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Estimating Recreation Value and Factors Affecting Willingness-to-Pay of Visitors to Badab-e Surt GeoPark, Summer Rangelands of North of Iran

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Abstract. Rangelands supply many benefits to society as forage and non-forage goods and services. While some of these can be valued in monetary terms, but it is not possible for some products and services such as recreational use of rangelands. So, the present study was conducted for the purpose of the recreational value of Mazandaran Badab-e Surt GeoPark summer rangelands using the Contingent Valuation Method (CVM) based on the maximum likelihood logit regression model. Data were collected from 311 sample visitors randomly by face-to-face interview and Double-Bounded Dichotomous Choice (DB-DC) questionnaire in 2016- 2017. The results showed that majority of the visitors (96.34%) were Willingness-To-Pay (WTP) for ecotourism in the region. The average WTP for an entrance fee was found to be about \$0.4 per visitor, and \$2.17 for each family. The total annual recreation value of the region estimated at \$39.84 per hectare. Logit regression model indicated that the involved variables, bid, income, number of family members, education, and regional quality were significant. However, based on research findings, the economic value of the recreational function of Badab-e Surt is very low, but other benefits such as environmental culture, job creation for the local community, alternative livelihoods and increased economic prosperity in the region will also be available using a nature tour in addition to the calculated amounts.

Key words: Badab-e Surt geopark, Contingent Valuation Method, Ecotourism, Entrance fee, Logit regression

Introduction

Rangeland as a special part of natural resources has the most beautiful collection of natural manifestations. Valley, waterfall, flowers and plants belong to the landscape that has turned natural habitat into unique natural museums. In recent years, natural resource economists have valued and assessed the role of natural resources in providing human well-being and have made significant progress in valuing the natural and ecological benefits of natural habitats (Nuva and Shamsudin, 2009). Ecosystem services can be classified into direct use, indirect use, option and non-use values. The direct use values of forest and rangeland area include the consumptive and non-consumptive uses, e.g. food, fiber, forage and fuel provision, and recreational uses. Ecological services such as improving air quality, mitigating climate change, carbon sequestration, flood protection and so on constitute the indirect use values (Pearce, 2001). The option values indicate willingness to pay to maintain an ecosystem for its probable uses in the future. Non-use values reflect willingness to pay to preserve the ecosystem as well as the willingness to pay irrelevant to the current uses (Lindberg and Hawkins, 1993; Pearce, 2001).

There are some other methods to evaluate the recreational value and ecosystem services such as travel cost method (TCM) and hedonic pricing method (HPM). Contingent valuation is an inherently more flexible tool than the other techniques such as HPM and the household production function approach. This is because it is possible in principle to use CV method to examine environmental goods and terms for providing them that are different from what has been observed now or in the past. It is also possible in principle to create CV method scenario experiments that avoid many of the economic modelling problems that are common to most observational data. Contingent valuation is also the only

approach that can generally be used to include what is usually referred to as the existence or passive use component of the economic value of an environmental good (Venkatachalam, 2004). Contingent valuation method surveys were initially seen as having three distinct advantages. First, CV method can obtain useful information where data on past consumer behavior had not been collected. Second, CVM permits the creation and presentation of scenarios that provide new goods or changes in existing goods that were substantially outside the range of current consumer experience. Third, CVM allows the measurement of the desired Hicksian consumer surplus rather than its Marshallian approximation. For many economists, the major drawback to CVM-based estimates was that they were based upon stated preferences rather than the observed behavior (Satari Yuzbashkandi and Mehrjo, 2019). A review of various studies in estimating the Recreational Value of forest, rangelands and national parks shows that the TC method and CV method are commonly used. For the TC method, if during the trip a visitor has more than one decision to use the trip, the value of the recreational place is overestimated, which can be problematic for the allocation of travel costs among the various purposes (Costanza *et al.*, 1997). Benefits from recreational use of public lands, e.g. ecotourism, are typically estimated using non-market valuation methods (Champ *et al.*, 2003; Saikia and Goswami, 2018). A review of various studies showed that the CVM is the most prominent and widely used method in determining the used and non-used values of natural resource e.g. forests, rangelands, wetlands, rivers, forest parks, and watershed (Champ *et al.*, 2003; Carson, 2004; Venkatachalam, 2004; Chen and Qi, 2018; Satari Yuzbashkandi and Mehrjo, 2019; Amirnejad and Ataie Solout, 2021).

It uses survey questions to elicit people's preferences for non-marketed goods by asking them how much they would be willing to pay for specified improvements or to avoid decrements in them (Mitchell and Carson, 1989). Most contingent valuation studies (Nuva and Shamsudin, 2009; Lindsey *et al.*, 2005; Iasha *et al.*, 2015) on ecotourism have focused on values which eco-tourists attach to ecotourism. Values of ecotourism development to local communities are rarely studied and it is often claimed that ecotourism promotes conservation of natural and cultural heritage of an area and may improve the standard of living of local residents (Wallace and Pierce, 1996; Eraqi, 2008). The support of local communities is often required for sustainable development of ecotourism. Therefore, it is important to know the value which local communities attach to ecotourism development projects. This will help policy makers with regard to decisions concerning how to package an ecotourism project to benefit more individuals in local communities.

In the last decades, growing researches were conducted in the field of recreational, conservation and economic values of natural ecosystems by contingent valuation method that the number of these studies in the field of rangeland is very small and related to recent decades that can be pointed to following studies (Bostan *et al.*, 2018). Alvarez and Larkin (2010) using travel cost and contingent valuation methods estimated the economic value of recreational use of Los Nevados National Park in the Andean region of Colombia. The average willingness to pay for restoration elicited through the closed-ended DC exercise was found to be about \$2.00 per person and the average WTP for restoration elicited through the open-ended exercise was found to be \$3.50.

Hayati and Khadem Baladipour (2012) using contingent valuation method stated the average WTP about (\$0.17) per visit and

annual recreational value of Ghourigol Lagoon about \$17690. Also, there was a significant and positive effect for variables such as education, family income and a negative effect for variables such as age, bid, and distance of residence to mentioned lagoon and probability willingness-to-pay of visitors. Fatahi Ardakani (2014) in estimating economic value of Margoon waterfall in Fars province, Iran came to the conclusion that 78% of visitors were willing to pay a fee for using the area. Also, age, interest rates, monthly income and Bid price have a significant effect on probability of individual WTP. Average individual WTP was estimated (\$1.2) as admission fee and annual ecotourism value was estimated 1.2 million\$ for recreational use. According to Sayade and Rafee (2014), the comparison between public preferences and willingness to pay for recreation for Sorkhe Hesar and other forest parks in Iran, using CV method and Logit regression model showed that WTP for recreation of the region was measured \$1 per person per visit suggested fee and family monthly revenue, the educational level, satisfaction rate, age, and inclination to revisit had a meaningful effect on people's inclination to pay for taking advantage of recreational use of this park. Yeganeh and *et al.* (2015) using CVM estimated the annual recreational value of Zanjan Taham watershed rangelands about \$0.93 per hectare and total recreational value estimated more than \$12762 that show the visitor's attention to considerable region recreational resources. Limaie *et al.* (2016) by evaluating the economic values of Saravan Forest Park, North of Iran came to the conclusion that variables such as proposed entrance fee, monthly income, non-governmental organization membership, moralizing view on the environment and natural resources as well as length of stay have significant effects on willingness to pay for the recreational use of the study area and total annual recreational value of the forest

park was \$12762. Serefoglu (2018) in determination of visitors' willingness to pay to enter Karagol Natural Park of Ankara using CV method showed that the average WTP for an entrance fee was found to be about \$0.22 for all observations when zero bids were included and about \$4.40 when zero bids were excluded. Also, respondents with higher income, respondents who were young, and the working status of the respondents had significant impacts on the probability of the WTP. Mahmoodi *et al.* (2019) in estimating the recreational value of Rudkhan castel forest park in Gilan province of Iran estimated the visitors' WTP by using CVM and the One-and-One-Half-Bound (OOHB) approach Dichotomous Choice (DC) questionnaire. Results showed that 85% of investigated individuals would pay for recreational usage of the Rudkhan Castel forest park. WTP was \$0.50 for each visitor in 2018. Total annual recreational value of the park was estimated about \$859309. The highest willingness to pay was related to the employees' group, female housewives and business, respectively. Amirnejad and Ataie Solout (2021) in estimating the economic value of ecosystem services in the Lar National Park in Mazandaran, Iran stated that the expected willingness to pay for each tourist per family member and each visit was \$0.36.

So, according to many conducted researches related to forest, lagoons and national park ecosystems, recreational function value of rangelands has rarely noticed. So, Orost rangelands in Mazandaran province in Iran were selected because of its considerable potential natural resources such as Badabe-e-Surt geopark. This region has the potential ecotourism that can be an alternative economic development through nature tourism activities in the region. The tourism activities can be opportunities such as income for local people who may have an economic impact on surrounding communities. Balade-e-Surt geopark has a

great potential in the development of ecotourism because it has a magnificent travertine fountain in Iran and is unmatched in the world. This waterfall was registered by the Ministry of Cultural Heritage, Handicrafts and Tourism in 2008 after Mount Damavand as the second natural heritage of Iran in the National List of National Works. So, it is registered globally as the world's second largest source of springs after the Pam Cosmos Fountain. According to this reason, the current study is therefore to estimate, the economic value of recreation function and also, the determinants of this kind of value. The next section gives an overview of the literature review and the data collection methodology, followed by theoretical framework and statistical analysis.

Materials and Methods

Study area

Badab-e Surt (B.S) is located in 95 km south of Sari city, Capital of Mazandaran province and 7 km west of Orost¹ village. It is in (36°21'17" E and 53°51'21" N) south of Sari county, Chahardange district, between Orost and Malkhast villages in Mazandaran province (Fig. 1). The area of the B.S is 3 ha and its buffer zone cover another 30,703 ha. B.S is visited yearly by 1 million visitors. It is at 1841 m above sea level. The average altitude at sea level is 1841 meters above sea level. It is a unique spring travertine spring in Iran and rare in the world after Turkey which was registered in the list of outstanding international monuments in UNESCO in 2001. Yen spring includes several springs with completely different waters in terms of color, smell, taste, and volume of water. The area around the spring is covered with wild barberry bushes and higher altitudes are covered with coniferous

¹ . Orost is a village in Poshtkuh Rural District, Chahardangeh District, Sari County, Mazandaran Province, Iran

forests. Three species of Asteraceae with of three genera and three species of Poaceae with of 2 genera have the most frequency. Due to the high sedimentation of the springs

and the formation of a rocky surface around the springs, plants grow at a distance from the springs. The Orost village has 222 households and 895 people.

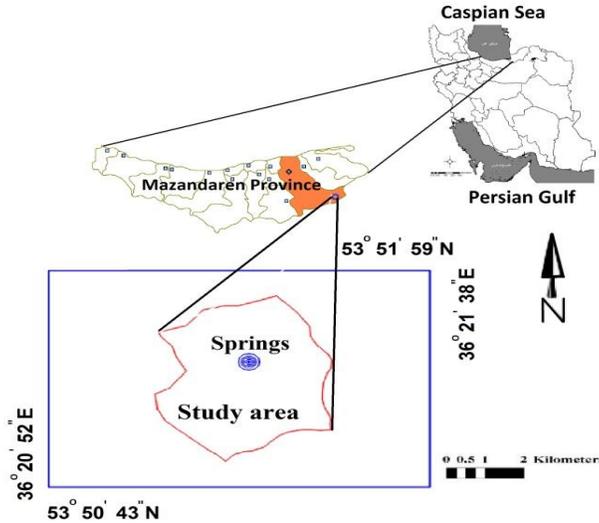


Fig. 1. The location of the study area, Badab-e Surt springs, Mazandaran province

Contingent Valuation Method

The CV method is utilized in the present study. It has since been widely used to measure the use and non-use values of environmental quality (Serefoglu, 2018; Zaiton *et al.*, 2013). One of the main issues regarding contingent valuation is how we should evaluate the observed responses and estimate a respondent’s WTP. The CV method is a direct valuation method in which

respondents are asked to express a WTP or willingness to accept in response to a hypothetical market situation (Wooldridge, 2006; Eraqi, 2008). A pretest was also done to check the validity and understandability of the contents of the questionnaire. The utility that the individual gains from using environmental resources is more than the state that he does not use environmental resources using (Equation 1).

$$U(1, Y - A; S) + \varepsilon_1 \geq U(0, Y; S) + \varepsilon_0 \text{ (Equation 1)}$$

Where:

U represents the indirect utility that the person gains.

Y and *A* stand for income and the offered price, respectively and

S is the other random variables with the mean of zero that are equally and independently distributed.

Zero means that the person does not visit the

jungle park and 1 means that he visits the park.

ε_0 , and ε_1 are random variables with the mean of zero which are equally and independently distributed. Δu can be described as the (Equation 2):

$$\Delta U = (1, Y - A; S) - U(0, Y; S) + (\varepsilon_1 - \varepsilon_0) \text{ (Equation 2)}$$

The probability (P_i) that he will accept the offer (A) is described as the following equation based on logit model (Equation 3). The logistic function estimates the probability of accepting the offered bid by household for restoration of mangrove, which is a function of bid amount and set of respondent's socioeconomic characteristic.

$$P_i = F_n(\Delta U) = \frac{1}{1 + \exp(-\Delta U)} = \frac{1}{1 + \exp\{-\alpha - \beta A + \gamma Y + \theta S\}} \quad \text{(Equation 3)}$$

Where:

$F_n(\Delta U)$ is the cumulative distribution function with a standard logistic difference and includes some of the socio-economic variables of this study such as income, bid, family number, and education.

Y and A are designated as income and the offered price, respectively and

S is the other socio-economic characteristics influenced by individual preferences.

$$E(WTP) = \int_0^{+\infty} F_n(\Delta U) dA \quad \text{(Equation 4)}$$

$$E(WTP) = \int_{-\infty}^{+\infty} F_n(\Delta U) dA \quad \text{(Equation 5)}$$

$$E(WTP) = \int_{\min A}^{\max A} F_n(\Delta U) dA \quad \text{(Equation 6)}$$

Of these, the third is the best method because this method has stability, consistency with theory and it is statistically

$$E(WTP) = \int_0^{\max A} F_n(\Delta U) dA = \int_0^{\max A} \left(\frac{1}{1 + \exp[-\alpha^* + \beta A]} \right) dA \quad \text{(Equation 7)}$$

Where:

$\alpha^* = (\alpha + \gamma Y + \theta S)$, and is the modified width of origin.

Where:

$E(WTP)$ is the expected value of WTP, and α^* is the adjusted intercept which was added by the socio-economic term to the original intercept term of $\alpha^* = \gamma Y + \theta S$.

The error term is small when there are large differences in systematic utility between alternatives one and two. Large errors are likely when differences in utility

The variable, Y is supposed to be binomial, taking the value of 1 for a “yes” and 0 for “no” response.

In order to estimate this function, the probability of “yes” responses can be modeled for different bid amounts and socioeconomic variables (such as income, education, age, etc.).

θ, β, γ are the estimated coefficients which are expected to be $\beta \leq 0, \gamma > 0$ and $\theta > 0$.

The parameters of logit model are estimated using the maximum likelihood method which is the only technique to estimate logit models. There are three ways to calculate the average WTP (Equations 4, 5 and 6):

efficient. Ultimately, the expected WTP is estimated as (Equation 7).

are small, thus decision makers are more likely to choose an alternative on the “wrong” side of the indifference line.

The estimating mean of WTP within the framework relies on making some assumptions about the upper and lower limits of the need. For example, knowing the price amounts at which probability to say

“NO” is zero and the probability to say “YES” is one. By applying this to the price behavior and assuming that individuals will not pay if they receive disutility from it, negative WTP can be ruled out and zero is used as the lower limit. The willingness to pay is represented by the dichotomous variable of WTP with values of 1 for those willing to pay the additional amount of entrance fee and 0 are otherwise.

The Ordinary Least Squares (OLS) regression of the above relationship with WTP as the dummy variable is beset by several problems namely: 1) non-normality of the error term, 2) heteroscedasticity, and 3) the possibility of the estimated probabilities lying outside the 0-1 boundary (Yacob *et al.*, 2009; Nuva and Shamsudin, 2009; Abedini *et al.*, 2016). Since the dummy WTP is actually a proxy of the actual propensity or ability of willingness to pay, the logit models guarantee that the estimated probabilities lie in the 0-1 range and that there is nonlinearly related to the explanatory variables. The logit approach assumes that the cumulative distribution of the error term is logistic. Hence, three interrelated open-ended questions were proposed regarding the willingness to pay based on 40 pre-questionnaires. Based on answers to the willingness to pay, the initial information obtained and the suggested fees were \$0.47, \$0.24 and \$0.95. First of all, the visitors were asked about the middle-proposed question \$0.47 in such a way that “BS has provided an opportunity to sights, to enjoy the nature and recreation as well as other usages. Are you willing to pay \$0.47 of your income as the entrance fee (ticket price) for each member of your family?” If the answer was negative, a lower price \$0.24 was offered and in the case of a positive answer, a higher price \$9.52 was offered to

the visitors. The second question was offered to the respondents who rejected the first question in such a way that “are you willing to pay \$0.59 of your income as the entrance fee for each member of your family?”

Questionnaire design and data collection

The questionnaire for this research was designed based on contingent valuation method (CVM). The questionnaire consists of a brief about the Badab-e-Surt springs, purpose of the study is divided into three sections; visitors’ socio-economic background, satisfaction on the services offered at the region and WTP of visitor for entrance fee. The questioning approach used in this study was the Double-Bounded Dichotomous-Choice (DB-DC) questionnaires (Hanemann *et al.*, 1991). The respondents were asked whether they are willing to pay a certain amount of money as an entrance fee or not (Iasha *et al.*, 2015). The data collection involved standardized face-to-face interviews that were designed and tested in a community outside the study area. Pre-test interviews were conducted on 40 randomly selected individuals and asked the visitors in the area about their maximum willingness to pay. The number of required questionnaires was determined based on the proposed formula. Findings from the pre-test interviews motivated several changes in the questionnaire e.g. the wording of the hypothetical market scenario. The face-to-face interview and actual surveys were conducted from September 2016 to September 2017 in B.S including weekends and public holidays and simple random sampling among 100000 visitors. The Cochran formula was used to calculate the appropriate sample size (Equation 8).

$$n = \frac{Nt^2pq}{Nd^2 + t^2pq} \text{ (Equation 8)}$$

Where:

n is the sample size,

N is volume of society (number of total visitors),

t is the value for the selected alpha level, e.g. 1.96 for (0.25 in each tail) 95 percent confidence level;

p is the estimated proportion of an attribute that is present in the population.

Q, is 1-p;

(p) (q) are the estimates of variance;

$$E(WTP) = \int_0^{100000} \left(\frac{1}{1 + \exp\{1.59 + 0.0001535A\}} \right) dA = 16880.48 \quad (\text{Equation 9})$$

The study was described to the respondents and then, they were asked series of demographic questions such as their occupation, annual income, and whether they have passed through primary, high, and post-high school education. Furthermore, they were asked whether they belonged to an environmental conservation group in the conditional valuation method. Individuals or households are supposed to maximize their utility according to their income constraints. To ensure that the sample represented the recreationist population, convenient selection and enumeration of the respondents were done on a staggered time frame which included weekends and public holidays. To avoid any spurious emotions affecting responses, they were informed that the study was being carried out for academic purposes only.

Logit models may be estimated in linear or logarithmic function forms. In this study,

d is the acceptable margin of error for proportion being estimated and the confidence interval in decimals.

The WTP value of each person was calculated for the recreational use of BS. Hence, after estimating the parameter values of the logit model using the maximum likelihood method, by numerical integration from zero to the proposed maximum willingness to pay (2 cents) as (Equation 9).

the linear logit model was used because it is easier to calculate the average willingness to pay with a linear form. WTP considered as an independent variable and socio-economic variables such as income, pro-posed fee, etc. determined as an independent. The MS Excel 2010, and Shazam10.2 (2011) software were used for the statistical analysis of variables, mathematical calculation, and parameter estimation of the logit model.

Results

Socio-Demographic background of the visitors

The parameter values such as average, standard deviation, minimum and maximum of statistical analysis of the socio-economic situation of site visitors are shown in Table 1.

Table 1. The statistical results social- economic characteristics of respondent's

Variables	Unit	Average	Standard deviation	Maximum	Minimum
Age	year	36.85	11.28	70	21
Schooling years	year	13.15	3.33	22	0
Family number	number	4.49	1.25	13	1
Income (each person/month)	\$	7.11	411232.43	30	2.5
Family Income (each family/month)	\$	9.441	5524800.1	40	2.5
Bid	\$	23629.63	11133.8	40	10
Number of visits per year	times	2.28	1.79	4	1

Visitor's willingness to pay

The visitor's willingness to pay to the bids for recreational valuation of B.S springs

showed that 13 people did not accept the first (middle offer) while 48 people accepted it. Consequently, the respondents that

accepted the second offer \$0.95 were asked the following question: Are you willing to pay \$0.95 as the entrance fee? Results show

that 55 people rejected it while 256 people accepted it (Table 2).

Table 2. Results of the proposed entrance fees (\$)

Respondents frequency	\$0.47		\$0.24		\$0.95	
	accept	reject	accept	reject	accept	reject
Number of respondents	48	13	80	170	256	55
Percentage (%)	14.25	4.66	24.75	55.34	81.09	18.91

The visitors WTP responses are presented in Table 3. Result shows that among 311 visitors, 302 (96.34%) agreed to pay as an

entrance for entrance and 9 persons (3.06%) were not willing to pay anything.

Table 3. Summaries of visitors WTP responses

WTP (\$)	Frequency	(%)
Yes	302	96.34
No	9	3.06

The educational level of respondents is presented in Table 4. Based on the results of the questionnaire, the most frequent was related to diplomas (33.15%) and the least

was related to illiterate visitors (1.36%). The most willing to pay belonged to MSc. and higher (\$1.07) and the least WTP belonged to illiterate visitors (4 cents).

Table 4. Educational levels of respondents

Education level	MSc. and Higher	Bachelor	Associate Degree	Diploma	High School	Illiterate
N	20	68	54	115	49	5
Frequency (%)	7.94	24.1	20.24	33.15	13.15	1.36
WTP (\$)	45000	3818.1	3628.3	3239.4	2715.7	1800

Results of Logit Regression Model estimated

The result of the conditional logit model is presented in Table 4. The variables, offer price (bid), income, education, family member, and accessibility were significant on WTP. The first indicator of the visitor acceptances for willingness to pay was the price (bid) offered. The coefficient for the offer price (bid) had a negative value; it means the higher price (bid) offered, so the respondents would be less willing to pay. Also, it shows that according to the scenario of the hypothetical market, if the proposed entrance fee increases, the probability of visitors' acceptance of the proposed entrance fee will be decreased and if the proposed entrance fee decreases, the probability of visitors' acceptance of the proposed entrance fee will be increased. According to the

elasticity estimation of willingness to pay, with a reduced (increase) of 1% in the proposed entrance fee, the acceptance probability of the entrance fee will be reduced (increase) by 0.165%. Moreover, due to the marginal effect of this variable, with an increase in the proposed fee by 2 cents, the acceptance probability of the entrance fee will be reduced by 1.131 units.

Income also had a statistically significant, positive impact on respondent's willingness to pay estimate. The positive value of visitor income indicated that willingness to pay for the entrance fee increased with higher income levels among the visitors. Normally, the higher visitors' income the more they would be willing to pay. The income estimated coefficient was significant (p<0.01) with a positive sign as it was expected. This would result in a more

revenue increase of visitors; the willingness to pay also will increase.

According to the elasticity estimation of this variable, with 1% increase in the amount of income, the probability of the entrance fee acceptance will be increased by 0.93%. Due to the marginal effect of this variable, when the income increases by 2 cents, the probability of the entrance fee acceptance will be increased by 0.572 units.

Family member was the next significant variable ($p < 0.01$) with negative significant value. The calculated elasticity amount for this variable shows that with an increase (decrease) of one unit (times) of this variable, the probability of the entrance fee acceptance will be increased (decrease) by 0.31%. The marginal effect of changes in this variable shows that with an increase (decrease) of the unit in the acceptance probability family member, the probability of the entrance fee acceptance will be increased (decreased) by 0.2052 units.

Education was significant with positive value. The calculated elasticity amount for this variable shows that with an increase (decrease) of 1% (level of education), the probability of the entrance fee acceptance will be increased (decreased) by 0.645%. The marginal effect of changes in this variable shows that with an increase (decrease) of one unit in the acceptance probability education, the probability of the entrance fee acceptance will be increased (decreased) by 0.433 units.

And lastly, the accessibility (satisfaction of the region) also was significant with positive value in this study. The calculated elasticity amount for this variable shows that with an increase of 1.59% in this variable, the probability of the entrance fee acceptance will be increased by 1.59 units.

The marginal effect of changes in this variable shows that with an increase of 1.057% in the acceptance probability of the regional quality on the situation of the environment, the probability of the entrance fee acceptance will be increased by 1.057 units. That means the accessibility to BS easy to reach, and the visitors are satisfied with accessibility. The “satisfaction of the region” is the one important for increasing number of visitors if the visitor was satisfied with accessibility, so many visitors will continue to come to B.S.

The statistics in Table 3 show the explanatory power of the logit model. The likelihood-ratio test compares the probability functions in the bounded state (when all coefficients are zero) and in the unbounded state. The estimated likelihood-ratio test is 271.06 and it is significant ($p < 0.01$). This indicates that in the logit regression model, explanatory variables (independent) could describe a dependent variable WTP very well. Therefore, due to the significance of this test, it is not possible to assume that all of the variables should be zero at the same time. The McFadden, Estorla, Madla, and Cragg-Uhler determination coefficient in the estimated regression model is 0.355, 0.45, 0.38 and 0.52 respectively. This indicates that the explanatory variables of the model properly explain the changes in dependent variables of the model. The percentage of correct predictions in this logit estimated regression model is equal to 76% and indicates that the estimated model has been predicted a high percentage of the dependent variable values due to the explanatory variables. In other words, nearly 76% of respondents answered “yes” or “no” to the willingness to pay by providing an appropriate ratio of proper information.

Table 4. Results of estimated logit regression model

Variables	Coefficient	SD	T-value	Elasticity	Margin of Error	p-value
Constant	-2.720	1.146	-2.372	-1.037	-0.678	0.018
Bid	-0.153×10 ⁻³	0.154×10	-9.947	-1.646	-1.131	0.000
Income	0.2762×10 ⁻⁶	-70.506×10	5.452	0.927	0.572	0.000
Age	-0.141	0.130	-1.084	-0.199	-0.129	0.280
Gender	0.752	0.367	0.204	0.242	0.159	0.840
Education (schooling years)	0.135	0.416	3.248	0.645	0.423	0.001
Family member	-0.179	0.553	-3.248	-0.311	-0.205	0.001
Visiting times	0.216	0.141	1.531	0.184	0.120	0.126
Accessibility	4.359	0.852	5.116	1.597	1.056	0.00

Mcfadden's R²=0.355,

Right prediction (%) =76

Log-likelihood=271.06

Cragg-Uhler coefficient=0.516

According to equation (4), the average WTP for using of B.S tourist region estimated \$0.4 per visitor, and the average of annual recreational value for visiting the BS tourist region is \$2.17 per family. The recreational value of this region obtains by the average of expectancy willingness to pay and multiplies it for all visitors. Out of 100000 total visitors of BS in 2017, the annual recreational value of the B.S region was obtained for \$39.84 per hectares.

Discussion

At the forefront of this issue is the role of nonmarket valuation in the improvement of protected areas. Nonmarket valuation methods are particularly suitable for answering questions concerning visitors' WTP for improvements in management or protected areas quality. Moreover, nonmarket valuation can help answer questions like 'what are protected areas worth to society?' Such questioning of the worth or value of parks to society is incomplete without an examination of the role and purpose of these kinds of area in the 21st century. In this section, the results obtained from this study are used to better understand these issues, particularly as they are related to B.S. However, the discussion is extended to other protected and unique areas in the developing world.

The Contingent valuation method has been the most commonly applied valuation

method in recent years, and it has been developed mainly in environmental valuation. The contingent valuation method is a simple, flexible nonmarket valuation method that is widely used in cost-benefit analysis and environmental impact assessment. However, this method is subjected to severe criticism. So, the contingent valuation method was used to estimate the recreational value of Badab-e Surt springs in North of Iran. The results highlighted several important issues concerning protected area management in the developing world. Therefore, it is required to estimate the economic benefit of recreational sites for an optimum allocation of scarce resources. The criticism revolves mainly around two aspects, namely, the validity and the reliability of the results, and the effects of various biases and errors (Venkatachalam, 2004).

The coefficient for the price (bid) had negative value; it means the higher price (bid) offered, so the respondents would be less WTP. This result is consistent with that of the previous studies by (Pak and Fehmi Turker, 2006; Nuva and Shamsudin, 2009; Yacob *et al.*, 2009; Samdin *et al.*, 2010; Abdullahi *et al.*, 2015) who stated that the higher the bid, the fewer respondents will be willing to pay. In other words, WTP decreases with an increase in the price.

Income is also a significant variable and had a positive relationship with WTP in this study. The positive value of visitor income

indicated that willingness to pay for the entrance fee increased with higher income levels among the visitors. Normally, the higher visitors' income, the more they would be willing to pay. The same results were also reported in (Yacob *et al.*, 2009; Kubak *et al.*, 2020).

The gender (male) was a positive value, the same finding was reported by (Nuva and Shamsudin, 2009) and they confirm income had significance effect on willingness to pay. These findings are in contradiction to the study of (Togridou *et al.*, 2006) who stated that income is not a significant predictor of willingness to pay.

Average willingness to pay was calculated based on estimated coefficients of the binary regression elicited through a (DB-DC) questionnaire exercise found to be in the amount of \$0.4 per person. The annual estimates of WTP value of B.S were estimated \$39.84 per hectares; In case, the mathematical calculation of expected willingness to pay was applied, the value was lower (\$0.24). The final value that would be obtained after implementing the entrance fee to B.S is approximately (\$0.47) million (in case of the second estimated price). The given value may be even higher if a range of offered prices is increased on more extreme values. As the questionnaire reveals, the real implementation of an entrance fee to B.S would bring many discrepancies. Generally, people do not believe that the fee would be used for a specific purpose. Thus, the use of entrance fees should be targeted and transparent to the visitor. This research states that the respondents would pay about \$4.02 per person for entrance to B.S while the average WTP for recreation was lower as (Mousavi *et al.*, 2014; Yeganeh *et al.*, 2015) stated. So, it was in contradiction to these researches. The reasons are related to two factors: (1) Degree of recognition and social members' information of tourist regions are different, (2) time of investigation and various features

of studied regions and creating desirability for visitors according to the type of region are different.

Another variable that has a significant relationship with respondent's willingness to pay was family members. By increasing household dimensions, a significant decrease was observed in the level of visitors' willingness to pay. Probability of non-acceptance of the bid for families with great dimensions is more because many of these families with more people in the family, as a result of less financial welfare, have less willingness to pay for visiting the B.S that contradict with findings of (Yeganeh *et al.*, 2015).

The results show that education has an important role in WTP. There is a direct relationship between literacy level and income level, as by increasing persons' education level, their perspective about environmental benefits and nature become more positive and their awareness increase about biology; for this reason, their willingness to pay increases too. The coefficient associated with the respondents who have post-high school education has a positive and statistically significant effects on WTC, i.e., the respondents who have post-high school education were more likely to contribute to the ecotourism project. So, WTP of people with high education level in MSc. and higher was \$1.07 and visitors in illiterate education level were \$0.04. Ezebilo *et al.* (2010) had the same idea who stated that respondents who have post-high school education are more likely to be employed in the formal sector of the economy and may earn more income and thus may have more money to support the improvement in quality of services project. Another reason may be that post-high school education helps to comprehend the news about e.g. future benefits of an improvement in quality of services in ecotourism.

Although the age variable has no significant effect statistically, the negative

sign for its coefficient shows that as people get older, the probability of positive response to offer price will decrease; in other words, conservation of the environment is more valuable for younger people than older people. Yeganeh *et al.* (2015) concluded that age variable has no effect on the level of visitors' willingness to pay, and its positive sign shows that as the visitors get older, the probability of positive response to offer price will decrease.

The effect of gender was not significant statistically; these results are consistent with findings of (Ezebilo *et al.*, 2010). They concluded in their study that gender has an important role in willingness to pay and most of them for willingness to pay were men. The coefficient associated with the respondent's gender has the expected sign; however, it was not statistically significant but it contradicts with findings of (Yeganeh *et al.*, 2015).

Conclusion

In this research, Orost rangeland due to Badab-e surat is a very important place for ecotourism. Transferring this region to a private section to equip the tourism facilities and to determine regulations for entrance of tourists and entrance determination is under investigation for a long time. According to the importance of subjects and determination of the economic value of natural promenade and green spaces for improving tourism industry and environmental policies, the results of this research force the managers and planners to find a solution for this valuable region which is the unique tourism attraction. With protected sites around the world facing serious funding crises and demands for alternative, extractive use of their land, revenue from visitor entrance fees must go further to provide the necessary infrastructure and labor for effective management and conservation. However, if entrance fees are raised too high, the decline

in visitor numbers would offset any revenue made. For this reason, establishing visitors' willingness to pay is an essential step in crafting an informed entrance pricing policy. As is the case with B.S, most parks in the developed and developing world alike are highly valuable but are extremely undervalued under the existing institutional framework, opening the way for other non-conservation land uses. Research on the economic value of these reserves can fill an important gap and allow decision-makers and the general public to make more informed choices regarding these important social assets. This study which estimated WTP gives an insight into the potential ecotourism benefits and economic benefits for the ecotourism at B.S. The Survey of 311 visitors found that visitors were willing to pay a mean entrance fee of B.S \$0.4 and a median entrance fee of \$2.17 per family shows that bid price, income level, and gender (male) were significant factors that influenced WTP.

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برآورد ارزش تفریحی و عوامل موثر بر تمایل به پرداخت بازدیدکنندگان ژئوپارک باداب سورت، مراتع ییلاقی شمال ایران

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چکیده. مراتع منابع زیادی به عنوان کالاها و خدمات علوفه‌ای و غیرعلوفه‌ای برای جامعه دارد. این کالاها و خدمات را می‌توان به صورت پولی ارزشگذاری کرد، اما ارزشگذاری برخی دیگر از کارکردها، از جمله استفاده تفریحی مراتع امکان پذیر نیست. از اینرو، هدف از مطالعه حاضر برآورد ارزش تفریحی مراتع ییلاقی ژئوپارک باداب سورت استان مازندران با استفاده از روش ارزشگذاری مشروط و مدل رگرسیون لاجیت بر اساس حداکثر راست‌نمایی می‌باشد. اطلاعات لازم از طریق تکمیل پرسشنامه و مصاحبه حضوری با ۳۱۱ بازدیدکننده و روش دوگانه-دوبعدی بصورت تصادفی طی سال‌های ۱۳۹۵-۱۳۹۶ بدست آمد. نتایج نشان داد که اکثر بازدیدکنندگان (۹۶/۳۴ درصد) برای استفاده بوم‌گردی از منطقه تمایل به پرداخت داشتند. میانگین تمایل به پرداخت بازدیدکنندگان، ۰/۴ دلار به ازای هر فرد و ۲/۱۷ دلار به ازای هر خانوار برآورد گردید. ارزش کل تفریحی سالانه هر هکتار از منطقه، ۳۹/۸۴ دلار به ازای هر هکتار به دست آمد. نتایج تخمین رگرسیون لاجیت نشان داد عوامل اثرگذار بر تمایل به پرداخت بازدیدکنندگان متغیرهای مبلغ پیشنهادی، درآمد، تعداد افراد خانواده، تحصیلات و کیفیت منطقه می‌باشند. یافته‌های تحقیق حاضر نشان داد اگرچه در حالت عادی ارزش اقتصادی کارکرد تفریحی منطقه مورد مطالعه بسیار ناچیز می‌باشد ولی با اجرای برنامه تور طبیعت‌گردی می‌توان سالانه علاوه بر مبالغ محاسبه شده، به مزایای دیگری همچون فرهنگ‌سازی زیست محیطی، ایجاد اشتغال برای جامعه محلی، تأمین معیشت جایگزین و افزایش رونق اقتصادی در منطقه نیز دست یافت.

کلمات کلیدی: ژئوپارک باداب سورت، روش ارزشگذاری مشروط، بوم‌گردی، مبلغ ورودی، رگرسیون لجستیک