

## Economic Valuation of Ecosystem Conservation Using Dichotomous Choice Approach (Case Study: Khabar National Park)

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### ABSTRACT

The development of economic valuation techniques and their potential applications to environmental assessment have important role in environmental economics. The objective of this study was to evaluate the conservation value of the Khabar National Park in Iran and people's willingness to pay for preserving it. This park is one of the most important environmental resources of the country in terms of its flora and fauna in Iran. A contingent valuation method with a dichotomous choice questionnaire based on a logit model was applied to determine the conservation value and people's willingness to pay for preserving the park. The required data was collected through completed questionnaires. Results indicated that the influence of the variables of bid, monthly income, gender, job and education level on households' willingness to pay are statistically significant. Therefore, an increase in income, education level, and people's expertise increases their willingness to pay, and an increase in bid decreases their willingness to pay. The Iranian households' average monthly willingness to pay for this park's conservation value was estimated at 4,328.6 Rials. The results of the study indicated that the use of the public capacities to protect the natural resources and the environment is a step in financing and participation of people for better protection of the environment.

**Keywords:** Contingent valuation method, Environment, Logit, Willingness to pay.

### INTRODUCTION

Nowadays, with population growth and development of economic activities, the importance of natural resorts and environment has been highlighted more than ever and needs to be studied. Ecosystem conservation efforts are now comprised of both preservation and ecological restoration strategies (Hjerpe *et al.*, 2015). These ecosystem services include provisioning services, such as timber for houses and other commodities, but are substantially comprised of nonmarket services such as climate regulation, provision of biodiversity,

and spiritual inspiration (Pagiola *et al.*, 2004).

Considering the growth in the current demand for resorts, there is a need for economic and social analysis along with a full study of people's demand. Urban landscapes and parks are among the essential aspects of urban recreation functions and have a great strategic importance in improving the environmental conditions of present urban communities. The significance of urban landscapes and parks can be argued in terms of their social, psychological and environmental advantages, as well as their economic aspects. Since values for changes in

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ecosystem services are not as certain as market values, non-market valuation techniques are required (Hjerpe *et al.*, 2015).

The urban parks enhance the attractiveness of cities due to their recreational, aesthetic and historical values, and thus lead to an increase in the number of tourist visits, and subsequently job creation. The closeness of natural elements such as trees and water adds to the value of properties and actually contributes to pay tax and urban space improvement. Valuation of environmental resources, a method employed for the optimal use of natural resources, can be very effective in environmental management, which tries to find the optimum balance of consuming natural resources. Environmental management can benefit from economics, planning and decision-making in order to find the best environmental alternatives that do not incur great expenses. According to economists and ecologists, the reasons behind the valuation of natural resources and environmental systems are: humans' understanding of environmental and ecological resources, presenting the country's environmental issues to decision-makers and planners, creating a relationship between economic policies and natural revenues, evaluating the role and significance of natural resources, balancing and modifying national accounts such as GNP and preventing the destruction and overexploiting of natural resources (Molaei, 2009).

Khabr National Park is located in the south of Baft County, in Kerman Province, and between 28° 25' and 28° 59' north latitude and 56° 39' and 56° 52' east longitude. This park, with an area of 120,000 hectares, is one of the most wonderful regions of Baft County in Kerman Province and is unrivalled in the province and country due to its biodiversity, which resulted from the presence of high mountains, numerous plains, and various basins. Khabr is the eleventh region entitled as National Park in Iran. This park was preserved as a protected area in 1971 and as Khabr and Rochon

Wildlife Refuge in 1975, and was finally registered as a cultural tourism site in UNESCO and was promoted to a national park in 1991. Variety and density of the flora and fauna of Khabr National Park, along with characteristics such as the homogeneity of native habitat, existence of some species of genetic reserves, especially in the mountains of the region, animal species like honey badgers (*Mellivora capensis*), badgers, Bonelli's Eagle (*Aquila fasciata*), rare plant species like olive begonia, Desert Teak (*Tecomella undulate*) *Pistacia atlantica*, *Artemisia*, *Zygophyllales* and *Junipers* -many of which are on the verge of extinction- have created different recreational places. This biodiversity includes 6% of plant species, 15% of mammal species and 20% of bird species of the country. The rich and varied wildlife of Khabr National Park is also notable and worthy: hundreds of bezoar goats, goats, ram, ewe and deer, dozens of panthers, Blanford's fox (*Vulpes cana*), wolves, caracals, jackals, etc, along with birds like Golden eagles, falcons, hubara buzzards, grey partridges (*Perdix perdix*), see-see partridge (*Ammoperdix griseogularis*) Eurasian Collared Doves, Black-bellied Sandgrouses, Ptarmigans, Common Kestrels (*Falco tinnunculus*), etc. exist in Khabr National Park. The presence of such a varied fauna and flora has made Khabr National Park an appropriate place for the use of researchers, fans of nature and tourism, and photographers (Department of Environment of Iran, 2017).

In recent decades, the economic evaluation of parks has received attention in Iran. For the first time, Yakhkeshi considered the issue of the resorts in 1972. Then, in 1977, Majnounian assessed the economic and social values of Ariamehr and Khazane Farahabad Parks of Tehran at 55,405 and 210,535 Rials per year, respectively. He concluded that despite its limited space as an inner-city park, the annual value of Khazane Farahabad Park is greater than that of Ariamehr Park with its vast area. Amirnejad and Khalilian (2006) estimated the visitors'

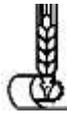
average willingness to pay for recreational use of Golestan National Park at 3,520 Rials per visit, and the annual tourist value of the park at 1.96 million Rials per hectare by using the Contingent Valuation Method (CVM). They identified the variables of income, bid and education level as factors determining the willingness to pay. Hashemnejad *et al.* (2011) estimated the visitors' average willingness to pay for Nour Forest Park, in Mazandaran Province, at 3,875 Rials, using the contingent valuation method, a dichotomous choice questionnaire, and logit model. Hayati *et al.* (2010) determined the factors influencing the willingness to pay and estimated the visitors' willingness to pay in city parks of Tabriz (Ilgoli and Mashroute Parks), employing the contingent valuation method and Heckman's two-stage method. The results indicated that the variables of monthly income, family size, gender, level of satisfaction with social security, and annual number of visits to the park influenced the visitors willingness to pay; and the visitors' average willingness to pay was evaluated at 2,231 Rials per visit. Mirzaei (2000) estimated the annual recreational value of the Palangdareh Region, Qom, at 83,395 Rials using the travel cost method. Employing the contingent valuation method, Khorshiddoust (2005) estimated a Tabriz citizen's monthly average willingness to pay for urban environmental preservation and urban pollution reduction at 41,140 Rials. Amigues *et al.* (2002) estimated the conservation value of the habitat on the banks of Garonne River at 67, 66, 13 and 133 Francs, using contingent valuation method with probit, linear, semi-logarithmic and Heckman's two-stage models, respectively. They identified the education level and place of residence as the determining factors in willingness to pay. Using the contingent valuation method, Lehtonen *et al.* (2003) showed that considering the preservation of the forests in the south of Finland, 73.8% of the respondents favored more preservation and were willing to pay for preservation of the

forests; 15.8% favored more preservation but did not pay for it, 5.5% were neutral, and 4.9% preferred less preservation of the forests. Reynisdottir *et al.*, (2008) employed the contingent valuation method to show that the visitors' average willingness to pay for admission to Skaftafell National Park and the Gullfoss Waterfall was 508 and 133 million ISK (Currency of the country), respectively. Using contingent valuation method, Pagiola (2001) estimated the residents' and tourists' willingness to pay for improvement and renovation of the Roman Palace located in the city of Split at 170 and 45 dollars per visit per year. Leinhoop and MacMillan (2007) estimated the value of the wilderness of Iceland at 243.16 Euros per year. Salvador and Mene'ndez (2005) estimated the non-market benefits of an urban park in Valencia, Spain, at 11942 Pesetas a year. Sanders *et al.* (1990) evaluated people's willingness to pay for protecting the rivers of Colorado. Kristrom (1999) estimated people's willingness to pay for protecting the ancient forests of America, using the contingent valuation method.

Since no study has been done on the valuation of Khabr National Park, this study aimed to determine the conservation value and people's willingness to pay for preserving the park, using the contingent valuation method and a dichotomous choice questionnaire through the logit model.

## MATERIALS AND METHODS

Contingent Valuation Method (CVM) is used to measure people's willingness to pay for environmental goods and services. This technique considers a hypothetical market for non-priced (non-market) goods and services based on which people's demand for such goods and services can be evaluated through their declared needs and the data derived from the questionnaires. In other words, this evaluation technique requires contacting people for determining the value of non-market goods and services. This technique was first used by Ciriacy-Wantrup



in 1947 to measure the benefits derived from soil erosion prevention. Davis (1963) adopted the technique to study hounds. Many economists used the achievements of Davis afterwards, and numerous CVM studies have been done in different countries and on various subjects; researchers have mainly focused on improving the CVM techniques (Smith, 1996). The main objective of this technique is to estimate the benefits drawn from a change in the production level or the price of some of the public and nonmarket goods and services. The obtained results can be used in cost-benefit analyses and public policies such as granting subsidies and pricing the non-market goods and services. In this study, consumer's surplus will be estimated which determines his/her willingness to pay for environmental goods and services by using dichotomous choice and double-bounded dichotomous choice questionnaires. In a dichotomous choice questionnaire, the respondents face a Yes/No choice for the bid, while in a double-bounded dichotomous questionnaire, the respondents face several bids and would be given further bids according to their response to a certain bid. In fact, further bids depend on their "Yes" or "No" replies or the respondents' reaction to the earlier bid. It is better to use double-bounded dichotomous questionnaires for a better estimation of people's willingness to pay (Marta-Pedroso *et al.*, 2007). In a differential pattern of utility, the indirect Utility of an individual ( $U$ ) is a function of their income level, personal characteristics, and the quality of the environmental goods that is valued. One is willing to pay for preserving environmental resources if his/her utility at the time of preserving the resource and paying for it is greater than his/her utility when not preserving it. Equation (1) is its algebraic expression (Lee and Han, 2002).

$$U(1, INC - B; S) + \varepsilon_1 \geq U(0, INC; S) + \varepsilon_0 \quad (1)$$

Where,  $U$  is the indirect Utility an individual receives when visiting a park,  $INC$  is people's monthly Income, and  $Bid$  ( $B$ ) is the amount that an individual subtracts from their income to pay for preservation of a certain resource, " $S$ " denotes other Stochastic variables (people's socio-economic characteristics) with the mean value of zero, which are distributed equally and independently. In the indirect Utility function  $U(0)$ , zero is related to the time when a resource has no utility for an individual and, therefore, they do not allocate money for preserving it. Number one is related to the opposite situation, when a resource is useful to an individual and they are willing to pay for preserving it. Therefore, the Utility difference ( $\Delta U$ ) is also a function of income,  $S$ , and  $Bid$ , which is shown as Equation (2) (Lee and Han, 2002).

$$\Delta U = (1, Income - Bid; s) - U(0, Income; S) + (\varepsilon - \varepsilon_0) \quad (2)$$

If  $\Delta U$  is greater than zero, preserving the park provides utility for people, and they maximize this utility by allocating money for preserving the park. The variables of income,  $S$ , and bid are factors influencing the rejecting or accepting of allocating money for preserving the park. Finally, there will be an econometric model whose dependent variable is composed of zero and one. Logit model is generally used to estimate such regression models with dependant variables of zero and one (Greene, 2002). This study employed a logit model to estimate the conservation value of Khabr National Park and to analyze the influence of different explanatory variables on people's willingness to pay. Logit cumulative probability distribution is shown in Equation (3) (Green, 2002).

$$P_i(Y = 1) = \frac{1}{1 + \exp(-\beta X)} \quad (3)$$

Where,  $P_i$  is the Probability of accepting the bid;  $X$  is the explanatory variables and  $\beta$  shows the parameters of the model. Based on this logit model, the probability of  $P_i$  (an individual's accepting one of bids) is expressed as Equation (4) (Hanememann, 1994).

$$P_i = F_\eta(\Delta U) = \frac{1}{1 + \exp(-\Delta U)} \frac{1}{1 + \exp\{-(\alpha - \beta \cdot Bid + \gamma \cdot Income + \theta \cdot S)\}} \quad (4)$$

Where,  $F_\eta(\Delta U)$  is the cumulative distribution Function with a standard logistic difference,  $\theta$ ,  $\gamma$ ,  $\beta$  are the estimated coefficient which are predicted as  $\theta > 0$ ,  $\gamma > 0$ ,  $\beta \leq 0$ . The parameters of the logit model are estimated using a Maximum Likelihood Estimator (MLE) (Judge *et al.*, 1988). Then, the expected value of willingness to pay is calculated via numerical integration within the range of zero and the highest bid (M) as shown in Equation (5) (Lee and Han, 1994).

$$E(WTP) = \int_0^M F_\eta(\Delta U) dBid = \int_0^M \left( \frac{1}{1 + \exp\{-(\alpha + \beta \cdot Bid)\}} \right) dBid \quad (5)$$

Where,  $E(WTP)$  is the Expected value of people's Willingness To Pay,  $(\alpha_0)$  is the modified intercept which has been added to the main intercept ( $\alpha$ ) via the socio-economic term. In order to evaluate the influence of changing each of the independent variables ( $X_{ik}$ ) on the probability of accepting a bid, the partial derivative of the previous equation is calculated so that the marginal effects of the variables are known (Judge *et al.*, 1988).

$$\frac{\partial P_i}{\partial X_{ik}} = \frac{l^{\Delta u}}{(1 + l^{\Delta u})^2} \beta_k \quad (6)$$

Finally, the elasticity of the  $K_{th}$  explanatory variable is also derived from Equation (7) (Judge *et al.*, 1988).

$$\varepsilon_i = \left[ \frac{l^{\Delta u}}{(1 + l^{\Delta u})^2} \beta_k \right] \frac{X_{ik}}{P_i} \quad (7)$$

As shown in Equation (7), the elasticities are not constant and depend on the value of the explanatory variables of Khabr National Park. Finally, Equations (8) and (9) are used to estimate the household's conservation Value ( $PV_{household}$ ) and its annual conservation value per hectare ( $PV_{household}$ ).

$$PV_{household} = E(WTP) \times N_m \quad (8)$$

$$PV_{household} = \frac{TPV}{A} \quad (9)$$

The data of this research was collected by completing the questionnaires and face-to-face interviews with the visitors to the

region. At first, 30 primary questionnaires were collected randomly from the region in order to determine the sample size; then, using Scheaffer *et al.* (2006) method, 180 questionnaires were completed by random sampling in Khabr, Baft, in Kerman Province. Shazam software was used to estimate the results of this study.

## RESULTS

The studied explanatory variables included age, income, family size, distance, number of visits, education level, and environmental value. The statistical results for the socio-economic characteristic are presented in Table 1.

Table 2 presents the professional status of the sample and shows that students account for the largest share (39.34%) of the respondents to questionnaires and the unemployed account for the smallest share (2.67%).

Table 3 shows the education level of the sample and indicates that people holding a Bachelor's degree represented the largest share (32.66%) of the sample, and people of elementary education account for the smallest share (12%).

Three bids of 5,000, 10,000, and 15,000 Rials are considered in this research to estimate willingness to pay. The three bids are selected based on the pre-test using open questionnaires on Khabr National Park. Sixty-four percent of the respondents did not accept the first bid (10,000 Rials a month) for preserving the Park, whereas the remaining 36 percent of respondents accepted the bid. When a lower bid (5,000 Rials a month) was suggested, 73 respondents (41%) accepted the fee, while the rest asked for a lower bid. Those who accepted the first bid (10,000 Rials a month) were placed in a higher bid group and were asked if they were willing to pay 15,000 Rials a month for preserving the park or not.

**Table 1.** Responder's main socioeconomic information. <sup>a</sup>

Variables	Average	Standard deviation	Maximum	Minimum
Age ( Year)	29.02	10.95	68	19
Level of education (Year)	14.1	3.41	18	0
Family size (Number)	4.94	1.81	11	1
Distance (Kilometers)	210	275.15	2000	18
Visit frequency per year	4.22	5.74	30	0
Monthly cost (Rial)	6080000	7507850	50000000	5000000

<sup>a</sup> Source: Research findings.**Table 2.** The occupation of respondents. <sup>a</sup>

Occupation	Skilled labor	Employee	Self-employed	Worker	Retired	University Student	Unemployed	Other cases
Number	8	45	14	5	7	59	4	8
Percentage	5.33	30	9.34	3.33	4.66	39.34	2.67	5.33

<sup>a</sup> Source: Research findings.**Table 3:** Educational level of responders. <sup>a</sup>

Education	Under diploma	Diploma	Upper diploma	Bachelor	Master or above
Number	18	23	31	49	29
Percentage	12	15.33	20.66	32.66	19.33

<sup>a</sup> Source: Research findings.

Thirty-six respondents accepted the final bid. In general, 77% of the respondents accepted paying a monthly fee for preserving the Park. The remaining 23% were not willing to pay. Some believed that conservation and preservation of environmental resources and resorts are among the government's duties and people have no responsibility to pay for preserving them (Table4).

Table 5 presents the results of the logit model for estimating the conservation value of the park. The coefficient of the variable of bid, which is the most important explanatory variable for valuation in WTP, was estimated at -0.00071 and was significant at

the level of 1%, as shown in the table. The negative value indicated that if the bid for preserving the park was increased under the hypothetical market condition, the probability of people's accepting the fee would reduce, and vice versa. The estimated elasticity of this variable showed that a 1% increase in the bid decreased the probability of accepting the fee and declaring willingness to pay for preserving the park by 0.65%; and its marginal effect showed that one unit increase in the bid decreased the probability of accepting to pay the fee for preserving the park by 0.000075 unit. The coefficient of the variable of income was estimated at  $2.09 \times 10^{-6}$  and was significant at

**Table 4.** Distribution of Willingness To Pay (WTP) among the respondents.

WTP	10000 Rials	5000 Rials	15000 Rials
Accept/Reject (No)	65/115	73/42	36/29
Accept/Reject (%)	36/64	41/23	20/16
Total (%)	100	64	36

Source: Research findings.

**Table 5.** Results of estimated willingness to pay function. <sup>a</sup>

Variables	Amount of estimated coefficients	t statistics	Amount of elasticity	Marginal effect
Y-intercept	0.5458	0.926	0.3757	-
Bid	-0.00071	-8.03***	0.652	0.000075
Monthly income	$2.09 \times 10^{-6}$	2.07***	0.304	$1.13 \times 10^{-6}$
Age	-0.018	-1.06	-0.03	-0.00119
Sexuality	1.39	2.13**	0.299	0.211
Number of Occupation	0.763	8.912***	0.81	0.143
Level of education	0.53	2.32**	0.401	0.69
Family size	0.1003	0.46	0.087	0.209
Monthly cost	$-6.43 \times 10^{-7}$	-1.091	-0.14	$-6.09 \times 10^{-7}$
Membership in EO	2.118	0.603	0.381	0.331
Number of visits	0.509	0.608	-0.04	-0.039

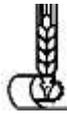
<sup>a</sup> Log-likelihood ratio test= 189.03; Correct prediction percentage= 0.893; McFadden  $R^2$ = 0.83; Estella  $R^2$ = 0.75, Maddala  $R^2$ = 0.80.\*\*\*, \*\*, \* Mean significant level of 1, 5 and 10 percent, respectively. Source: Research findings.

5 per cent. As expected, its positive value indicates that with an increase in the income, the probability of allocating an amount of money for preserving the park is also increased. With a 1% increase in people's income, the probability of their accepting the bid increases by 0.304%, and one Rial increase in people's income, increases the probability of accepting the fee increases by  $1.13 \times 10^{-6}$  unit. The coefficient of the variable of gender showed that men had more probability for acceptance of bids.

The coefficient of the number of occupation variable is 0.763 and is significant at one percent. This parameter indicates that with an increase in the number of occupation, the probability of their positive response in WTP also increases. With a 1% increase in the number of occupation, the probability of accepting the bid increases by 0.81%; an increase in the number of occupation increases the probability of accepting the bid by 0.143 unit. The coefficient of the variable of education level with its expected positive value is significant at 5%. The positive sign shows that with an increased level of education, it is more probable that an individual allocates an amount of money for preservation of the park. Considering the estimated elasticity, it can be concluded that with a 1% increase in people's education

level, the probability of willingness to pay for preserving the park is increased by 0.40%; and its marginal effect shows that one unit of increase in the level of education, increases the probability of accepting to pay by 0.69 per unit. Variables including age, family size, monthly cost membership in Environmental Organizations (EO) and number of visits have not significant effects on suitable levels (1%, 5%, and 10%). Multicollinearity in this study was tested using Principle Component (PC) test and this problem was not proved among independent variables.

The estimated statistic of the likelihood estimator, which is significant at 1%, shows that the selected independent variables can properly explain the dependent variation in the logit model. This statistic also indicates that the estimated parameters cannot be equal to zero at the same time. Furthermore, the McFadden coefficient shows that the independent variables adequately explained the dependent variables. According to the percentage of the correct predictions, which is 89.3%, the model could predict a large percentage of the dependent variable. Based on the results of the study, the predicted value of the average willingness to pay for preserving Khabr National Park is estimated at 4,328.6 Rials considering Equation (5) (using the logit model and via numerical



integral within the range of zero and the maximum bid (150,000 Rials)). In other words, the households' monthly average willingness to pay for preserving Khabr National Park is estimated at 4,328.6 Rials, which amounts to 51,943.2 Rials a year. In other words, each of the studied households is willing to pay 51,943.2 Rials of its income annually to preserve Khabr National Park and prevent its destruction.

Given the budget of the Department of Environment of Iran, Khabr National Park's conservation value (1,257 Billion Rilas) was 66.4 percent of the budget of the Department. In other words, realizing the conservation value of national parks such as Khabr National Park provides the necessary funds for the conservation of these resources without increasing the national approved budgets, but through public resources (Table6).

## DISCUSSION

Khabr National Park plays an important role in conserving natural ecosystem with its diverse animal and plant species. Based on the results derived from the estimation of logit model, the households' monthly average Willingness To Pay (WTP) for the conservation value of this park is estimated at 4,328.6 Rials, which can be used as a basis for the province's tax policies. Considering this amount, the annual conservation value of the park is approximately equal to 51,943.2 million Rials, which indicates the importance of the visitors' attention to this place. The results of this study on the final amount of WTP approximately are the same amount with Khorshiddost (1997). In this study, 77% of the respondents accepted paying a monthly fee for preserving the park, which was 73.8%

of the results of the study of Lehtonen *et al.* (2003). In all of studies, paying a monthly fee had a negative effect on acceptance probability and the same conclusion was drawn in this study.

With regard to the importance of the income variable, enhancing the income level of people, especially the poor members of societies, can be considered as a policy means for more preservation of Khabr National Park. Since environmental expenditures and, generally, the demand for the conservation use of the environment are considered elastic, people are willing to pay for enjoying it only when their income is increased. Moreover, since the results indicated that youth are more willing to pay, paying attention to their employment and income can lead to desirable results. The coefficient of the variable of the education level, with its expected positive effect, is significant at 5 percent level. Therefore, it is expected that with an increase in people's expertise and education level, their knowledge and understanding of the significance of environmental resources and the necessity to preserve them will also be increased. Additionally, a greater expertise brings about a higher income, which increases people's ability to allocate an amount of money for preservation of environmental resources. The interviews with the visitors and those interested in the environment revealed that despite the park's environmental significance and attractiveness, a great number of respondents had no previous knowledge and information about the park and had not even heard its name. Therefore, public media can play an important role in introducing such natural resources, as well as fostering a culture of preservation of environmental resources and improving people's understanding of the park. Organizing training and promotional

**Table 6.** Estimating Khabr National Parks' share of the budget of Department of Environment of Iran.<sup>a</sup>

Region	Budget of the Department of Environment of Iran (Billion Rials)	Conservation value of the Khabr National Park (Billion Rials)	Share (Percent)
Country	1893.6*	1257	66.4

<sup>a</sup> Source: Department of Environment of Iran and Research findings.

workshops, printing brochures, etc. can also be beneficial. Considering the importance and significance of environmental resources and their role in our life, better planning and further research in this field are necessary and Khabr National Park, with an area of 120,000 hectares, deserves more attention. The results of the study showed that the effect of the suggested variables including gender, occupation, monthly income, and level of education is significant on the possibility of accepting the bids and change of public participation in financing national parks. Therefore, increased income, level of education, and expertise of people increase the possibility of accepting the bids and increasing public participation. However, increasing the amount of bids reduces the possibility of public acceptance and participation. According to the results of this study, the average willingness to pay an annual payment by every Iranian household to contribute in financing protection of Kabir National Park was estimated at 51,943.2 Rials. If we generalize this figure to total number of Iranian households, the potential of Iranian family participation in financing Khabr National Park in Iran would be more than a big portion of the total budget of The Iranian Department of Environment. Therefore, it is concluded that the use of the public capacity to protect the natural resources and the environment is a step in the financing and participation of people for better protection of the environment. In fact, this study shows that by public partnership in financing and saving natural resources, we can be hopeful for their survival for future generations. Given the importance of the conservation value of the Khabr National Park in attracting public resources and popular contributions, attempting to turn these tendencies into monetary units also helps funding the Iranian Department of Environment. In other words, the realization of these revenues in other national parks in the country will play an important role in providing real funds for conservation of natural resources and environment.

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## REFERENCES

1. Akbari, N., Shajari, H. and Bidram, R. 2007. Estimating Consumers' Willingness to Pay for Vehicle Gasoline Price. *J. Econ. Res.*, **42**: 39-58.
2. Amigues, J. P., Boulatoff, C., Desaignes, B., Guathier, C. and Keith, J. E. 2002. The Benefits and Costs of Riparian Analysis Habitat Preservation: A Willingness to Accept/Willingness to Pay Contingent Valuation Approach. *Ecol. Econ.*, **43**: 17-31.
3. Amirnejad, H. and Khalilian. P. 2006. Determining the Conservation and Recreational Values of Noshahr Sisangan Park by Using People' Willingness to Pay. *Res. Dev. Magazine*, **21**: 15 - 24.
4. Askari, A. and Mehregan, N. 2001. Estimating Cultural Heritage Visitor Willingness to Pay by Using VCM (Case Study: Ganjnameh Hamedan). *J. Econ. Res.*, **1**: 93-115.
5. Brookshire, D. S., Eubanks, D. S. and Randall, A. 1983. Estimating Option Price and Existence Value for Wildlife Resources. *Land Econ.*, **12**: 1-5.
6. Ciriacy-Wantrup, S. V. 1947. Capital Returns from Soil-Conservation Practices. *Am. J. Agric. Econ.*, **29**: 1181-1196.
7. Davis, R. 1963. The Value of Outdoor Recreation: An Economic Study of the Maine Woods. Doctoral dissertation in economics. Harvard University.
8. Department of Environment of Iran. 2017. *Statistics Yearbook*. Office of Statistics. <https://www.amar.org.ir/english/Iran-Statistical-Yearbook>
9. Falihi, N. 2005. Economic Valuation of Environmental Resources, Anzali Wetland. PhD. Dissertation, Science and Research Branch, Islamic Azad University.
10. Ghorbani, R. 2007. *An Analysis of Spatial Distribution of Urban Parks in Tabriz and Its*



- Inferior State*. Research Projects of Tabriz University.
11. Greene, W. 2002. *Econometric analysis*, New York University, Fifth edition, Prentice Hall.
  12. Hanememann, W. 1994. Valuing Environment through Contingent Valuation. *J. Econ. Perspect.*, **8(4)**: 19-43.
  13. Hashemnejad H., Feizi, M. and Seddigh, M., 2011. Determining the Recreational Value of Nour Forest Park (NFP) in Mazandaran Using Contingent Valuation. *J. Environ. Stud.***57**: 129-136.
  14. Hayati, B. Ehsani, M. Ghahremanzadeh, M. Raheli H. and Taghizadeh M. 2010. Factors Influencing the Willingness to Pay of Visitors in Tabriz (Ilgoli and Mashroute Parks) Employing the Contingent Valuation and Heckman's Two-stage Methods. *Q. J. Econ. Agric. Dev.* **24(1)**: 91-98
  15. Hjerpe, E., Hussain, A. and Phillips, S. 2015. Valuing Type and Scope of Ecosystem Conservation: A Meta-Analysis. *J. For. Econ.*, **21**: 32-50.
  16. Judge, G. and *et al.*, 1988. *The Theory and Practice of Econometrics*. 2nd Edition, Wiley, New York.
  17. Khorshiddost, A. 1997. The Role of Pricing Methods and Economic Analysis in the Environmental Assessment. *Environ. Stud.*, **11**: 102-93.
  18. Khorshiddoust, A. M. 2005. Contigent Valuation in Estimating the Willingness to Pay for Environmental Conservation in Tabriz?. *Environ. Stud.*, **51**: 12-21.
  19. Kristrom, B. 1999. On the Incorporation of Non-Market Outputs of Forests into National Accounting Systems. In: "*The Living Forest: Non-Market Benefits of Forestry*". Commission, The Stationary Office, London, UK.
  20. Lee, C. and Han, S. 2002. Estimating the Use and Preservation Values of National Parks Tourism Resources Using a Contingent Valuation Method. *Tour. Manage.*, **63**: 531-540.
  21. Lehtonen, E., Kuuluvainen, J., Pouta, E. and Rekola, M. 2003. Non-Market Benefits of Forest Conservation in Southern Finland. *Environ. Sci. Policy*, **66**: 195-204.
  22. Leinhoop, N. and MacMillan, D. 2007. Valuing Wilderness in Iceland: Estimation of WTP Using the Stall Approach to Contingent Valuation. *Land Use Policy*, **64**: 289-295.
  23. Majnoungeian, H. 1977. Comparing the Economic Value of Tehran' Farahabad and Khazaneh Parks. Master's Thesis, Tehran University Press.
  24. Marta-Pedroso, C., Freitas, H. and Domigos, T. 2007. Testing for the Survey Mode Effect on Contingent Valuation Data Qualify. A Case Study of Web Based Versus in Person Interviews. *Ecol. Econ.*, **62(3)**: 388-398.
  25. Mirzaei, M. 2000. Vegetation and Ecological Value of Semidesert Area Soutwest of Qom (the Panther Valley). Thesis Plant Sciences, Tarbiyat Modares University Press.
  26. Molaiei, M. 2009. Economic and Environmental Valuation of Arasbaran Forests Ecosystem. PhD Dissertation, University of Tehran.
  27. Pagiola, S. 2001. Valuing the Benefits of Investment in Cultural Heritage: The Historic Core of Split. In *Paper Presented at the International Conference on Economic Valuation of Cultural Heritage*, Cagliari, PP. 19-20.
  28. Pagiola, S., Agostini P., Gobbi J., Cees H., Ibrahim M., Murgueitio E., Ramirez E., Rosales M. and Ruiz J. 2004. *Paying for Biodiversity Conservation Services in Agricultural Landscapes*, The World Bank Environment Department, Paper No. 96, Environmental Economics Series.
  29. Reynisdottir, M, Song, H. and Agrusa, J. 2008. Willingness to Pay Entrance Fees to Natural Attractions: An Icelandic Case Study. *Tour. Manage.*, **29**: 1076-1083.
  30. Salvador, S. and Menéndez, L. 2005. Estimating then on-Market Benefits of an Urban Park: Dose Proximity Matter?. *Land Use Policy*, **241**: 296-305.
  31. Sanders, L. D., Walsh, R. G. and Loomis, J. B. 1990. Toward Empirical Estimation of the Total Value of Protecting Rivers. *Water Resour. Res.* **26(7)**: 1345-1357.
  32. Scheaffer, Richard L. Scheaffer, William Mendenhall, R. Lyman Ott, Kenneth G. Gerow, 2006. *Elementary survey sampling*, 7<sup>th</sup> edition, Belmont, CA: Thompson.
  33. Smith, V. and Kerry, D. 1996. Can Contingent Valuation Distinguish Economic Values for Different Public Goods. *Land Econ.*, **72(2)**: 139-151.
  34. Yakhkeshi, A. 1974. *An Introduction to Iran's National Parks and Forests*. Tehran University Press.

## ارزش گذاری اقتصادی مطبوعیت محیط زیست با استفاده از روش انتخاب دوگانه (مطالعه موردی: پارک ملی خبر)

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### چکیده

توسعه روشهای ارزشگذاری اقتصادی و کاربرد آنها در ارزیابی های زیست محیطی، نقش مهمی در اقتصاد محیط زیست ایفا می کند. هدف این مطالعه بررسی ارزش حفاظتی پارک ملی خبر در ایران و تمایل به پرداخت مردم برای حفظ آن است. پارک ملی خبر در جنوب شهرستان بافت در استان کرمان و در ایران واقع شده است. این پارک از جهت گونه های فون و فلور یکی از غنی ترین منابع زیست محیطی کشور بحساب می آید. در این مطالعه با استفاده از روش ارزش گذاری مشروط و پرسشنامه انتخاب دوگانه، در قالب مدل لوجیت، ارزش حفاظتی و میزان تمایل به پرداخت افراد برای حفاظت از این پارک تعیین گردید. داده های موردنیاز از طریق تکمیل پرسشنامه جمع آوری گردیده است. نتایج نشان داد که اثر متغیرهای پیشنهاد، درآمد ماهانه، جنسیت، شغل و میزان تحصیلات بر تمایل به پرداخت بازدیدکنندگان از نظر آماری معنی دار می باشند، بطوری که افزایش درآمد، میزان تحصیلات و تخصص افراد موجب افزایش تمایل به پرداخت افراد شده و بالعکس افزایش مبلغ پیشنهادی، تمایل به پرداخت افراد را کاهش میدهد. با توجه به نتایج این پژوهش متوسط تمایل به پرداخت ماهانه هر خانوار ایرانی در رابطه با ارزش حفاظتی این پارک ۴۳۲۸/۶ ریال تخمین زده شده است. نتایج این مطالعه بیانگر آن است که استفاده از ظرفیت های عمومی برای حفظ منابع طبیعی و محیط زیست، گامی در جهت تأمین مالی و نیز مشارکت مردم برای حفظ بهتر این منابع تلقی می گردد.