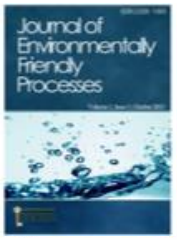
Petrotex Library Archive

Journal of Environmentally Friendly Processes

Journal Website: http://www.petrotex.us/



Estimating the recreational value of Lighvan Chay River uses Contingent Valuation Method

Amir Reza Shahabinia[1], Vahid Amini Parsa[*2], Hamidreza Jafari[3], Saeed Karimi[4], Omid Karami[5]

[1] *MSc Student in Environmental Science, Faculty of Environment and Energy, Science and Research Campus, Islamic Azad University, Tehran, Iran*
[2*] *MSc Student in Environmental planning and management, Faculty of Environment, University of Tehran, Iran, aminiparsa@ut.ac.ir*
[3] *Professor of environment, Faculty of Environment, University of Tehran*
[4] *Assistant Professor of Environmental Planning, Faculty of Environment, University of Tehran, Iran*
[5] *MSc on Agricultural Economy, University of Tehran, Iran*

Abstract

According to rising attention of policy makers to economy growth without considering its harmful effects and environmental impact, the nature is being destroyed, and many species are subject to extinct. Beside this carelessness, the lack of awareness of the actual value of the environment would be another factor for ignoring the environmental issues. Hence, controlling and monitoring of the natural landscape, is critical to achieve a healthy planet containing an improved life quality. Economic valuation technique can play a significant role in human well-being towards a sustainable developed system. Economic valuation services can be used to improve the environmental policies for human well-being improvement. The aim of this research is to estimate the recreational value of the Lighvan Chay River with the use of contingent valuation method and Double–Bounded Dichotomous Choice (DDC). The results from 141 questionnaires which were surveyed and completed from by the tourists and visitors, and using estimating Logit model shows that both marital status and length of the visit, dissatisfaction of utilities and the offered bid variables were significant at 101, 21 and 11 respectively. In this paper the average willingness to pay was estimated 8500 Rials ($0.283) per visitor by using Shazam 10. Finally, the recreational annual value was estimated to 795,110,400 Rials, equivalent to US $26503.68 for Lighvan Chay River.

Key words: economical valuation, contingent valuation, recreational value, Logit model, Lighvan Chay River

1. Introduction

Nature-based recreation is an integral part of human life. For example approximately 97% of the USA population participates in some form of outdoor recreation each year [4]. Survey results indicate that over 206 million people 15 years or older participates in outdoor recreation activities each year; many of these participate are looking to forests, parks, and preserves to participate in these activities. Visitors use natural areas to participate in nature-based recreation activities such as walking, recreating with family and friends, sightseeing, picnicking, and viewing nature scenery, which are among the most popular outdoor recreation activities in the USA [4]. Nature-based recreation provides visitors with an opportunity to satisfy their recreation needs while maintaining the diversity and richness of an area's natural, cultural, and historical resources. Recreation visitors look for natural areas to meet their recreation needs, and often travel to distant areas for recreation. This hints at a high demand for such areas and resources, but many areas struggling to measure these values [22].To better understand and articulate the value of nature-based recreation, researchers seek to identify measurable variables that reflect economic values associated with nature-based recreation. To explore these values in LighvanChay River we used contingent valuation method (CVM).

Contingent Valuation (CVM) methods have been employed by economists to value environmental goods and services. CVM has achieved prominence in this work despite controversy over its ability to accurately measure economic values (e.g., [9, 13]). However, CVM is only part of a class of preference elicitation methods called 'stated preference' (SP). Other types of SP approaches capable of eliciting environmental preferences have not been widely used in environmental valuation [17]. CVM has been extensively applied in both developed and developing countries. Much of the impetus to this acceptance was the conclusions of the special panel appointed by the US National Oceanic and Atmospheric Administration. The panel concluded that CVM studies could produce estimates reliable enough to be used in a judicial process of natural resource damage assessment. In particular, CVM has been successfully applied to a variety of water relate discus including sanitation, water supply, in-stream and off-stream recreation, flow enhancement and health risks. It has also been used in very different contextual frameworks: lakes and rivers, groundwater, bathing water (both salt and freshwater), fishing sites, urban water parks, wetlands and marine and coastal areas [7]. Also CV method is a widely used nonmarket valuation method especially in the areas of environmental cost–benefit analysis and environmental impact assessment [5, 19]. The CV method was originally proposed by Ciriacy-Wantrup (1947) [3] who was of the opinion that the prevention of soil erosion generates some 'extra market benefits' that are public goods in nature, and therefore, one possible way of estimating these benefits is to elicit the individuals' willingness to pay for these benefits through a survey method [13, 20]. However, Davis (1963) was the first to use the CV method empirically when he estimated the benefits of goose hunting through a survey among the goose-hunters [6]. This method gained popularity after the two major non-use values, namely, option and existence values have been recognized as important components of the total economic values in environmental economics literature, especially during the 1960s. While the conventional revealed preference methods such as travel cost method are not capable of capturing these non-use values [24], the only method that is identified for estimating these values is the contingent valuation method (CVM) [8]. Hence, a considerable amount of studies on CVM—both theoretical and empirical in nature—have emerged in the economic valuation literature, including a large number of studies criticizing the CV method [26]. CVM elicits people's preferences for public goods by asking how much they would be willing to pay or accept for a specified change in the availability of the goods, normally using a questionnaire. It addresses the absence of traditional markets for public goods by describing a hypothetical market in which respondents are able to purchase the goods in question. The elicited willingness to pay (WTP) amounts are therefore contingent upon the hypothetical market presented to the respondent [19]. CVM has been used extensively in the valuation of biodiversity including recreational use of biodiversity (e.g., [18, 23]), and the perceived value of conservation policies (e.g. [11, 12]. Although the use of CVM is widespread, Hanley and Spash (1995) identified a number of potential sources of bias such as [14]: (1) strategic bias caused by individuals being able to secure benefits greater than the costs they have to pay by answering dishonestly; (2) vehicle bias which arises from the hypothetical instrument of payment used (for example, some individuals may regard 1% increase in taxation as more ''costly'' than one dollar increase in price. However the use of a neutral payment vehicle can resolve this source of bias); (3) information bias based on the amount of information provided to respondents; and (4) hypothetical bias, where respondents answer a question in such a way as to please the interviewer, or state that they are willing to pay more than they truly would, knowing that they will not have to spend real money.

The economic evaluation of rivers and lakes has traditionally focused on the demand for on-site recreation use. However, non-use values may play as important a role in justifying expenditures in water protection as the more conventional use benefits [7]. Rosenberger and Loomis (2001) provide a review of non-market valuation studies conducted between 1967 and 1998 that estimate economic use values for recreational activities [21]. They identify 39 studies involving fishing activities, all focused on North American case studies. In Australia and New Zealand, there are many fewer published studies. A revealed preference technique was used by Swait et al (2004) to estimate values for recreational fishing in Western Australia [25], while Wheeler and Damania (2001) used the contingent valuation method (CVM) to estimate the recreational values of fishing in New Zealand [27].

A number of recent recreation demand studies have combined observed and contingent behavior data in order to better understand how households respond to changing environmental conditions. Adamowicz et al. (1994) [1], for example, compare site selection choices estimated from actual data versus those anticipated under hypothetical scenarios. Both Englin and Cameron (1996) and Azevedo, Azevedo et al (2003) [2, 10]combined data on the number of trips actually taken with the intended number of trips given alternative trip costs. Layman et al, (1996) combine observed travel cost data and hypothetical travel cost data to estimate the value of three alternative recreational fishing management proposals [15]. Loomis (1997) uses information on actual trips at current trip costs, intended visitation at higher trip costs, and intended visitation with two proposed quality changes [16].

According to rising attention of economic policy makers to growth and lack of consideration to the effects, environmental goods are being destroyed. Lack of awareness of the actual value of the environment is one of the important factors of ignoring the environmental issues. Improving environmental quality, natural landscape controlling and monitoring is so important to achieve sustainable development. Applying Economic valuation can play a significant role in human well-being and sustainable development. Economic valuation can be used to improve the environmental policies leads human well-being improvement'. The aim of this research is to estimate the recreational value of the LighvanChay River with the use of contingent valuation method and Double–Bounded Dichotomous Choice (DDC).

2. Materials and Methods

The contingent valuation method is the most common stated preference valuation method. It involves the careful structuring of a scenario in which an individual is offered a good (improved environmental quality, new public good, etc.) and is requested to identify whether he/she would be willing to trade off money for the offered public good. The value of the good is elicited contingent on there being a market for the good. The dependent variable in CVM studies is "probability of willingness to pay". A Logistic, Normal and Tobit distribution is used for determining factors affecting willingness to pay. If we assume a logistic distribution for the difference in the error terms, the following closed form expression results for the probability of saying "Yes" [13].

$$\Pr(\text{Yes})=1-\frac{e^{(-\alpha+\beta B)}}{1+e^{(-\alpha+\beta B)}}=\frac{1}{1+e^{(-\alpha+\beta B)}} \quad (1)$$

The parameters of these indirect utility functions are typically estimated by maximum likelihood where the likelihood function is the product across respondents of the probability of their response, or [13].

$$L=\prod_{n=1}^{N}\Pr_n(\text{Yes})^{\delta}\Pr_n(\text{No})^{1-\delta} \quad (2)$$

Where the probability of saying No is simply 1 minus the probability of saying yes, and δ is an indicator variable that equals 1 for those who voted "Yes".Given the definition of the probability of "Yes" the expected value of the random variable compensating variation is [13]:

$$C=\int_{-\infty}^{0}F(B)dB+\int_{0}^{\infty}\big(1-F(B)\big)dB \quad (3)$$

Open ended and close ended are two kinds of questionnaires that is used in CVM surveys. Double-Bounded that is a close ended one is used in questionnaires. 2500, 5000 and 10000 Rials are used for bid prices.
To obtain an acceptable degree of precision in sample statistics, such as the mean WTP amount, contingent valuation studies require large sample sizes because of the large variance in the WTP responses. This statement follows from the fact that the estimated standard error of mean, SEM, [13]:

$$SEM=\frac{\hat{\delta}}{\sqrt{n}}, \quad (4)$$

Decreases as a function of the $\sqrt{n}$ for any estimated standard deviation of the WTP responses, $\hat{\delta}$. The standard error of most other summary statistics, such as the median and the total willingness to pay, are also decreasing functions of sample size.
Sample size selection procedures can make direct use of this fact if an estimate of the population variance, δ^2, is available and the researcher is interested in the absolute error. Typically, however, the researcher will be interested in the likely magnitude of the relative error (the percentage deviation from the true mean) rather than the absolute magnitude of the error. In this situation, the researcher needs to have a prior estimate of the coefficient of variation, V, where

$$V=\frac{\sigma}{\overline{TWTP}} \quad (5)$$

As a rough approximation, the necessary sample size, n_0, can be determined from the formula:

$$\left[\frac{Z\hat{\sigma}}{\Delta\overline{RWTP}}\right]=\left[\frac{Z\hat{V}}{\Delta}\right]^2 \quad (6)$$

Where Δ is the percentage difference between the true willingness to pay ($\overline{TWTP}$) and the estimated $\overline{RWTP}$ [19].Using the above formula for calculating sample size, it was estimated 149 for this study.

3. Results and discussion

The first part of the questionnaire was about socio-economic characteristics of visitors. The aim of this part is determining factors affecting Willingness to Pay (WTP) of visitors for recreational uses. Table1 shows the descriptive statistics for socio-economic characteristics of visitors in the sample.

Table1. Descriptive Statistics for variables in CVM

Variable	Mean	Standard error	Mode	Max	Min
Age (year)	37	11	40	65	19
Education (year)	12.23	4.21	16	22	0
Household size	4.22	1.92	4	17	1

Average number of visits(in year)	5.04	5.54	1	30	1
Average time of every visit (hour)	9.58	6.16	10	48	3

Double-dichotomous choice questionnaire is used in this study. Table2 shows the possibility of acceptance for different prices. In every questionnaire, 5000 Rialswere first price that is asked. 19.45% of respondent accepted the first price. If respondent has accepted it, upper price (10000 Rials) would be offered. 20.13% of people, who answered 'yes' to first price, accepted upper price (10000 Rials). Among respondents who answered 'no' to the first question, 48.32% accepted a lower price (2500 Rials).

Table2. Acceptance Probability of Different Bid Prices

Bid Price (Rials)	Probability of Acceptance (%)
5000	19.46
10000	20.13
2500	48.32

As mentioned above, dependent variable in CVM is probability of accepting bid prices. Table3 shows factors affecting WTP of respondent. Bid price is significant at 1% level. Increasing bid price has a negative effect on WTP. If the variable increases 1 Rials, possibility of WTP will be increased by %0.029.
Finally, mean of WTP and aggregate recreational value of LighvanChay River were estimated 8500 Rials for every visitor and 795110400 Rials for a year.

Table3. Factors Affecting WTP for Recreational Use of LighvanChay River

Variable	Coefficient	Se	T-student	Elasticity at mean	Marginal Effect
Constant	1.0133	1.6571	0.61148	-	-
Bid	-0.0015	0.0005	-2.8015*	-0.5904	-0.00029
Age	0.00625	0.0148	0.4217	0.1708	0.00123
Sex	-0.50673	0.3072	-1.6493***	-0.276	-0.0996
Marital Status	-0.11118	0.3951	-0.2813	-0.0638	-0.0218
Average time of every visit	0.03554	0.02042	1.7403***	0.2491	0.00698
Satisfaction from social services****	-0.61887	0.20685	-2.9918**	-0.71064	-0.1216
Likelihood Ratio	-	-	25.4463	-	-

*, ** and *** indicate significance at 1%, 5% and 10% levels respectively. **** (1=completely satisfied)

4. Conclusion

Ecosystem valuation can be a difficult and controversial task, and economists have often been criticized for trying to put a "pricetag" on nature. However, agencies in charge of protecting and managing natural resources must often make difficult spending decisions that involve tradeoffs in allocating resources. These types of decisions are economic decisions, and thus are based, either explicitly or implicitly, on society's values. Therefore, economic valuation can be useful, by providing a way to justify and set priorities for programs, policies, or actions that protect or restore ecosystems and their services. The recreational value of LighvanChay River was assessed using a double bounded dichotomous contingent valuation method. By determining factors affecting WTP of visitors, the annual recreational value of the river was estimated 795110400 Rials.
One of the factors affecting WTP of visitors is "sex" variable. The negative effect of the variable on WTP means that women have more willingness to pay for recreational uses. Approximately, women have 10% willingness to pay more than men. So, recreational uses of environmental goods have more value for women.

5. References

[1] Adamowicz, W., J. Louviere, Williams, M., (1994). Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities. Journal of Environmental Economics and Management 26, 271- 292.
[2] Azevedo, C. D., Herriges, J. A., Kling, C. L., (2003). Combining Revealed and Stated Preference: Consistency Tests and Their Interpretations," American Journal of Agricultural Economics 85, 525-537.
[3] Ciriacy-Wantrup S.V., (1947). Capital returns from soil conservation practices. Journal of Farm Economics; 29: 1181– 96.
[4] Cordell, H.K., Betz, C.J., Green, G.T., (2002). Recreation and the environment as cultural dimensions in contemporary American society. Leisure Science 24, 13 41.
[5] Cummings, R.G., Brookshire, D.S., Schulze, W.D., editors, (1986). Valuing environmental goods: a state of the arts assessment of the contingent valuation method. Totowa, NJ: Roweman and Allanheld.

[6] Davis, R., (1963). The value of outdoor recreation: an economic study of the marine woods. PhD Thesis. Harvard University.
[7] Day, B., Mourato, S., (1998). Willingness to pay for water quality maintenance in Chinese rivers. CSERGE Working Paper. Centre for Social and Economic Research on the Global Environment University College London and University of East Anglia WM 98-02.
[8] Desvousges, W.H., Johnson, F.R., Dunford, R.W., Boyle, K.J., Hudson, S.P., Wilson, N., (1993). Measuring natural resource damages with contingent valuation: tests of validity and reliability. In: Hausman JA, editor. Contingent valuation: a critical assessment. Amsterdam: North Holland; p. 91– 159.
[9] Diamond, P.A., Hausman, J.A., (1994). Contingent valuation: Is some number better than no number? Journal of Economic Perspectives. 8: 45-64.
[10] Englin, J., Cameron, T. A., (1996). Augmenting travel cost models with contingent behavior data: Poisson regression analyses with individual panel data. Environmental and Resource Economics 7, 133-147.
[11] Garrod, G.D., Willis, K.G., (1997). The non-use benefits of enhancing forest biodiversity: a contingent ranking study. Ecological Economics 21: 45–61.
[12] Gurluk, S., (2006). The estimation of ecosystem services' value in the region of Misi Rural Development Project: results from a contingent valuation survey. Forest Policy and Economics 9: 209–218.
[13] Hanemann, W.M., (1994). Valuing the environment through contingent valuation. Journal of Economic Perspectives. 8: 19-44.
[14] Hanley, N., Spash, C.L., (1995). Cost benefits analysis and the environment. Edward Elgar, Aldershot.
[15] Layman, R., Boyce, R., Criddle, K., (1996). Economic Valuation of the Chinook salmon Sport Fishery of the Gulkana River, Alaska, Under Current and Alternate Management Plans." Land Economics 72, 113-128.
[16] Loomis, J. B., (1997). Panel Estimators to Combine Revealed and Stated Preference dichotomous choice data," Journal of Agricultural and Resource Economics 22, 233-245.
[17] McFadden, D., (1986). The choice theory approach to market research. Market. Sci., 5: 275-297.
[18] Mercer, E., Kramer, R., Sharma, N., (1995). Rain forest tourism: estimating the benefits of tourism development in a new national park in Madagascar. Journal of Forest Economics 1: 239–269.
[19] Mitchell, R.C., Carson, R.T., (1989). Using surveys to value public goods: the contingent valuation method. Washington, DC: Resource for the Future.
[20] Portney, P.R., (1994). The contingent valuation debate: why economists should care. Journal of Economic Perspectives; 8: 3–17.
[21] Rosenberger, R., Loomis, J., (2001). Benefit Transfer of Outdoor Recreation Use Values: A Technical Document Supporting the Forest Service Strategic Plan (2000 Revision), General technical report, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
[22] Shrestha, R.K., Stein, T.V., Clark, j., (2007). Valuing nature-based recreation in public natural areas of the Apalachicola River region, Florida. Journal of Environmental Management 85, 977–985.
[23] Slee, B., (2007). Social indicators of multifunctional rural land use: the case of forestry in the UK. Agriculture Ecosystems and Environment 120: 31–40.
[24] Smith, K.V., (1993). Nonmarket valuation of environmental resources: an interpretative appraisal. Land Economics; 69: 1–26.
[25] Swait, J., Adamowicz, V., van Bueren, M., (2004). Choice and temporal welfare impacts: incorporating history into discrete choice models, Journal of Environmental Economics and Management 47, 94–116.
[26] Venkatachalam, L., (2004). The contingent valuation method: a review. Environmental Impact Assessment Review. 24 89–124
[27] Wheeler, S., Damania, R., (2001). Valuing New Zealand recreational fishing and an assessment of the validity of the contingent valuation estimates, Australian Journal of Agricultural and Resource Economics 45, 599–621.