

Economic evaluation of natural forest park using the travel cost method (case study; Masouleh forest park, north of Iran)

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ABSTRACT: We evaluated recreational and socioeconomic values of Masouleh forest park, north of Iran. Travel Cost Method (TCM) or Clawson method was used for evaluation. Therefore, 96 questionnaires were distributed among the visitors. The results indicated that the variables such as travel time to the park, travel costs, age and education were effective variables in using the park. The results show that there is a significant relation between travel time and the number of visitors whereas by increasing travel time the number of visitors decreased. Furthermore, there is a significant relation between the number of visitors as a dependent variable and travel costs whereas when the travel cost increases, the number of visitors decreases. Results indicated that the willingness to pay decreased by increasing the entrance fee. The models estimated an average willingness to pay 12,500 Iranian Rials per visit. The results also indicated that the average round trip travel cost was 85.5 (10,000 Iranian Rials).

Keywords: willingness to pay; recreational value

Outdoor recreation is an activity that increases visitors' relaxation. The demand for outdoor recreation has been increasing with the increasing population. However, natural and financial resources are limited for outdoor recreation. Therefore, it is required to estimate the economic benefit of recreational sites for optimum allocation of scarce resources. Masouleh forest park in the north of Iran is one of the most frequently used and popular destinations of visitors in the north of Iran. In order to determine its recreational value, Travel Cost Method (TCM) or Clawson method is used. TCM is an economic valuation used to calculate the value of some goods or services that cannot be obtained through market prices such as forest parks, ecosystems, beaches, etc. It assumes that the value of a site is reflected by how many people are willing to pay to get there. It is called a revealed preference method, because actual be-

haviour and choices are used to account the environmental values. This method was initially introduced by CLAWSON (1959) and has been modified by a number of researchers.

CLAWSON (1960) explained that putting an accurate and acceptable value on outdoor recreation would be valuable in resource management in different ways. First, it would provide a means for comparing the importance of recreation with that of other uses of the same resources. Secondly, the value of the recreation to be provided by a proposed recreation site would provide one measure of the desirability of making the necessary investment in the project. Thirdly, the value of the recreation would provide a ceiling to any fees that might be charged for its use.

The basic concept of the TCM is that travel cost expenses and time that people incur to visit a place represent the access price to the place. Therefore,

the people's willingness to pay to visit the place can be determined based on the number of trips at different travel costs. It is required to impute values that reflect the true social costs and benefits of recreational activities using some techniques of environmental resources valuation. If the economic costs and benefits of outdoor recreation sites were not estimated using accepted environmental valuation techniques, conservation benefits could not be nearly approximated (ENYEW 2003).

Measures of economic value are based on what people want – their preferences. Economists generally assume that individuals, not the government, are the best judges of what they want. Thus, the theory of economic valuation is based on individual preferences and choices. People express their preferences through the choices and tradeoffs that they make, given certain constraints, such as those on income or available time (Ecosystem Valuation 2013).

TCM can be used to estimate the costs-benefits of a recreational site such as: elimination of an existing recreational site, addition of a new recreational site and changes in environmental quality at a recreational site. TCM is relatively uncontroversial, because it is modelled on standard economic techniques for measuring value, and it uses information on actual behaviour rather than verbal responses to hypothetical scenarios. It is based on the simple and well-founded assumption that travel costs reflect the recreational value. It is often relatively inexpensive to apply (Ecosystem Valuation 2013).

There are some other methods to evaluate the recreational value and ecosystem services such as Contingent Valuation Method (CVM), Hedonic Price Method (HPM).

TCM method is based on actual behaviour or what people actually do rather than willingness to pay or what people say they would do in a hypothetical situation. Furthermore, TCM is less costly than the other methods and the interpretation of results is easier than in the other methods.

There are many researches concerning the valuation of recreational sites (forest park, national park, beach etc.) using TCM such as: STEVENS and ALLEN 1980; DWYER et al. 1983; KNAPMAN and STANLEY 1991; CHEN et al. 2004; HERATH and KENNEDY 2004; ROLFE and GREGG 2012.

There are a few studies dealing with the valuation of recreational sites in Iran. MAJNONYAN (1977) was the first researcher in Iran who calculated the recreational value of Tehran forest park in Iran using TCM. The other researchers in Iran using TCM included: MOJABI and MONAVVARI 2005, SOUDI

SHAHABI and SMAILI SARI 2006, PISHKARI and ESMAILI SARI 2007.

The purpose of this study is to examine and estimate the recreational benefit of Masouleh forest park, north of Iran using TCM.

MATERIAL AND METHODS

Study area. Masouleh forest park includes a part of the mountain forests of the Caspian Sea. The area of the park is about 2,400 ha. This park is located about 60 km from Rasht, the centre of Guilan province and 400 km from the capital city of Iran, Tehran (Fig. 1). It is one of the most popular tourist destinations in Iran and due to its neighbourhood with the historical and cultural city of Masouleh it has some foreign visitors as well. The trees in the Masouleh Forest Park include: beech, hornbeam, alder, etc.

TCM method. It is difficult to identify the price and value of a commodity and service when there is not any bargaining in the real market. TCM is one of the techniques used to estimate the value of recreational sites using consumption behaviour in related markets. In other words, this method is a non-market procedure whereby a recreational site value is estimated by considering how much people spend to access the site (travel costs, entry fees, on-site ex-

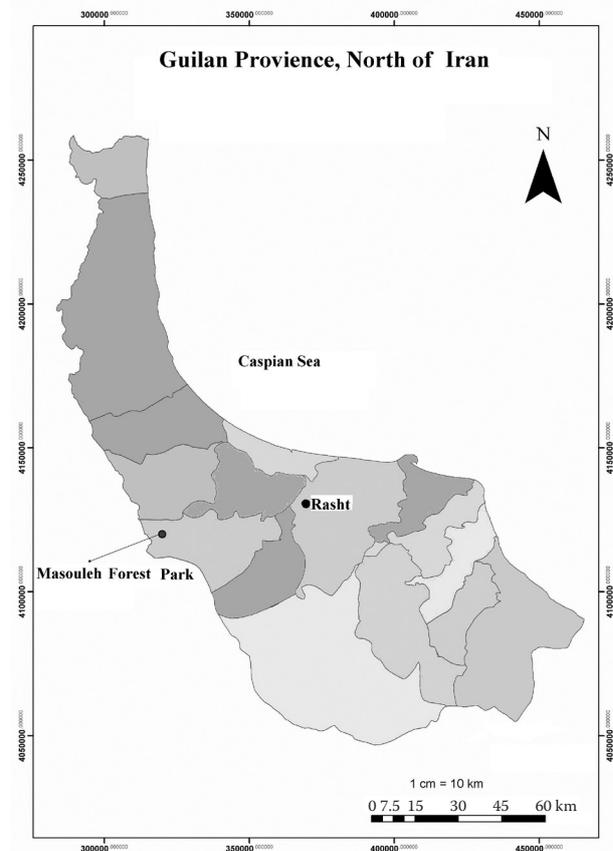


Fig 1. Study area (Masouleh forest park, north of Iran)

penditures) and also it considers the willingness of visitors to pay for the recreational site. The method assumes weak complementarity between the recreational site and consumption expenditure. This implies that when consumption expenditure falls to zero, the marginal utility of visitation is also zero, or alternately the recreational site will be valued only if consumption expenditure is positive (HANLEY, SPASH 1993). The method has become widely accepted and is generally regarded as one of the success stories of non-market valuation (SMITH 1993).

Two kinds of TCM exist, individual and zonal. In zonal TCM, the area surrounding the recreational site is divided into several zones and the number of visits from each zone is counted. Individual TCM calculates travel costs separately for each individual and requires a more detailed survey of visitors. At this research the zonal TCM is used.

The required data and information were collected via questionnaires. The questionnaire is aimed to collect information on the visitors' behaviour towards the environmental goods or services to be evaluated. The questionnaire had two sections. In the first section some general questions were asked such as: age, education, income per month, kind of trip (lonely, with family or with a group), kind of vehicle to access the site.

Specific questions regarding the recreational value were asked in the second section of the questionnaires such as: number of visits from each zone, demographic information about people from each zone, distance from each zone, travel cost from each zone, the opportunity cost of travel time, the amount of time spent at the site, quality of the recreational site, natural attractive phenomenon at the site, willingness to pay to access the site.

More explanation about the questionnaire composition is given below:

- Age classes in the questionnaire were 15–30, 31–40, 41–50, 51–60 and more than 61.
- Number of visits per year was 1 time per week, 2 times per week, 1 time per month, 1 time per season and 1 time per year.
- Travel time to access the site was less than 1 h, 1.1–2 h, 2.1–32 h, 3.1–42 h and more than 4.1 h.
- Education classification was such as secondary school, high school, 2 years at the university, B.Sc., M.Sc. and PhD.
- Time spent at a recreational site was less than 3 h, 3–6 h, 6–9 h, 9–12 h and more than 12 h.
- Kinds of recreation were hiking inside the park, pool and beach, climbing and club and the other healthy recreation.
- There were also some questions about the mone-

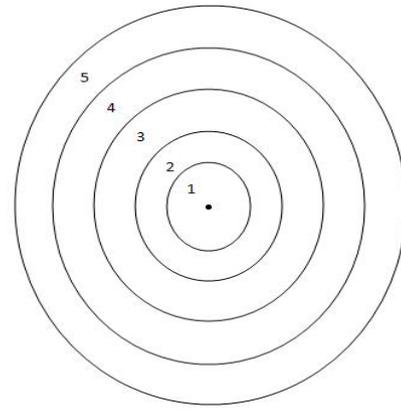


Fig 2. Different zones surrounding the Masouleh forest park

tary values for travel costs per person of visitors, costs spent inside the park, income of sample visitors, willingness to pay for entrance fee.

Zoning the areas. It was assumed that there are 5 zones based on their distances surrounding the recreational site at this study (Fig. 2). The length of the radius in each zone is shown in Table 1.

Table 1. Length of the radius in each zone

Zone	Length of radius (km)
1	0–50
2	50–100
3	100–150
4	150–200
5	> 200

Sampling method. The sample size (number of questionnaires) is an important issue for proper and reliable estimating of the economic value of the site. The sample was selected using a random method. In order to determine the sample size, 30 preliminary questionnaires were used. Then the variances of questions were determined. The Cochran function (Equation 1) was used to determine the required questionnaires (COCHRAN 1977).

$$n = \frac{Nt^2s^2}{Nd^2 + t^2s^2} \quad (1)$$

n – number of questionnaires (sample size),
 N – population size (number of people that visit the recreational area),

t – coefficient of confidence interval that was determined from t -student and assumed that the studied attribute is normally distributed,

s^2 – estimated variance of responses to the questions in preliminary questionnaires,

d – degree of accuracy or error percentage (ranges usually from 1 to 10%) .

Sample size estimation is usually done at two stages. At the first stage, it is assumed that it is possible to ignore the fraction size of (n/N) . Then, the following equation is extracted from Eq. (1).

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

Replacing the values of t , s and d in Eq. 2, the required sample was determined and it was 96 questionnaires:

$$n = \frac{1.96^2 \times 0.15^2}{0.03^2} = 96 \quad (3)$$

The questionnaires were distributed randomly among the visitors in the peak season (summer 2012). In the peak season there is a large number of visitors as compared to other seasons and it can be considered as representative of the total visits in one year.

RESULTS

Descriptive results

Socio-economic characteristics

Results of questionnaires indicated that visitors came from different areas of Iran (5 zones). Details of population, number of visitors, percentage of visitors in comparison with the zone population are shown in Table 2.

In this sample size it was observed that 76% of respondents were males and 24% were females. 74% were married and 26% were single. The number of visitors in different age classes is shown in Table 3. It documents that the two middle age classes (31 to 50) have the highest visitors.

Household's response to visit the site

The basic assumption of TCM is that people reflect their willingness to pay for a recreational site by the amount of money and time they spent to visit the site. Therefore, the number of annual visits and travel costs per round trip are two factors that are used to draw the demand curve of the site. The frequency

Table 3. Number of visitors in different age classes

Age (yr)	Frequency	Relative frequency (%)
15–30	22	22.91
31–40	30	31.25
41–50	29	30.20
51–60	11	11.45
61 <	4	4.166

and relative frequency of annual visits to the site are shown in Table 4; as it has been shown 44.79% visited the site 1 time per month or 12 times per year.

Table 4. Frequency and relative frequency of annual visits to the site

Number of visits (yr)	Frequency	Relative frequency (%)
1 time per week	23	23.95
2 times per week	2	2.08
1 time per month	43	44.79
1 time per season	11	11.45
1 time per year	17	17.70

Travel time to access the site

Results show that 41.66% of sample visitors travel to the park less than 1 h. As the travel time increases, the number of visitors decreases (Table 5).

Table 5. Travel time to access the site

Travel time to access the site (h)	Frequency	Relative frequency (%)
> 1	40	41.66
1.1–2	33	34.37
2.1–3	9	9.37
3.1–4	8	8.33
4.1 <	6	6.25

Occupation of sample visitors

The results of sample questionnaires show that 41.6% of the visitors to the site are governmental employees (Table 6).

Table 2. Frequency of visitors at different zones

Zone	Population	Number of questionnaires for visitors	Number of visitors per 10,000	Percentage of visitors in comparison with the zone population
1	352,170	42	1.135	0.0113
2	1,338,508	33	0.134	0.0013
3	461,879	9	0.324	0.0032
4	184,133	8	0.706	0.007
5	72,812,979	4	0.001	0.00001

Table 6. Occupation of sample visitors

Occupation	Frequency	Relative frequency (%)
Own business	30	31.25
Governmental employee	40	41.66
Businessman	8	8.33
Retired	9	9.37
Student	9	9.37

Education of sample visitors

The results of questionnaires show that most sample visitors (41.66%) studied at least 4 years at the university and have the B.Sc. level. Furthermore, 62.5% of visitors have an academic education. The details of education are shown in Table 7.

Table 7. Education of sample visitors

Education	Frequency	Relative frequency (%)
Secondary school	10	10.41
High school	26	27.08
2 years at the university	8	8.33
B.Sc.	40	41.66
M.Sc.	10	10.41
PhD	2	2.08

Visitor's time spent on site

Results indicated that 46.87% of visitors stay between 9 and 12 h or about half a day at the recreational site and only 3.12% stay less than 3 h at the site (Table 8).

Table 8. Visitor's time spent on the site

Time spent (h)	Frequency	Relative frequency (%)
< 3	3	3.12
3–6	7	7.29
6–9	16	16.66
9–12	45	46.87
> 12	25	26.041

Kinds of recreation

The visitors were asked to cite one of the priorities for their outdoor activity. Results show that 62.5% of the visitors preferred hiking inside the park (Table 9).

Travel costs per person of visitors

About 63.54% of visitors spent less than 30 (10,000 Iranian Rials) to visit the site. The mini-

Table 9. Kind of recreations of sample visitors

Kind of recreations	Frequency	Relative frequency (%)
Hiking inside the park	60	62.5
Pool and beach	21	21.875
Climbing and club	14	14.58333
Other healthy recreation	1	1.041667

mum and maximum round trip travel costs were 1 and 170 (10,000 Iranian Rials), respectively. The average round trip travel cost was 85.5 (10,000 Iranian Rials) (Table 10).

Table 10. Travel costs per person of visitors

Round trip travel cost (10,000 Iranian Rials)	Frequency	Relative frequency (%)
< 30	61	63.54
31–60	20	20.83
61–90	4	4.16
91–120	4	4.166
121–150	2	2.08
> 151	5	5.20

Travel cost per round trip consists of mileage and time costs. Time costs or opportunity cost of time spent on the site. It was determined by asking the visitors how much they could earn if they worked instead to visit the park.

Costs spent inside the park

The visitors were asked how much they spent inside the site. The results indicated that the cost spent inside the park varied and 57.29% spent less than 200 000 Iranian Rials (Table 11).

Table 11. Costs spent inside the park

Cost spent inside the site (10,000 Iranian Rials)	Frequency	Relative frequency (%)
< 20	55	57.29
20–40	22	22.91
40–60	6	6.25
60–80	7	7.29
80–100	6	6.25

Income of sample visitors

Results show that 67.70% of sample visitors had an income between 710 and 1,500 (10,000 Iranian Rials) and this range of income related to the people with average income in Iran. It means that most visitors related to the average income of the country and as the

income of people increases from the average level, the number of visitors decreases. In contrast, the poor people with the income less than 700 (10,000 Iranian Rials) have a lower frequency (3.12%) (Table 12).

Table 12. Income of sample visitors

Monthly income (10,000 Iranian Rials)	Frequency	Relative frequency (%)
< 700	3	3.12
710–1,500	65	67.70
1,510–2,500	27	28.12
2,510–4,000	8	8.33
> 4,100	8	8.33

Willingness to pay for entrance fee

The visitors were asked how much they are willing to pay as entrance fee (the site is free access). Results show that 75% of visitors were willing to pay less than 10,000 Iranian Rials and as the amount of fee increases, the frequency decreases. The weighted average of willingness to pay for enjoyment inside the park was 12,500 Iranian Rials (Table 13).

Table 13. Willingness to pay the entrance fee

Willingness to pay entrance fee (10,000 Iranian Rials)	Frequency	Relative frequency (%)
< 1	72	75
1 × 2	18	18.75
2 × 4	4	4.16
> 4	2	2.08

Regression analysis

Relation between the time to access the site and the number of visitors

Regression analysis was used in order to determine a relation between the time to access the site as an independent variable and the number of visitors as a dependent variable. Results indicated that there is a significant relation between these two variables with a significance level of 0.05% (Table 14).

Table 14. Results of parameter values of the time to access the site and the number of visitors

	α	β	σ	R^2	R
Parameter value	47.1	-9.3	7.34	0.842	0.917
SD	7.70476	2.323073			
<i>t</i> -statistics	6.11	-4.0			

α , β – parameters, σ – (standard deviation of ϵ), R^2 – coefficient of determination, R – correlation coefficient

Equation (4) was estimated for a relation between the time to access the site and the number of visitors:

$$N = \alpha + \beta t + \epsilon \quad (4)$$

where:

N – number of visitors,

t – time to access the site,

α , β – estimated parameters,

ϵ – series of normally distributed errors with mean zero and autocorrelation zero.

Relation between the access cost to the site and the number of visitors

Regression analysis was used to determine a relation between the access cost to the site as an independent variable and the number of visitors as a dependent variable. Results indicated that there is a significant relation between these two variables with a significance level of 0.05% (Table 15).

Table 15. Results of parameter values of the access cost to the site and the number of visitors

	α	β	σ	R^2	R
Parameter value	53.2216	-0.36611	14.93	0.66	0.81
SD	14.60876	0.130578			
<i>t</i> -statistics	3.64	-2.80			

α , β – parameters σ – (standard deviation of ϵ), R^2 – coefficient of determination, R – correlation coefficient

Equation (5) was estimated for a relation between the time to access the site and the number of visitors:

$$N = \alpha + \beta A_c + \epsilon \quad (5)$$

where:

N – number of visitors,

A_c – time access cost to the site,

α , β – estimated parameters,

ϵ – series of normally distributed errors with mean zero and autocorrelation zero.

Relation between income and number of visitors

Results of regression analysis between the income and the number of visitors show that there is not any significant relation between the number of sample visitors and the income.

Relation between willingness to pay and the number of visitors

Results of regression analysis between willingness to pay and the number of visitors show that a logarithmic equation is the best estimator of this relation ($R^2 = 0.883$) (Fig. 3).

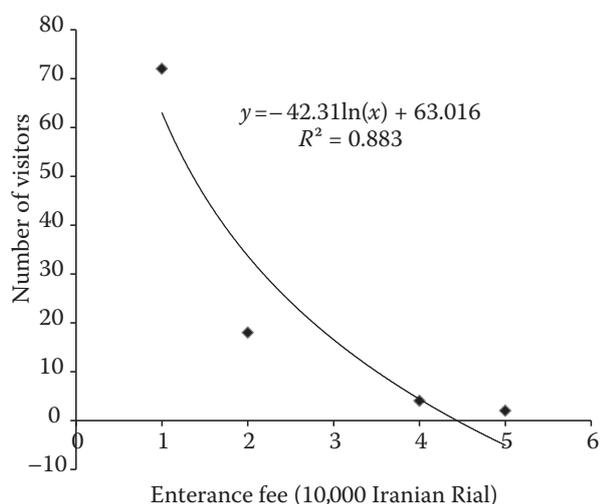


Fig. 3. Logarithmic equation between willingness to pay and the number of visitors

DISCUSSION

The objective of this study was to estimate the economic value of Masouleh forest park as a recreational site in the north of Iran. Therefore, the monetary value of the mentioned recreational site using TCM was estimated. TCM is used for estimating the economic values of environmental goods and services. It is usually applied to estimate economic values of sites such as national parks and forest parks for recreation.

TCM is based on the assumption that travel costs represent the price of access to a recreational site. Peoples' willingness to pay for visiting a site is thus estimated based on the number of trips that they make at different travel costs. This is called a revealed preference technique, because it 'reveals' willingness to pay based on the consumption behaviour of visitors (Environmental Justice Organisations 2013).

TCM particularly requires having accurate information about travel costs such as distance cost and travel time costs and time that visitors are willing to spend getting to and staying on the recreation site (ENYEW 2003).

Recreation is a human activity which increases visitor's utility. Following a rise in the population, income and mobility the demand for outdoor recreation has been increasing in many developing countries (CLAWSON et. al. 1966).

Results of this study show that the two middle age classes have the highest visitors. This means that this recreational site is more attractive to these two age classes.

Results also show that 44.79% visited the site 1 time per month or the demand of sample visitors for this park is 12 times per year. 62.5% of visitors have aca-

demical education. It shows that university educated people are more interested to visit this park. This result is similar to the results of ENYEW (2003).

Results indicated that 46.87% of visitors stay between 9 and 12 h or about half a day at the recreational site. This could be due to organized trips by the visitors to stay half a day at the site.

Results show that 62.5% of the visitors preferred hiking inside the park. The response rate is a good indicator of sample visitor's interest in different kinds of recreation activities. The activity with the highest rating was hiking inside the park.

The average round trip travel cost was 85.5 (10,000 Iranian Rials). Travel cost per round trip consists of mileage and time costs. The time spent traveling is considered as part of the travel costs, because this time has an opportunity cost. Time costs or opportunity cost of time were determined by asking the visitors how much they could earn if they worked instead to visit the park. The time spent travelling is considered as part of the travel costs, because this time has an opportunity cost. It could have been used for doing other activities (e.g. working, spending time with friends or enjoying a hobby). The value of time is determined based on the income of each respondent.

Results show that 67.70% of sample visitors had an income between 710 and 1,500 (10,000 Iranian Rials) and this range of income related to the people with average income in Iran. It means that most visitors related to the average income of the country and as the income of people increases from the average level, the number of visitors decreases. In contrast, the poor people with the income of less than 700 (10,000 Iranian Rials) have a lower frequency (3.12%).

Results show that 75% of visitors are willing to pay less than 10,000 Iranian Rials and as the amount of fee increases, the frequency decreases. The weighted average of willingness to pay for enjoyment inside the park was 12,500 Iranian Rials.

Results of regression analysis indicated that there is a significant relation between times to access the site and the number of visitors.

Results of regression analysis indicated a significant relation between the access cost to the site and the number of visitors.

Results of regression analysis between the income and the number of visitors show that there is not any significant relation between the number of sample visitors and the income.

Results of regression analysis between willingness to pay and the number of visitors show that a logarithmic equation is the best estimator of this relation.

The TCM may also be combined with another valuation method such as contingent valuation method

to estimate the economic value of a change (either enhancement or deterioration) in the environmental quality of the recreational site by asking the same tourists how many trips they would make in the case of a certain quality change. This information could help in estimating the effects that a particular policy causing an environmental quality change would have on the number of visitors and on the economic use value of the recreational site (Environmental Justice Organisations 2013).

The true economic value of ecosystem services may not be reflected in market transactions, because there is not any real transaction for ecosystem services in the market. Therefore, the TCM of economic valuation uses the cost of time and travel to define the value people place on something in the absence of a market price, by observing actual human behaviour.

Results of this research show that the majority of visitors' ages belongs to two middle age classes (31 to 50 years). Therefore, the suggestion is that the authorities of the recreational site should provide more facilities based on the interest of this group of people.

Results also show that most visitors have academic education. Hence, it may be good to have a cultural centre for the visitors in the recreational site.

The visitors' time spent at the site varies. Therefore, this issue should be considered for providing facilities for visitors.

The results of this study can improve the quality of environmental services of the Masouleh forest park and expand varieties of services that they could supply based on the people's demand.

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