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FARMERS' WILLINGNESS TO PAY FOR SOIL CONSERVATION PRACTICES IN GOBU SEYO DISTRICT, EASTERN WOLLEGA ZONE, OROMIA NATIONAL REGIONAL STATE OF ETHIOPIA

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ABSTRACT

This study was conducted to explore the household's willingness to pay (WTP) for soil conservation practices in Gobu Seyo district Oromia National Regional State of Ethiopia. In this study, multi-stage sampling procedure was used to select 3 sample peasant associations (PAs) and 238 specific sample farm households. Data collection was conducted from September to October 2015. The objective were to explore the amount of labour, the household's (HHs) would be willing to contribute for soil conservation practices and the factors affecting their willingness to contribute the labour. The result pertaining the mean value of WTP for soil conservation practices from sample households were willing to contribute 25.39 man days labor per year. The results obtained through Bivariate Probit to examine factors affecting mean willingness to pay, showed that HHs heads of education level, total income of the household, perception on productivity decline and access to credit were significantly and positively affects while distance to development centers, livestock in tropical live stock unit and initial bid were significantly and negatively affects willingness to pay for soil conservation practices. As policy implications, an effort would be needed to strengthen literacy, increase farmers' awareness about the importance of conservation practices and credit facilities, increase numbers of extension office to minimize the time of farmers to contact extension workers.

Keywords: Gobu Seyo District, Contingent valuation method, Double bond Dichotomous, soil conservation practices, Probit, Tobit, and Willingness to Pay

1. INTRODUCTION

Since humans worldwide obtain more than 99.7% of their food (calories) from the land and less than 0.3% from the oceans and aquatic ecosystems, preserving cropland and maintaining soil fertility should be of the highest importance to human welfare (David and Michael, 2013). Soil

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erosion reduces the general productivity of terrestrial ecosystems (Brevik, 2009). Soil erosion increases water runoff thereby decreasing water infiltration and the water-storage capacity of the soil, remove organic matter and essential plant nutrients from the soil and soil depth is reduced, and it reduce the presence of valuable biota and the overall biodiversity of the soil (David and Michael, 2013). The loss of agricultural value due to land degradation between 2000 and 2010 was estimated be $US 7 billion, a huge sum in relation to investments in sustainable land management (Sonneveld, 2002).

Soil erosion is almost universally recognized as a serious threat to human wellbeing especially in developing countries. Ethiopia, being among developing countries, has heavily relied on its agriculturally based economy and most severely eroded countries in the world. The average annual rate of soil loss in Ethiopia is estimated to be 12 tons/hectare/year, and it can be even higher on steep slopes with soil loss rates greater than 300 tons/hectare/year where vegetation cover is scant (USAID, 2000). The extent of fertile land available for agriculture is decreasing and it reduces the production potential of land, and thus makes it difficult to produce enough to feed the growing population (Tesfa and Tripathi, 2015).

In Ethiopia, efforts towards soil conservation were started since the 1970s and 1980s. Since then, a huge amount of money has been invested in an attempt to introduce soil and water conservation measures. However, success to date has been limited (Derajew *et al*., 2013). Among these the most commonly cited factors include failure to consider indigenous land management practices, high initial costs which are not affordable to poor farmers and also trying to apply uniform techniques in different agro ecological regions without consideration of farmers Willingness to pay (Aklilu, 2006). Hence, the main objective of this paper is therefore to estimate farmers mean willingness to pay in man day's labor for soil conservation practices and to identify the determinant of farmers' mean willingness to pay for soil conservation plan which was very important and relevant to formulate policy options and support systems that could accelerate use of soil conservation measures in the study area (Gobu seyo district).

2. VALUATION OF NATURAL RESOURCES

If a good or service contributes positively to human wellbeing, it has economic value. Economic valuation refers to the assignment of money values to non-marketed assets, goods and services. Non-marketed goods and services refer to those which may not be directly bought and sold in the market place. According to Freeman (2003) the widely used methods of valuation of some non-market goods and services are revealed and stated preference methods. The revealed preference methods infer the value of goods and services based on actual observable or revealed behavior. Stated Preference method uses a direct approach to elicit willingness to pay; this method involved asking people directly about the values they place on non-market services by creating in

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effect, a hypothetical market. Among the frequently used methods of stated preference, the Choice Modeling and Contingent Valuation Method (CVM) are the commonly used ones. Choice Modeling do not ask questions directly; instead they ask people to rank alternatives, whereas, CVM is used to measures willingness to pay through direct questions such as 'What are you willing to pay?' and 'Are you willing to pay £ X'? (Hausman, 1993).

The contingent valuation method (CVM) is a direct method in which it involves asking a sample of the relevant population questions about their WTP or WTA. In the contingent valuation method, respondents are asked various questions on the basic issues such as the maximum amount they are willing to pay (WTP) to access and enjoy any welfare gain due to an improvement in environmental quantities, qualities or both or the minimum amount they are willing to accept (WTA) in compensation for welfare loss due to deterioration in environmental quantities or qualities or both (Habtamu, 2009). A CVM method was also employed to elicit household's WTP for soil conservation practices. Among four different major elicitation methods of CVM survey (Open ended format, Bidding game, Payment cards and Dichotomous or Discrete choice) dichotomous choice approach has become quite widely adopted. The Single Bounded Dichotomous Choice format is easier for respondents to make willingness to pay decisions than open-ended questions (Bennett and Carter, 1993). However, the Double-Bounded Dichotomous Choice format is useful to correct the strategic bias and improve statistical efficiency over Single-Bounded in at least two ways. First, it is similar to the current market situation in Ethiopia, where sellers state an initial price and a chance is given to the buyers to negotiate (Gebrelibanos, 2012). Second, the yes-yes, no-no response in the Double Bound Dichotomous Choice format sharpens the true and makes clear bounds on unobservable true WTP hence; there is efficiency gain (Haab and McConnell, 2002).

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

Gobu Sayo district is situated in East Wollega Zone of Oromia National regional state which is 265 km West of Addis Ababa and 65 km from Zonal Town Nekemte. Its altitude is in the range of 1556- 2580 meter above sea level. The district consists of 8 rural (PAs). The total land area of the district is estimated to be about 33,753 ha of which 21640 (64%) hectares are cultivable, 1132 (3.3%) hectares are covered by forest, 6907 (20.5%) hectares are pasture land, 4073 (12.2%) hectares are barren (degraded) and unutilized land. The total population of the district was 46806 (49.44% male, 50.56 % female) in which 6442 were headed by male and 832 were headed by female households. The Agro climatic conditions of the district are 80% weyena dega and 20% kola. The annual rainfall of the area ranges from maximum 1658 mm to minimum 830 mm. The

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annual maximum and minimum temperature ranges from 27^0c to 13^0c. The common crops produced by farm households in the area include maize, Finger millet, *Teff* and sorghum.

3.2. Data source and data collection method

A multi stage sampling techniques was used to select representative sample households. In the first stage, Gobu Seyo district was purposively selected from the Eastern Wollega Zone taking in to account the accessibility to conducting survey and severity of erosion problem. In the second stage, three Peasant Associations (Ongobo Bekanisa, Ago Laften and Tibe Hara) were randomly selected. In the final stage, total of 238 households were selected from the 3 PAs in probability proportional to number of households in the KAs using systematic random sampling techniques. For this study, primary data was collected from sample respondents through a structured questionnaire, via face to face interview. Secondary data were obtained from year of 2015 annual reports of Agriculture office.

3.3. Elicitation Methods and Questionnaire Design

Among four major elicitations Contingent Valuation method Double-Bonded Dichotomous Choice (DBDC) question approaches were applied in this study. Alberini (1997) conducted bid design by a pilot survey with open-ended questions that, directly asking the individuals the maximum amount they are willing to pay for the improved garbage disposal services. So this study, to design starting bid a plot survey has been conducted with open-ended questions that directly asked the maximum amount they are willing to pay for the improved soil conservation practices before conducting final survey. The range of response varied between 0 and 60 man days with high concentration at the middle. The band width for the estimated kernel is determined at 30 man days. In view of this, three starting bids of 20, 30 and 40 man days were randomly allocated to 238 sampled households in the final survey

In the DBDC approach, the respondents were asked a question requiring a "yes" or "no" response about whether they accept the randomly offered follow up bid or not. Moreover, if the respondents said "yes", then another willingness to pay question was asked using a higher bid (the bid were doubled). If the respondents said "no", another WTP question was asked using a lower bid (the bid were halved). For example, when offered a bid of 20 a follow up bid of 40 was offered if the answer was “yes” and in case of a “no” response a bid of 10 was given to the household (Table 1).

Table 1: Bid design and number of randomly assigned sample households

First round bid	2^{nd} round bid if "YES" in 1^{st} round	2^{nd} round bid if " NO" in 1^{st} round	Sample size
20	40	10	78
30	60	15	83
40	80	20	77
Total			238

Source: Own survey, 2015

3.4. Empirical Model Specifications

3.4.1. Estimation of Factors Affecting Willingness to Pay Model

To developing a model that will predict whether or not a particular household will have either a WTP of zero or some positive WTP for soil conservation practice, economists assume that there exists some underlying, unobservable (latent) variable and utility index, such variable is determined by certain variables including the characteristics of the household. If the latent variable exceeds some threshold level then the household will declare a positive WTP (Haab and McConnell, 2002).According to Haab and McConnell (2002) the indirect utility for respondent j can be written as

$u_j = u\,(l,, z_j,\, q)$ - (1)

Where U_i is the utility of the household j, l is vector of respondent's labor endowment, Z_j is vector of households' socio-economic characteristics and q vector is soil conservation quality as perceived by the farmer.

Formally, WTP is defined as the amount that must be taken away from the person's income or/and labor to obtain other goods or services. If the household answer was "Yes", the amount of original labor he/she has been reduced by the amount of the bid (B_j). When the respondent answer was "yes" to a required payment of B_j or will accept the randomly assigned initial bid the following condition has to be satisfied.

$U_i\,(l_j - B_j, z_j,\, q^*) > u_0\,(l_j,, z_j, q)$ - (2)

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Where, B_j is the amount of labor contribution in bidding and q* as the quality after the soil conservation practices were undertaken while q as the quality before the soil conservation practices were undertaken.

Therefore, the probability that a household will decide to pay for the soil conservation is the probability that the conditional indirect utility function for the proposed intervention is greater than the conditional indirect utility function for the status quo.

$$Pr\ (yes_j) = (\ u_1\ (l_j - B_j, z_j, q^*) + \varepsilon_{1j} > u_0\ (l_j, z_j, q,) + \varepsilon_{0j}) \quad (3)$$

Where ε_{0j}, ε_{1j} are the error terms which are assumed to be normally distributed with mean zero and constant variance.

The utility functions are usually unobservable and the Utility function of the i^{th} household which is assumed to be a function of observable household characteristics; resource endowment and environmental quality, X_{ti}, and a disturbance term ε_{ti} can be specified as;

$$U^t_i = f\ (X_{ti}) + \varepsilon_{ti}, \quad t = 0,1 \quad i = 1\ 2\ \ldots..n \quad (4)$$

The focus in this model is on the factors that determine the probability of accepting the initial bid. The i^{th} farm household head will be willing to accept the initial bid when $u^1_i \geq u^0_i$. Therefore, the choice problem can be modeled as binary response variable Y, Where

$$Y_i = \{1, \text{ if } U\ (l_j - B_j, z_j, q^*) + \varepsilon_{1j} > U_0\ (l_j, z_j, q,) + \varepsilon_{0j} \text{ and } 0, \text{ otherwise} \quad (5)$$

When the dependent variable in a regression model is binary, the analysis could be conducted using linear probability or Logit or Probit models (Pindyck and Rubinfeld, 1981). Bivariate Probit models are estimated for the double bounded models, for efficiency and follow-up approach comparison (Tim *et al.,* 2007). According to Cameron and Quiggin (1994) a Bivariate Probit model was specified as follows:

$$y^*_1 = \beta x_1 + \varepsilon_1$$

$$y^*_2 = \beta x_2 + \varepsilon_2 \quad (6)$$

$$E\ (\varepsilon_1 / x_1, x_2) = E\ (\varepsilon_2 / x_1, x_2) = 0$$

$$Var\ (\varepsilon_1 / x_1, x_2) = E\ (\varepsilon_2 / x_1, x_2) = 1$$

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$Cov\ (\varepsilon_1, \varepsilon_2/ x_1, x_2) = \rho$ - - -- -- - -- - - -- - - -- - -- - -- - -- - -- - -- - -- - -- - - --- - - -- - - -- - - - - (7)

Where: y^*_1= i^{th} respondent unobservable true WTP at the time of the first bid offered. WTP = 1 if $y^*_I \geq \beta_i^0$ (initial bids), 0 otherwise

y^*_2 = i^{th} respondent implicit underlying point estimate at the time of the second bid offered.

x_1 and x_2 = the first and second bids offered to the respondents, respectively. ε_1, and ε_2 = error terms for the first and second above equations, respectively. β_1 and β_2 = Coefficients of the first and second bids offered , respectively. ρ is correlation coefficient, which is the covariance between the errors for the two WTP function

The most general econometric model for the double-bounded data comes from the formulation (Tim *et al.,* 2007).

$WTP_{qi} = \mu_q + \varepsilon_{qi}$ ---- -- - -- -- - - -- --- - - - -- - - -- -- - - - -- --- - - - -- - - - - - -- - - -- - -- -(8)

Where WTPqi represents the i_{th} respondent's willingness to pay, and q = 1, 2 represents the first and second response. The $\mu_1$and μ_2 are the means for the first and second responses. To build the likelihood function, from the probability of observing each of the possible two-bid response sequences (yes-yes, yes-no, no-yes, no-no). For instance, the probability that respondent j answers yes to the first bid and no to the second is given by;

$Pr\ (yes, no) = pr\ (\mu_1 + \varepsilon_{1i} \geq B^1, \mu_2 + \varepsilon_{2i} < B^2)$ - -- - - - -- -- - -- - - -- - - -- - - -- - ---- - -- -- -- - - - -(9)
The other three response sequences can be constructed in the same way.

Hence, the i^{ih} contribution to the likelihood function is:

$$L_i\ (\mu/B) = pr\ (\mu_1 + \varepsilon_{1i} \geq B^1, \mu_2 + \varepsilon_{2i} < B^2)^{YN} * pr\ (\mu_1 + \varepsilon_{1i} > B^1, \mu_2 + \varepsilon_{2i} \geq B^2)^{YY}$$
$$* pr\ (\mu_1 + \varepsilon_{1i} < B^1, \mu_2 + \varepsilon_{2i} < B^2)^{NN} * pr\ (\mu_1 + \varepsilon_{1i} < B^1, \mu_2 + \varepsilon_{2i} > B^2)^{NY}$$ --- -- - --- ---(10

Where YY = 1 if the response is (Yes, Yes) and 0 otherwise, YN = 1 if the response is (Yes, No) and 0 otherwise, NY = 1 if the response is (No, Yes) and 0 otherwise and NN = 1 if the response is (No, No) and 0 otherwise. B^1 = is the initial bid randomly offered to the respondents. B^2 = is the second bid randomly offered to the respondents.

This formulation is referred to as the Bivariate discrete choice model. If the error terms are assumed to be normally distributed with means 0 and constant variances of σ_1^2 and σ_2^2 then WTP_{1i} and WTP_{2i} have a Bivariate normal distribution with means μ_{1i} and μ_{2i} and variances σ_1^2

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and σ_2^2 and correlation coefficient ρ. The likelihood function for the Bivariate Probit model can be derived as below (Tim *et al.,* 2007).

The probability of a no-no response, is

$pr\ (\mu_1 + \varepsilon_{1i} < B^1,\ \mu_2 + \varepsilon_{2i} < B^2)\ \Phi\ \varepsilon_{1i}\,\varepsilon_{2i}\ \{\frac{B1-\mu1}{\sigma1}, \frac{B2-\mu2}{\sigma2}, \rho\}$

The probability of a yes-no response is

$pr(\mu_1 + \varepsilon_{1i} \geq B^1,\ \mu_2 + \varepsilon_{2i} < B^2)\ \Phi\ \varepsilon_{1i}\,\varepsilon_{2i}\ \{-\frac{B1-\mu1}{\sigma1}, \frac{B2-\mu2}{\sigma2}, -\rho\}$

The probability of a no-yes response is

$pr\ (\mu_1 + \varepsilon_{1i} < B^1,\ \mu_2 + \varepsilon_{2i} > B^2)\ \Phi\ \varepsilon_{1i}\,\varepsilon_{2i}\ \{\frac{B1-\mu1}{\sigma1}, \frac{B2-\mu2}{\sigma2}, -\rho\}$

The probability of a yes-yes response is

$pr\ (\mu_1 + \varepsilon_{1i} > B^1,\ \mu_2 + \varepsilon_{2i} \geq B^2)\ \Phi\ \varepsilon_{1i}\,\varepsilon_{2i}\ \{-\frac{B1-\mu1}{\sigma1}, \frac{B2-\mu2}{\sigma2}, \rho\}$

Defining $y_{1i} = 1$ if the response to the first question is yes, and 0 otherwise, $y_{2i} = 1$ if the response to the second question is yes, and 0 otherwise, $d_{1i}=2\ y_{1i} - 1$, and $d_{2i}= 2\ y_{2i} - 1$, the i_{th} contribution to the Bivariate Probit likelihood function is

$$L_i\ (\mu/B) = \Phi\ \varepsilon_{1i}\,\varepsilon_{2i}(d_{1i}\ (\frac{B1-\mu1}{\sigma1}),\ d_{2i}\ (\frac{B2-\mu2}{\sigma2}), d_{1i}\ d_{2i}\ \rho \quad (11)$$

where $\Phi\ \varepsilon_{1i}\ \varepsilon_{2i}$ is the standardized bivariate normal cumulative distribution function with zero means, unit variances and correlation coefficient ρ.

The mean WTP from bivariate probit model was computed using the formula specified by (Haab and Mconnell, 2002) that is,

$$\text{Mean WTP} = -\frac{\alpha}{\beta} \quad (12)$$

α is a coefficient for the constant term, and β is a coefficient for offered bids to the respondents.

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4. RESULTS AND DISCUSSION

4.2. Descriptive Statistics Result

The socio economic characteristics of sample households are given in Table 2, the majority of respondents 233 (98 percent) were males. Out the households surveyed, about 98.3% were in marriage, and 0.4% has never been married while divorced persons were account for about 1.3% of the respondents. With regard to religious affiliation, 49.4% were Orthodox Christians, 45% Protestant Christians and 5.6% of the respondents were Muslims. The education figures revealed that 167 (70%) had received formal education with average years of schooling 4.54 while 71 (30 percent) were illiterate. Out of the total literate household heads, 116 (69.4%) received primary education (from grades 1-8). However, 51 (30.6%) had received secondary education (grades 9-12).

Table 2 1: Households' characteristics of marital status, Religion, source of income and status of land shared or rented

Socio economic characteristics	Categories of HHs	Frequency	%
Sex	Male headed	233	98.0
	Female headed	5	2.0
Marital status	Single	1	0.4
	Married	234	98.3
	Divorced	3	1.3
Religion	Orthodox Christian	118	49.4
	Protestant Christian	106	45.0
	Muslim	14	5.6
Educational status	Illiterate	71	30.0
	Literate	167	70.0
	Grade 1-8	116	69.4
	Grade 9-12	51	30.6
Primary source of Income	Crop production	203	89.4
	Live stock raising	21	7.1
	Others	14	3.5
Sharing and Rented of land	Yes	178	79
	No	60	21

Source: Own Survey (2015)

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The 89.4% respondents indicated that crop production was the main source of their income, 7.1% earned major income from the sale of livestock and the other 3.5% of respondents' primary source of income was selling Eucalyptus trees and renting out animal cart. Out of the total sample respondent, there were only 60 (21 percent) farmers who did not either rented in or rented out the land. However, 79% of the sample households practiced rented in or rented out or share cropping (Table 2).

4.3.The Econometric Analysis

4.2.1. Bivariate Probit Model Results and Discussions

Before running the econometric model, the presence of outlying, multicollinearity and heteroscedasticity problems were tested. The result showed that there was no serious multicollinearity problem between the variables. Similarly, to correct the heteroscedasticity problem, the robust standard errors were used. Out of the 15 explanatory variables hypothesized to affect willingness of farmers' to participate in soil conservation practices in the study area, 7 were found to have significant influence on the probability of willingness to pay among the farm households. The chi-square test showed the overall goodness of fit of the model at less than 1% probability level (prob > chi2 = 000).

Table 32: Seemingly unrelated Bivariate Probit estimates of WTP

Explanatory Variable	WTP for first bid			WTP for second bid			Marginal effect	
	Coef.	Robust Std.Err	p>/z/	Coef.	Robust Std.Err	p>/z/	Dy/dx	Robust Std.Err
AGE	-.004379	.036801	0.905	-.014815	.0259753	0.568	-.005551	.00972
EDUC	.2607341*	.1497096	0.082	.18724***	.050071	0.000	.0701548	.01891
SOCP	3.898897***	.6113097	0.000	.98726**	.4406103	0.025	.3120039	.106
DISDC	-.3816763***	.1296888	0.003	-.1539**	.072406	0.034	-.057663	.02725
OWNL	-.077593	.0902213	0.39	.015905	.0620042	0.798	.00595	.02322
FAMS	.0105502	.1747216	0.952	.108953	.097886	0.266	.040820	.0366
FARMI	.0002018***	.00051	0.000	.00038	.0044	0.393	.000144	.0002
PROD	2.0988***	.5699735	0.000	.011627	.3180506	0.971	.00436	.11942
LIVES	-.287756***	.0661339	0.000	-.023575	.0395437	0.551	-.0088	.01483

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PERER	.5663954	.4347756	0.193	.220683	.340258	0.517	.0835	13011
EXV	.0249958	.0193472	0.196	.011806	.010305	0.252	.00442	.00384
LANDT	.401222	.5409244	0.458	.45466	.3817486	0.234	.1572455	.11915
CRED	4.9968***	1.056495	0.000	1.051***	.3514277	0.003	.38116	.11913
BID1	-.24179 ***	.038833	0.000				-.1402	-0.026
BID2				-.0834***	.0126179	0.000	-.031263	.0047
CONS	7.126053	3.288478	0.030	1.778939	2.111261	0.399		
ATHRHO	19.05203***	2.356711	0.000					
RHO	.785							

Source: Own Survey (2015)

*,**,*** represent the significant at 10%, 5%, 1% level of probability of significance respectively. Log pseudo likelihood = -76.118081, Wald test of rho=0, chi2(1) = 65.3537 Prob > chi2 = 0.00

From Table 3 it is evident that education level of the respondents (EDUC) is positively and significantly related to WTP. That is, respondents with more years of schooling likely to be willing to pay for conservation practices. One possible reason could be that literate individuals were more concerned about soil conservation practices. The result also revealed that holding other things constant, a unit increase in years of schooling of the respondents, increases the probability of accepting the first bid as well as the follow up bid by about 7 %. The finding was similar to findings by Habtamu (2006).

It could be seen that total income in the year (FARMI) of the respondent was found to have positive and significant relationship with the households' WTP. This positive effect indicated that respondents with higher yearly income were more likely to say yes to the first bids than households with lower income. This may be due to the fact that, always the individuals that were accustomed to higher income from previous production is more likely to invest different inputs to his farm by expecting high income than these farmers familiar with subsistence way of life or to these farmers whose production is limited to hand-to-mouth. A study by Bamlak and Yirdaw (2015) recognizes significant association between household's income and willingness to pay.

The results of livestock holding (LIVES) had a negative significant effect on willingness to pay for soil conservation practices at 1% level of significance in the study area. Ceteris paribus, increase in one unit livestock holding in TLU leads to decrease the probability of accepting WTP in labor contribution by 0.88%. This may be due to the fact that household with large population of livestock, discouraged by the pervious un-stabilized constructed conservation practices because of movement of animal over farm plot especially during non cropping season and this

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system contradict with establishment of physical structure of soil conservation practices. This finding is inconsistent with the empirical findings by Desta (2012) and Gebrelibanos (2012).

In the study area as hypothesized access to credit (CRED) showed positive and significant effect with the household WTP. Keeping other effects constant, HHs who had access to credit were more willing to pay than those without access to credit by the amount of 38%. This may be due to those farmers took credit have more hope full to get high production to pay credit and as well as family consumption by investing more labor for soil conservation, unless they sell their asset to pay the credit. The finding was inconsistence to findings by (Desta, 2012) which have negative relationship.

Farmer's perception on productivity decline (PROD) showed that it had a positive and significant effect on willingness to pay for soil conservation practices. Farmers perceived the productivity decline on their farm are willing to pay more than those without perceiving the problem of existence of productivity decline by soil erosion problem by the amount of 0.44%. Farmer's perception on soil erosion hazard was insignificant on respondents WTP for soil conservation practices in this study, this implied only knowing the presence of erosion did not encouraged them to take the action, but knowing the consequences of erosion problem on productivity motivated them to participate in soil conservation practices. This showed that only by perceiving the soil erosion problem is not always necessary to ensure to have WTP for soil conservation practices.

Distances to agricultural extension office (DISDC) was hypothesized that the further away the residence of the household from the agricultural extension office, was less expected to be willing to participate in soil conservation practices. It was found to be negative and significant at 1 percent probability level. This result showed that keeping the influences of other factors constant, farmers'WTP decrease by 5.77% as distance of the household's home increased by 1 kilometer. This success was obtained due to the farmers near to development center have more exposure to different information's than other farmers far from development centers or extension office.

Concerning offered initial bid (BID1) had negative and significantly relation to WTP for soil conservation while second bid (BID2) to follow up bid at less than 1% significance level with willingness to pay for conservation practices. This implied the probability of a yes response to the initial bid increased with decrease in the offered initial bid. The marginal analysis indicated that as the starting bid price increases by one unit, the probability of household' WTP for soil conservation practices decrease by 14%. This is Consistent with the findings of Bamlak and Yirdaw (2015)

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Using these coefficients in Table 3, the mean willingness to pay for soil conservation practices from the double bounded probit estimate was estimated using the formula by Habb and McConnell, (2002) (see equation 12) to be 25.39 man days per year per household.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This study examined Households' Willingness to pay for soil conservation practices in Gobu Seyo district, Eastern Wollega Zone, Oromia National Regional State, Ethiopia. The main objective of this study was to identify factors affecting smallholder farmers' willingness to pay for soil conservation practices. A designed contingent valuation questionnaire (primary data) was administered to 238 farm households drawn randomly from three PAs. Mean willingness to pay from the Double-bounded Dichotomous choice (DBDC) model was 25.39 man days per a year. This value was less than the current the government plan which says every house hold has to be contribute 30-45 man day per year to perform soil conservation activities around the study area. This showed that there is additional man days contribution by farmers without their willingness to pay.

The estimated result of Bivariate Probit model indicated that the explanatory variable households heads of education level, total income of the household, perception on productivity decline and access to credit exercised significant positive impact while distance to development centers, livestock in tropical live stock unit and initial bid were identified to have significant negative influence on willingness to pay for soil conservation practices. Therefore, it was concluded that adequate attention about of these variables may greatly contribute to increase willingness to pay and the sustainable use of soil conservation practices in the study area without using additional force by local government leaders to persuade farmers on conservation practice. Conservation practices of natural resources would be most effective when understood in the context of individual farmer's WTP. To implement desirable land management method in a more sustainable way, it is essential to generate viable changes in the attitude of farmers as initial step. It may serve as a corner stone for initiating appropriate planning and program implementation. For instance, Programs for training to farmers regarding implementation of soil conservation practices in successful manner need to be imparted along with emphasis to increase literacy. The households with raising livestock needs awareness as a soil erosion has a serious impact on grazing land to decrease productivity of grazing land. Linking farmers with credit facilities to induce sufficient investment on their land.

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