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The estimation of ecosystem services' value in the region of Misi Rural Development Project: Results from a contingent valuation survey

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Abstract

Stated and revealed methods are widely used in the estimation of non-use benefits of ecosystem services and public goods. This paper presents an application of survey based on contingent valuation method for valuation of the non-use benefits of improvement in ecosystem services through Misi Rural Development Project (MRDP), which is integrated with environmental considerations, in Bursa–Turkey. MRDP objects to improve various non-use benefits such as forest and river ecosystems, which residents do not directly purchase in any markets for goods and services. The estimated value of MRDP was per head annually 67.94 USD. Generalizing this value to the households living around the Misi yields 2,306,474 USD/Year. The present value willingness to pay for 20 years is 19,636,313.00 and 461,294.80 USD using discount rates of 10% and 5%. Although this analysis supports the ensuring sustainability of ecosystem service in Misi settlement, multi-agency management systems have caused some issues in rural settlements based on natural resources' productivity in Turkey. Therefore, rural development projects, integrated with environmental considerations like MRDP will be a good chance to provide the sustainability of ecosystem services especially in developing countries.

Keywords: Forest ecosystems; Water ecosystems; Contingent valuation; Rural development projects

1. Introduction

Industrial Revolution caused welfare increases in urban areas. However, during that period, the weak rural societies whose livelihood based on natural resources started to exhaust and destroy the natural resources excessively. Therefore, importance of the protection of environment and natural resources was started to be recognized as one of the principle concerns of the latter half of the 20th century, and has dominated political agenda at the beginning of third millennium.

Apart from tangible characteristics, benefits of natural resources do not usually appear in economic activities. Thus, natural resources such as forest and

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water resources are under heavy pressure. Although there is an increasing recognition of the need to conserve these natural resources; losses and degradations have continued in the entire world. One reason is that economic values of the natural resources do not take part in the economic decision processes. Therefore, a number of methods were improved to value environmental goods to integrate inside the economic decision process in the developing world. Contingent valuation method (CVM) is one of those methods that are widely used to integrate the benefits of public goods and services (forests, river, watershed and wetlands etc.) into economical decision process (Baumol and Oates, 1988). It was firstly used by Davis (1963) for a study of hunters in Maine Forest. Since then, the method has become the most widely used and most controversial of all environmental valuation techniques. Comprehensive accounts of the method may be found in Mitchell and Carson (1989), Hanley and Spash (1993) and Bateman and Willis (1995).

This paper is organized in six sections, and investigates public preferences for improving ecosystem in Misi Settlement by estimating willingness to pay (WTP) for MRDP that will improve quantity and diversity of recreational areas, and develop public welfare with integrated action plans. Next section describes Misi region and MRDP. This is followed by a short description of the CVM and presented information of the empirical study. The results of the study are then presented and discussed, and conclusions then explained the importance of this method in environmental analysis of rural development projects in Turkey.

2. Misi Rural Development Project (MRDP)

Misi is situated in Bursa province, which is in the northwest of Turkey, and an old settlement, that has traditional characteristics and public goods such as Misi Forest and Nilufer River. Although there are a lot of discussions about public goods, Garrod and Willis (1999) made a substantial classification for all goods from private to public. They determined three criteria: the opportunity cost of their consumption; property rights of the producer and property rights of the consumer were codified as (1, 1, 1) where these respective attributes are present, and as (0, 0, 0) where they are absent. Given to this classification private goods (1, 1, 1) are those that have opportunity costs of consumption (if one person consumes the good it is not available for anyone else); producer rights exist which permit the owner to decide whether to sell the good and to whom; and consumer rights, which allow the consumer to decide whether or not to consume the good. Pure public goods (0, 0, 0) are those with zero opportunity cost of consumption, and where exclusion cannot be practiced by producers or consumers. Many environmental goods are pure public goods such as air quality, flood protection, noise, visual amenity benefits etc. Moreover semi-public goods and open access or commons were codified as (0, 0, 1) and (1, 0, 1) sequence. Misi's forest ecosystem services provide important use and non-use benefits for the region, such as recreational use, soil conservation, habitats and watershed maintenance for native and endangered species, regulation of atmospheric quality and landscape amenities facilitates. Those characteristics fit the public goods (0, 0, 0) mentioned above. Moreover, this forest presents great potential for the expansion of valuable habitat. Increasing the areas of valuable habitat would both protect the species that are already present and encourage others which would have been present in these habitats in the past. Water ecosystem service (Nilufer River) is also important environmental resource and public good for the region. It also provides various use and non-use benefits such as agricultural irrigation, natural purification of water, erosion control, habitat for fish and endangered species, dilution of wastewater, recreational use and landscape beauties. Thus, conservation of water resource quality corresponds to an increase in the utility of consumer as well as the society's welfare. However, intensive farm techniques, excessive chemical uses, lower income and education levels and unwise timber harvest at the region threatened the Misi settlement and its ecosystems.

Another important issue is unsuccessful and complicated management system at the region. Misi settlement is managed through a multi-agency management system. In this system there are a lot of government institutions that have right to manage the public goods. This system on the natural resources has caused some issues in rural settlements in Turkey. For example, land use practices around the Misi settlement are managed by local government agencies. The Ministry of For-

estry manages the forest areas of the Misi basin, the agricultural lands around the Misi are managed by the Ministry of Agriculture, and water resources are managed by the National Water Services. This system has been an obstacle to the development and conservation of natural resources. Thus, Bursa Metropolitan Local Government decided to carry out a common project, which will protect the historical Misi settlement and improve ecosystem services. The primary aims of this project are to:

- Increase the income level of the local residents
- Provide conservation and preservation initiatives for the wildlife
- Create natural protection areas for the native species
- Improve recreational and landscape amenities watching facilitates
- Improve water quality
- Develop socio-economical structure and agricultural production with sustainable ways
- Provide public participation to the action plans and projects.

3. Environmental valuation methods and the contingent valuation method

Although ecosystem services mentioned above are often without prices, they do contribute utility to individuals and therefore have value. This value is monetized as the individual's maximum WTP (Loomis et al., 2000). There are several techniques that can be used to value the benefits of forest and water ecosystem services.

The *travel-cost method* (TCM) is primarily used to estimate the demand or marginal valuation curve for recreational sites (Douglas and Taylor, 1999). From this demand curve the consumer surplus of recreation with improved water quality can be estimated (Loomis and Walsh, 1997). If restoration of natural resources occurs in an urban settlement where there are residences nearby the river or forests, the hedonic property methods may be applied (Kula, 1994). The *hedonic price method* (HPM) attempts to evaluate environmental services, the presence of which directly affects certain market prices. However, if improved forest and water ecosystem services provide also important use and non-use benefits such as habitats for wildlife and landscape amenities like in the MRDP, then there will be an existence and bequest value (Krutilla, 1967; Loomis and White, 1996). The only method currently capable of estimating these non-use values of water and forest ecosystem services is *contingent valuation method* (Loomis et al., 2000).

CVM approach asks people to directly report their willingness to pay or willingness to accept (WTA). WTP and WTA concepts are based on Hicksian welfare measures named "Compensating Variation (CV)" and "Equivalent Variation (EV)." CV is the maximum (minimum) amount of money that can be taken from a household while leaving it just as well off as it was before environmental quality level increase (fall). EV is the minimum (maximum) amount of money that must be given to a household to make it as well off as it have been after environmental quality level increase (fall). In other words, CV is separated in the following way: when the final welfare is worse than the initial welfare, it is willingness to accept but when the final welfare is better than the initial welfare, it is willingness to pay. EV is just the opposite of WTA for situations where welfare is improved and WTP when welfare declines (Haab and McConnell, 2002). The relationships are shown in Table 1.

In this study, the economic model of benefit measurement takes into account the utility level of a respondent for ex ante and ex post implementation of the MRDP. It used maximum WTP scenario based on CV. Related support for the role of WTP comes from the National Oceanic and Atmospheric Administration (NOAA) "Blue Ribbon Panel" on CVM, which recommends that researchers measure WTP (Mitchell and Carson, 1989).

Although it is certainly possible to employ contingent valuation for commodities available for sale in regular marketplaces, many applications of the method deal with public goods such as improvements in forest or water quality, amenities such as national parks, and private non-market commodities

Table 1
The relationships among CV, EV, WTP and WTA

	Compensating variation	Equivalent variation
Utility level increases	WTP	WTA
Utility level decreases	WTA	WTP

such as reductions in the risk of death, days of illness avoided or days spent hunting or fishing. Many CVM studies have practiced to estimate total WTP (or WTA) value through CVM survey in the case of water resources (e.g., Raje et al., 2002; Barton, 1998; Mitchell and Carson, 1989; Navrud, 1995), and forest resources (e.g., Garrod and Willis, 1999; Adamowicz et al., 1996). Nallathiga and Paravastu (2004) presented a substantial CVM literature in the 13th Annual Conference of the European Association of Environmental and Resource Economics: Feenberg and Mills (1980) measured water quality conservation in a benefit–cost framework and described a methodology for valuing benefits and costs of water pollution abatement, while considering water as a public good. It is one of the few such studies that provided a framework for valuing water quality, and offered a discussion on policy implications. Navrud (1995) attempted to value water quality improvements for a lake affected by acid rain depositions in The Netherlands using CVM to conclude that the WTP was quite high, whereas, the WTA was very low as several respondents turned down. This study established WTP, rather than WTA, as an appropriate estimation of water quality, though theoretically both are equal. In another study, Carson and Mitchell (1993) distinguished demand for water quality under various uses to value demands for each use by conducting WTP surveys. Similarly Brox et al. (1996) conducted a survey for evaluating the WTP for water quality as well as supply enhancements in Grand River watershed by including both quantitative and qualitative dimensions in the study.

While the CVM procedure tries to maximum WTP amount per household, investigation can be conducted to identify contributions of relevant items such as respondent's income levels, education, age, gender, cultural background, tastes, familiarity level etc. (Piran et al., 1997; Kula, 1994). Then, a general willingness to pay function for individual i is likely to be:

$$\mathrm{WTPi} = f(\mathrm{Qi},\mathrm{Yi},\mathrm{Ti},\mathrm{Si}) \quad (1)$$

where WTPi is willingness to pay for respondent, Qi is quality/quantity of attribute, Yi is the income level, Ti the index of tastes and Si is a vector of relevant socio-economic factors. For a discussion of this methodology see Cummings et al. (1986) and Hanley (1989).

4. The empirical study

In CVM studies, there are some WTP formats to elicit the maximum WTP. In open ended (OE) format; the respondent is generally asked a question of the form: "What are you willing to pay?" In dichotomous choice (DC) format; the respondent is asked "Are you willing to pay $\$X$?" with the amount X being varied across the sample (Bateman et al., 1999). This approach is one of the most compatible elicitation methods. However, it requires large sample size. In payment card format (PC); the respondents are asked to pick a value from a range given on a card. In iterative bidding game (IB); the respondent is asked a series of questions bidding up and down from an analyst determined starting point until the maximum WTP is established (Bateman et al., 1999). Clear evidence of starting point bias was demonstrated in a number of studies such as Boyle and Bishop (1987), Hanley (1989).

In this study, an OE format was used to investigate public WTP for the levels of forest and water ecosystems by the MRDP action plans described in Section 1. The Local Agenda 21 organization based on Bursa Metropolitan City Municipality is well-known with the agricultural extension works in the rural Bursa, where the research carried out. Initially, Local Agenda officials made detailed explanations related to the importance of forest and river ecosystem's benefits by using intensive agricultural extension methods. Next weeks face-to-face OE survey format was conducted and 129 surveys were applied in the region. The surveys were conducted between 18.00 and 21.00 p.m. at the respondent's home, which is selected by random sampling. The disposition of survey's application is indicated in Table 2.

Face-to-face format is one of the most reliable surveys in CVM studies of developing countries (FAO, 2000). Hadker et al. (1997) states the value of this method compared with the mailed questionnaire and telephone surveys in those countries. In this

Table 2
The application of survey

Category	Number	%
Number of visit the respondent's house	150	100
Refusals (no time, lack of trust etc.)	21	14
Net sample size	129	86

way, interviewers can actually interact with respondents and clarify theirs doubts by minimizing non-response rates. Therefore, the quality of the data will improve (Bandara and Tisdell, 2004).

The survey consisting of three sections had totally 40 questions. There were five demographic questions in the first section. Demographical characteristics of the survey respondents were compared to relevant information from census data for Misi settlement. The sample characteristics of age, gender, education level, household total income were compared with these characteristics in the 1997 census data by using a χ^2 (Chi-squared) analysis. None of the sample characteristics is significantly different from the census data at the 0.01 level. Survey was effectively prepared to remove the doubts regarding reliability of the data. For instance, in the first section, it was asked to respondents how much land they have and how much agricultural production cost per year they have. In the next section, it was directly asked to the respondent about his income. Thus, it was tried to be sure of the date, and made crosswise verifications for other independent variables.

The second section investigated the respondent's relations with the forest and river ecosystems, and recreational attitudes with Misi settlement. The final set of questions dealt with household willingness to pay for the ecosystems' conservation and preservation. The valuation question asked to respondents was about their annual WTP for integrated program that would preserve the environmental quality, which is developed by the MRDP project. Following statement is WTP question asked to respondents.

"This study is conducted by Uludag University and Bursa Metropolitan City Municipality (BMCM) to realize the opinions and values Misi residents hold related to the protection of native plants and animals, Misi Forest's landscape amenities value and Nilufer River's value. BMCM needs funds to provide the protection and improvement of whole Misi Forest and Nilufer River's benefits in the frame of Misi Rural Development Project supported by The Ministry of Environmental and Forestry. Imagine the BMCM and the Ministry of Environmental and Forestry wish to obtain money specifically to carry out the project mentioned above. Assume the money raised by "The Ministry of Environmental and Forestry Preservation Fund for Misi" will be used only for the protection and preservation of Misi's ecosystems in the region. How much money would you pay for this fund each year?.....USD. (Note that this is an imaginary situation and that the money will not be collected and your answer cannot be identified with you.)"

Following Table 3 presents the number of respondents at different WTP levels. As can be seen it is a fairly well-behaved distribution. Percentage of zero WTPs is 3.1% of sample size. Generally WTP of respondents appears in WTP levels of between 55 and 80 USD.

The payment vehicle was a hypothetical "The Ministry of Environmental and Forestry Preservation Fund for Misi" to which household can donate money for the preservation and management of Misi's ecosystem values. In this context, respondents were informed that the importance of Misi settlement and its ecosystems will be improved through the fund. Especially in developing countries such as Turkey, the payment mechanisms on tax increases have some issues on survey interviews because of tax evasion and inequity, and lack of confidence about government policies. The annual donation to an independent conservation trust mechanism has also not to succeed because of lower socio-economic statues. Because in Turkey Non-governmental Organizations' (NGOs) efficiency is weak, and the number of member is very low. The number of member of all NGOs concerning environment and development issues is 0.002% in rural areas and 0.019% in urban areas of all population (personal communication with Annual Agenda 21 officials). Therefore, the donations to local government's preservation and conservation program for Misi ecosystems were accepted as payment mechanism.

The ordinary least squares statistical method was used to estimate the relationship of total annual benefit to the characteristics of households and resource.

Table 3
Distribution of WTP responses

$	0	10	30	50	55	60	65	70	75	80	95	100	110
Number of respondent	4	5	6	6	11	18	29	15	13	11	7	3	1

The following model was used to estimate per household WTP:

$$Y_i = \alpha + \sum_{i=1}^{n} \beta_i x_i + \varepsilon_i \quad (2)$$

where β_i is coefficient to be estimated, a is constant, x_i is mean or median of related variables and ε is error terms. The independent variables used in the multiple regression analysis are described in Table 4.

One indicator of validity of the results of a CVM is whether WTP is affected by the variables suggested as important by economic theory (for example, socio-economical variables and attitudes on preserving ecosystems) and whether the signs of the coefficients of the variables are in line with a priori expectations. Expected signs of socio-economic and attitude variables are also presented at Table 4.

In order to evaluate most significant parameters on mean WTP, firstly standard regression model, and then the method of "Forward Stepwise Regression" were adapted. The standard regression model included the variables Age, With_Nat, Edu, Income, Totaland, and titled as Model I. In the method of forward stepwise regression, dummy variables were used, and titled as Model II. In this model, the independent variables were individually added or deleted from the model at each step of the regression until the "best" regression model is obtained. In this method, the importance of a variable is judged by the size of the t/F statistics for dropping the variable from the model (Statistica General Conventions, 1995). Following Table 5 is about means, median and standard deviations of the variables.

Correlation analysis was done for examining any close association between independent variables, which might lead to multicollinearity. We saw that multicollinearity was generally low.

Table 4
Variable specification and expected signs of the Model 1 and Model 2

Variables	Expected sign	Description
Age	+	Respondent's age
Edu	+	Education level 1—Literate, 2—Primary, 3—Secondary, 4—High School, 5—University
Income	+	Household annual income (TL)
Gender	−	1—Men, 0—Otherwise
Chem_use	−	1—I uses chemicals, 0—Otherwise
With_nat	+	Daily respondent's working time in open areas
Household	−	Household size
Totaland	−	The amount of land (Ha.) owned by the respondent
Env_sens	+	1—The nature is very important for Turkey, 0—Otherwise
Next_gen	+	1—MRDP is beneficial for the next generations, 0—Otherwise
Pro_info	+	1—Respondent knows MRDP entirely, 0—Otherwise
Per_benf	+	1—MRDP would be beneficial for the respondent, 0—Otherwise
Land_own	−	0—Inheritance, 1—Inheritance+Buying, 2—Buying
Nat_prot	+	1—To protect the nature is necessary for the respondent, 0—Otherwise
Other_species	−	1—Flora and Fauna can be removed for human, 0—Otherwise

Table 5
Descriptive statistics for the analysis

Variable	Median	Mean	Standard deviation
Age	50	45.267	9140
Edu	1	1300	0.792
Income	2.5×10^9	3.25×10^9	1.08×10^9
Gender	1	0.955	0.010
Chem_use	1	0.600	0.558
With_nat	8	9367	1960
Household	4	3767	0.908
Totaland	6.5	9567	2280
Env_sens	1	0.900	0.220
Next_gen	1	0.850	0.150
Pro_info	0	0.250	0.125
Per_benf	1	0.567	0.340
Land_own	0	0.433	0.350
Nat_prot	1	0.967	0.180
Other_sp	1	0.167	0.430

5. Results and discussion

Multivariate regression analysis procedure was undertaken by using Statistica Statistical Software to identify the factors associated with respondent's responses for the open ended WTP question. The F statistic was used as a measure to estimate the overall statistical performance of the estimated linear regression equation. The coefficient of multiple determination (R^2) was also employed, similar to

Bandara and Tisdell (2004), Leones et al. (1997), to test up to what extent the variation in the explanatory variables used in the model were capable of explaining the variation of the dependent variable (Maddala, 1992). These measures indicate that the Model II had satisfactory explanatory power and fitted the data reasonably well. The overall ability of this model to yield a correct prediction on Misi resident's WTP for the conservation and sustainability of ecosystem services was significant at the $\alpha = 0.05$ level of significance.

The results of multivariate linear regression analysis for WTP of the MRDP are shown in Table 6.

The first model had lower statistical significance than the second model. In the second model, as number of variables increased, F and R-values increased. Furthermore, the impact of the dummy variables was examined upon final model. In Model II, most of the estimated coefficients had expected signs. Of fifteen variables, Gender, Next_Gen, Pro_Info, Per_Benf, Nat_Prot and With_Nat variables were insignificant statistically. As might be expected the coefficient for the age, income and education level (Edu) were positive and significant at 0.01 level. Household size (household) variable was negative and significant at 0.05 level. This suggests that WTP amount will increase while respondent's age, income and education level increase and household size decrease. Bandara and Tisdell (2004) state that improvements of the education system and the other demographical factors, and the incorporation of environmental education into the school curriculum in Sri Lanka have been a positive impact on the younger people's awareness or specific knowledge about contemporary conservation issues. Heinen (1993) observed a similar situation in a study of people's attitudes towards the wildlife in a National Park in Nepal. In this study, he found that positive attitudes towards the preservation of nature, as measured by the individual's WTP, correlate highly with the respondent's age, years of schooling and the gender. He also noticed an interesting relationship between age and the years of schooling. Younger respondents are found often to have more years of schooling than the older ones in his sample. There are also quite similar situations on MRDP case.

The amount of total land (Totaland) owned by respondents have negative coefficient. It may be said that the respondents, which have large amount of land, is unaware of the social values of the project. This variable can be also related to the chemical use

Table 6
Parameter estimation for Model I and Model II

Variables	Model I		Model II	
	Coefficient (standard deviation)	t-ratio	Coefficient (standard deviation)	t-ratio
Constant	−7120593.2460 (1790148.3115)	(−3.9776)**	−6941184.3330 (1652662.936)	(−4.1999)**
Age	0.3130 (0.0401)	(7.8054)**	0.3150 (0.0795)	(3.9580)**
With_Nat	0.0980 (0.0176)	(5.5681)*		
Edu	0.6130 (0.3295)	(1.8600)*	0.7920 (0.1588)	(4.9850)**
Income	0.1690 (0.0938)	(1.8010)*	0.7600 (0.1473)	(5.1580)**
Totaland	−0.370 (0.0712)	(−5.1950)**	−0.280 (0.1332)	(−2.1010)**
Other_Sp			−0.3200 (0.1769)	(−1.8085)*
Land_Own			−0.3500 (0.2034)	(−1.7200)*
Env_Sens			0.2200 (0.0552)	(3.9850)**
Chem_Use			−0.5880 (0.3371)	(−1.7440)*
Household			−0.2080 (0.1210)	(−1.7180)*
Multiple	0.6008		0.8539	
R^2	0.3609		0.7291	
Adjusted R^2	0.2278		0.6072	
F	142.105		118.3215	

* Significant at the 0.05 level.
** Significant at the 0.01 level.

variable. While chemical uses increase on farmlands, WTP value for the MRDP decreases. The variable of Other_Species has naturally negative coefficient. This means that the larger WTP value stated by the respondents, the more willing to protect other species consequently ecosystem. The variable of Land_Own is statistically significant and has also negative coefficient. This implies that the respondents who buy their lands are more willing to pay for the MRDP than those who are not. The variable of Env_Sens is also statistically significant, and has naturally positive coefficient. The result suggests that, a respondent who is environmental sensitive would contribute more towards the conservation of the ecosystems in Misi region. Loomis and Larson (1994) and Bandara and Tisdell (2004) observed a similar situation in a CV survey for endangered species.

In the stepwise regression procedure, Model II firstly included all of the variables entered introduced. In the following iterations, variables were eliminated one by one until the desired t-value is attained. As iterations went on, the adjusted R^2 value increased. The final equation for the second model is significant at the 0.05 level as indicated by F value of 118.3.

Generally, mean WTP and median WTP will take different values. Frequently, WTP data show a distribution that is skewed to the right. In such a case, the mean will tend to take on higher value than the median. For this reason, some analysts have argued that median WTP is a more robust measure of central tendency since its value is not so greatly influenced by occasional very high WTP values (Harrison and Kriström, 1995). From the point of view of decision-makers the two measures for summarizing the distribution of WTP can be seen to have quite different interpretations. If the decision-maker wishes to make a decision based on efficiency criteria, then the mean is the most appropriate measure (Brent, 1998; Bateman et al., 2002). In this study, it used "mean" which is accordant with efficiency criteria. Using the regression equation, mean WTP was calculated at the mean of other independent variables. The result of mean annual WTP per household was 67.94 USD with a 95% confidence interval of 57.47–78.40 USD for the benefits of MRDP project. This figure is generalized to households around in the Misi, and total WTP will be 2,306,474.836 USD/year.

6. Conclusion

In this study, it was applied to survey a sample of rural residents in Misi settlement near Bursa metropolitan area to elicit WTP for the conservation of the Misi Settlement's ecosystem in Turkey, and results showed that eliciting willingness to pay using CVM provides a simple and reliable method for quantifying the related use and non-use values of MRDP. Although we need to add other variables to the model according to the values of R^2, the estimations of this study are good enough for the future development of MRDP, which is integrated with environmental considerations. Moreover it will be useful tool for policy mechanisms.

Generally zero WTP responses appear in between 10 and 20% of all samples in CV literatures. In this study, of the 129 respondents surveyed, 125 (96.9%) stated that they were willing to pay for non-use values of the MRDP. One may state that the friendly approaches of Local Agenda 21's officials and effective agricultural extension applications at the area removed the prejudice of respondents for zero WTP. Thus, zero WTP responses were only 3.1%. Application of multiple regression analysis combined with dummy variables (Model 2) reveals that Misi resident's WTP for the conservation of the Misi's forest and river ecosystem is annually per head 67.94 USD. If this figure is generalized to households around in the Misi, it would be 2,306,474.00 USD per year. The present value WTP for 20 years was 19,636,313.37 USD using discount rate of 0.10%, 461,294.80 USD using discount rate of 0.05%.

Multi-agency management systems on the natural resources have caused some issues in rural settlements based on natural resources like the case of Misi. This multi-agency management system has been the obstacle in the development and conservation of natural resources in Turkey. Integrated ecosystem management plans should be carried out for environmental resources' use around rural settlements like Misi. In this context, MRDP will also be an important case for other settlements in Turkey.

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