



ESTIMATED RECREATIONAL VALUE OF LAHIJAN FOREST USING BY CONTINGENT VALUATION METHOD

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ABSTRACT

Considering numerous functions and services provided by forests and forest parks and also forest destruction trend in the world and Iran, this study practiced economic valuation of the Lahijan forest. To do this, WTP of the park visitors was estimated using contingent valuation method thorough dichotomous choice questionnaire. To calculate WTP the model used was Logit. The model parameters were calculated. The result showed that average WTP of the visitors for the park recreational value was 8,216 Rials per visitor and its total annual value was 123 billion Rials. The result also revealed that the bid and revenue parameters were significant by 1% from a statistical point of view, both of which were the most effective factors in the visitors' WTP. In addition, the in line with increasing forest attractions, the WPT grew by 47%. The results indicated visitors' interest in recreational areas and forest parks, which can be taken into consideration when these ecosystems are managed.

Keywords: recreational value, Lahijan forest, contingent valuation method, willingness to pay.

INTRODUCTION

In the recent years, environmental economists have addressed environmental valuation and its role in fulfilling human welfare. In general, total economic value is categorized into two groups of use and non-use values. Use value of forests in turn is grouped into consumptive and non-consumptive (Fatahi, 2010).

Non-use value involves amounts that individuals are willing to pay to conserve forests. As a result, they are known as conservational values (Kritilla, 1967). Recreational value is among non-consumptive use values of forests.

A great deal of research has been carried out on recreational value of forests, most of which use contingent valuation method (CVM). For example, recreational value of the US forest in Montana was calculated at \$108 per visit using CVM. Also, recreational value of eastern forests in the US was estimated to be \$10.43 per household (Krieger, 2001). Recreation value of the Malaysian forests was calculated by Costanza using CVM totaled \$740 per hectare (Garrod and Willis, 1997). In five North Korean national parks, recreational value was an average of \$10.54 per household annually (Lee and Han, 2002). In Iran, recreational value of Sisangan Park was

reported to be 2, 477 Rials per visit in 2004 (Amirnejad *et al.*, 2006). The average tourism value of Golestan Park was 3,520 Rials per visit. Its annual tourism value totaled 18 billion Rials (Amirnejad and Khalilian, 2007). Eil Goli Park in Tabriz had an estimated tourism and recreation value of 1, 594, 300 Rials (Nahrli, 1998).

Other studies used CVM to estimate forest values include Kin *et al.*, 2007; Lehtanen *et al.*, 2003; Hanemann, 1984; Read *et al.*, 1995; Boyle *et al.*, 1985; Bateman and Langford, 1997; Smaeili and Ghazali, 2010.

With respect to numerous functions and services provided by forests and forest parks and also forest destruction trend in the world and Iran, this study practiced economic valuation of the Lahijan Forest. Lahijan County has an area of 3,5485km², located in Guilan Province, northern Iran (DOE, 2012).

Lahijan lies between longitude 36°34' and 38°27' north of the equator and between 48°53' and 50°48' east of the equator (Figure-1).

Its forests are mostly located southward and eastward. The study covered an area of 300ha of the County's forests that had significant tourism attraction with the highest number of visitors.

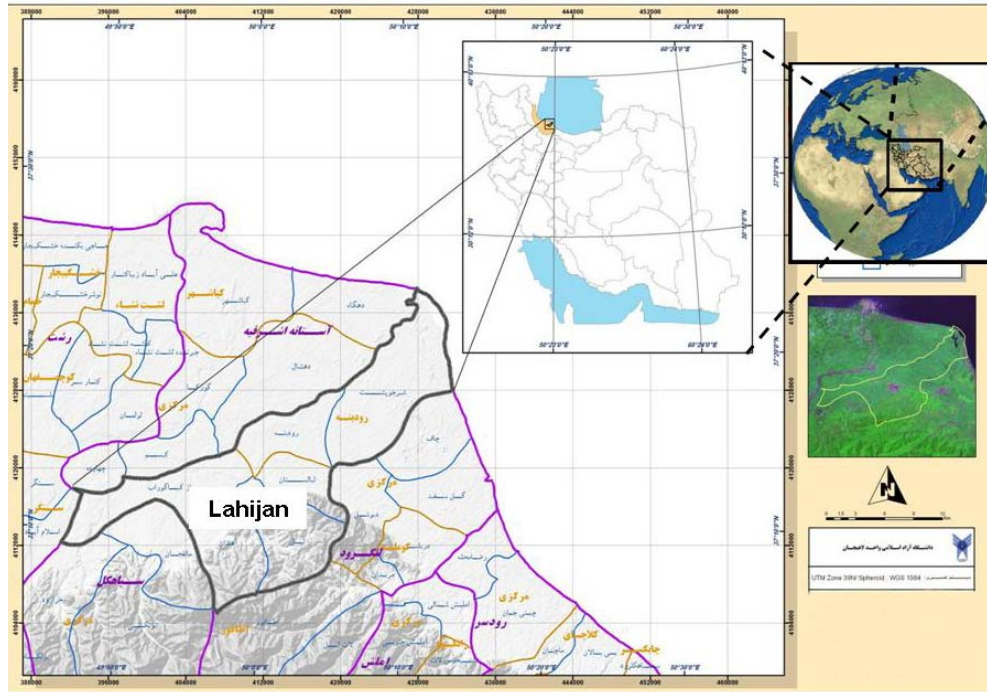


Figure-1. Location of study area.

MATERIALS AND METHODS

The favorable approach to estimate non-use values (conservation) is CVM (Amirnejad, 2005). It uses surveys to directly elicit individual willingness to pay for conserving environmental goods. WTP is the lower bound determined by individuals for that environmental good (Kealy and Turner, 1993).

CVM was first introduced by Ciriacy-Wantrup in 1947 and Davis used it for the first time in 1960 (Fatahi, 2010). It was utilized in research pertaining to valuation frequently. The method, however, was mostly used in forest ecosystem valuation.

This method determines individual WTP in various hypothetical market scenarios. In other words, it identifies how respondents are willing to pay in various scenarios. At first glance, CVM seems simple in that some people are questioned how much they are willing to pay for a certain good. However, it needs not only economic theories, but also sociological, psychological, and statistical concepts. To calculate willingness to pay of forest visitors, double dichotomous choices (DDC) questionnaire was used. In this method, respondents choose only one bid among several bids. It was first introduced by Bishop and Heberlein in 1979 (Amirnejad and Khalilian, 2007). Respondents are faced with a bid in a hypothetical market and ought to answer either yes or no. The next suggestion depends on the first response (Venkatachalem, 2003). It is common to start with a primary offer or bid to see whether the respondent approve it or not. If s/he agrees with the first offer, a consecutive process begins, through which base price builds up to the point that the individual states s/he is unwilling to pay any

extra money. The last offer accepted shows maximum WTP. Therefore, it is needed to design a DDC questionnaire that provides correct and enough information that makes visitors aware of the hypothetical market to interview and elicit their willingness to pay for recreation value.

Three offers were made including 5 000, 10 000, and 20 000 Rials. In the first question a 10 000-Rial offer was presented in the following question:

“This forest provides an opportunity for recreation in the country. Are you willing to pay 10 000 Rials from your monthly income as entrance fee?”

If the answer was negative, the 5 000-Rial offer was put forward; if the answer was positive, the 20 000 Rials was offered.

In this study to determine the sample, Morgan formula (1970) and were employed. 375 questionnaires were completed and analyzed. They were fill out during 4 weeks in the summer and fall of 2011.

To determine WTP estimation model, it was assumed that individuals accept or reject the recreation value bid (entrance fee) based upon their maximum utility, which the following formula 1 expresses:

$$U(1, Y-A; S) + \epsilon_1 \geq U(0, Y; S) + \epsilon_0 \quad (1)$$

Where

U = indirect utility; Y = income; A = bid; and S = other socioeconomic characteristic affected by individual taste; 0 = the individual does not visit the forest; 1 = the individual visits the forest.



ϵ_0 and ϵ_1 are random variable with mean of 0, distributed evenly and independently.

$$\Delta U = U(1, Y-A; S) - U(0, Y; S) + (\epsilon_1 - \epsilon_0) \tag{2}$$

Commonly, Logit and Probit models and qualitative regression method are used to estimate the above model.

The probability (P_i) that a respondent accepts one of the bids (A) was expressed based on Logit model (formula 3).

$$P_i = F_{\eta}(\Delta U) = \frac{1}{1 + \exp(-\Delta U)} = \frac{1}{1 + \exp\{-(\alpha - \beta A + \gamma Y + \theta S)\}} \tag{3}$$

Where

$F_{\eta}(\Delta U)$ = accumulative distribution function; γ and θ are estimated coefficients.

Parameters of Logit model are calculated using Maximum Likelihood, the only technique available to calculate the model. Afterwards, expected WTP is estimated within the range of 0 to maximum offer by integrating as follows:

$$E(WTP) = \int_0^{Max.A} F_{\eta}(\Delta U) dA = \int_0^{Max.A} \left(\frac{1}{1 + \exp\{-(\alpha^* + \beta A)\}} \right) dA \tag{4}$$

Where

E (WTP) is expected WTP; that was added through socioeconomic expression.

$$[\alpha^* = (\alpha + \gamma Y + \theta S)]$$

In this study, linear Logit model was used to calculate mean WTP. In addition, to carry out statistical analysis of variables and to calculate the parameters SPSS and Shazam applications were employed.

RESULTS

The outcome of statistical analysis of 375 questionnaires follows. Table-1 demonstrates descriptive outcome of qualitative variables and Table-2 shows quantitative variables. 70% of the respondents were male, i.e. 262 respondents. 90% believed that the forest environment was attractive; however, 10% found it inappropriate due to safety and health reasons. Table-3 and Table-4 shows educational and occupational profile of the visitors. Regarding WTP, 286 individuals (76%) rejected first offer and were not willing to pay 10 000-Rial entrance fees per person. In contrast, 89 individuals (24%) accepted the offer. When the lower offer was put forward (5 000 Rials), it was accepted by 194 respondents (68%). Those who were willing to pay 10 000 Rials were also asked whether they wished to 20 000 per person. 32 people (36%) accepted and 57 (64%) refused. It is notable that maximum WTP amounted to 40 0000.

Table-1. Qualitative variables.

| Gender | | Forest attractions | | Member of environmental NGOs | |
|--------|------|--------------------|----|------------------------------|-----|
| Female | Male | Yes | No | Yes | No |
| 113 | 262 | 338 | 37 | 10 | 365 |

Table-2. Quantitative variables.

| Variables | Mean | Max | Min | Standard deviation |
|----------------|---------|----------|---------|--------------------|
| Age | 36.5 | 70 | 18 | 12.6 |
| Education span | 14.2 | 24 | 6 | 3.4 |
| Household size | 5 | 10 | 1 | 1.45 |
| Monthly income | 4675320 | 32000000 | 1400000 | 2160000 |

Table-3. Frequency distribution of Lahijan Forest visitors.

| Occupation | Expert | Government employee | Self-employed | Housewife | Worker | Retired | Others | Total |
|------------|--------|---------------------|---------------|-----------|--------|---------|--------|-------|
| Frequency | 20 | 108 | 121 | 46 | 52 | 15 | 13 | 375 |
| Percentage | 5 | 29 | 32 | 12 | 14 | 4 | 4 | 100 |

**Table-4.** Educational profile of the visitors.

| Education | Postgraduate | Graduate degree | Associate degree | High school diploma | No diploma | Illiterate | Total |
|------------|--------------|-----------------|------------------|---------------------|------------|------------|-------|
| Frequency | 27 | 153 | 44 | 82 | 56 | 13 | 375 |
| Percentage | 7 | 41 | 12 | 22 | 15 | 3 | 100 |

The outcome of Logit model is demonstrated in Table-5. Variables that not statistically meaningful were ignored from the model. Estimated coefficient of offer variable that was the major descriptive variable of WTP probability was meaningful by -1%. This reveals that the more the offer, the less the WTP. Education coefficient was positively meaningful. In other words, the more educated the respondent, the more the probability of WTP acceptance. The household dimension was negatively meaningful. That is to say as the household dimension grows, the WTP decreases. Table-6 demonstrates the marginal impact of per unit change of each descriptive variable. The marginal impact of the descriptive variable of income was 0.00033. This means that provided that other variables are fixed, one unit increase in bid would lead to a 23-percent decrease in WTP probability. The marginal impact of virtual variable of forest attraction amounted to 47%, meaning that if other variable are fixed

and the forest attraction increases, WTP probability would increase by 47%. The expected mean WTP of recreational value of Lahijan Forest, after calculation by Logit model using maximum likelihood, and integrating between 0 and the highest bid was calculated as follows:

$$WTP = \int_0^{2000} \left[\frac{1}{1 + e^{x \cdot p \{- (16.325 - 0.014)\}}} \right] dx = 821.6$$

Accordingly, mean WTP for Lahijan Forest use was 8 216 Rials per visitor.

Recreational value of Lahijan Forest per hectare = mean WTP * total visitors = (8 216 * 15 000)/300 = 123 240 000

As a result, recreational value of Lhijan Forest per hectare totals 123 240 000 Rials.

Table-5. The result of Logit model.

| Variables | Coefficients | Value of Z | Statistical significance |
|---|--------------|------------|--------------------------|
| Bid | 0.0014- | 2.59 - | 0/0000 |
| Income | 0.00066 | 12.7 | 0.0000 |
| Education | 3.7 | 2.94 | 0.005 |
| Household dimension | 0.00135- | 3.67 | 0.061 |
| Forest attraction | 4.9 | 5.2 | 0.0046 |
| Log likelihood= -178 McFadden R2 Percent of right prediction= 67.2 % = 0.55% | | | |

Table-6. Marginal impact of the descriptive variables.

| Variable | Income | Bid | Education | Household dimension | Membership | Attraction |
|-----------------|---------|---------|-----------|---------------------|------------|------------|
| Marginal impact | 0.00033 | 0.0023- | 0.46 | 0.006- | 1.1 | 0.47 |

DISCUSSION AND CONCLUSIONS

This study determined the recreational value of Lahijan forest based on the visitor WTP for entrance fees. Although Iran is a developing country and the income level is average, the results showed that the visitors were willing to pay for using the park and environmental conservation. The mean WTP for entrance fees was calculated to be 8 216 Rials, and maximum WTP 40 000. This reveals how much the visitors valued natural resources. According to the results, the variables income and bid played the most important roles in WTP - other researchers such as Amirnejad and Khalilian (2007) and

Emami Meibodi and Qazi (2008) have already pointed out the bid role. In the study revealed hopeful results in that the individual were very aware of the role and significance of forest parks and resorts in the countryside. In addition, they were deeply interested in protecting such ecosystems. These may be taken into consideration in the future management of and planning for natural resources.

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