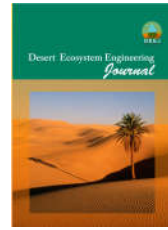




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Valuing Recreation Ecosystem Services in Jebalbarez Natural Park Using the Regional Travel Cost Method

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Abstract

Considering the significant role of natural parks in providing an appropriate recreational services for the increasing population worldwide, this study sought to examine the recreational value of Jabalbarez Natural Park (located in Jiroft, Kerman province, Iran) using the regional travel cost method. To this end, a questionnaire was administered to 198 visitors of the Park who were randomly selected, enquiring them regarding their socio-economic status and their opinion about the Jabalbarez Natural Park. The results indicated that the education level ($R^2=0.546$, $p<0.001$) and income ($R^2=0.863$, $p<0.001$) had significant positive effects on people's willingness to pay for the entrance fee of the Park, with 74.2% of the respondents expressing their approval to pay the entrance fee. Moreover, it was found that the willingness of the respondents to visit the Park decreased significantly with an increase in the distance from the Park and the travel costs ($R^2=-0.571$, $p<0.001$). The results of estimating the recreation demand function of the park also showed that travel costs, income level, age, and education level of the visitors exerted a significant influence on the number of visitors ($p<0.01$).

On the other hand, the annual recreational value of the Jabalbarez Natural Park was estimated as 12536089250 Rials by calculating the subsurface of the recreational demand curve. Jabalbarez Natural Park in Kerman province is less known to Iranian people than similar areas in the country. Therefore, this study revealed the importance of paying attention to recreational management and development in the area.

Keywords: Recreational Value, Natural Park, Semiarid Lands, Demand Curve.

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1. Introduction

Assessing ecosystem services reveals the benefits of nature to humans, elaborating on the monetary and non-monetary values of ecosystem functions (Pascual et al., 2010). However, some ecosystem services are difficult to understand due to their intangible essence, requiring empirical knowledge (MA, 2005). On the other hand, cultural ecosystem services offer physical, emotional, and mental benefits to the relevant stakeholders (Kenter et al., 2014). Nonetheless, while the demand for cultural ecosystem services is expected to further increase with growing urbanization (Guo et al., 2010), there is no market for trading cultural services (Martín-López et al., 2009). Therefore, valuing non-market functions and services is crucially important to help decision-makers and planners prevent the destruction and exploitation of natural resources (MA, 2005).

Visitors who travel for recreation purposes usually look for natural areas to meet their needs, often traveling to distant areas to do so (Shrestha et al., 2007). In this regard, many studies have so far been conducted on the demand for non-market services such as recreation (Bjork et al. (2008), Paudyal et al. (2018), Scholte et al. (2018), Riechers et al. (2018), Cunha et al. (2018), and Moseley et al. (2018)) using different methods, including contingent value method (CVM) and travel cost method (TCM) (Schweppe et al., 2015; Leh et al., 2018).

As a method used for non-market assessments, TCM values those products, such as cultural heritage and cultural heritage conservation sites, that are not purchased and sold in regular markets (Alberini & Longo, 2006). Therefore, the method appears to be suitable for measuring natural resources-based tourism, being able to be used for measuring the economic benefits of recreation sites such as parks, forests, and wildlife sanctuaries (Leh et al., 2018).

According to the TCM, it is assumed that real market prices are used to value the non-market characteristics of the environment as an indirect way to estimate the recreational benefits of the landscapes, including beaches, historical and

natural sites, and other recreational places (Chen et al., 2004).

There are two kinds of TCM: is estimated Individual Travel Costs (ITCM) and Regional Travel Costs Method (RTCM), each of which fits a distinct goal. In this regard, while ITCM is suitable for places that are frequently visited by local people, RTCM suits the investigation of those visitors who travel to distant destinations.

In this regard, some studies have been carried out on valuing recreation services using TCM. For instance, Kheyri et al. (2020) estimated economic value of Gahar lake in Lorestan province using zonal travel costs method, finding that the recreational value of the study area was estimated at USD 84.538 per visitor and USD 1,986,657.163 per year.. Furthermore, Voke et al. (2013) investigated the economic value of coastal recreational regions in Pembroke, the United Kingdom, where marine renewable energy is produced using the individual travel cost method, showing that the average recreational value of the region was 148\$ per capita. Also, Musamba et al. (2012) examined the recreational value of Lake Victoria in Tanzania using the travel cost method, estimating the annual recreation value of the lake to be 1044760 \$. On the other hand, Azizi and Seydan (2014) investigated the recreation value of Shirinsou wetland using the regional travel cost method, reporting that the daily and annual tourism values of Shirinsou Wetland were 92000515 and 33580187975 Rials (Iranian Currency), respectively.

Considering the fact that the development and protection of natural ecosystems for recreation services have been one of the essential governmental policies in many countries, including Iran, it could be argued that Natural Parks play a significant role in providing people with the requirements of recreation (Bennett, 1996). Therefore, this study sought to survey the economic value of recreation services in Jebalbarez Natural Park, which is known as a recreation center in southern Kerman province, Iran.

2. Materials and Method

2.1. The Study Area

Covering an area of about 993.35 square

kilometers (Fig 1), the study area is a rangeland located in Jebalbarez, Jiroft, Kerman province, Iran (57° 53' E 28° 52' N), whose average elevation is 1750 meters above sea level. Moreover, the region's average annual precipitation and temperature rates are 250 mm and 15.2 °C, respectively. Also, the maximum and minimum temperature rates of the study area are 39 °C and -9°C in August and

December, respectively.

Established about 15 years ago, the Jebalebarez Natural Park is located within the region, covering an area of three square kilometers, where the dominant plant species are *Amygdalus scoparia* Spach., *Ebenus stellata* Boiss., *Launaea Spinosa* (Forssk.) Sch.Bip., *Artemisia aucheri* Boiss.

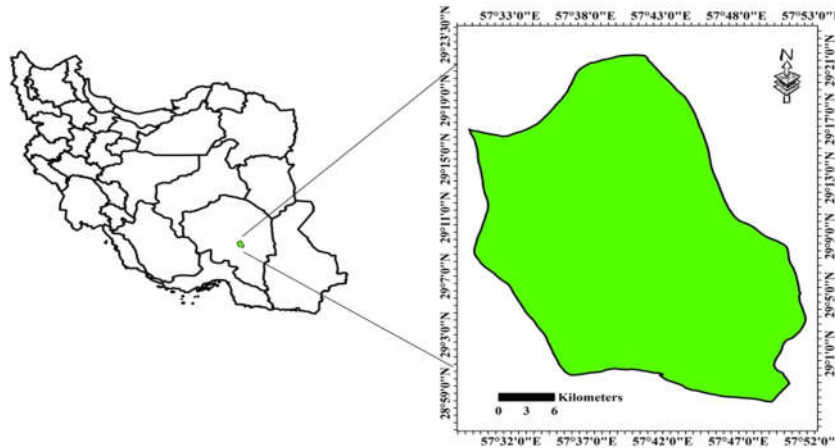


Figure (1): Map of the study area

2.2. Data Collection

To collect the required data, a questionnaire comprising of social and economic sections was developed based on the data obtained from face-to-face interviews made with the visitors. Accordingly, thirty questionnaires were distributed among the visitors as a pre-test determine the sample size using the following equation:

$$n = \frac{t^2 s^2}{d^2} \quad (1)$$

Where n stands for the sampling number, t represents t-student, d shows the acceptable error margin, and s is the standard deviation of the visitor's willingness to pay for entrance fees (Mitchell & Carson, 1989). The statistical population of the study comprised of 198 visitors of Jabalbarez Park who were randomly selected to participate in the research.

2.3. The regional travel cost method

This study used the RTCM to value recreation services in the study area. According to this method, information about the number of visits

made by people coming from different distances is collected, allowing the researcher to calculate the number of visits under different prices. The method also helps the researcher use the collected data to examine the demand function of the region and estimate the consumer surplus or economic benefits of recreation services (Fleming & Averil, 2008).

Therefore, this study used the RTCM to evaluate the economic value of recreation services offered in Jebalbarez Natural Park. To this end, first, concentric circles (the natural park is chosen as the center) were drawn for different radii with fixed distances to divide the residential areas based on their distance from the Park.

Then, the number of visits made in each zone was calculated in proportionate to the number of people living in each area (calculated according to the results of the general population and housing census published in 2017 by Iran's National Statistics Center). Afterward, the average distance of each zone from the national park, the costs of and the time taken for

traveling from each zone to the Park were calculated.

Moreover, the responders were asked to articulate the travel time taken from the starting point of the trip to the natural park, which was added to the time spent visiting the park to measure the total time of visiting each zone and thus calculate the travel costs (as suggested by Bateman et al., (1996)). In other words, each visitor's travel costs were calculated based on the total costs of transportation, including fuel costs, the car's wear and tear, public transportation, and travel's time opportunity costs.

On the other hand, people lose some of their work time or income by traveling to recreation places (Ward & Loomis, 1986). Therefore, as ignoring the cost of time opportunity reduces the value of the estimated recreation value, it is normally calculated as one-third or one-fourth of a person's daily income (Clawson & Knetsch, 1966). Accordingly, to calculate the costs of travel time opportunity, visitors were asked to report their monthly income, the average number of working days per month, and the number of hours they work per day (to measure the average costs of their working hours).

In the fourth step of the study, the relationship between travel distance, travel costs, and the number of people who visited the recreation site were modeled to estimate the demand function using the following equation:

$$\frac{V_i}{N_i} = F(TC_i, S_i, A_k) \quad (2)$$

Where V_i stands for the individual visitors who traveled from zone i to the Jebalbarez Natural Park, N_i represents the population in zone i , Tc_i shows the travel costs from zone i to the Jebalbarez Natural Park, S_i is the demographic characteristics of the visitors in zone i , and A_k indicates the aesthetic features of the Jebalbarez Natural Park compared to other recreation sites (K).

In the fifth step, the demand function for visiting the recreation site was calculated based on the relationship between the number of visitors and the distance dimension and between the number of visitors and the travel costs using a regression model. Furthermore, the frequency of visiting was calculated per thousand or tens of thousands of people based on the relationship between the travel costs and the number of visitors. The curve drawn in this regard indicates the visitor's demand for visiting Jebalbarez Natural Park.

In the sixth step, the area below the demand curve was calculated to determine the economic value of the recreation service. On the other hand, the new ratio of the number of visitors for new costs per thousand or tens of thousands of people was calculated by adding the recreation values to the average travel costs, placing these new values in the simplified model. Finally, the daily value of recreation services was measured by calculating the area below the curve of the obtained demand function through the following equation (as suggested by Willis, 1991).

$$V = \sum_{i=1}^n N \times AP \quad (3)$$

Where V stands for the economic value of the recreation services, N represents the number of visits made in zone i , and AP shows the hypothetical entrance price.

The relationship between the average travel costs and the number of visitors shows the visitor's behavior pattern towards cost alterations. The respondents were given the opportunity to choose hypothetical entries for knowing the visitor's behavior pattern in terms of paying the entrance fee.

The desirable entrance fees were considered as 5000, 7500, 10000, 15000, 20000, 25000, and 30000 Iranian Rials based on what respondents offered in the pre-test questionnaire, which were then added to the average costs of accessing the recreation sites to calculate the new costs per each thousand people by putting the data in the simplified

version of the model, the new ratio of the number of visitors was calculated for.

Finally, the socio-economic characteristics of the visitors were examined, followed by modeling the relationship between such characteristics and the number of visitors in each zone. It should be noted that all statistical analyses were performed using the SPSS statistical software.

3. Results

The study's results suggested that 18.7% of the respondents were under 20 years old, 47% were between 20-35 years old, 16% were between 35-45 years old, 12.1% were between 46-60 years old, and 6% were over 60 years old.

Moreover, in terms of monthly income, it was found that 6% of the respondents earned

less than 10 million Iranian Rials, 38.4% earned between 10 - 15 million Iranian Rials, 4.35% earned between 16 - 20 million Iranian Rials, and 9.6% earned more than 20 million Iranian Rials. Also, in terms of education level, 9.6% of the respondents held lower than high school degrees, 29.3% held high school degrees, 46.4% held undergraduate degrees, and 14.6% had graduate and post-graduate degrees.

On the other hand, 49.5% of the respondents were female and 50.5% were male, from among whom, 21.2%, 30.8%, and 28.3% were farmers, ranchers, and employees, respectively, and 19.7% of the respondents had other occupations. Furthermore, the family size was 2, 3-5, and over 5 persons for 34.3%, 38.3%, and 27.4% of the respondents, respectively (Table 1).

Table (1): Socio-economic characteristics of the responders

		Observations	Frequency (Percent)
Age(year)	<20	37	18.7
	20-35	32	16.2
	36-45	93	47
	46-60	24	12.1
	60<	12	6
Income (Iranian Rials)	<10000000	12	6
	10000000-15000000	76	38.4
	16000000-20000000	70	35.4
	20000000<	40	20.2
Education Level	Less than High school	19	9.6
	High school	58	29.3
	Undergraduate	92	46.4
	Graduate and Post-graduate	29	14.6
Gender	Female	98	49.5
	Male	100	50.5
Occupation	Farmer	42	21.2
	Rancher	61	30.8
	Employee	56	28.3
	Others	39	19.7
Family members (number)	2	68	34.3
	3-5	76	38.3
	5<	54	27.4
Sum		198	100

Moreover, in terms of the motivations behind visiting Jabalbarez Park, it was found that 28.2% of the respondents visited the Park to enjoy its natural landscapes, 26.2% visited the site due to its beauty and environmental attractions, 17.1% visited the Park to get rid of

urban life and benefit from the clean air, 21.7% visited the Park because they found it better than other recreation sites, and 6.5% of the respondents visited the place on the recommendation of their family members and relatives.

Furthermore, 29.8% and 34.3% of the respondents found Jabalbarez Park exceptionally and almost beautiful, respectively. However, 27.2%, 7.2%, and 1.5% of the respondents found the beauty of the Park as moderate, little, and very little, respectively. In addition, 41.4%, 25.3%, 12.1%, and 21.2% of the respondents found spring, summer, autumn,

and winter as the appropriate time to visit Jabalbarez Park for recreation purposes, respectively. on the other hand, while 17.1% of the respondents agreed and 33.8% of them totally agreed to pay for protecting the area and 23.2% of them remained silent in this regard, 16.9% of the participants disagreed and 9% of them totally disagreed to do so (Table 2).

Table (2): Responders' Attitudes Concerning Jebalbarez Natural Park

		Observations	Frequency (Percent)
Visiting Motivations	Enjoying natural landscapes	56	28.2
	Getting rid of urban life and benefiting from the clean air	34	17.1
	the beauty of the park and its environmental attractiveness	52	26.2
	Considering the park a better place for recreation than other places	43	21.7
	Recommendation of relatives and acquaintances	13	6.5
landscape beauty of the rangeland	Exceptional	59	29.8
	Almost	68	34.3
	Moderate	54	27.2
	Little	14	7.2
	Very Little	3	1.5
Willingness to visit in different seasons	Spring	82	41.4
	Summer	50	25.3
	Autumn	24	12.1
	Winter	42	21.2
Paying for rangeland protection	Totally agree	80	40.4
	Agree	67	33.8
	No Idea	12	6.06
	Disagree	21	10.6
	Totally Disagree	18	9
Sum		198	100

Table 3 shows the population, visiting frequency, visiting ratio per 1000 people, average visiting number, and distance in eight zones. Accordingly, while zone one, which is located at an average distance of 6.67 km away from the Park, had the highest number of visitors (58), zone nine, which is located approximately 85.97 km away from the Park, had the lowest number of visitors (1).

Table 4 shows the demographic characteristics of the visitors in each zone. Accordingly, the

lowest and highest travel costs belonged to zones one and nine, with their average amount being 15676543.8 and 103898.5 Iranian Rials, respectively. Moreover, it was found that the visitors categorized in zone four had the highest monthly income (28976894.3 Iranian Rials) and education level. Also, the oldest age of the visitors belonged to zone one, with its average being 44.7 years.

Table (3): Results of the second step of the regional travel cost method

Zone	Population	Visiting Frequency	Visiting Percent	Visiting Ratio per 1000 people	Average visiting Rate	Average distance
1	16567	58	29.2	293	0.003500	6.67
2	10689	45	22.7	227	0.004209	13.79
3	3456	33	17.1	172	0.009837	30.78
4	136789	23	11.6	116	0.000168	45.86
5	156787	18	9.09	91	0.000114	60.83
6	56786	12	6.06	61	0.000211	70.57
7	67898	5	2.5	25	0.000073	75.87
8	127458	3	1.5	15	0.000023	80.87
9	76873	1	0.9	10	0.000013	85.97
sum	653303	198	100			

Table (4): Socio-economic Characteristics of the Visitors in Nine Zones Studied

Zone	Average Travel Costs (Iranian Rials)	Average Monthly Income (Iranian Rials)	Average Education Level (years of study)	Average Age (year)
1	456787.9	15676543.8	13.6	44.7
2	567895.8	16782647.2	12.7	36.6
3	589535.7	14765415.5	13.7	38.9
4	789873.2	28976894.3	18.7	32.1
5	859865.1	24568766.1	16.3	33.4
6	907865.7	12345638.4	14.2	36.7
7	939876.3	13456724.3	13.3	31.4
8	977894.5	16789535.6	16.2	35.7
9	103898.5	17856367.9	18.5	40.5
Average	688165.9	17913170	15.24	36.66

The correlation coefficient between distance and travel costs was reported as 0.61 ($p < 0.01$). On the other hand, while there was a significant negative correlation between travel costs and the number of visitors ($R^2 = -0.484$), a positive significant correlation was found between visitors' income status and their willingness to pay for the entrance fee (to be used for the protection of Jabalbarez Natural Park ($R^2 = 0.863$)).

Moreover, while a significant negative correlation was reported between the number of visitors and the travel costs ($R^2 = -0.571$), a positive correlation was found between income level and the number of days spent walking in nature ($R^2 = 0.56$) (Table 5).

On the other hand, the recreation value of the region was calculated based on the demand function. Accordingly, travel costs (TC), age (A), an education level (E), and income level (I) were found to have been related to the visiting ratio per every 1000 people (VR) (Table 6). In this regard, a significant negative correlation was found between travel costs, age, education level, income status, and VR ($p < 0.01$). The regression equation of this function was calculated as follows: $VR = \exp(-5.87 - 0.00000241 TC - 0.34 A + 0.27E + 0.00000051I)$.

Accordingly, the simplified form of the equation was obtained using the average income, age, and education level as follows: $VR = \exp(-5.06 - 0.00000241 TC)$.

Table (5): Results of Pearson's correlation between research variables

	Coefficient	SD	T	P-value
Constance	-5.87	1.71	-8.89	0.000
Travel Cost (TC)	-0.0000241	0.000	-5.12	0.000
Age (A)	-0.34	0.18	-6.83	0.000
Education Level (E)	0.27	0.13	3.12	0.004
Income (I)	0.00000051	0.000	4.12	0.001
$R = 0.84$ $R^2 = 0.71$	$R_{adjusted} = 0.70$		$F = 11.6$	$P\text{-value} = 0.00$

Table (6): The results obtained from estimating the recreation demand function in Jebalbarez Natural Park

	R^2	P- value
Income level and the number of days spent walking in nature	0.546	0.00
Income level and willingness to pay entrance fees	0.863	0.00
Family members and willingness to pay entrance fees	0.765	0.00
Education level and willingness to pay entrance fees	0.546	0.00
Number of visitors and travel costs	-0.487	0.00
Number of visitors and distance	-0.571	0.00
Travel costs and distance	0.612	0.00

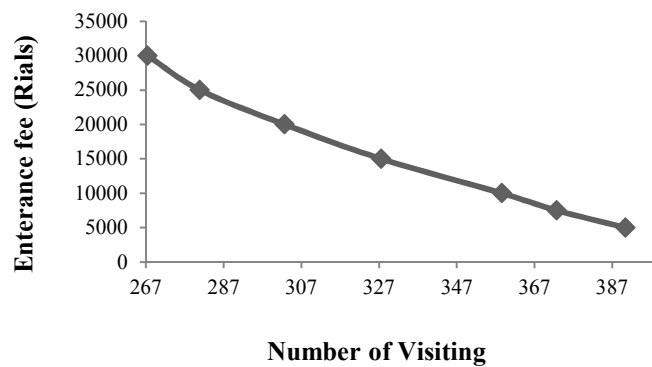


Figure (2): Visiting Demand Curve of Jebalbarez Natural Park

The visiting demand curve of Jebalbarez Natural Park was made based on the correlation between the number of visits and the entrance fee (Figure 2). The area below the curve indicates the daily value of recreation services, according to which the daily and annual recreational values of the Jebalbarez Natural Park were estimated as 34345450 and 12536089250 Iranian Rials, respectively.

4. Discussion and Conclusion

The study's results suggested that enjoying the natural ecosystem was the main reason behind selecting Jebalbarez Natural Park for recreation purposes. In other words, benefiting from the beauties of nature was an important item for visitors when choosing a site for recreational activities (Thiele et al., 2020). In this regard, this study found that 74.2% of the respondents agreed to pay for the protection of the Jebalbarez Natural Park, indicating that the Iranian people were fully aware of the significance and necessity of natural parks, which, in turn, encourages policymakers and managers to plan for the quantitative and qualitative development of natural ecosystems.

The results also showed that there was a significant positive correlation between family

size and the people's willingness to pay the Park's entrance fee, which is consistent with the results found by Seyed Salehi et al (2017), who reported that the people coming from larger families preferred the tranquility of the Park's environment to their home for spending their leisure time. Therefore, it could be argued that paying attention to cultural activities and family recreation will increase the utility of the Park.

It was also found that people's willingness to pay increased with an increase in their income status and education level, indicating the influence of these important socio-economic factors on people's attitude towards nature, which is consistent with the results reported by Van den Berg & Koole (2006) and Salmanzadeh et al. (2013) who argued that people with higher education and income level were more likely to help develop natural ecosystems. In other words, as educated people seek to spend their leisure time entertaining themselves and walking in nature, they undertake to obtain more information about nature, thus developing in themselves a sense of protecting and conserving natural resources (Hashimoto, 2002).

On the other hand, Chen et al. (2004) reported that 64% of the people who visited the beach had high education levels (For instance, college and university students). They also found that income level had a significant correlation with the number of travels made by people. Moreover, Lloyd-Smith et al. (2019) investigated the recreational demand for fishing trips, suggesting that the individual value of leisure time was substantially different from the visitor's income level. In this regard, the results of the current study showed that visiting frequency decreased with an increase in travel costs.

Furthermore, a study carried out by Raziah (2003) on agricultural parks revealed a decrease in travel rates with an increase in travel costs. Fixon & Pangapanga (2016) also argued that travel costs were the socio-economic factors that affected the rate of visitors' trips to Lengwe National Park, Malawi. In addition, in their study on the Belum-Temenggor forest Leh et al. (2018) found that the travel cost (as an independent variable) had a significant correlation with the variables concerning the recreational demand function.

The results of the current study also suggested that the quality and beauty of the natural park were two important factors in attracting the attention of the visitors, which are consistent with the results found by some previous studies that reported a positive correlation between the beauty of a site and recreation services (van Zanten et al., 2016). In other words, the beauty of the landscapes is considered an influential factor in choosing tourist destinations with natural ecosystems (Scolozzi et al., 2014), exerting a great influence on people's understanding of and behavior toward protecting the environment (Cooper et al., 2016).

As a crucially important factor in social surveys of recreation (Asheim, 2000), identification of the visitors' age is required for providing them with suitable facilities to spend their leisure time. In this regard, the results of the present study indicated that the average age of visitors was 36 years old, with most of the visitors' age ranging from 30 to 60 years old. The reason behind such an age range could be attributed to the lack of recreational facilities for

age groups less than 20 years and more than 60 years, which need to be taken into account in the prospective plans set for managing the Jabalbarez Natural Park. In the same vein, Mafi Gholami et al. (2011) and Limaie et al. (2014) argued that age was one of the most influential variables in visiting Masouleh's natural forest park.

The locality is another significant variable in people's desire to visit natural recreation sites (Cooper et al., 2016). In this regard, the results of the current study indicated that the Jebalbarz Natural Park was more visited by the people living in proximity of the Park than those residing in areas far away from it, confirming the results of previous studies that valued recreation services in terms of travel costs (for instance, Mafi Gholami et al., 2011; Azizi & Seydan, 2014; Seyed Salehi et al., 20017).

The daily turnover of recreation services offered in the Jabalbarez Natural Park was found to be 34345450 Iranian Rials, which is lower than what other studies reported for Parvaz forest park (Mafi Gholami et al., 2011) and Taleghani forest park (Pishkari and Esmaili Sari, 2007) using the regional travel cost method, suggesting that Jabalbarez Natural Park is less known to the Iranian public than similar areas in the country.

This study highlighted the significance of paying attention to recreation management and development in Jabalbarez Natural Park. Moreover, comparing the supportive and encouraging policies carried out for the private sector to invest in recreational services, the results of this study help develop tourism in the region, considering the fact that the problem of declining environmental tourism lies in the lack of good advertisements and financial facilities in terms of introducing recreation sites.

Therefore, ecosystem managers can introduce natural ecosystems to the public by running extensive advertising campaigns. Moreover, developing the recreation industry may create sustainable income resources for local people by getting them involved in recreation programs and encouraging them to protect natural ecosystems. However, the recreation value of Jabalbarez Natural Park (as obtained in this study) does not represent the real turnover of the visits made by people. In

other words, other Park's values, including direct usage (such as forage and wood production), indirect application (such as soil protection and water regulation), and non-tangible values (such as the very existence of

the Park and heritage-related values) were not evaluated in this study. Therefore, it could be said that the actual value of Jebalbarez Natural Park is much higher.

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