REGULAR ARTICLE

URBAN FRESHWATER USERS' WILLINGNESS TO PAY FOR UPLAND DEGRADED WATERSHED MANAGEMENT: THE CASE OF DECHATU IN DIRE DAWA ADMINISTRATION, ETHIOPIA

Alem MEZGEBO*, Endrias GETA, Fresenbet ZELEKE

Address:

Haramaya University College of Agriculture and Environmental Science, School of Agricultural Economics and Agribusiness, Dire Dawa, Ethiopia
*Corresponding author: adeway12@gmail.com

ABSTRACT

The study assesses urban freshwater users' perception of watershed degradation and users' willingness to pay for upland degraded watershed management. Cross sectional data was collected from 282 urban freshwater users. A number of causes and effects of watershed degradation and water supply problems are identified. Economic instruments and mechanisms are also identified as the basis of charging and collecting the fee for watershed management, respectively. Besides, contingent valuation result shows that about 82 percent of the respondents were willing to pay for upland degraded watershed management. The mean willingness to pay from the spike model was computed to be 97 Ethiopian birr (ETB) per annum for five years whereas the mean willingness to pay from the open-ended elicitation method was computed 70 ETB per year. Urban freshwater user willingness to pay is affected by total income, initial bids, marital status, ownership of house and educational levels. The study recommends that any watershed management activities need to consider the socio-economic variables of the affected respondents. Besides, it is worthy to consider the demand of the urban dweller (downstream users) for any upland degraded watershed management.

Keywords: degraded watershed management; urban freshwater users; willingness to pay
JEL: Q00, Q20, Q50, Q57, Q59

INTRODUCTION

A watershed is a total land area that is drained to some point on a stream or river. It is an area of land that captures rainfall and other precipitation where all of the water that falls in it ends up in common outlet (**Sheng, 1990; Achouri, 2002; Swallow et al., 2002; Lakew et.al 2005; Postel and Thompson, 2005; Wani et al., 2008**). The size of watershed can be a few square kilometers or thousand square kilometers (**Sheng, 1990**). Watershed includes people, their farming system and interactions with their land resources, management strategies, social, economic and cultural aspects (**Lakew et.al, 2005**). All watersheds contain many kinds of natural resources such as soil, water, forest, rangeland, wildlife, minerals, etc (**Sheng, 1990**). They are very important for providing clean water, purification of freshwater, recreational opportunities and tourism (**Hajkowicz and Okotai, 2005; Postel and Thompson, 2005**). Watersheds help to mitigate climatic change and protect biodiversity. However, the 2005 Millennium Ecosystem Assessment concludes that globally, 60 percent of all ecosystem services (like watershed services) are currently being degraded and used unsustainably. Watershed degradation is the loss of health, productive potential of land and water over time (**Sheng, 1990; Aglanu, 2014**).

Reduced economic opportunities and increased social problems are the effects of watershed degradation. The degradation was considered as the greatest constraint to sustainable development in most of the developing countries (**Sheng, 1990**). Currently, there has been a growing concern by policy makers, interest groups and the public in pursuing degraded watershed management. In order to properly manage watershed services reliable information on the economic value of upland degraded watershed management is very crucial. However, in Ethiopia as well as in the study area no attempt was made to estimate the economic value of degraded upland watershed management using contingent valuation method. This study therefore, tried to estimate the economic value of Dechatu watershed management. The level of awareness of urban freshwater users' about the causes and effects of watershed degradation were also assessed. The result of this study will be used for policy planning and improving the socio-economic, environment and well-being of the communities.

DATA AND METHODS

Study Area
The study was conducted in Dire Dawa Administration, Dechatu watershed, located in eastern Ethiopia. The study area is among the most broken and mountainous regions of the country. The physiography of the study area can be classified into: (a) mountain ranges mainly located in the southern part with slopes above 45% with shallow soil depth and mostly covered with scattered woods and shrubs; (b) hills found scattered all over the

area, with slopes ranging between 16 and 30%, very shallow soils composed mainly of stones and rock out-crops most of which are devoid of vegetation cover; (c) valley bottoms and river terraces mainly situated at the foot slopes of mountain ranges and rivers banks with moderately fertile and deep soil and with slopes ranging from 0 to 3% and (d) flat plains mostly concentrated in the north eastern and north western part , with slopes ranging between 0 and 3%, deep and fertile soils with slight vegetation cover (mostly shrubs) mainly used as grazing and browsing by pastoral livestock (**DDAEPA, 2011**). Based on the 2007 population and housing census of Ethiopia, the total population of the study area is 228,856 with an average of about 4 persons per households. All these people uses dechatu watershed as source of water supply (**FDREPCC, 2008**).

Sampling Techniques and Methods of Data Collection
A two-stage sampling technique was used to select sample respondents. In the first stage three urban kebeles (05, 06 and 09 kebeles) were purposively selected as they are severely affected by flood from the upland degraded watershed. *Kebele* is an administrative hierarchy in Ethiopia. In Ethiopia there are nine regional state where every region is structured into zones. Besides, zones are divided into districts and every district is again divided into *kebeles*. Secondly, proportionally from population size in each Kebele, a total of 282 freshwater users' were randomly selected. Both primary and secondary data were collected for this study. The secondary data were collected from relevant sources including Central Statistical Agency, and Dire Dawa Bureau of Agriculture. The primary data on the willingness to pay were collected through face to face interview. Structured questionnaire was pre-tested to evaluate its effectiveness and to identify the initial bids. The initial bids identified and used in actual survey were include 30, 70, 100, 140 and 180 Ethiopian birr (ETB) per year. ETB refers to Ethiopian birr which means Ethiopian currency. EUR 1 = 26 ETB during the study period. The chosen bids were randomly assigned to the respondents such that each bid was presented to an equivalent sub-sample.

Contingent valuation method (CVM) was employed to elicit urban freshwater users' willingness to pay (WTP) for upland degraded watershed management. Many CVM studies have made use of this format because it has properties for incentive-compatible or truthful revelation of preferences. Despite, these advantages there are four possible sources of bias such as strategic bias, information bias, starting point bias and hypothetical market bias in CVM (**Tietenberg, 2003**). A strategic bias occurs when respondent understate and overstate the true values of the WTP (Hanley *et al.,* 1997). An information bias occurs when the respondents are forced to value the environmental goods with which they have little or no information (**Tietenberg, 2003**). On the other hand, the starting point bias occurs when the respondent's WTP amount is influenced by a value introduced by the hypothetical scenario (**Mitchell and Carson, 1989**). Hypothetical market bias seems to depend on how the questions are asked in the CVM questionnaire and on how realistic respondents feel the

hypothetical market (**Hanley and Spash, 1993**). To minimize these CVM biases the present study used the following four approaches. First, a clear presentation of hypothetical market, and face to face interview method was used to collect the data from the respondents. Second, CVM in the form of double bounded elicitation method was used to elicit the mean willingness to pay. Third, the initial bids were identified before the actual survey was conducted. Fourth, the sample respondents were selected using random sampling method.

Data Analysis Methods
In contingent valuation survey the respondents were also given an opportunity to zero bid (willingness to pay) (**Johnson and Whitehead, 2000**). These zero responses may separate genuine and protest zeros. Hence, to distinguish between genuine and protest zero responses, and to treat these zero response, we should adopt an appropriate framework of analysis (**Strazzera *et al.,* 2003**). Nonparticipation can have a substantial impact on the results of CVM studies. If it is inadequately accounted for in the estimation process resulting in an important difference in the final WTP estimates (**Haab, 1999; Dziegielewska and Mendelsohn, 2007**).

A genuine zero value is not a problem since it reflects the true value that the public good has for the respondent. The problem is with protest zero responses (**Jorgensen and Syme, 2000**). In the traditional CVM analysis protest responses has tended to exclude from the sample data set. However, this creates a problem if protest responses encourage a selectivity bias (**Calia and Strazzera, 2001**), that is, there is a systematic relationship between protesting and participating in the market. Although there is no a general consensus in the CVM literature on the most appropriate way of dealing with this problem of nonparticipation, a solution that has gained an increasing popularity is the Spike model. The Spike model was proposed by **Kriström (1997)** and it explicitly allows for the possibility that some portion of the respondents are indifferent to the good being valued, i.e. this model assigns a non-zero probability to zero WTP responses.

Following **Kriström (1997)**, the simple spike model was used in the study to allow a better handling of the zero responses that are common when using the dichotomous choice referendum format. A respondent was asked whether or not he or she is willing to contribute to a trust fund that was used for the management of degraded Dechatu watersheds. The willingness to pay for a change in environmental quality(watershed improvement) $q_0 \rightarrow q_1$ can be expressed (1)

$$V(y - WTP, q_1) = V(y, q_0) \qquad (1)$$

where: V(y, q) is an individual's indirect utility function and y is income.

If there is a continuum of individuals who associate different values to the watershed management, the probability that an individual's WTP does not exceed an amount A(initial bid) is given by Eq. 2.

$$\Pr(WTP \leq A) = F_{wtp}(A) \qquad (2)$$

where $F_{wtp}(A)$ is a right continuous non-decreasing function.

As a result, the expected WTP can then be expressed by Eq. 3.

$$E(WTP) = \int_0^\infty 1 - F_{wtp}(A)dA - \int_{-\infty}^0 1 - F_{wtp}(A)dA \qquad (3)$$

To be able to estimate $F_{wtp}(A)$ in this study different amounts of initial bids (A) were presented to each sub-sample. The spike-model assumes that the distribution function of WTP ($F_{wtp}(A)$) has the Eq. 4 form.

$$F_{wtp}(A) = \begin{cases} 0 \ if \ A < 0 \\ P \ if \ A = 0 \\ G_{wtp} \ if \ A > 0 \end{cases} \qquad (4)$$

where p belongs to (0, 1) and G_{wtp} (A) is a continuous and increasing function such that G_{wtp} (0) = p and lim A→∞ G_{wtp} (A) =1. This creates a jump-discontinuity or a spike at zero.

In this study after the contingent valuation scenario was presented to the respondents two valuation questions were offered for the spike model. These valuation questions include:
- Whether the respondent is willing to participate in the market.
- Whether the respondent is willing to pay the initial bid per year.

For each respondent, *i*, an indicator of S_i was defined to determine whether the respondent is "in-the-market" or not (Eq. 5).

$$S_i = \begin{cases} 1 \ if \ WTP > 0 \\ 0 \ if \ WTP \leq 0 \end{cases} \qquad (5)$$

The respondent is "in-the-market" if the additional amount that he/she is asked to contribute to the trust fund is lower than his/her willingness to pay. To identify the effect of respondent's socio-economic characteristics on their WTP for upland degraded watershed management, the model specified by Eq. 6 was used.

$$S_i = \gamma_0 + \gamma_1 V_{1,j} + \gamma_2 V_{2,j} + \cdots + \gamma_k V_{k,j} + \varepsilon_{S_{i,j}} \qquad (6)$$

where:
$V_{S_i} = \{V_1, V_2, \ldots, V_K\}$ is also a vector of explanatory variables not necessarily distinct of X_{T_i} below; γ unknown parameters of the model. Analogously, one can assume that behind the decision to participate in the hypothetical market ($S_i = 1(yes)$ the latent variable T_i was used to indicate the respondent's willingness to pay the suggested prices A (Eq. 7).

$$T_i = \begin{cases} 1 \ if \ WTP > A \ and \\ \quad 0 \ otherwise \end{cases} \qquad (7)$$

This latent variable T_i is specified as:

$$T_i = \alpha + \beta A_i + \gamma_1 X_{1,i} + \gamma_2 X_{2,i} + \cdots + \gamma_M X_{M,i} + \varepsilon_{T_{i,i}} \qquad (8)$$

where $X_{T_i} = \{X_1, X_2, \ldots, X_M\}$ is a vector of explanatory variables, A_i is the initial bids, offered to the respondent in order to enjoy an improvement in the environmental quality $q_0 \rightarrow q_1$, in the case of this study, upland Dechatu watershed management. And α, β and γ are unknown parameters of the model. The disturbance terms are assumed to have a bivariate normal distribution with a correlation parameter, ρ. That is, $(\varepsilon_{S_i}, \varepsilon_{T_i}) \sim BVN(0,0,1,1,\rho)$. Therefore, with the introduction of these decision rules, the spike model becomes a bivariate specification with sample selection (Eq. 9).

$$\begin{cases} S_i = 0 \ if \ S^* \leq = 0 \\ S_i = 1 \ if \ S^* > 0 \rightarrow \begin{cases} T = 1 \ if \ T^* > 0 \\ T = 0 \ if \ T^* \leq 0 \end{cases} \end{cases} \qquad (9)$$

The log likelihood for the sample is then given by (Eq. 10).

$$L = \prod_{S_i=0} P(S^* \leq 0) \prod_{S_i=1}[\prod_{T_i=1} P(S^* > 0, T^* > A) \prod_{T_i=0} P(S^* > 0, T^* \leq A] \qquad (10)$$

which implicitly contains the joint probability of S^* and T^* and the marginal probability of S^*.

RESULTS AND DISCUSSION

Socio-economic characteristics of freshwater users
All the sample size including the protest response (bidders) (11.3% of the respondents) was included in the analysis to avoid the problem of sample selection bias. The descriptive result shows that 84.4% and 15.6% were males and female respondents, respectively. Among the sample respondents 81.9% were married. About 65% and 31% of the sample respondents were living in their own house and kebele, respectively. The remaining 4% were living in rented house. The age of these sample respondents ranged from 18 to 77 years with an average about 44 years. The average age indicates that most of the sample respondents were active working group. The average family size was 5 persons with a minimum of 1 and maximum of 9 persons per household. This average family size was greater than the national average of 4.7 persons per household (**FDREPCC, 2008**). This is due to the fact that the respondents are practiced a polygamy custom. On average the educational status of the sample respondents was computed at 8 years of schooling. On average the monthly income of sample households was computed at 2021 ETB per month. This is because of Khat production and smuggled goods.

Perception on water availability and quality
The result shows that about 99% of the urban respondents were connected to urban water supplier. The remaining 1% of the respondents was fetched water for domestic purposes from deep well. The average water

consumption per month of the respondents was 1.89 cubic meters. However, 56.4% of the respondents reported that water is availability for 8 hours per day. About 2.1% of the respondents stated that water is available the whole day (Table 1).

Table 1: Perception on the availability of water

Availability	Frequency	Percent
Available the whole day (24 hrs)	6	2.1
Moderately available (16 hrs)	117	41.5
Available (8 hrs)	159	56.4
Total	282	100

Source: survey data

83.3% of the sample respondents reported that there is no problem on the quality of water directly used from the pipeline. Whereas the remaining respondents reported that there is a problem on the quality of availability of water (Table 2).

Table 2: Perceptions on the quality of water

Quality of water	Frequency	Percent
Highly acceptable	235	83.3
Moderately acceptable	45	16
Acceptable	2	0.7
Total	282	100

Source: survey data

Awareness on the causes and effects of water supply problems

The respondents are using the water resource for drinking, cooking, bathing, cleaning and other purposes. However, shortage of water supply is a problem for the livelihoods of the respondents. Four interrelated causes of water supply problems were identified and described: (1) busted pipeline, (2) insufficient raw water, (3) deforestation and (4) climate change. Each of these causes would individually enhance water supply problem of the urban freshwater users. The result shows that 48.9% of the respondents were identified busted pipeline as the cause of water supply problem. In the case of insufficient raw water 66% of the respondents answered yes response. Moreover, 27% and 10% of the respondents stated that deforestation and climate change were the causes of water supply problem, respectively (Table 3). Insufficient raw water is ranked first by respondents as cause of water supply problem. This insufficient raw water may be occurred due to the degradation of upland watershed.

On the other hand, four effects of water supply problem were identified: (1) health problem (2) higher expenditure (3) delay in household chores (4) affected personal hygiene. Specifically, 57% of the respondents reported that health problem is the effect of water supply problem. About 52% of the respondents said that higher expenditure is the problem. In the case of delay in household chores 24% of the respondents say yes response. Moreover, about 35%, the respondents stated that personal hygiene problem is the effect of water supply problem (Table 4). This is in agreement with the findings of **John-Dewole (2012)**. **John-Dewole (2012),** found that lack of good water supply enhanced various

forms of water-borne diseases such as typhoid fever, diarrhea and paratyphoid fever.

Table 3. Cause of water supply problem

Causes	Response Yes (%)	No (%)
Busted pipeline	49	51
Insufficient raw water during the dry season	66	34
Deforestation	27	73
Climate change	10	90

Source: Survey data, 2014

Table 4. Effects of unstable water supply to freshwater users

Effects	Response Yes (%)	No (%)
Health problem	57	43
Higher expenditure	52	48
Delay in household chores	24	76
Personal hygiene is affected	35	65

Source: survey data, 2014

Perception on causes of Dechatu watershed degradation

About 87.6% of the sample respondents were familiar with the Dechatu watershed, and they reported that the upland watershed has been degraded. Agricultural expansion, population pressure, soil and water degradations, change in weather conditions and climate change are the causes of watershed degradation identified from the respondents. Specifically, 23.8% and 53.3% of the respondents reported that agricultural expansion, and soil and water degradations are the causes of upland degradation, respectively (Table 5). This study is consistent with the finding of **JICA team (2007)**. **JICA study team (2007)** identified that intensive firewood collection, over-grazing, unfavourable climatic conditions, shifting cultivation, poor land management and lack of law enforcement as the causes of watershed degradation.

Table 5. Causes of Dechatu watershed degradation

Causes	Response Yes (%)	No (%)
Agricultural expansion	24	76
Population Pressure	62	38
Soil and Water degradations	53	47
Change in weather conditions	10	90
Climate change	17	83

Source: Survey data, 2014

Solutions were also elicited from the aware respondents for possible improvement of degraded Dechatu watershed. Strong government regulation, soil and water conservation, tree planting and training users and creation of other source of income are among the protection measures (Table 6).

Well managed and protected watershed provides goods and services for the communities. According to **EPA (2012)**, healthy watersheds provide many ecosystem services such as water storage, air filtration, carbon storage, nutrient cycling, soil formation,

recreation, food and timber. The result of this study is consistent with the finding of **EPA (2012).** The result found that well managed and protected watershed absorbs water and makes it available for future, minimize floods, and improve water quality. Specifically, 66% of the respondents reported that well managed and protected watersheds are important for absorb water and make it available for future use. About 40% of the respondents specified that well managed and protected watersheds are important for minimizing floods. On the other hand, 25% of the respondents reported that well protected watershed is very important for water quality improvement (Table 7).

Table 6. Solutions for watershed degradation

Solutions	Response	
	Yes (%)	No (%)
Government regulation	13	87
Tree planting	34	66
Soil and water conservations	67	33
Training	51	49
Other source of income	13	87

Source: Survey data, 2014

Table 7. Important of well protected watershed

Important	Response	
	Yes (%)	No (%)
They absorb water and make it available for future use	66	34
They minimize floods	40	60
Improve water quality	25	75

Source: Survey data, 2014

Freshwater users' responses on mechanisms and economic instruments

Three mechanisms were identified to collect the fund for upland degraded watershed management. These mechanisms include contribution as trust fund, amount to be added to water bill and recover through income tax. Specifically, about 13% of the respondents preferred none of the mechanism. On the other hand, 26% of the respondents preferred trust fund mechanism. Whereas about 45% and 16% of the sample respondents were specified water bills and income tax as appropriate mechanisms to collect watershed management fee, respectively. In general, the result shows that the majority of the respondents were willing to contribute as amount to be added to water bill.

The bases of charging the fee were also identified from the respondents: (1) volume of water used (2) income (3) number of members in the households and (4) fixed rate. About 9% of the respondents were selected fixed rate as a base of charging the fee. On the other hand, about 14% of the respondents were selected none of the bases of charging the fee.

Freshwater users' WTP for upland degraded watershed management

About 82% of the sample respondents were willing to pay for Dechatu watershed management. Among these willing respondents about 45% of them accepted the initial bids offered to them. The average initial bids

assigned to the respondents were computed at 104 ETB. From discrete responses of WTP, the study shows that about 20% of the respondents accepted both the 1st bids and 2nd higher bids offered. Besides, about 25% of the respondents responded "Yes-No" response. Furthermore, about 20% and 35% of the sample respondents responded "No-Yes" and "No-No" for the offered bids, respectively (Table 8).

The mean willingness to pay for upland degraded watershed management was computed at 97.13 ETB per year per household for five years horizon (Table 9). The result shows that the mean WTP from spike model is different from the mean value of open ended elicitation method significantly at 1% level of significance. This is because open ended elicitation method has an advantage to avoid the anchoring effect unlike double bounded elicitation method. This finding is consistent with various studies (**Amponin*et al.*, 2007; Alem, 2012**).

The mean WTP of the respondents from open ended elicitation method was computed at 70.27 ETB per households per year for five years. The willing respondents were also asked to point out their reasons for their maximum willingness to pay. About 42.9% of the respondents reported that they could not afford more than what they stated because of inadequate income. On the other hand, ''I think it is worth that amount and others should pay'' were also the reasons identified from 28.4% and 10.3% of the sample respondents, respectively. Nevertheless, about 18.44% of the sample respondents were not willing to pay for upland degraded watershed management. Of the unwilling respondents about 88.7% of them were stated genuine zero. Whereas, the remaining respondents stated protest zero. The criteria for selecting protest zero was based on the discussion on NOAA panel guide on **Arrow et al (1993)**

Determinants of urban freshwater users' WTP

Table 10 summarizes the determinants of freshwater users' willingness to pay for upland degraded watershed management. The result shows that the income of the sample respondents had positive and significant relationship with the freshwater users' WTP. The positive effect indicates that respondents with higher monthly income were more likely to say yes to the offered bids than freshwater users' with lower income. This shows that degraded watershed management is a normal economic good whose demand changes in the direction of income change. The studies by **Amponin *et al.* (2007) and Alem (2012)** recognized significant association between households' income and WTP.

The result of the biprobit model also showed that education level of the respondents was positive and significant impact on WTP. One possible reason might be that literate individuals are more concerned about watershed management than illiterate one. In addition, the reason might be that education may enable respondents to make independent decisions and paves the way to have greater access to job opportunity. This is in agreement with the findings in other studies (**Tegegne, 1999 and Carlsson *et al.* 2004**).

Table 8. Freshwater users' responses from double bounded elicitation method

Offered bids			Households Response for the offered initial bids			
Initial bids(ETB)	Second higher bids(ETB)	Second lower bids(ETB)	yes-yes (%)	yes-no (%)	no-yes (%)	no-no (%)
30	60	15	11.7	6.03	0.36	1.77
70	140	35	3.55	7.8	3.9	4.97
100	200	50	2.13	5.32	4.26	8.16
140	280	70	1.42	3.55	6.03	8.51
180	360	90	1.06	2.5	4.97	12.06

Source: survey data, 2014

Table 9. Parameter estimates of spike model

	Coef.	Std. Err.	z	P>z
Initialbid	0.017	0.001	11.99	0.000
_Constant	1.49	0.150	9.93	0.000
A:1/(1+exp(_b[s:_cons]))				
wtp:1/(_b[eq1:initialbid])*log(1+exp(_b[s:_cons]))				
A	0.18	0.02	8.14	0.000
wtp	97.13	6.73	14.43	0.000
Number of obs=282				
Wald chi2(1)=143.85				
Log likelihood= -258.46453				
Prob> chi2=0.000				

Source: model output, 2014

Table 10. Bivariate probit regression result

	eq1: wtparticipate		eq2: wtpinitialbid	
Explanatory variables	Coef.	P>z	Coef.	P>z
Age	0.020	0.079*	0.002	0.826
Sex	0.020	0.942	0.183	0.486
Maritalstatus	-	-	-	-
Single (base)(1)	-	-	-	-
Married(2)	0.075	0.850	-0.275	0.421
Widow/er(3)	-0.213	0.591	0.117	0.850
Divorced (4)	-1.31	0.050**	-1.303	0.050**
Occupations	-	-	-	-
Unemployed(base)(1)	-	-	-	-
Self-employed (2)	0.263	0.412	0.452	0.111
Governmentemployee (3)	-0.124	0.716	0.308	0.329
Privatesectoremployee (4)	0.132	0.922	-5.274	1.000
Educationallevel	0.132	0.000***	0.058	0.017**
Householdsize	-0.007	0.936	-0.076	0.326
totalincome	0.0002	0.091*	.0004	0.000***
Waterconsumptionin(m^3)	0.158	0.321	0.113	0.397
Ownershipofhouse	-	-	-	-
Owned(base)	-	-	-	-
Rented	-0.899	0.048**	-0.650	0.151
Kebele	0.062	0.774	-0.202	0.303
Bids	-0.005	0.032**	-0.015	0.000***
Constant	-1.135	0.125	0.031	0.962
Number of obs= 282				
Wald chi2(30)= 184.52				
Log likelihood= -221.76				
Prob> chi2= 0.000				

***, ** & * indicate significant level at 1%, 5% and 10%, respectively

Source: model output, 2014

Divorced respondents were less likely willing to pay for upland degraded watershed management than single respondents. The coefficient of this variable is negative and significant at 5% level of significance. The study shows that respondents lived in rented house were less likely willing to pay than the households lived in their own house. This could be due to households were spent high expenditure for renting house. The coefficient of this variable was significant at 5% level of significance. The coefficient of starting bids had negative sign and

significant for households WTP. The negative sign indicates that as starting bid price increases the probability of freshwater users' willingness to pay were reduced. In other word, the demand for upland degraded watershed management was decreased as price increases. This is consistent with the finding of various studies (**Whittington *et al.,* 1990; Carlsson *et al.,* 2004; Amponin *et al.,* 2007; Alem, 2012**).

Aggregate Benefits of upland degraded watershed management

An important issue related to the measurement of welfare using WTP is aggregation of benefit. Since the watershed dealt with is not a pure public good the mean WTP was used as a measure of aggregate benefit of improved degraded upland watershed management. The aggregate WTP was calculated by multiplying the mean WTP by the total number of households in the population. From spike model the aggregate benefit for upland degraded watershed management of the total population of the study area was computed at 5,206,362 ETB per year. Whereas, from open ended elicitation method the total WTP was computed at 3,766,613 ETB.

CONCLUSION AND RECOMMENDATIONS

Contingent valuation method was used to elicit freshwater users' willingness to pay for degraded watershed management. The descriptive analysis shows that the urban residents are facing water supply problem because of busted pipeline, insufficient raw water, deforestation and climate change. The local government together with the freshwater users' should therefore take an immediate action to manage the upland degraded watershed. Unless, it is very difficult to sustain life in the degraded watershed, and hence migration may increase. The study objective was identified different causes of upland watershed degradation from the respondents. The main causes of watershed degradation are agricultural expansion, population pressure, soil and water degradation, weather and climate changes. Therefore, the government together with the residents should carry out soil and water conservations and planting tree on the degraded watershed.

The study found that Mechanisms to collect the amount of money for degraded watershed management are different from household to household. In addition, the basis of charging the fee applied for management activities should also different from individual to individual.

The annual willingness to pay value of households from the double bounded choice was greater than the annual total WTP from open ended format. The study concluded that double bounded dichotomies choice is affected from anchoring effect. The findings in the study can be used to compare for the cost of the watershed management. If the aggregate willingness to pay is lower than the proposed cost of watershed management plan, there should be an effort from the management agency or government to solve social acceptability problem.

Willingness to pay was also affected from different household's socio-economic characteristic such as total income, initial bids, marital status, ownership of house and educational levels. The study leads us to conclude that understanding of such socio-economic characteristics is a necessary and first step to achieve watershed management.

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