	0.1430	0.1936	0.1580	0.1770	0.1986	0.1737	0.2099	0.2067	0.1801
AF	0.0739	0.0866	0.0655	0.0905	0.0904	0.0647	0.0621	0.0757	0.0850	0.0772
SP	0.0779	0.0804	0.0602	0.0788	0.1066	0.0575	0.0593	0.0629	0.0711	0.0727
Column sum	1	1	1	1	1	1	1	1	1	

Table 5 – Calculation of the consistency ratio of the criteria. See Table 1 for abbreviations of the criteria.

	Criteria									Row sum	Consistency vector
	VD	EPS	FD	SA	APC	DUP	PSV	AF	SP		
VD	0.1082	0.1102	0.0982	0.1069	0.0967	0.1247	0.1219	0.1138	0.1008	0.9814	9.0702
EPS	0.1783	0.1823	0.1808	0.1639	0.1834	0.1995	0.2332	0.1657	0.1671	1.6542	9.0740
FD	0.1336	0.1226	0.1214	0.0970	0.1108	0.1185	0.1114	0.1413	0.1443	1.1009	9.0683
SA	0.0882	0.0967	0.1087	0.0874	0.0707	0.0795	0.1020	0.0763	0.0825	0.7920	9.0617
APC	0.1066	0.0944	0.1040	0.1179	0.0955	0.1033	0.0965	0.0808	0.0648	0.8638	9.0450
DUP	0.0650	0.0687	0.0769	0.0824	0.0696	0.0752	0.0656	0.0866	0.0920	0.6820	9.0691
PSV	0.1590	0.1398	0.1963	0.1540	0.1772	0.2050	0.1801	0.2140	0.2113	1.6367	9.0877
AF	0.0730	0.0847	0.0663	0.0882	0.0905	0.0668	0.0644	0.0772	0.0923	0.7034	9.1113
SP	0.0771	0.0786	0.0610	0.0768	0.1068	0.0592	0.0614	0.0642	0.0727	0.6578	9.0481

Max. eigenvalue (λmax) = 9.0706; n = 9; Random Index (RI) = 1.46; Consistency Index (CI) = λmax-n / (n-1) = 0.0088; Consistency Ratio (CR) = CI / RI = 0.0060

mean of the consistency vectors was then calculated to obtain λmax. The Random Index (RI), a constant used in consistency rate calculations, is assigned different values based on the number of criteria. Since there were 9 criteria in the study, the RI value was 1.46. If the consistency ratio is less than 0.10, the matrix is considered to be consistent (Saaty 1980). In this way, we obtained the general priority (weight) values of the criteria that were checked for consistency.

At the outset of the study, we conducted a survey, with experts, regarding the criteria for determining the FTP. The CR was calculated for the responses of each questionnaire; 10 survey forms with CR < 0.10 were used in the AHP. After calculating the geometric means for all the survey results, the pairwise comparison matrix, which included the preference values, was constructed (Table 3). The calculation processes described in detail above were then applied to the matrix, and the weights of the FTP criteria were obtained. Following this, the percentages for the main criteria were ranked and a mountainous area FTP assessment table was developed, which uses a grading system for both the main and sub-criteria. On this scale, the maximum possible score of a mountainous region's FTP is 100 points. Thus, the scale is practical and could be used to determine the potential of flora tourism in mountain regions in Turkey and Europe.

Results

For the criteria identified in this study, the matrix for the pairwise comparisons between all criteria was developed using the geometric means of the data obtained from the pairwise comparison questionnaires (Table 3). The matrix presents the values of every single criterion with respect to every other criterion (1 indicates equal significance). The relative weights of each criterion in the normalized matrix were as follows: EPS 0.1823, PSV 0.1801, FD 0.1214, VD 0.1082, APC 0.0955, SA 0.0874, AF 0.0772, DUP 0.0752 and SP 0.0727 (Table 4). The three most significant FTP criteria for a mountainous area, therefore, are the presence of endemic and rare vegetation, the protection status / scientific value, and the floristic

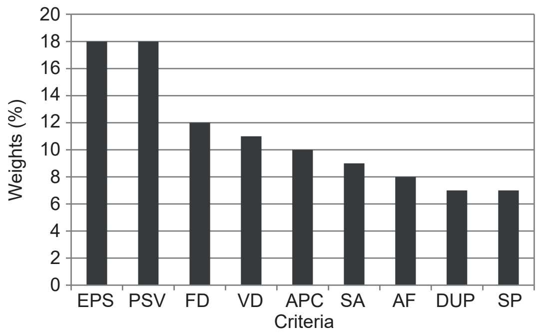

Figure 3 – Distribution of the percentage weight scores of the criteria. See Table 1 for abbreviations of the criteria.

diversity. The logical consistency of the set of 9 criteria was calculated as presented in Table 5. Accordingly, it was found that λmax = 9.0706, CI = 0.0088 and CR = 0.0060. Thus, it was determined that the evaluation criteria proposed in the study were consistent (since CR < 0.10).

The values obtained for the criteria weights are presented as percentages (Figure 3): the weights of EPS and PSV were 18%, FD was 12%, VD was 11%, APC was 10%, SA was 9%, AF was 8%, and DUP and SP were 7%.

FTP Assessment Scale

Subscales of the main criteria and the related scoring system are presented in Table 6. The maximum score was divided between 6 categories based on EPS in the area. Due to the particular characteristics of alpine and mountainous areas, endemic and rare plant species in these areas exhibit a more limited distribution compared to other areas. The richness of species decreases with elevation, on average by 15–45 species per 100 m increase in elevation (Nagy et al. 2003). Thus, the number of species in the EPS category was attributed a score of 10 and its multiples. Accordingly, the score for each category is 18 / 6 = 3 points. In the floristic diversity (FD) section, a total of 6 categories were created. Accordingly, the score for each category is 12 / 6 = 2 points.

The PSV section was based on the Protected Area Categories in IUCN (2018); 18 points were awarded

Table 6 – FTP Evaluation scale. See Table 1 for abbreviations of the criteria.

Criteria	Max. score	Sub-attributes and rating score
EPS	18	The number of endemic and rare plant species in the area, 1. 1–10 species (1x3 = 3 points) 2. 11–20 species (2x3 = 6 points) 3. 21–30 species (3x3 = 9 points) 4. 31–40 species (4x3 = 12 points) 5. 41–50 species (5x3 = 15 points) 6. 51 species and over (6x3 = 18 points) The corresponding category (the number of endemic and rare species in the area) is multiplied by 3 to give the EPS score.
PSV	18	IUCN Protected Area Categories (IUCN 2018) - Strict Nature Reserve - Wilderness Area - National Park - Natural Monument or Feature - Habitat/Species Management Area - Protected Landscape/Marine environment - Protected area with sustainable use of natural resources 18 points are given if the area has one or more of these statuses.
FD	12	The approximate number of taxa in the area 1. 1–200 taxa (1x2 = 2 points) 2. 201–400 taxa (2x2 = 4 points) 3. 401–600 taxa (3x2 = 6 points) 4. 601–800 taxa (4x2 = 8 points) 5. 801–1000 taxa (5x2 = 10 points) 6. 1001 taxa and over (6x2 = 12 points) The corresponding score (1–6) for number of taxa in the area is multiplied by 2 to give the FD score.
VD	11	Vegetation Classification (developed from USNVC 2018) - forest, woodland - shrubland - grassland, meadows - step and Xeric, semi-desert - aquatic (e.g. lakes, rivers and streams, swamps) - nonvascular, sparse vascular rock - agricultural - developed vegetation - rocky outcrop, cliff - boreal - alpine, subalpine The VD score is equal to the number of vegetation types that the area has.
APC	10	Vegetation types contained in the field - coniferous forest - deciduous forest - mixed stand - bushes and tree - grassland and scrub compositions The number of vegetation types in the area is multiplied by 2 to calculate the APC score.
SA	9	Months with seasonal attractiveness; - January, February, March, April, May, June, July, August, September, October, November, December The number of months with seasonal attractiveness is multiplied by 0.75 to calculate the SA score.
AF	8	Accessibility and bioclimatic comfort found in the field; - vehicular transport (e.g. motor vehicles, cable cars) - access by bicycle or on foot - distance from the nearest residential area (not more than 20 km) - climate, acceptable bioclimatic comfort (based on Oligay's bioclimatic chart) (Olgyay 1963) The number of access features and bioclimatic suitability for the area is multiplied by 2 to calculate the AF score.
DUP	7	- presence of medicinal or aromatic plants - presence of edible plants; ethnobotanical value The number of features in the area is multiplied by 3.5 to calculate the DUP score.
SP	7	Services in the area; - infrastructure (facilities and accommodation) - guides and promotion services - trekking routes - safety of area The number of services in the area is multiplied by 1.75 to calculate the SP score.
Total score (%)		

as an evaluation score if the area has one or more of these statuses. In the VD section, the mountainous area vegetation was divided into 11 classes, with 1 point each, based on the Vegetation Classification in USNVC (2018). Each area received one point for each of the characteristics that it presents.

In the APC section, a scoring based on 5 categories of 2 points each was designed, based on the presence of natural plant communities in mountainous areas (10 / 5 = 2 points). The total number of features available in the area was multiplied by 2 to obtain the evaluation score. In the SA section, the seasonal land-

Table 7 – Calculating the FTP of KMNP. See Table 1 for abbreviations of the criteria.

Criteria	Max. score	Sub-attributes in KMNP	Rating score
EPS	18	88 endemic plant species	6x3 = 18
PSV	18	National Park	18
FD	12	2152 taxa	6x2 = 12
VD	11	Forests; shrubland; grassland; aquatic (lakes and streams); nonvascular; rocky outcrop; alpine (and subalpine)	7
APC	10	Coniferous forest, mixed stand, bush and tree, grassland and scrub compositions	4x2 = 8
SA	9	March, April, May, June, July, August, September, October, November, December	10x0.75 = 7.5
AF	8	Vehicular transport, by bicycle or on foot, climate (The distance to the KMNP from the nearest residential area is about 50 km.)	3x2 = 6
DUP	7	KMNP has medicinal-aromatic plants and edible plants (about 250 taxa).	2x3.5 = 7
SP	7	Guides and promotion services, trekking routes (KMNP does not have sufficient infrastructure services or safety of the area)	2x1.75 = 3.5
Total score (%)			87

scape quality in the natural area over 12 months was assessed separately. Thus, the score of each category is 9 / 12 = 0.75 points. Accordingly, the total number of months considered to possess seasonal attractiveness was multiplied by 0.75 to obtain the total evaluation score.

In the AF section, four categories (concerning access to the area, distance and bioclimatic comfort) were allocated 2 points each to give the visit potential of the area (8 / 4 = 2 points). For the area's bioclimatic comfort, the scoring was based on the conditions in which individuals are bioclimatically comfortable, as described by Olgyay (1963): relative humidity between 30% and 65%; temperature between 21 °C and 27.5 °C; wind speed up to 5 m / s. In the DUP section, the presence of medicinal-aromatic plants and species with ethnobotanical uses were determined as the evaluation criteria, and 3.5 points were assigned for each criterion (7 / 2 = 3.5 points). Finally, in the SP section, the facilities in the area were classified under 4 categories, and 1.75 points were assigned to each category (7 / 4 = 1.75 points). The actual overall rating score is calculated by adding the score for each line in the mountain area tourism potential assessment form. A grading system was obtained by dividing 100 points into 5 categories, as follows:

If FTP ≤ 20%, then very low
if 20% < FTP ≤ 40%, then low
if 40% < FTP ≤ 60 %, then average
if 60% < FTP ≤ 80%, then high
if FTP > 80%, then very high.

Flora Tourism Potential of Kackar Mountains National Park

The analysis conducted using the KMNP nature tourism management plan data (RNTP 2014) and the data obtained in the field studies produced an overall result of 87% for the FTP of the area (Table 7) (= *very high*). However, due to problems such as the distance from residential areas, insufficient infrastructure services and poor security, the AF and SP criteria scores were low.

Discussion

Various approaches for assessing the tourism potential of resources can be found in the literature (e.g., Travel-Cost analysis, SWOT analysis, Descriptive analysis, Geographic Information Systems, Stakeholders' assessment, Weighted Sum Model / Method) (Yan et al. 2017). The present study focused on determining the FTP within the context of alternative tourism. In this context, the AHP method allows us to measure the consistency of the decision-making and assessment criteria and to determine the degrees of significance.

Gülez (1990) developed an evaluation method to determine the recreational potential in forests. The advantages of that method are its practicality, the consideration of natural and cultural elements in conjunction with each other, taking negative factors into consideration, and the possibility of calculating both the current and future recreational potential of the area. The disadvantages of the method are its subjectivity, the fact that it requires meteorological records, its inability to produce definite results, and that it cannot be applied to all forest recreational activities. Thus, to determine recreational potential, the application of a multi-criteria decision-making method, where all assessment criteria are addressed, would help produce robust decisions. Choo et al. (2017) demonstrate the applicability of decision-making models in medical tourism, slow tourism and sustainable tourism destinations.

The analysis criteria proposed in the present study could provide references for future studies. However, the ranking of indicators and sub-indicators could be extended or made more reliable by experts.

In one study (Irmak & Yılmaz 2011) conducted to determine the preferences and trends of the participants in flora tourism activities, the vast majority of the participants preferred the spring for flora tourism activities. The vast majority also stated that flora tourism activities require at least one day or one week, and they preferred coasts and forests as flora tourism destinations. The surveys demonstrated that the most interesting plant types for participants were aromatic plants, geophytes and endemic species. The participants' priorities were security, the beauty of the landscape, and rich vegetation. We observed that the criteria proposed by Irmak & Yılmaz could indeed be effective for determining the potential of flora tourism. These same characteristics are already found in KMNP, thus demonstrating its interest as a destination for flora tourism.

In contrast with some other studies on flora tourism (e.g., Turpie & Joubert 2004; Xie et al. 2005; James et al. 2007), since the present study was conducted using qualitative data, the *tourist preferences* parameter was excluded from the analysis. However, future studies could develop more holistic analysis methods.

Certain previous studies have demonstrated that the EPS, FD, VD, APC and SA parameters are effective for determining the value of flower tourism (Turpie & Joubert 2004; Alaeddinoglu & Can 2011). Although SP and AF are quite important criteria for mass tourism and nature tourism (Priskin 2001; Yan et al. 2017), the EPS, PSV and FD parameters are more significant for FTP.

Although KMNP had high FTP (87%), adequate infrastructure facilities are not provided in the area, access to the peaks is challenging, and guide services are inadequate. However, to improve a destination's level of attraction for tourism, transportation, accommodation, and visitor services and infrastructure facilities should be made available (Priskin 2001). On the other hand, the unplanned and intensive use of national parks because of the recreational facilities that they already offer could affect the areas adversely. Future comprehensive research to analyse the potential impact of tourism and recreation would help develop conservation and management strategies, especially in protected areas (Wraith & Pickering 2017).

Conclusion

As increasingly diverse tourism activities shift towards natural areas, flora tourism is becoming increasingly popular, especially in protected areas with high floristic diversity. Experts should ensure adequate preservation status and load capacities for areas that are rich in flora and that have rare and endangered plant species. In this context, plant-bioinformatics systems could help define sustainable use of protected areas and plant species (Boz 2014).

Flora tourism routes should be planned differently from those in other intensively used areas for nature-based tourism activities; since conducting multiple activities on the same routes would endanger natural resources, this would threaten sustainability. By ensuring the ex-situ cultivation of certain endemic and endangered plant species, the possible damage to sensitive ecosystems by flora tourists, who visit the sites precisely in order to see the plants, would be avoided. Another important issue is the organization of adequate training and promotional activities by the relevant stakeholders.

Aesthetic plant species have the potential to attract tourists to natural areas (see e.g. Turpie & Joubert 2004; Akpınar Külekçi & Bulut 2016), which could encourage local people and administrators to improve flora tourism. However, the presence of aesthetic plants may not be sufficient on its own for the development of flora tourism. Thus it would be beneficial, initially, to determine the whole range of resources in areas with FTP, and develop planning strategies accordingly.

Because of the range of criteria used here, our study should be applicable in any mountainous area with possible potential for FPT. Although it would be easier to determine FTP in mountainous areas with specific conservation status compared to mountainous areas without a database of plant species, this method could also help reveal possible new nature-based tourism destinations, as well as record those regions with known tourism potential.

References

Akıncı, H., A. Yavuz Özalp & B. Turgut 2013. Agricultural land use suitability analysis using GIS and AHP technique. *Computers and Electronics in Agriculture* 97: 71–82.

Akpınar Külekçi, E. & Y. Bulut 2016. Evaluation of plant that landscape value of carry some cover plants tourısm potential flora in Oltu and Olur district. *Journal of the Institute of Science and Technology* 6: 95–105.

Alaeddinoglu, F. & A.S. Can 2011. Identification and classification of nature-based tourism resources: western Lake Van basin, Turkey. *Procedia Social and Behavioral Sciences* 19: 198–207.

Ballantyne, M. & C. Pickering 2012. Ecotourism as a threatening process for wild orchids. *Journal of Ecotourism* 11: 34–47.

Balmford, A, J. Beresford, J. Green, R. Naidoo, M. Walpole & A. Manica 2009. A global perspective on trends in nature-based tourism. *PLoS Biolgy* 7: 1–6.

Boz, D. 2014. Diversification of botanic tourism by benefiting from the plant bioinformatics system, Global Review of Research in Tourism, Hospitality and Leisure Management. *An Online International Research Journal* 1(2): 102–116.

Choo, S., K. Lee & J. Park 2017. Development of rural accommodation selection criteria: the case of South Korea. *European Journal of Tourism Research* 17: 246–260.

Chow, C.C. & P. Luk 2005. A strategic service quality approach using analytic hierarchy process. *Managing Service Quality* 15(3): 278–289.

Cox, M.A.A. 2007. Examining alternatives in the interval analytic hierarchy process using complete enumeration. *European Journal of Operational Research* 180(2): 957–962.

Eagles, P.F.J. 2007. Global trends affecting tourism in protected areas. In: Bushell, R. & P.F.J. Eagles (eds.), *Tourism and protected areas: benefits beyond boundaries*: 27–43. CABI Publishing.

Fernandes, I.D.S., F.A.F. Ferreira, P. Bento, M.S. Jalali & N.J.S. António 2018. Assessing sustainable development in urban areas using cognitive mapping and MCDA. *International Journal of Sustainable Development & World Ecology* 25(3): 216–226.

Folmer, A., T. Haartsen, A. Buijs & P.P.P. Huigen 2016. Wildlife and flora and the perceived attractiveness of green places: A comparison between local and national green places. *Journal of Outdoor Recreation and Tourism* 16: 16–23.

Ghoddousi, S., P. Pintassilgo, J. Mendes, A. Ghoddousi & B. Sequeira 2018. Tourism and nature conservation: A case study in Golestan National Park, Iran. *Tourism Management Perspectives* 26: 20–27.

Gülez, S. 1990. An evaluation method for the determination of forest recreation potential. *Journal of the Faculty of Forestry Istanbul University* 40(2): 132–147.

Irmak, M.A. & H. Yılmaz 2011. Determination of perception of flora tourism via questionnaire surveys. *Biological Diversity and Conservation (Biodicon)* 4(1): 99–106.

IUCN 2018. Protected area categories. The International Union for Conservation of Nature (IUCN). Available at: https://www.iucn.org/theme/protected-areas/about/protected-area-categories (accessed: 02/07/2018)

Jalal, J.S., G.S. Rawat & P. Kumar 2008. An initiative to community based orchid conservation in the Gori Valley, Uttarakhand, Western Himalaya, India. *The McAllen International Orchid Society Journal* 9: 12–16.

James, I., T. Hoffman, A. Munro, P. O'Farrell & R. Smart 2007. The value of flower tourism at the Namaqua National Park: environmental and ecological economics. *South African Journal of Economic and Management Sciences* 10(4): 442–456.

Knezevic, R. 2008. Contents and assessment of basic tourism resources. *Tourism and Hospitality Management* 14(1): 79–94.

Lindemann-Matthies, P., X. Junge & D. Matthies 2010. The influence of plant diversity on people's perception and aesthetic appreciation of grassland vegetation. Biological Conservation 143(1): 195–202.

Nagy, L., D. Thompson, G., Grabherr & C. Körner 2003. Alpine biodiversity in Europe: an introduction. Joint Nature Conservation Committee, Peterborough (UK). Available at: http://jncc.defra.gov.uk/pdf/pub03_alpnetbooklet_all.pdf (accessed: 06/07/2018)

NCNP 2018. Kackar Mountains National Park, General Directorate of Nature Conservation and National Parks (NCNP). Available at: http://kackardaglari.tabiat.gov.tr/ (accessed: 27/08/2018)

Newsome, D., S.A. Moore & R.K. Dowling (eds.) 2002. *Natural area tourism: ecology, impacts and management.* Sydney.

Newsome, D. & K. Rodger 2013. Wildlife tourism. In: Holden, A. & D. Fennell (eds.), *The Routledge Handbook of Tourism and the Environment*: 345–358. New York.

Olgyay, V. 1963. *Design with climate, bioclimatic approach to architectural regionalism.* New Jersey.

Pickering, C.M. & M. Ballantyne 2013. Orchids: an example of charismatic megaflora tourism? In: Holden, A. & D. Fennell (eds.), *Handbook of tourism and the environment.* London (UK).

Pirselimoglu Batman, Z. & Ö. Demirel 2015. Ecology-based tourism potential with regard to alternative tourism activities in Altındere Valley (Trabzon – Maçka). *International Journal of Sustainable Development & World Ecology* 22(1): 39–49.

Priskin, J. 2001. Assessment of natural resources for nature-based tourism: The case of the Central Coast Region of Western Australia. T*ourism Management* 22: 637–648.

Priskin, J. 2003. Characteristics and perceptions of coastal and wildflower nature-based tourists in the central coast region of Western Australia. *Journal of Sustainable Tourism* 11: 499–528.

RNTP 2014. Rize Nature Tourism Master Plan 2014–2023. Available at: http://bolge12.ormansu.gov.tr/12bolge/Files/R%C4%B0ZE%20DO%C4%9EA%20TUR%C4%B0ZM%C4%B0%20MASTER%20PLANI%20.pdf (accessed: 20/08/2018)

Saaty, T.L. 1980. *The Analytic Hierarchy Process: planning, priority setting, resource allocation.* New York (NY).

Saaty, T.L. & L.G. Vargas (eds.) 1991. *Prediction, projection and forecasting.* Dordrecht.

Sarı, D. 2010. Biyoçeşitlilik ve floristik çeşitlilik açisindan alpin alanlarin önemi (Importance of the alpine areas in terms of biodiversity and floristic diversity). *Proseedings of 3rd National Black Sea Forestry Congress:* 1447–1455. May 20–22; Artvin, Turkey. [In Turkish]

Sarı, D., & C. Acar 2015. Evaluation of the natural plant taxa in alpine rocky habitats in terms of the functions of planting design. *ACU Journal of Forestry Faculty* 16(2): 144–163.

Siikamäki, P., K. Kangas, A. Paasivaara & S. Schroderus 2015. Biodiversity attracts visitors to national parks. *Biodiversity Conservation* 24(10): 2521–2534.

Sipahi, S. & M. Timor 2010. The analytic hierarchy process and analytic network process: An overview of applications. *Management Decision* 48(5): 775–808.

Temizkan, S.P. & G. Yıldırım 2014. The Application of Local Guidance within the Context of Sustainable Tourism: The Case of National Park at the Kackar Mountains, Electronic. *Journal of Social Sciences* 13(49): 124–149.

Tsaur, S.H. & C.H. Wang 2007. The evaluation of sustainable tourism development by analytic hierarchy process and fuzzy set theory: an empirical study on the Green Island in Taiwan. *Asia Pacific Journal of Tourism Research* 12(2): 127–145.

Turpie, J. & A. Joubert 2004. The value of flower tourism on the Bokkeveld Plateau – A botanical hotspot. *Development Southern Africa* 21(4): 645–662.

USNVC 2018. United states national vegetation classification database, United States National Vegetation Classification (USNVC) V2.01. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Available at: http://usnvc.org/explore-classification/ (accessed: 02/07/2018)

Worboys, G., T. DeLacy & M. Lockwood (eds.) 2005. *Protected area management: principles and practice* (2nd ed.). Cambridge (UK).

Wraith, J. & C. Pickering 2017. Tourism and recreation a global threat to orchids. *Biodiversity and Conservation* 26: 3407–3420.

Xie, Y., X.D. Wang, M.H. Meng & X.Y. Li 2005. Study on the development of the flower-themed tourism in Lin'an, Zhejiang. *Journal of Zhejiang Forestry Science and Technology* 25(2): 65–68.

Yan, L., W.G. Bo & Z. Meng 2017. A mathematical model for tourism potential assessment. *Tourism Management* 63: 355–365.

Author

Derya Sarı

is an Assistant Professor in the Department of Landscape Architecture at Artvin Çoruh University, Turkey. Her research focuses on landscape assessment, landscape ecology, alpine habitats, floristic diversity and nature-based tourism. Department of Landscape Architecture, Faculty of Art and Design, Artvin Coruh University, 08000, Arhavi, Artvin, Turkey. E-mail: deryasari@artvin.edu.tr