

# WILLINGNESS TO PAY FOR WATERSHED PROTECTION BY DOMESTIC WATER USERS IN TUGUEGARAO CITY, PHILIPPINES

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## Abstract

Over the years, policy makers have explored various mechanisms, which address environmental management and poverty alleviation. Payments for environmental services (PES) is a relatively new concept which is now recognized as a way to address both of these goals. In a PES system, those who benefit from the environmental services (ES) compensate those who provide these services in order to secure ES provision. This paper investigates the value that domestic water users in Tuguegarao City place on watershed protection. Using the Contingent Valuation Method (CVM), this study established the willingness to pay of domestic water users in Tuguegarao City. Payments would contribute to a fund that would provide for the watershed protection of the Penablanca Protected Landscape and Seascape (PPLS). This would help to ensure the provision of a reliable water supply for their households. This local fund may lead to funding for a possible watershed management program. This would generate solutions to forest problems by directing funding support to upstream communities to implement measures protecting the PPLS.

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### **Poverty Reduction and Environmental Management (PREM)**

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## **WILLINGNESS TO PAY FOR WATERSHED PROTECTION<sup>1</sup> BY DOMESTIC WATER USERS IN TUGUEGARAO CITY, PHILIPPINES**

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### **List of acronyms**

CVM	Contingent Valuation Method
DENR	Department of Environment and Natural Resources
ES	Environmental Services
IEC	Information Education Communication
MTWD	Metropolitan Tuguegarao Water District
MWTP	Mean Willingness to Pay
NGO	Non-government Organizations
NSO	National Statistics Office
PAVA	Pooled Adjacent Violators Algorithm
PES	Payments for Environmental Services
PPLS	Penablanca Protected Landscape and Seascape
RUPES	Rewarding the Upland Poor for Environmental Services
SPSS	Statistical Package for Social Sciences
WTP	Willingness to Pay

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## Background of the report

Payments for environmental services (PES) is a relatively new concept but it is quickly becoming a recognized way to address the twin goals of environmental protection and poverty alleviation. As defined in Wunder (2005), PES is a voluntary transaction where a well-defined ES or a land-use likely to secure that service is being 'bought' by an ES buyer from an ES provider if and only if the ES provider secures ES provision. Presently, there is growing interest in PES as a means to secure improved natural resource management where the land managers are unable to capture the resulting benefits. In addition, policy makers are also capitalizing on the possibility of using PES as a poverty alleviation tool, particularly to improve the welfare of the ES providers (i.e. upstream communities).

Some of the major environmental services that are already being marketed include biodiversity, carbon sequestration, landscape beauty and watershed protection. In terms of watershed-related PES schemes, Latin America is considered to be the most dynamic region; it is characterized by domestic payments where rich urban areas pay mostly poor rural landowners.<sup>2</sup> Implemented in 1996, the Costa Rica PES program receives revenues from two hydroelectric power companies, the State Power Producer and a private firm. Another program, instituted in 2000, receives revenues from a hydrological fee included in each user's water bill, private contributions, and through partnerships with private companies<sup>3</sup>. On the other hand, Mexico has the largest program with the PES payments riding on the federal water fee.<sup>4</sup> In Ecuador, the FONAG program was launched in 2000. FONAG receives funds from the government, private institutions and NGOs which are invested and the returns to investments are used for watershed protection. The program also aims to collect payments from water users.<sup>5</sup>

In contrast, the least active continent in terms of PES is Africa. Compared to other regions of the world, it has much less watershed-based PES activity. Funding support for scoping efforts mostly coming from international donors and NGOs and focuses on watershed protection services. Often the buyers are the government (representing water users), followed by donors/NGOs and the private firms<sup>6</sup>.

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<sup>2</sup> Taken from the presentation of Ms. Josefina Braña Varela and Mr. Carlo Muñoz Piña on *Experiences with PES in Latin America* at the Global Workshop on Payments/Rewards for Environmental Services held on January 22 – 23, 2007 in Lombok, Indonesia.

<sup>3</sup> For more discussions on these, the reader is referred to Redondo-Brenes, A. and K. Welsh, 2006.

<sup>4</sup> Taken from the presentation of Ms. Josefina Braña Varela and Mr. Carlo Muñoz Piña on *Experiences with PES in Latin America* at the Global Workshop on Payments/Rewards for Environmental Services held on January 22 – 23, 2007 in Lombok, Indonesia.

<sup>5</sup> Pagiola, S., J. Bishop and N. Landell-Mills. 2004.

<sup>6</sup> The discussion for the PES in Africa was taken from the presentation of Dr. Paul J. Ferraro on *Payments for Hydrological Services in Africa* at the Global Workshop on Payments/Rewards for Environmental Services held on January 22 – 23, 2007 in Lombok, Indonesia.

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For Asia, PES is just recently taking-off. A few cases of functioning PES markets actually exist. There are also a number of pilot action sites in various stages of development.<sup>7</sup> Most notable of these is the Rewarding the Upland Poor for Environmental Services (RUPES) Program of the World Agroforestry Centre (ICRAF) which implements action research agenda on PES in various locations in Nepal, Indonesia, and the Philippines.

Another PES initiative in the Philippines started with a project under the Poverty Reduction and Environmental Management (PREM) Program with funding from the Dutch Ministry of Foreign Affairs which was implemented in July 2003 and completed in December 2004. The main objective of the project was to explore and design a PES program in two Philippine upland sites, (1) the Peñablanca Protected Landscape and Seascape (PPLS) in Peñablanca, Cagayan and (2) the Kalahan Forest Reserve in Sta. Fe, Nueva Vizcaya. Since the completion of the Philippine PREM project<sup>8</sup>, several developments related to PES and watershed protection have transpired within the PPLS. In particular, a group of private citizens residing in Tuguegarao City, which draws part of its water requirements for domestic and irrigation purposes from the watershed, has come together and agreed to undertake efforts to protect the PPLS. "DANUM ti Umili Association, Inc."<sup>9</sup> was created to establish and manage a conservation trust fund initially from its twelve founding members and eventually from pooling funds from grants, donations and other volunteer-driven sources. The fund's proceeds are intended to be used to support the rehabilitation of the watershed of the PPLS. Funds could also be utilized to provide incentives for upland communities to manage their own watershed protection activities. The PPLS could then sustain the provision of its environmental functions such as carbon sequestration, landscape beauty, habitat for wildlife, soil erosion and sedimentation control and flood control. In this way, both upland dwellers and the local public would benefit.

## **1. Introduction**

The Peñablanca Protected Landscape and Seascape (PPLS) which covers 103,000 hectares is located in the Northern Sierra Madre Mountain Range. It is 508 kilometers to the north of Manila and accessible by land and air travel (see Figure 1). The PPLS provides important environmental services to both local and global communities, such as watershed protection, recreation, biodiversity and carbon sequestration,. In particular, the PPLS is a vital watershed not just for the com-

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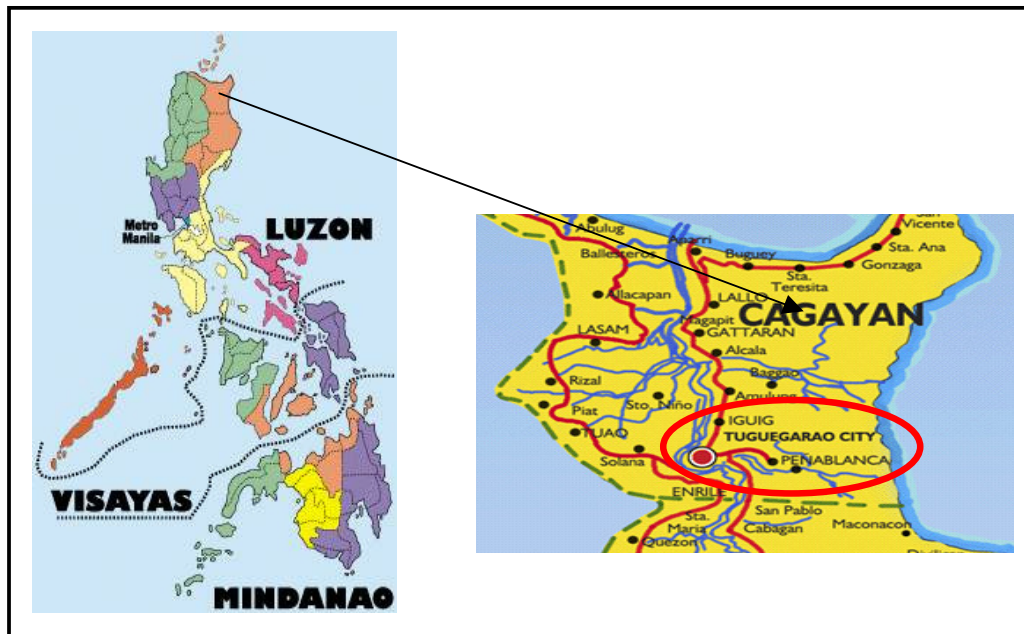
<sup>7</sup> Taken from the presentation of Ms. Margie Huang on *PES in Asia: Trends, Lessons Learned, Best Practices, and Knowledge Gaps* at the Global Workshop on Payments/Rewards for Environmental Services held on January 22 – 23, 2007 in Lombok, Indonesia.

<sup>8</sup> Bennagen, M.E. et al, forthcoming.

<sup>9</sup> DANUM ti Umili Association, Inc. (Water for the People) is a duly-registered non-stock, non-profit association composed of members from the private business sector, academe, civil society organizations and individuals in Tuguegarao City with interests in the water resource coming from the Peñablanca Protected Landscape and Seascape through the Pinacanauan River.

munities in Peñablanca but also for the residents of Tuguegarao City<sup>10</sup> where families source their water for domestic and farming purposes.

Figure 1 Map of the Philippines



The population of Tuguegarao City is 136,000 inhabitants or 25,169 households.<sup>11</sup> To this population, the water district services 82.7 percent of the total households with 20,816 service connections.<sup>12</sup> The water supplied to these users is drawn from various springs and groundwater wells in the PPLS, Tuguegarao and the municipalities of Piat and Solana<sup>13</sup>. In the PPLS, the water district operates three springs and two groundwater wells. For 2006, 17 percent of total water production of the water district came from the PPLS while the remaining 83 percent came from eight other

<sup>10</sup> Tuguegarao City is a peninsula in the lower Cagayan River basin of the Cagayan Valley Region in the northeastern portion of the Island of Luzon. It serves as the main entry to the Province of Cagayan and is located immediately west of the Sierra Madre foothills. It is approximately 450 kilometers north of Manila, the capital city of the Philippines. Tuguegarao has third level potable water services in individual house connections provided by the Metropolitan Tuguegarao Water District (MTWD) (Source: Office of the City Planning and Development Office, Tuguegarao City City Development Strategy)

<sup>11</sup> Projected based on the 2000 data from the National Statistics Office (NSO).

<sup>12</sup> Data as of September 2006. Aside from Tuguegarao, MTWD also provides water to nearby towns such as Solana and Piat. In total, MTWD has 22,600 service connections: 1,407 in Solana and 377 in Piat. (MTWD, personal communication, November 2006)

<sup>13</sup> Source: Metro Tuguegarao Water District. Personal Communication with Ms. Ninia Lumauan. MTWD Division Production Manager, November 2006.

pumping stations in various locations in Tuguegarao, Piat and Solana<sup>14</sup>. Breaking down water production in the PPLS, 4 percent came from the three springs and 13 percent from the two Parabba water pumping stations.

In terms of serviced area or water consumption, Tuguegarao City takes the largest share of the water extracted. On average, 94 percent of the water is supplied to Tuguegarao residents and only 6 percent is supplied to households in nearby Solana and Piat. (see APPENDIX A).

Over the years, rapid population growth, increasing incomes, growth of industries and urbanization has caused a growing demand for water. Presently, the actual amount of water extracted and supplied to consumers for the Tuguegarao system is already 69 percent of the maximum capacity given the existing technology<sup>15</sup>. To mitigate growing concerns, the water district has installed various infrastructures such as additional deep wells and pumping stations. However, it is expected that production wells could only last for a further 40-50 years before the ground water supply deteriorates<sup>16</sup>.

Given this growing demand for water, combined with the deterioration of water facilities and the hydrological limitation of groundwater extraction, it is expected that there will be higher costs of maintenance and extraction of water or fast depletion of groundwater supply. Thus, the water district plans to tap additional water sources including other springs in Peñablanca and surface water of the Pinacanauan River. The water district recognizes that in the long run, tapping surface water is a more economical alternative and could provide greater net benefits. Thus, they are working on the rehabilitation of the PPLS watershed which is expected to lessen the pressures on the water supply and enhance the additional benefits that could potentially be derived from it. Given this scenario, assessing peoples' valuation of the watershed protection services of the PPLS is of great importance.

In addition, a PES program calls for making ES beneficiaries to make payments to those providing the services. Thus, for a PES program to be sustainable, the direct involvement of the beneficiaries of the environmental services is necessary, particularly in expressing their willingness to be part of the program, contribute to the PES fund, and eventually help improve the welfare of ES providers. Collectively estimating the value that domestic water users place on these environmental services could provide a basis for policies geared towards better watershed management. In 2004, Bennagen, *et al.* was able to estimate the value domestic water users in Peñablanca place on watershed protection services. Fifty-two percent of those surveyed are willing to pay Php 20/month/household for the protection of the PPLS watershed.

This paper seeks to complement the findings in Bennagen, *et al.* In support of DANUM ti Umili's efforts in particular and PES initiatives, this study aims to provide information on the amount of benefits that could potentially be gained by Tuguegarao City residents from the water-

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<sup>14</sup> The eight other water pumping stations are: Buntun 1, Buntun 2, Pallua, Annafunan, Larion Bajo, Centro, Basi and Piat

<sup>15</sup> For the Tuguegarao system, actual production for 2006 is 7,714,889 m<sup>3</sup> while the maximum capacity is 11,179,196.64 m<sup>3</sup>. (Source of raw data: MTWD, personal communication with Engr. Janice Ramirez)

<sup>16</sup> MTWD. Personal communication with Ms. Ninia Lumauan. August 2006.

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shed protection of the PPLS. The study also aims to tap these potential revenues in support of PES, specifically to finance the watershed protection activities of upstream communities in the PPLS. The study will: (1) assess the perceptions regarding water supply; (2) assess the level of awareness of Tuguegarao residents on the role of watersheds in ensuring a sustainable water supply; (3) determine domestic water users' willingness to pay (WTP) for the watershed management of the PPLS; (4) identify the socio-economic factors that influence water users' WTP; (5) identify the various reasons why water users may or may not be willing to pay for watershed management and (6) propose a watershed management fee.

The remainder of this paper is as follows: Part 2 outlines the methodology employed by the study. Part 3 presents the results while Part 4 shows the potential revenues that may be used for PPLS watershed protection. The last part summarizes the results of the study and provides some policy implications.

## 2. Methodology

The environment is replete with services that people directly and indirectly benefit from. For instance, adequate forest cover results in watershed protection services, which ensures steady flows of water. It also provides other environmental functions such as carbon sequestration, landscape beauty, provision of habitat for wildlife, control of soil erosion, sedimentation and flooding. Because of these benefits, people attach positive economic values to environmental services.

To estimate the economic value of environmental services such as watershed protection services, there are two sets of techniques that can be employed. The most common approach is the stated preference approach, which allows people to express the value they place on the non-marketed good or service through the creation of hypothetical markets<sup>17</sup>. The contingent valuation method (CV)<sup>18</sup> which attempts to elicit information about respondents' preferences for a good or service by asking them how much they are willing to pay (WTP) or willing to accept (WTA) for a good or service, has become one of the most widely used stated preference technique in valuing environmental goods and services (Carson *et al.*, 2001). This is the technique used in this study. The guidelines prescribed by the National Oceanic and Atmospheric Administration (NOAA) panel<sup>19</sup> were also followed in the conduct of this study to address reliability issues on information derived from CV studies.

Existing literature proves that few extensive empirical studies analyzing the economic benefits of watershed protection using CV have been accomplished. Eisen-Hecht and Kramer (2002) estimated households' willingness to pay to maintain the current level of water quality in the Ca-

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<sup>17</sup> The other set of techniques is known as revealed preference techniques which use information from markets that are associated with the good or service that is being valued (Bateman et al., 2002).

<sup>18</sup> The term "contingent" is used because the good or service would not be actually provided. The provision of good or service is purely hypothetical (Whittington, 1998).

<sup>19</sup> The NOAA panel was tasked to determine whether the CV technique is capable of providing reliable information about lost existence or other passive-use values, in the light of the growing controversy on the approach. The panel has prescribed a set of guidelines which if complied with would define an ideal CV survey and qualify it as a reliable source of valuation information (see Arrow et al., 1993).

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tawba River Basin in North and South Carolina, with the calculated mean WTP annually at \$139/household (Duberstein and de Steiguer, n.d.). On the other hand, Pattanayak and Kramer (2001) obtained farming households' annual willingness to pay for drought control services in Eastern Indonesia, which is expected to decrease drought conditions for crops and improve dry season water. The resulted mean WTP for this study is \$2-3/household.

On watershed protection in the Philippines, four CV studies have been implemented which found that Filipinos benefit from this service. These studies valued watershed protection services in Mt. Makiling Forest Reserve (Francisco *et al.*, 2000), Angat, Ipo, Umiray and La Mesa Watersheds (Calderon *et al.*, 2005), Mt. Isarog Natural Park (Calderon, unpublished) and Peñablanca Protected Landscape and Seascape (Bennagen *et al.*, forthcoming). All employing CV, these studies found there was a positive willingness to pay for watershed protection services from various water users. Focusing on the results of the four studies on willingness to pay estimates of domestic water users, willingness to pay per month ranged from Php 20 to as high as Php 55. The willingness to pay per month for watershed protection services was found to be highest in the Mt. Isarog study and lowest for the PPLS study (Bennagen *et al.*, forthcoming). The willingness to pay estimates for Mt. Makiling and Apo-Ipo-Umiray-La Mesa were Php 36 and Php 29, respectively.

## 2.1 Sampling Procedure

The data were collected from a random sampling of households in selected villages within Tuguegarao City. Of the total 49 villages in Tuguegarao City, 15 were randomly chosen and a total of 401 survey questionnaires were administered through a systematic sampling of households. Employing a face-to-face survey, the number of questionnaires assigned for each village was determined in proportion to the total number of households. Respondents were selected based on the  $i^{\text{th}}$  number of house counted in the village. The "i" is calculated using the assigned number of questionnaires and the total number of households in the area. Table 1 presents the sample size per village which was determined in proportion to the total number of households in the area. However, minor adjustments were made to efficiently carry out the survey. Two survey screeners were also used. Only household heads<sup>20</sup> of families with a water district connection were considered as valid respondents of the survey.

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<sup>20</sup> Head of the family could be husband, wife or working children of legal age. Working children of legal age may not necessarily be those who are main providers of the household.

Table 1: Sample Size per Village, Tuguegarao City, 2006

Village	Number	%
Caritan Sur	15	3.7
Annafunan West	24	6
San Gabriel	60	15
Caritan Centro	38	9.5
Centro 12	22	5.5
Centro 11	30	7.5
Cataggaman Pardo	24	6
Centro 5	18	4.5
Libag Sur	18	4.5
Tanza	60	15
Centro 1	13	3.2
Linao West	21	5.2
Centro 4	18	4.5
Gosi Sur	19	4.7
Tagga	21	5.2
<b>Total number of respondents</b>	<b>401</b>	

## 2.2 Survey Instrument Development

The careful drafting and pre-testing of a CV questionnaire is important to be certain that it mimics the relevant features of the marketplace (Bateman *et al.*, 2002) and that the respondents have understood and accepted the main description and questioning reasonably well given the way the questionnaire was drafted.

### Qualitative Research Procedures

As preparatory activities towards the formulation of a well-designed CV survey instrument, qualitative research procedures such as key informant interviews (KIIs) and focus group discussions (FGDs) were utilized. To come up with a credible CV scenario for this study, focus group discussions in two villages in the city, key informant interviews particularly with the General Manager and staff of the Metropolitan Tuguegarao Water District (MTWD) and various questionnaire pretests were conducted. From these activities, the plausible range of bid prices, the payment vehicle or the method of collecting payment and other information necessary in building a credible and acceptable hypothetical watershed management scenario were obtained<sup>21</sup>.

### Bid Price Determination

Pretests were done to assist with the selection of the final bid amounts. Three price levels were used in the pretest activities held in two mixed income neighborhoods. For each price bid, around 10 questionnaires were implemented.

<sup>21</sup> Credibility and acceptability are important considerations. If the scenario is not credible or acceptable, the valuation study may be compromised. (Bateman et al., 2002).

From the pretest activities, five plausible bid amounts were determined and used in the survey proper. These are Php5, Php15, Php30, Php50 and Php100.

### 2.3 Questionnaire Structure

The questionnaire (see Appendix B), translated in the Filipino dialect, was structured following Calderon *et al.* (2005). Information on water use and knowledge on water supply information were assessed. Information on the “good” to be valued was provided, the payment mechanism and provision rule was described and the WTP referendum question was posed. Debriefing questions were also included to determine how much information was imparted, how much of the information did the respondent take seriously, and what influenced the respondent’s vote. Several revisions on the questionnaire were made based on the results of the focus group discussions, key informants interviews and pre-testing activities.

The survey questionnaire implemented consisted of four sections outlined below:

Section	Title
1	Water Supply Information
2	Level of Awareness
3	Assessment of Willingness to Pay for the PPLS Watershed Management Fund
4	Socio-Economic Information

Section 1 is divided into two parts. The first part inquired on the water usage, expenditures and sources of the respondents while the second part asked about the water quality and quantity concerns. Section 2 assessed the level of awareness of the respondents by asking a number of knowledge questions pertaining to protected areas, watersheds and the PPLS. The third section highlighted the hypothetical scenario on the “good” to be valued. For the last part, socio-economic questions such as age, gender, civil status, education, household income and membership in environmental organizations were posed. These information would be necessary in determining the factors affecting WTP and would also allow estimation of population statistics

### Elicitation Method

Past Philippine CV studies on watershed protection employed various types of elicitation methods. The PPLS study (Bennagen *et al.*, forthcoming) employed the payment card method wherein respondents are presented with a visual aid containing monetary amounts and are asked to choose the maximum amount they would be willing to pay for the watershed protection. Both Calderon studies utilized the referendum format. The valuation question was posed by asking respondents a referendum question which inquired if they are willing or not willing to vote for a watershed management program that would require payment of a watershed management fee. For all three studies, the respondents were also asked about their preference for the payment mechanism.

For this study, the dichotomous choice or (DC) “take-it-or-leave-it” referendum format was adopted. The referendum format is recommended by the NOAA panel since it has the advantage

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of being incentive compatible.<sup>22</sup> In particular, the study used the single-bounded dichotomous choice by asking if respondents would vote for the establishment of a proposed watershed management program, which would make them, pay a monthly surcharge on their water bill.

### Payment Vehicle

The payment vehicle used in the study is a surcharge to the water bill because the service being valued pertains to the water use benefits of the households. In addition, with respect to poverty concerns, a surcharge on the water bill would also indicate that only those in the water district network will eventually be made to pay. The poorest groups, who mostly could not afford the water district connection, will be excluded from paying.

To assess acceptance by the respondents, a debriefing question pertaining to the mode of payment was included in the questionnaire. This was also intended to check if the payment vehicle has any influence on the respondent's willingness or non-willingness to pay.

### Hypothetical Scenario

The watershed management program scenario presented in Section 3 consisted of four parts. In Part A, the current and future water supply conditions were presented to level-off information between respondents on the non-market good to be valued. In this section, the various sources of water provided by the water district to households including the PPLS Watershed were cited. The existing and future threats to the water supply were also explained. In addition, future development plans on the water system to mitigate these threats were also described. In Part B, the role of forests and watersheds in providing sustainable water supply was described. Part C details the proposed PPLS watershed management program and the short and long term effects of these activities to watershed protection. In the last part, the establishment of the PPLS watershed management fund to which the payments of the domestic water users would be directed, and the contingent valuation question of whether the respondent is willing or not willing to support the program (willingness to pay) are included.

### The Proposed Program

It is the goal of CV studies to be able to present a clear and credible hypothetical scenario on the provision of the environmental good or service being valued. The study made use of a conservation program on the PPLS watershed that focused on providing solutions to forest problems through the establishment of a watershed management fund. In particular, the fund would finance protection activities, which include regular forest patrolling, and monitoring activities, reforestation, employment of sustainable upland farming technology, installation of soil control structures

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<sup>22</sup> In a dichotomous choice format, respondents respond "yes" if he or she is willing to purchase the good or service and "no" otherwise. Respondents only have to make a decision about a given price similar to the way they may decide whether or not to buy a certain product in the supermarket, with a stated market price. This format provides incentives for respondents to truthfully reveal their preferences under certain circumstances, i.e. incentive compatible, in the sense that it is in the respondent's strategic interest to accept the bid if his WTP is greater than or equal to the price asked and reject it otherwise. (Bateman et al., 2002)

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and investment in agro-forestry activities to be undertaken by upstream communities. These activities will affect the PPLS by reducing illegal activities and ensuring a more stable and reliable water supply for various users because of its improved condition. However, the program would require that households with water district connection pay a fixed additional amount over and above their water bill per month. All funds raised would go to the PPLS watershed management fund to be used in undertaking the conservation activities.

### The Institution

In addition to the amount of additional payment on water, respondents may also have a preference for the institution to collect and manage the fund. It was presented in the scenario that the fund to be collected from the additional monthly water payments would be managed by a private foundation composed of representatives from various stakeholders like private individuals, the water district, an environment agency, local government units and non-government units. This foundation would also be the one to decide on the activities of the upland communities.

### The Provision Rule

The purpose of the referendum would be to see how many households in Tuguegarao would support the establishment of the PPLS watershed management program. A provisionary rule was included to present under which condition the good or service would be provided. The result of the referendum will determine if the fund for watershed management will be established or not. The provision rule adopted by the study is that the program will only be undertaken if more than 50% of the voters would agree to support the program.

### The Willingness to Pay Question

As exactly worded, the referendum question posed was:

*The PPLS Watershed Management Program would mean that you and the other families in Tuguegarao who are connected to the Water District will pay a fixed monthly surcharge of Php \_\_\_\_\_ that would be added to your water bill. The money that will be collected will go to the PPLS Watershed Management Fund that would be used for the activities of the communities upstream to undertake protection and conservation of the PPLS.*

**Would you vote YES or NO to the PPLS Watershed Management Program?**

Yes

No

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A cheap talk script<sup>23</sup> aimed to reduce hypothetical bias was also added in the questionnaire. Before asking the CV question, the interviewer explained the hypothetical bias phenomenon wherein respondents would vote for the program in surveys but would vote otherwise in an actual referendum. Respondents were also reminded of their budget constraint and were assured that the very poor families who do not have water connection will not be affected. They were also requested to vote according to how they could act in the event of a real referendum. In addition, colored pictures were also used to more effectively explain the watershed management program scenario.

## 2.4 Survey Implementation

### General Field Protocols

Before the actual implementation of the survey, courtesy calls to concerned local government officials were conducted. Permit letters from the city mayor and the village heads were secured, in case such would be requested by the respondents. In addition, a guide was also requested from the village heads for each enumerator to facilitate the introduction to respondents and also for the delineation of area assignments. Before formally starting the interview, ethical protocols for CV surveys such as an introduction of the implementing agencies, asking for the respondents' consent, mentioning the confidentiality clause, and explaining the purpose of the survey, were used.

The survey proper was administered from August 23 to September 6, 2006.

### Survey Mode

A face-to-face interview was used to elicit WTP values for the proposed PPLS watershed management program. A total of 675 households were approached to accomplish the 401 interviews. Of the total households approached, 202 (30%) households were unable to accommodate the survey team because nobody was around or the household head, who is the only valid respondent of the survey, was not at home at the time of the interview. In such cases, the next household with available household head was sought as replacement. The original household was replaced with the next household who accepted the interview. On the other hand, 72 (11%) households refused to be interviewed. This low refusal rate is a good indicator because CV studies aim for low non-response rates to be reliable. The usual reason given by those who refused was "busy with household chores". A similar replacement procedure was applied for refusals.

## 2.5 Data Processing and Analysis

The study used two estimation frameworks to calculate the mean WTP: (1) parametric and (2) non-parametric. The parametric estimation is a probabilistic technique wherein a probability is

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<sup>23</sup> The cheap talk follows from the design of hypothetical CV questionnaires developed by Cummings and Taylor (1999) which includes an explicit discussion of the hypothetical bias problem – what hypothetical bias is and why it might occur. Its primary intention is to induce respondents to give valid and reliable responses discouraging the exhibition of strategic behavior. (Hasler, B. and T. Lundhede. 2005).

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assigned to observing a particular WTP or a particular utility change while the other, non-parametric estimation provides a purely empirical approach to analyzing WTP responses.

For each model, analysis was first applied to the uncensored sample without imposing any restrictions on certainty and protest bids. For the next rounds of analyses, WTP responses were calibrated with respect to respondents' certainty and protest votes were excluded from the data set. Multivariate logit regression analysis was also applied to analyze factors affecting WTP responses and determine if WTP estimates follow theoretical validity.

### Statistical Procedures

Analysis was done using parametric and non-parametric estimation frameworks to be able to make a relative comparison and identify the more conservative estimate. The literature provides that estimates of willingness to pay of the parametric technique are sensitive to the distribution of the functional form. On the other hand, the non-parametric model is considered a less restricted approach to estimating WTP (Haab and McConnell, 2002).

### Parametric Estimation

Parametric models allow for the incorporation of respondent characteristics into the willingness to pay function (Haab and McConnell, 2002). This helps describe the behavioural or preference tendencies of the respondents. In effect, the parametric technique estimates the preference function, which would allow the calculation of the willingness-to-pay value given the estimated parameters.

Following Bateman *et al.*, (2002) a bid function can be calculated explaining the variation in WTP response due to the change in the characteristics of the non-market good, in prices of market goods and differences in socio-economic characteristics of respondents such as income.

The basic theoretical model employed in this paper is the random utility model (RUM). In the RUM, the observed discrete choice response of each individual is assumed to reflect a utility maximization process. From the standard economic theory standpoint, there is an indirect utility function given by  $V(\cdot)$  which describes the maximum amount of utility a household can get from their income ( $Y$ ) subject to the prices of the goods ( $P$ ), and the level at which the non-market environmental good ( $G$ ) will be provided. The possible effect of demographic and socio-economic factors ( $D$ ) on this utility is also assumed. This is given by:

$$V(Y, P, D, G) \tag{1}$$

Any change in one of the factors would impact the level of household utility. An increase in the provision of the non-market good, say from  $G^0$  to  $G^1$ , represents an improvement - in the case of the study this is represented by the establishment of the watershed management program – and thus, household utility will be higher.

$$V(Y, P, D, G^1) > V(Y, P, D, G^0) \tag{2}$$

In a CV survey, respondents are assumed to compare utilities. Under the assumption that he is a utility maximizing agent, a respondent in a dichotomous choice survey would accept or reject a bid amount by responding “yes” or “no” for the change in the level of provision of the good de-

pending on which choice would have highest utility. Under the watershed management program scenario, he would accept the proposal if:

$$V(Y-P, D, G^1) > V(Y, S, G^0) \quad (3)$$

As interpreted, the household is willing to pay the bid amount provided his utility with the watershed management program and the required payment is higher than without the watershed management program at the zero bid price. However, there is also a random part of respondents' preferences which cannot be observed by the researcher and is therefore uncertain. Only probabilities may be assigned to the yes and no responses. The probability that the respondent would accept the proposal is given by:

$$\text{Prob (Yes)} = \text{Prob} [V(Y-P, D, G^1) + \epsilon_1] > \text{Prob} [V(Y, D, G^0) + \epsilon_0] \quad (4)$$

The first two terms of the equation could be determined while the additional element,  $\epsilon$ , is the stochastic term that represents the part of the true indirect utility that cannot be captured. Based on this equation, the willingness to pay for a change in  $G$  can be expressed as:

$$\text{Log} \left[ \frac{\text{Prob(Yes)}}{1 - \text{Prob(Yes)}} \right] = \alpha_0 + \beta_1 P + \beta_2 G + \sum \beta_i D_i \quad (5)$$

The  $\alpha$  and  $\beta$  in the equation can be calculated parametrically using the logit regression. From the parameter estimates derived by the equation, the mean WTP can be estimated using the formula:

$$\text{Mean WTP} = [1/\beta_1] [\ln (1 + \exp(\alpha_0 + \beta_2 G + \sum \beta_i D_i))] \quad (6)$$

On the other hand, the median is calculated using the formula:

$$\text{Median WTP} = [1/\beta_1] [\alpha_0 + \beta_2 G + \sum \beta_i D_i] \quad (7)$$

### Non-Parametric Estimation

An alternative framework to estimating the mean values of the WTP distribution does away with the assumption of a parametric distribution, thus, it is referred to as the non-parametric technique. This technique is purely empirical and allows estimation of the survivor function of WTP responses (Bateman *et al.*, 2002). Again following Bateman *et al.*, (2002) non-parametric mean and median WTP were calculated.

In a CV survey with a dichotomous choice design that uses a range of positive bid levels, denoted as  $B_j$ ,  $j = 1, 2, \dots, J$ . Respondents presented with one of the bid prices reply whether they are willing to pay the given price or not. In addition, a bid level,  $B_0$ , with value zero, is assumed and it is further assumed that if the respondents will be presented with this bid level, they will reply yes.

At each bid price, point estimates of the survivor function can be calculated. The point estimate of the survivor function at each bid level can be generated by dividing the number of respondents who answered 'Yes' to that bid level, denoted by  $n_j$ , by the total number of respondents in that sub-sample,  $N_j$ .

$$\hat{S}(B_j) = \frac{n_j}{N_j} \quad j = 0 \text{ to } J \quad (8)$$

$B_j$  is the notation for the bid level.

Under the assumption that everyone is willing to pay a non-negative amount for the non-market environmental good,

$$\hat{S}(B_0) = 1 \quad (9)$$

A survivor function should be non-increasing for it to be valid. If this condition is violated, a pooling technique known as the pooled adjacent violators algorithm (PAVA) is applied wherein the data for two adjacent bid levels are pooled if the estimate of the survivor function for the higher bid level is greater than that for the lower bid. This is given by the formula:

$$\hat{S}(B_j) = \hat{S}(B_{j+1}) = \frac{n_j + n_{j+1}}{N_j + N_{j+1}} \quad (10)$$

Given a valid survivor function, mean WTP could then be estimated using the formula for non-parametric calculation:

$$\text{MeanWTP} = \sum_{j=1}^J \hat{S}(B_j) [B_j - B_{j-1}] \quad (11)$$

As interpreted, mean WTP is the sum of the probabilities of the respondent voting behavior times the difference between two bid levels.

### Certainty Adjustment

The inclusion of respondent's uncertainty (or certainty) in CVM models is one of the frontier issues in non-market valuation of environmental resources (in Subade, 2005). Thus, this study tested the effect of qualifying the "yes" responses on WTP. Qualifying the "yes" responses means converting them into "no" responses depending on the respondent's answer to the follow up question about their level of certainty. Respondents were asked how certain they are about their WTP response. The respondents were asked to choose one of five levels of certainty: completely sure and willing to convince others, completely sure, sure, not sure and completely not sure. To adjust for uncertainty, this study recodes the "yes" responses to "no" if the respondent was "not sure" or "completely not sure". Calibrating for certainty is expected to decrease the WTP percentage.

### Protest Bid Identification

Protest bids, as identified by Bateman *et al.*, (2002) are non-responses of households wherein the genuine WTP are not provided and respondents either responded with a zero value or with an unrealistically high value instead. Their responses do not represent their true value of the non-market good since they are protesting to an aspect of the hypothetical scenario, such as mistrust for the institution who will manage the funds or the belief that watershed protection is a government responsibility; thus, they could also be termed as scenario rejecters (Subade, 2005)

To separate protest votes from “true” responses, respondents who are not willing to pay the bid price were asked a debriefing question in which they are asked to state their reason for their unwillingness to pay anything for the non-market good. Because they are assumed not to be indicative of the true valuation of the respondents, protest responses may be removed from the CV sample.

The responses cited were grouped into fourteen (14) categories. Eight (8) of these were identified as protest votes. The reasons and their classification are in Table 2.

*Table 2: Classification of Reasons for Respondents’ Non-Willingness to Pay*

Valid No Responses	Protest Votes
I cannot afford to pay any additional amount to what I am currently paying	I think it should be the government that should finance the watershed management activities in the PPLS
Not all water comes from Peñablanca	I do not trust the institution who will manage the funds for this conservation work in the PPLS
Poor people will be affected	Only the rich households should pay
We are not benefiting from it	The rich companies getting resources should pay
We do not have any water problem	Present water service is not good
Just recently got connected	The Water District already charges a very high amount/gets a large income from it already/has funds for it
	Those who consume more must pay
	It is not our obligation

Censoring for protest votes reduces the sample size and the percentage of respondents willing to pay will increase.

### Hypothesized Effects of Variables on WTP

In the parametric analysis, the independent variables used in the multivariate logit regression, their definition and hypothesized directions of effects on the respondent’s willingness to pay are summarized in Table 3.

*Table 3: Hypothesized Direction Effects of Socio-Economic Variables on WTP*

Variable name	Variable Description	Direction of Effects
WTPAMT	Bid amount, (5, 15, 30, 50, 100)	-
GENDER	Respondent’s gender (1=male, 0=female)	?
MARRIED	Respondent’s marital status (1=married, 0=otherwise)	?
INCOME	Household monthly income	+
EDUCATTA	Respondent’s educational attainment (in years)	+
TOTHHMEM	Total number of household members	-
AGE	Respondent’s age	+/-
ENVTORG	Membership in environmental organization (1=yes,0=no)	+

The bid price (WTPAMT) is expected to negatively affect WTP. This is supported by the economic theory that as prices increase the demand for the good, or in this case willingness to pay for watershed protection services, decreases.

Various socio-economic variables are predicted to influence WTP in different directions. For GENDER and civil status (MARRIED) an effect is sometimes found, although *a priori* there is no expectation on the direction of the effect. The other socio-economic variables indicate respondents' ability/inability to pay. Those who can afford more would be willing to pay a higher amount. Household monthly income (INCOME) and educational attainment (EDUCATTA) impress positive effects on WTP since they indicate a higher ability to pay. For TOTHHMEM, it is expected that the more people live with the respondent the less willing he is to pay due to more expenses for the household. On the other hand, age could have both positive and negative effects depending on how they value future use. Older respondents may already be thinking of future generations' water use and would like them to have a guaranteed water supply while younger ones may highly value it because of the longer life expectancy argument, which gives them more chances from benefiting from the good. Lastly, membership in environmental organizations (ENVTORG) is expected to influence WTP in a positive direction because of more environmental concern or awareness of those who are part of such organizations.

### 3. Results

This section provides the summary of the socio-economic characteristics of the sample respondents. It also includes information on their water supply, level of awareness, behavior and attitude concerning the watershed and protected area concepts. Statistical averages and frequencies were computed using SPSS<sup>24</sup>.

#### 3.1 Socio-Economic Profile

Table 4 presents the general profile of the respondents. The average age is 44 years old. The majority of the respondents are female, married and have either reached collegiate (tertiary) level of education or completed a vocational 2-year course. It is part of the Filipino culture for the wives to stay at home and attend to household needs while the husbands financially provide for the family. Thus, it is not surprising that the survey covered more women than men. In addition, most households have 6 members and have 2 members with incomes including any relatives who are working and sending remittances from abroad. The observed average household monthly income is Php 14,581. This family income is higher than the country and provincial averages<sup>25</sup>. For the whole of the Philippines, average monthly income of a household of 6 is only Php 12,855 while for Cagayan, the province covering Tuguegarao, it is only Php 8,573. However, the observed household monthly income is lower than the average for the National Capital Region (NCR), Php 27,023, where the capital city, Manila, is located. A large 89 percent own the houses they reside in. Lastly, only a few (3%) of the sampled respondents are members of an environmental organization.

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<sup>24</sup> SPSS originally referred as Statistical Package for Social Sciences.

<sup>25</sup> Source of raw data: Family Income and Expenditure Survey (NSO, 2000).

Table 4: Socio-Economic Profile of Sample Respondents

Indicator	Number	(%)
Ave. age		44
Gender: Female	285	71
Civil Status: Married	350	87
Ave. educational attainment (in years)		12
Ave. number of household members earning <sup>1/</sup>		2
Ave. number of household members		6
Ave. total monthly income		14,581
Ownership of house: Owned	356	89
Membership of an environmental organization	10	3
<b>TOTAL NUMBER OF RESPONDENTS</b>		<b>401</b>

Note: <sup>1/</sup>Includes Overseas Contract Workers (OCWs)

### 3.2 Water Source, Use and Expenditure

Respondents were asked which item accounts for the largest share in their monthly budget. Among the budget items presented, the food expense tops the list followed by electricity and educational expenditures (Appendix C). Water comes in fourth with shelter and clothing at the bottom. Though it is a necessity in life, the water share in the household expenses is not high relative to the other expense items. This may indicate that the present water charges are still within reasonable means and do not have a considerable impact on the household budget.

Table 5 presents the water use indicators for the sampled households. On average, households with metered connections consume 25 cubic meters (m<sup>3</sup>) of water monthly, spending an average of Php 280 per month or Php 11 per m<sup>3</sup> for tap water<sup>26</sup>. These estimates are based on the most recent water bill of the 257 households who were able to present their water bills to the survey team. This average water consumption is a huge amount for a household while the average water bill is very low for this large amount of water when compared with cases for other Southeast Asian countries. This may be indicative of excessive use given that water price is low.

Meanwhile, 51 percent get an average of 0.07 m<sup>3</sup> of water per day (or 2.1 m<sup>3</sup>/month) from other sources, mostly buying bottled water (39%). This indicates that though households have other sources, a large portion of their water is still sourced from the water district connection. Households regularly purchasing bottled water spend an average of Php 355/month<sup>27</sup>. Though households purchase bottled water, most adults are able to drink directly from the faucet. In fact, a high percentage (81%) of households drink water from the faucet and bottled water is mostly for the consumption of children at home. Nonetheless, households end up spending a higher amount for bottled water than they do for tap water. This indicates their willingness to pay more provided they are assured of safe drinking water for their children. This is supported by the findings on the negative effects of water problems discussed below. It could then be more economical for them

<sup>26</sup> For residential connections, minimum monthly charge is presently Php 95 for the first 10 cubic meters. (MTWD, personal communication, 2006).

<sup>27</sup> The price of water in a 5-gallon container ranges from Php 35-50.

to pay for watershed protection that could secure access to potable water than to spend a larger amount of money buying bottled water.

*Table 5: Water Use Information on Sample Households.*

Indicator	Amount
Ave. monthly water consumption from water district (in m <sup>3</sup> )	25
Ave. water bill previous month (in Php)	280
Households sharing water connection	12%
Households with other sources	51%
Manual pumpwell	57 (14%)
Electric pumpwell	3 (0.7%)
Dug well	10 (3%)
Spring, lake, river, rain	1 (0.2%)
Bottled water	157 (39%)
Ave. daily water usage from other water sources (in m <sup>3</sup> )	0.07
Ave. additional money spent per month for bottled water per household (in Php)	355
Households directly drinking water coming from water district connection	81%
Households with water-related problems with water district connection in the last 1-2 year/s	63%
<b>TOTAL NUMBER OF RESPONDENTS</b>	<b>401</b>

Total may not add-up to 100% due to multiple responses.

### 3.3 Water Quality and Quantity Concerns

In terms of water problems, more than half of the sampled households (63%) have experienced water-related problems in the past one to two years. The majority of the problems are related to the quality of the water. 52 percent of respondents have encountered dirty water in terms of in color, odor or taste (Table 6). Water quantity problems, such as irregular supply and low water pressure were experienced by 35 percent of the respondents. From this, we could infer that people recognize the problems and the need for a solution, which could possibly influence their willingness to pay for watershed protection.

*Table 6 Water Related Problems.*

Problem	Number	(%)
Total respondents with water problems	251	
Water quality problems (dirty water)	207	52
Water quantity problems (irregular water supply, low pressure, others <sup>1/</sup> )	142	35
<b>TOTAL NUMBER OF RESPONDENTS</b>	<b>401</b>	

<sup>1/</sup>Water problem during school days, occasional water interruptions.

Total may not add-up to 100% due to multiple responses.

The water quantity problems are perceived by the respondents to be mainly caused by the growing number of water users (Table 7). Very few (7%) associate it with water management and other factors like scheduled brownouts, distance from water facilities, insufficient or defective water facilities and low river outflow. Also few respondents (6.6%) think that regular water interruptions are caused by the scheduled clean-up operations of tanks and facilities of the water dis-

trict, the main reason identified by the water district. Also noteworthy is the relatively small percentage of households associating the problem to deforestation (1.4%) and insufficiency of raw water during the dry season (4.9%). Although the threat to water posed by the growing number of users is recognized, the last two points suggest that more efforts must be exerted from both the water district and PES implementers. In particular, efforts in informing the public on how they could be affected by watershed degradation particularly of the PPLS watershed, if their support on watershed protection is warranted.

*Table 7 Perceived Main Causes of Water Supply Problems.  
In percent to total respondents with water problems.*

Cause	(%)
Many/growing number of water users	76
Water management	7
Cleaning schedule	7
Insufficient raw water during dry season	5
Busted pipes	4
Deforestation	1
Others <sup>1/</sup>	7
Missing/no response	4
<b>Number of respondents with water quantity problems</b>	<b>142</b>

<sup>1/</sup>Include brownouts, distance from water facilities, defective water facility, small pipes, river outflow. Total may not add-up to 100% due to multiple responses.

Although a significant amount is spent on bottled water, most of the sample households do not perceive higher expenditures for water as the main negative implication of the water problems (Table 8). Only 24 percent agree to this negative effect. This may indicate that households may possibly not mind paying more money as long as the perceived main negative effects of water problems such as health problems (41%) and delays in doing household chores or inconvenience or wasted time (41%) are minimized.

*Table 8 Perceived Negative Effects of Water Problems.  
In percent to total respondents with water problems.*

Effect	(%)
Health problems	41
Delays in doing household chores/inconvenience or wasted time	41
Higher expenditures for water	24
Personal hygiene is affected	23
Missing/no response	11
<b>Number of respondents with water problems</b>	<b>251</b>
<b>TOTAL NUMBER OF RESPONDENTS</b>	<b>401</b>

Total may not add-up to 100% due to multiple responses.

### 3.4 Level of Awareness and Attitude

On the water supply source, peoples' awareness varies among the sources cited. A relatively large percentage (34%) believes that the water provided by the water district to the households in

Tuguegarao comes from Peñablanca springs (Table 9). A slightly lower percentage (32%) thinks it comes from a deep well or water pump station from various locations. However, a relatively high percentage (28%) does not know where their water comes from. Only a small percentage thinks that it is from the Pinacanauan (10%) or Cagayan rivers (8%).

Table 9 Knowledge on Water Supply Source.

Source	Number	(%)
Peñablanca springs	135	34
Deep well/pumping station	128	32
Pinacanauan river	41	10
Cagayan river	32	8
Others	24	6
Don't know	113	28
<b>TOTAL NUMBER OF RESPONDENTS</b>		<b>401</b>

Total may not add-up to multiple responses.

The survey reveals that most respondents are not aware of the concepts presented to them (Table 10). Overall, a large percentage of the sample households was not familiar with the protected area and watershed concepts and has not heard about the PPLS. About 32 percent did not know what a protected area is, while 36 percent was unaware of how watersheds work. Twenty seven percent did not know about the PPLS. Concepts were explained to these respondents after asking the knowledge questions. But for those who were familiar with the PPLS, 83 percent knew that it is a protected area. However, only 62 percent understands that the PPLS is a watershed. These findings provide additional support to the earlier observation on the need for more information, education and communication campaigns in the area.

Table 10 Knowledge about Protected Areas, Watershed and the PPLS.

Indicator	Number	%
Know what a protected area is	128	32
Know what a watershed is	144	36
Familiar with the PPLS	107	27
Know that the PPLS is a protected area	89	83
Aware that the PPLS is a watershed	66	62
<b>TOTAL NUMBER OF RESPONDENTS</b>		<b>401</b>

Those respondents who knew about the watershed were also asked for their view regarding the importance of protecting it. An overwhelming majority of 141 out of the 144 sample respondents or around 98 percent agreed to the value of keeping it protected. The top two reasons why watershed protection is viewed as essential are (1) providing sustainable water supply and (2) improving water quality (see Table 11). Its role in controlling floods and soil erosion or landslides is recognized by 17 percent and 9 percent of sample respondents, respectively. Nine percent are especially concerned about the destruction of forest and nature. The watershed's role in preserving biodiversity and providing other benefits were cited by a small number of respondents.

Table 11 Reasons for Watershed Protection Importance.

Indicator	Number	(%)
It provides a more sustainable water supply	68	48
It improves water quality	51	36
It minimizes floods during the rainy season	24	17
It absorbs water and makes this available for future use	18	13
It prevents soil erosion/landslides	13	9
Avoids forest/nature destruction	12	9
Contains rare species	1	1
Provides many benefits	3	2
<b>Number of households who know the watershed concept and believe that watershed protection is important</b>	<b>141</b>	

Total may not add-up to 100% due to multiple responses

### 3.5 Willingness to pay

The study considered the various nuances of doing a CV. In particular, hypothetical bias which can be adjusted using certainty debriefing responses was explored. For each bid level, the impact of screening for certainty was found to be small. The percentage of “yes” responses for the same bid level decreased by only by 1-3% when censored for certainty (Table 12).

*Table 12 Distribution of “YES” Responses. Uncensored and Adjusted for Certainty.*

Bid	"YES"Response (%)		Number of Respondents
	Uncensored	Adjusted	
5	78	75	80
15	60	60	81
30	46	45	80
50	50	48	80
100	36	35	80
<b>Pooled</b>	<b>54</b>	<b>53</b>	<b>401</b>

For both data sets, the study finds that more than half of the respondents are willing to pay the specified bid amount for watershed protection. The uncensored data had 54 percent of respondents who are willing to pay, while this slightly decreased to 53 percent when the data set was censored.

Comparing percentages of “yes” responses for the lowest and highest bids, the uncensored sample had 78 percent saying “yes” to the lowest bid amount while 36 percent are willing to pay the highest amount. On the other hand, 75 percent are willing to pay the lowest bid price while 35 percent said “yes” to the highest bid price for the adjusted model. With more than 30 percent saying “yes” to the highest bid amount, these results exhibit a problem common to many CV studies known as the “fat tail” problem. A large share of the respondents is willing to pay for the watershed protection even at the highest price level. The reason could have been that the highest bid amount was set too low. To possibly address this problem, a reasonable strategy is to estimate the conservative lower bound WTP, i.e. Turnbull estimator (Haab and McConnell, 2002), which would yield the same results as using the formula for non-parametric mean WTP in Section 2.5.

Given the CV question applied and interview process employed, a sensible statistical analysis could still be made.

Though the guidelines in conducting CV surveys were followed and that cheap talks were employed to neutralize any biases, it may not be discounted that the fat tail problem could have been also created by the “yea saying” of the respondents (i.e. respondents agree with the interviewer regardless of their true feelings towards the good/services due to the social desirability of the “yes” response), as what the literature suggests. Unfortunately, however, the literature does not provide possible tests that could be employed to confirm existence of “yea saying” (Subade, 2005).

For both uncensored and adjusted samples, the WTP percentage is also consistent with economic theory when analyzed across bid amounts except for the Php 50 bid. As the price of the good or service increases, the respondent is less willing to purchase the good. However, for the Php 50 bid more people are willing to pay than there are for the lower bid of Php30.

Protest responses were also screened to isolate respondents with a “true” valuation for watershed protection. To allow protest screening, respondents with a “no” response to the referendum question were asked to give their reason for voting no. Bautista (2003) offers various conditions on why beneficiaries of watershed protection services would not be willing to pay. Non-willingness to pay may be associated with communities recognizing their rights to good water quality and that access to it has no constraints; users are already used to obtaining services for free; there is no existing law requiring them to pay; inability or lack of income to pay; and high resistance from powered entities.

For the survey, the main motive given by those non-willing to pay is inability to pay any additional amount to what is currently being paid by the household which is considered to be a valid “no” response or zero bid (Table 13). This is crucial to the study because otherwise, the sample would be dominated by protest responses. Should the results reveal protest response dominance, the study would fail and the derived WTP estimates would not be credible. Though the second and third main reasons cited, the “belief that it is the responsibility of the government to finance the activity” and the “mistrust of the institution who would manage the funds”, are both classified as protest responses, “NO-voters” citing other protest reasons are minimal and total protest responses do not dominate. In addition, the study finds that only 2 respondents indicated that their “no” response has to do with the poor water resource, i.e. “the water service is not good”, and inadequacy of water supply or “we face no water problem”.

*Table 13 Reasons for Non-Willingness to Pay for Sample Households. Domestic Water Users, Tuguegarao City, 2006.*

Main Reason	Number	%
I cannot afford to pay any additional amount to what I am currently paying	131	71
I think it should be the government that should finance the watershed management activities in the PPLS	25	14
I do not trust the institution who will manage the funds for this conservation work in the PPLS	10	6
Only the rich households should pay	1	1
Not all water comes from Penablanca	1	1
Rich companies getting resources should pay	1	1
Poor people will be affected	1	1
Water service is not good	1	1
Very high amount/large income already from it/ water district has funds for it	6	3
Not benefiting from it	1	1
No water problem	1	1
Just recently got connected	1	1
Those who consume more must pay	1	1
Not our obligation	1	1
No reason given	3	2
<b>Number of respondents NOT WTP</b>	<b>185</b>	
<b>TOTAL NUMBER OF RESPONDENTS</b>	<b>401</b>	

For the purpose of this study, the model, which adjusts “yes” responses with respect to certainty and considers “no” responses as legitimate zero valuation will be adopted. It can be argued that a referendum CV survey would be less concerned whether the zero response represents a true valuation and would be more focused on whether it reflects intended behavior (Lindsey, 1994 in Indab, unpublished). Protest responses are said to be mostly legitimate influences on actual behavior. The rest of the sensitivity analysis results are presented in Appendix D.

To determine what motivates people to be willing to pay, respondents who were willing to pay the bid price were asked to identify their reasons for their willingness to pay for watershed protection. Bautista (2003) also provided possible explanations on willingness to pay of beneficiaries for watershed protection services. Beneficiaries would likely be willing to pay if there are threats to their present water supplies; if future supplies are uncertain and they would like to guarantee their future needs; if there is an explicit policy mandating users to pay and the government is capable of enforcing such a rule, thus, discouraging free-riding; if utility of the service to their economic activities is clearly realized; and if there is confidence on the proper use of funds.

For the study, 78 percent of respondents specified that they would like a more reliable water supply and 21 percent valued watershed protection for the sake of future generations (Table 14). Other reasons cited include wanting the PPLS or the watershed not to be destroyed (12%), wanting the watersheds to continue production of environmental services (7%), believing that watershed protection would benefit everyone (4%), wanting to help (3%) and acknowledging that it is their duty as water users (2%).

Table 14 Reasons for Willingness to Pay for Sample Households Domestic Water Users, Tuguegarao City, 2006

Main reason	Number	(%)
I want more reliable water supply	164	78
I would like the future generations to have reliable water supply	45	21
I want that ppl/watershed not to be destroyed	26	12
I want the watersheds to continue producing other environmental services like flood control, biodiversity conservation, recreation and carbon sequestration	14	7
I believe it will benefit everyone/ It is a good project	9	4
I will be able to help	6	3
It is my duty as a water user	4	2
No response	1	1
<b>Number of respondents with WTP with certainty</b>		<b>210</b>
<b>TOTAL NUMBER OF RESPONDENTS</b>		<b>401</b>

Total does not add-up to 100% due to multiple response

In Table 15, respondents' perceptions of the threats to the PPLS and of the PPLS watershed management program design are presented. Of the 107 respondents who are familiar with the PPLS, 56 percent agree that the threats to the PPLS are real even before the survey or the hypothetical scenario was presented to them. On the other hand, indicators of how well respondents have understood and believed the scenario reveal positive results. Respondents recognize the threats to their water supply (63%), believe that the program will be effective in protecting the PPLS watershed (94%) and liked the manner in which payments will be collected, i.e. as an additional fee imposed on water tariffs (84%). This signifies acceptance of the CV scenario presented in the survey.

Table 15 Perception on Threats to the PPLS and Program Design. Sample Respondents, Domestic Water Users, 2006.

Indicator	Number	%
Threats to the PPLS	60	56
<b>Total number of respondents who knows about the PPLS prior to the interview</b>		<b>107</b>
Threats to Water Supply	252	63
Effectivity of the Program	376	94
Acceptance of the Proposal	337	84
<b>TOTAL NUMBER OF RESPONDENTS</b>		<b>401</b>

### 3.6 Non-Parametric and Parametric WTP Estimates

Using the non-parametric and parametric approaches, the mean and median WTP are calculated. Both are valid measures of WTP and the use of any is dependent on the criteria being used by the decision-maker. From an efficiency standpoint, the mean WTP is a more valid measure while median WTP is more appropriate if it is within the majority-vote rule. (Bateman *et al.*, 2002).

The results of the two approaches are compared for the sake of coming up with conservative WTP estimates. The univariate estimates of the logit model (see complete results in Appendix E), which uses only the bid amount as the independent variable of WTP, were also calculated to compare with the estimates of the non-parametric model.

The results of non-parametric and parametric WTP estimation are presented in Table 16. (For the complete results of the sensitivity analysis, see Appendix F) It is observed that the non-parametric approach yielded lower mean WTP estimates than the parametric approach even when compared with the univariate model. This is consistent with the expectation that the non-parametric approach would give more conservative values. The mean WTP for the non-parametric approach is Php 42 compared to Php 75 and Php 66 for univariate and multivariate parametric analyses, respectively.

Table 16 Non-Parametric and Parametric WTP Estimates using the Adjusted Model.

Indicator	Mean	Median
Parametric		
Univariate	75	47
Multivariate	66	39
Non-Parametric	42	41

Note: Amounts are in Philippine pesos. Php50=1USD.

### 3.7 Multivariate Regression Analysis

Multivariate regression analysis helps analyze WTP responses by determining if WTP estimates are internally consistent or theoretically valid<sup>28</sup>. This model would permit identification of the factors that influence respondents' WTP and checking if directions of effects are consistent with theoretical expectations. Appendix G contains the complete multivariate regression results.

In the multivariate regression analysis, only two explanatory variables were found to significantly influence willingness to pay for the PPLS watershed management program, the bid amount (WTPAMT) and household income (INCOME) (See Table 17). This is consistent with the *a priori* expectation that the price of the good and ability to pay would influence peoples' willingness to purchase the good. The directions of effects of these variables are in opposing directions. The bid amount negatively influence WTP indicating that the higher the bid, the less likely respondents would be willing to pay in support of the PPLS watershed management program. On the other hand, household income affects WTP in the positive direction. The higher the household income, the more people will want to pay. Lastly, observing consistency of signs of coefficients of explanatory variables presents an indication of the theoretical validity of the model.

<sup>28</sup> Theoretical Validity is the extent to which a measure behaves according to theoretical predictions. (Whitehead et al., 1996) A type of theoretical validity test focuses on the internal consistency of CV responses. (Whitehead et al., 1995. In Whitehead et al., 1996)

Table 17 Multivariate Logit Analysis.

Variable	Coeff.	Std.Err.
ONE	0.1929 (0.2794)	0.6905
WTPAMT	(0.0158) (-4.8260)*	0.0033
INCOME	0.0000 (2.9714)*	0.0000
Log Likelihood function	-252.4519	
Restricted Log likelihood	-271.6111	
Chi-squared	38.31846	
McFadden R-squared	0.07054	

\*Significant at 1% level of significance.

Figures in (.) are t-statistics.

#### 4. Potential revenues for watershed protection

The community stands to benefit from an increase in monthly water charges in terms of having available funds for the watershed management of the PPLS. Applying the highest bid amount that would pass an actual referendum (i.e. Php 15/household/month) to the total number of water service connections in Tuguegarao City, potential revenues from water charges that could initiate funding for the watershed management could get as high as Php 312,240 per month or Php 3,746,880 annually (Table 18).

Table 18 Potential Revenues in Philippine peso, 2006.

Number of service connections in Tuguegarao	20,816
Proposed Watershed Protection Fee	15
Potential Monthly Income	312,240
Potential Annual Income	3,746,880

#### 5. Summary and policy implications for PES implementation

The study finds that domestic water users in Tuguegarao City have a positive willingness to pay to ensure a reliable water supply. This may possibly be used as potential revenue for watershed protection. Debriefing responses revealed that domestic water users do not directly relate the reliable water supply condition to watershed protection. Most households could not associate that water problems may exist due to deforestation and insufficiency of raw water during the dry season. Only a small number are even aware on where their water is sourced and what could possibly affect their water supply. Thus, the study could not directly say that the respondents are willing to pay for watershed protection services but rather for reliable water supply.

The presence of water problems and the recognized threats to water supply may be indicative of peoples' willingness to pay to be certain of good water supply. Households recognize that there are already threats to their water supply because of their own water problem experiences in the past one to two years, which they largely associate to the growing number of, water users in the city. A majority of the water users have expressed their willingness to support a watershed man-

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agement program ensuring reliable water supply in the coming years not just for themselves but also for future generations.

The study also notes that more than half of the respondents have alternative sources of water. This would indicate that if the surcharge is set too high, these people could easily shift sources and may choose to disconnect from the water district to avoid a high payment especially since most people could not recognize the water supply - watershed relationship and that all water sources are linked with the watershed. On the other hand, if the right amount of surcharge is imposed, households may opt to continue with the water district connection. There will be less resistance from them provided they are assured of safe drinking water for their families and sufficient water for domestic use, especially as the survey revealed, they spend a considerable amount on bottled water, the biggest alternative source among the respondents. It may be more economical for them to pay for watershed protection that could secure access to potable water than to spend a larger amount of money buying bottled water. Thus, the setting of the surcharge amount is a crucial factor in obtaining support for watershed protection and may need to go through negotiations between domestic water users and the water district managers.

Since most respondents were unable to link reliable water supply with good watershed management, activities geared towards informing and educating the public must be carried out. If support for watershed protection is required for the program to be effectively carried out, PES practitioners and local policymakers must work on keeping the public or the ES beneficiaries in particular, informed of the various environmental services they benefit from. This includes the reasons why watershed conservation is necessary and how the continuous provision of these environmental services may possibly be guaranteed. Information, education and communication (IEC) campaigns may provide awareness to relevant groups regarding threats to the water supply and how it is linked with various activities or land uses in the upland areas. Higher education of the populace may lead to mobilization of volunteerism in support of watershed conservation. Furthermore, watershed managers must be able to exhibit transparency on how the funds raised are being utilized and inform ES beneficiaries on the watershed protection activities taking place in the PPLS. Should a watershed management fee be institutionalized as part of the monthly water charge, it should also be marked out for watershed conservation and remitted in a separate account, the PPLS Watershed Management Fund. The beneficiaries must also be assured that their payments are properly used on the things they are intended for.

As recommendation for future work, there is a need to investigate if downstream beneficiaries are able to incorporate the welfare improvements for upstream communities in their willingness to pay decisions. How downstream communities perceive the impacts of a PES system on the welfare of the upstream communities and whether this affects their willingness to pay for watershed management must be examined.

Overall, this study provides substantial implications for watershed protection for resource managers and policymakers. A good number of ES beneficiaries are willing to support a program that would require them to pay a certain amount. This potential local fund may be substantial enough to initiate funding for the proposed watershed management program which could generate solutions to forest problems by directing funding support to upstream communities to implement measures protecting the PPLS. A scheme requiring households to pay a monthly water surcharge

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directly to the watershed management fund (to be managed by a private foundation) is also widely acceptable. Thus, the establishment of DANUM ti Umili complemented with expressed willingness to pay for reliable water supply of domestic water users in Tuguegarao City may be considered an appropriate initial step towards better development of a watershed management program in the PPLS.

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## APPENDIX A

*Total Monthly Water Supply by Serviced Area.  
In cubic Meters and Percent to Total, as of 2006.*

Month	Tuguegarao		Solana and Piat		Total
	Amount	% share to total	Amount	% share to total	
January	606,930	94.48	35,487	5.52	642,417
February	555,913	95.01	29,204	4.99	585,117
March	686,519	96.34	26,110	3.66	712,629
April	645,330	94.22	39,592	5.78	684,922
May	646,450	94.71	36,109	5.29	682,559
June	635,465	94.08	39,966	5.92	675,431
July	656,814	94.42	38,789	5.58	695,603
August	648,339	92.02	56,198	7.98	704,537
September	646,713	94.77	35,681	5.23	682,394
Average	636,497	94.45	37,460	5.55	673,957

Source of raw data: personal communication with MTWD.

## APPENDIX B

### Survey Instrument

#### A SURVEY OF DOMESTIC WATERS USERS IN TUGUEGARAO CITY

This survey pertains to the study being conducted by the Resources, Environment and Economics Center of Studies, Inc. (REECS) with office address in Quezon City and the Institute of Environmental Studies of the Free University in the Netherlands on “Designing Payments for Environmental Services in the Philippine Uplands”.

Your opinion and cooperation is very important for the successful completion of this study. The main objective of this survey is to find out the perception of the people in Tuguegarao City regarding the use and management of the source of water.

Your household was randomly selected to be part of the study. The survey interview will probably take less than an hour. **We would like to request that only the household head (husband/wife/ or working adult children) should answer this questionnaire.** However, you may consult with other members of your household when answering the questionnaire if you wish. We also request that you will NOT discuss with your neighbors or other people outside your immediate household when you are providing your answers.

We would like to assure you that whatever information you will reveal in this survey will be used solely for this research and your identity shall be held in strict confidentiality. There is no right or wrong answer to the questions. We only want to find out your honest opinion.

Date of interview	
Time interview started	
Time interview completed	
Interviewer/enumerator	

For encoding purposes:
a.
b.
c.

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<b>I. WATER SUPPLY INFORMATION</b>
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**A. Water Source, Use and Expenditure**

1. Among the following household needs, which has the largest share in your monthly budget (*Choose ONE*) – **Show card**

Item	Place a (√) mark
a. Food	
b. Clothing	
c. House/Shelter	
d. Water	
e. Electricity	
f. Education	
g. Others, pls. specify: _____	

2. What is your water consumption/month from your Water District connection?  
\_\_\_\_\_ cubic meters?

*ENUMERATOR: Can we ask that you show us your water bill last month for you to be able to easily respond to our questions?*

3. How much was your water bill last month? ₱ \_\_\_\_\_

4. Do you share your water connection with other household?

<input type="checkbox"/> Yes	<input type="checkbox"/> No ( <b>go to Item #6</b> )
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5. If yes, how much, in percent, is your share in the water bill? \_\_\_\_\_ %

6. Do you use/buy water from other sources in addition to Metropolitan Tuguegarao Water District?

<input type="checkbox"/> Yes	<input type="checkbox"/> No ( <b>go to Item #10</b> )
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*ENUMERATOR: The Metropolitan Tuguegarao Water District used to be referred to as NAWASA. Now it is called by this name. For the whole survey, we will be calling it MTWD.*

7. If yes, what are your other sources of water? (*please check all applicable and specify if owned/shared*)

Source	Place a (√) mark	Owned / shared
a. Manual pumpwell		
b. Electric pumpwell		
c. Dug well		
d. Spring, lake, river, rain		N/A
e. Bottled water		N/A
f. Others, pls. specify: _____		

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8. How much is your family's **DAILY** water usage **FROM OTHER WATER SOURCES**?  
\_\_\_\_\_ liters

*ENUMERATOR: Get some sort of an estimate in terms of number and size of pails, drums, etc. and try to relate it in liters.*

9. If water **FROM OTHER WATER SOURCE** is bought, how much additional money do you spend **PER MONTH**, on the average? ₱ \_\_\_\_\_

**B. Water Quality and Quantity Concerns**

*ENUMERATOR: Now, we will be talking about the quality and quantity of water you get from the Water District.*

10. Do you or your family drink the water coming from the Water District?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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11. Have you or anyone in your family experienced any water-related problems from the Water District connection in the last 1-2 year/s?

<input type="checkbox"/> Yes	<input type="checkbox"/> No ( <b>go to Item #16</b> )
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12. If yes, what water-related problems have you experienced? (*multiple answers possible*)

- Dirty water (taste, color, and smell,) – (**if this is the only answer, go to Item # 15**)  
 Irregular water supply  
 Others, please specify: \_\_\_\_\_

13. On the average, how many hours per day can you get water from your faucet?

(*please check ONE*)

- Never  
 1-5 hours  
 6-10 hours  
 11-15 hours  
 16-23 hours

14. What do you think is the main cause of water supply problems? (*Please check ONE*) – **Show card**

- Busted pipes  
 Insufficient raw water during the dry season  
 Deforestation  
 Water management  
 Many water users  
 Others, please specify: \_\_\_\_\_

- 
15. What are the negative effects of the water problems to your household? (*Please check, multiple answers possible*) – **Show card**
- Health problems
  - Higher expenditures for water (buying or boiling water)
  - Delays in doing household chores/inconvenience or wasted time (need to stock-up water)
  - Personal hygiene is affected
  - Others, please specify: \_\_\_\_\_

<b>II. LEVEL OF AWARENESS</b>
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**A. Water Supply Source**

16. Where do you think is the Water District getting the water they are distributing to Tuguegarao residents? (*multiple answers possible*) – **Show card**

<input type="checkbox"/> Pinacanauan river <input type="checkbox"/> Cagayan river <input type="checkbox"/> Peñablanca springs	<input type="checkbox"/> Deep well <input type="checkbox"/> I don't know <input type="checkbox"/> Others, pls. specify: _____
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**B. Watershed Concept**

*ENUMERATOR: Now, we will be talking about the Peñablanca Protected Landscape and Seascape. It is located in the Municipality of Peñablanca - Show map*

17. Do you know what a protected area is?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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*ENUMERATOR: IF THE ANSWER IS "NO", EXPLAIN SLOWLY AND CLEARLY WHAT A PROTECTED AREA IS - A protected area is an identified portion of land and water wherein destructive human activities like extraction of resource is prohibited. Such portion is declared a protected area due to its unique physical and biological significance. It should be maintained and conserved to enhance its biological diversity for scientific, educational, and recreational use. This is in relation to the Republic Act 7586 (National Protected Areas System Act of 1992).*

18. Are you familiar with the Peñablanca Protected Landscape and Seascape or PPLS?

<input type="checkbox"/> Yes	<input type="checkbox"/> No ( <b>go to Item #21</b> )
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19. Where did you learn about PPLS? (*Multiple answers possible*)

<input type="checkbox"/> a. Newspaper <input type="checkbox"/> b. Radio <input type="checkbox"/> c. Television <input type="checkbox"/> d. Filmshowing <input type="checkbox"/> e. Brochure	<input type="checkbox"/> f. Relatives/friends <input type="checkbox"/> g. Water distributor <input type="checkbox"/> h. Posters <input type="checkbox"/> i. Others, pls. specify: _____
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20. Are you aware that PPLS is a protected area?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
------------------------------	-----------------------------

21. Do you know what a watershed is?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
------------------------------	-----------------------------

*ENUMERATOR, IF NO, PLEASE EXPLAIN WHAT A WATERSHED IS: A watershed is the area of land that catches, stores and releases rain to a marsh, stream, river, lake or groundwater.*

22. **If your answer to Item #18 is YES**, are you aware that PPLS is a watershed?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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23. The following questions are about watersheds. Please tell me whether the following statements are true or false – or don't know if you are unsure of the answer.

a. The condition of the watershed determines the supply of water we use in our houses.

<input type="checkbox"/> True	<input type="checkbox"/> False	<input type="checkbox"/> Don't know
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b. The watershed provision of various goods and services is largely dependent on the state of its forest cover.

<input type="checkbox"/> True	<input type="checkbox"/> False	<input type="checkbox"/> Don't know
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24. Is it important to manage and protect the watershed for the households in Tuguegarao City?

- Important (**go to Item #25**)
- Not important (**go to Item #26**)
- No opinion (**go to Item 27**)

25. If you answered **IMPORTANT**, why is it important? (*choose ONE*)

- It absorbs water and make this available for future use
- It minimizes floods during the rainy season
- It improves water quality
- Provides more sustainable water supply
- To avoid forest/nature destruction
- Others, please specify: \_\_\_\_\_

*ENUMERATOR: Specify exact answer* \_\_\_\_\_

26. If you answered **NOT IMPORTANT**, why is it not important? (*choose ONE*)

- It doesn't directly affect my household
- I don't believe in its role in improving water supply
- I don't understand the connection between the watershed and water supply
- Others, please specify: \_\_\_\_\_

*ENUMERATOR: Specify exact answer* \_\_\_\_\_

**III. ASSESSMENT OF WILLINGNESS TO PAY FOR THE PPLS  
WATERSHED MANAGEMENT FUND**

**A. Presentation of Water Supply Situation**

*ENUMERATOR: Now, we will be talking about the present condition of the water supply here in Tuguegarao*

The Water District presently draws its water supply from springs and groundwater from wells. The three spring sources and two wells are located in Peñablanca while the other wells are situated in various locations inside and outside of Tuguegarao.

Over the years, rapid population growth, increasing incomes, growth of industries and urbanization impressed growing demand for water. According to the Water District, they are now drawing water deeper from the ground compared to a few years ago.

- To mitigate concerns, they sought additional water supply with the installation of various infrastructures such as additional deep wells and pumping stations. However, production wells could only last for 40-50 years before ground water supply deteriorates.
- Given this growing demand for water, deterioration of water facilities and the hydrological limitation of groundwater extraction, it is expected that there will be higher costs of maintenance and extraction of water or fast depletion of groundwater supply.

The Water District is planning to tap additional sources including other springs also in Peñablanca and surface water such as from the Pinacanauan River. The watershed of Pinacanauan River is in the Peñablanca Protected Landscape and Seascape (PPLS). The Water District believes that in the long run, tapping surface water is a more economical alternative and could provide greater net benefits. Rehabilitating PPLS watershed would enhance these potential benefits.

**B. Description of the Role of Forests and Watersheds in Sustainable Water Supply**

*ENUMERATOR: Before proceeding any further with the survey, let me explain some concepts to make sure that we have a clear understanding of the succeeding questions I'm going to ask you.*

A watershed is like a kitchen sink. You've seen how the kitchen sink catches water from the faucet and drains this into an outlet. This works in a similar manner in watersheds like the PPLS. It also catches water from the rain. From the Lagum area for example, it drains the water through a network of rivers and streams in the area, until it reaches the Pinacanauan River. (*Picture 1: show watershed diagram*).

The amount of water that can be stored in the watershed is largely affected by its land uses. It is widely accepted that maintaining a good forest cover (*Picture 2: show picture of good watershed*) increases the capacity of the watershed to store water and regulate its flow.

But, our country is losing its forest cover fast. (*Picture 3: show picture of bad watershed*). In PPLS, deforestation and poor land use practices (*Picture 4: show picture of slash and burn*) are common and these have damaged the condition of the watershed affecting the water flow. The attraction of PPLS particularly to the poor has partly to do with the lack of livelihood opportunities and the numerous goods and services it can get from PPLS. The dependence on PPLS by these

communities result in the degradation of the resources they depend on for livelihood and survival. As a consequence, floods during the rainy season and droughts during the dry season are common.

### **C. The Proposed PPLS Watershed Management Program**

*ENUMERATOR: At this point, let us now talk about the management of PPLS and the creation of a possible PPLS Watershed Management Program.*

If there will be a PPLS Watershed Management Program that would be established, this would generate solutions to forest problems and the upstream communities could implement measures protecting PPLS such as:

- a. Regular patrolling and monitoring activities in the forest;
- b. Reforestation of a bigger area in the watershed per year and refrain from cutting trees; (*Picture 5: refo projects*)
- c. Employment of sustainable upland farming technology and installation of soil erosion control structures (vegetative and engineering) like the hedgerow; and (*Picture 6: sustainable farming technology-HEDGEROW*)
- d. Invest in agro-forestry activities; (*Picture 7: agro-forestry activities*)

In the short term, these protection measures will help reduce if not eliminate illegal logging, *kalingin* (slash-and-burn), forest fires, wildlife poaching, squatting, and other destructive activities in the PPLS.

In the long run, you are more assured to have a more stable water supply because of the improved condition of the PPLS. There may be enough water during the dry months, and water rationing will be reduced, if not altogether eliminated. The occurrence of floods will also be minimized.

Aside from these, the PPLS will also become a more reliable source of water for irrigation, boat transportation, and recreation activities. In other words, improved PPLS watershed management will provide a whole package of benefits to you and to society as a whole.

### **D. The PPLS Watershed Management Fund**

#### **Background on the PPLS Watershed Management Fund**

However, it is not that easy to implement the PPLS Watershed Management Program. It needs funds. At present, the money paid by connected water users to Water District is mainly for the operation, maintenance, improvement and expansion of the distribution of water. The Water District does not directly pay for the water they extract from the PPLS. Very little, if any, could be used for the management of the PPLS. There is no money available for watershed protection, which is a very important factor in the 'production' or condition of water resources available from the watersheds.

Presently, the Department of Environment and Natural Resources or DENR is implementing projects like agro-forestry and reforestation together with other interested agencies/groups. However, efforts are still insufficient. The DENR has very limited resources and because of this limitation, they are unable to engage the support of local community upstream in protecting the for-

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est. The support extended by non-government organizations (NGOs) is still inadequate to fully protect and manage the PPLS.

Thus, the PPLS Watershed Management Program could not be effectively carried out due to inadequacy of funds.

### **The CV Question**

Implementing the PPLS Watershed Management Program would require considerable resources to be mobilized. We are undertaking this survey to find out if enough households in Tuguegarao would be willing to give to the fund to make it worthwhile. One proposal is that people would be paying a ***fixed additional amount over and above their water bill*** to be given to the fund. Given this situation, let us suppose that Water District would be willing to collect the payments. All funds raised through the surcharge would go to the **PPLS Watershed Management Fund** and would be used for the watershed protection and conservation activities in the upstream. The fund would be managed by a private foundation composed of representatives from various stakeholders – private individuals, Water District, DENR, local government units (LGUs), and NGOs. This foundation will serve as an intermediary and would decide on the activities of the upland communities that will be supported by the fund. Under no circumstances will the fund be used for any other purpose.

**Let us suppose that there would first be a referendum in Tuguegarao.**

*ENUMERATOR: A referendum is a direct vote in which an entire population is asked to either accept or reject a particular proposal*

The purpose of the referendum would be to see how many households in Tuguegarao would support a plan for the City Government to impose a **monthly fixed charge on everyone's water bill over and above the present water bill**. The result of the referendum will determine whether the fund for the management of the watershed will be established or not.

**Suppose further that the PPLS Watershed Management Program** would be undertaken only if **more than 50% of the voters** in Tuguegarao would support the plan to charge a fixed monthly water fee.

**Also assume** that this *surcharge is fixed and would be added to your household water bill every month*. All other households in Tuguegarao would pay the same amount. Naturally, the very poor households in our society who do not have water connection will not be required to pay anything for the conservation.

**PLEASE REMEMBER THAT: The survey you are participating in today is only to find out your opinion about this matter. It is not an actual referendum. We are interested in finding out how you would vote IF an actual referendum will take place in Tuguegarao.**

Past studies have found that many people say that they would vote for a program like this when they are asked their opinion in a survey, but then they vote against the program in an actual referendum. In other words, respondents seem to have a tendency to say they would vote for the program even if they do not really mean it. Researchers are not sure why people do this. It may be because it feels good to say yes in a survey when people do not actually have to pay. Or it may be to please the person doing the survey.

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We would like to request you to really ask yourself if you are going to vote YES or NO to the program if this would be a real referendum. **If you answer YES, you should be willing to spend money for protection of the PPLS watershed that may assure sustainable water supply in the future (in which case it would reduce your money available for your other expenses).** In any case, I ask you to vote just exactly as you would vote if you were really going to face the consequences of your vote.

Please remember that this is an independent research study, not commissioned by any interest group, carried out mainly because of the Research Team's desire to find out how water users feel about ensuring the protection of watershed. There are no right or wrong answers to these questions.

*ENUMERATOR: Please make sure the fund concept is fully understood by the respondent before proceeding to the next question*

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27. The *PPLS Watershed Management Program* would mean that you and the other families in Tuguegarao who are connected to the Water District will pay a *fixed monthly surcharge* of ₱ \_\_\_\_\_ that would be added to your *water bill*. The money that will be collected will go to the *PPLS Watershed Management Fund* that would be used for the activities of the communities upstream to undertake protection and conservation of PPLS.

Would you vote YES or NO to the *PPLS Watershed Management Program*?

<input type="checkbox"/> Yes ( <b>go to Item #31</b> )	<input type="checkbox"/> No
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1. If you voted “NO”, what is your reason? (*ONE answer only*).

- I do not think that the protection of the PPLS is worth doing (NO)
- I cannot afford to pay any additional amount to what I am currently paying (NO)
- I think it should be the government that should finance the watershed management activities in PPLS (PV)
- I do not trust the institution who will manage the funds for this conservation work in PPLS (PV)
- I do not think that reliability of water supply is important (NO)
- I do not believe that paying will result in improved watershed management in PPLS (PV)
- I do not believe that improved watershed management in PPLS will result in more reliable water supply (PV)
- Only the rich households should pay (PV)
- All should pay and not just those who are connected to Water District (PV)
- Others, please specify: \_\_\_\_\_

*ENUMERATOR: Specify exact answer:* \_\_\_\_\_

29. If you voted “NO” on the proposal of setting up the **PPLS Watershed Management Fund** given that this will cost your household a monthly payment of ₱ \_\_\_\_\_ as additional payment to your water bill, is there any amount that you would be willing to pay, with 100% certainty, to support the Program?

<input type="checkbox"/> Yes	<input type="checkbox"/> No ( <b>go to Item #32</b> )
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30. If yes, what amount would this be? ₱ \_\_\_\_\_/month (**go to Item #32**)

31. If you voted “YES” in **Item #27**, please indicate your reason. (*please check only ONE*)

- I want more reliable water supply
- It is my duty as a water user
- I want the watersheds to continue producing other environmental services like flood control, biodiversity conservation, recreation and carbon sequestration
- I would like the future generations to have reliable water supply
- I believe that the council will do a good job in administering the fund
- I do not think I would ever really have to pay a surcharge on my water bill
- Others, please specify: \_\_\_\_\_

*ENUMERATOR: Specify exact answer:* \_\_\_\_\_

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32. How certain were you that you would vote “YES/NO” in Item # 27? - **Show Card**

- Completely sure and willing to convince others (**go to Item #34**)
- Completely sure (**go to Item #34**)
- Sure (**go to Item #34**)
- Not sure
- Completely not sure

33. If your answer in Item #32 is NOT SURE or COMPLETELY NOT SURE, why do you have some doubts about your vote?

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34. Before this interview, did you think there were real existing threats to the PPLS?

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
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35. When you decided on your vote, did you agree that there are threats to your water supply because of the condition of PPLS?

<input type="checkbox"/> Yes ( <b>go to Item # 37</b> )	<input type="checkbox"/> No
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36. If NO, why not? (*check only ONE*) – **Show card**

- I see no serious threat in the water that our household use
- PPLS is already very far from Tuguegarao City
- As far as I know, the watershed is still in very good condition
- The government could very well manage PPLS
- Others, please specify: \_\_\_\_\_

37. When you decided on your vote, did you believe that the PPLS Watershed Management Program would actually be effective in protecting PPLS?

<input type="checkbox"/> Yes ( <b>go to Item #39</b> )	<input type="checkbox"/> No
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38. If NO, why not? (*check only ONE*) – **Show card**

- The funds may not be used to support the program activities due to graft and corruption
- The funds may be used by the government to other uses
- The funds may not be used in compensating the upstream communities.
- The upstream communities may not adhere to what was agreed on in the Program
- The problem in PPLS is already very big and can no longer be resolved
- Others, please specify: \_\_\_\_\_

39. When you decided on your vote, did you like the proposal to collect people's payment as a surcharge on water bill, rather than, say an increase in other taxes?

<input type="checkbox"/> Yes ( <b>go to Item #41</b> )	<input type="checkbox"/> No
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40. If NO, why no? (*choose only ONE*) – **Show card**

- The water bill is always increasing. I'm afraid this fee will always increase also.
- Monthly collection is simply too much. Why not make this an annual payment?
- I do not like compulsory payments.
- I prefer paying in other ways for the program rather than increasing my water bill.
- Others, please specify: \_\_\_\_\_

<b>IV. SOCIO-ECONOMIC INFORMATION</b>
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**ENUMERATOR:** Now, we would like to get information on you and your family to help us in our study.

41. Age: \_\_\_\_\_ years old

42. Gender:

<input type="checkbox"/> Male	<input type="checkbox"/> Female
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43. Civil Status:

<input type="checkbox"/> Single	<input type="checkbox"/> Married	<input type="checkbox"/> Widow/er
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44. What is your highest educational attainment? (**PLEASE CHECK and GIVE the HIGHEST LEVEL**)

Education	Level
<input type="checkbox"/> No formal schooling	
<input type="checkbox"/> Elementary	
<input type="checkbox"/> High school	
<input type="checkbox"/> Vocational	
<input type="checkbox"/> College	
<input type="checkbox"/> Master's	
<input type="checkbox"/> Higher than Master's degree	

45. What is your occupation? (*multiple response possible*)

- Unemployed/housewife
  - Self-employed
  - Government employee
  - Private employee
  - Laborer/mechanic/tailor/skilled worker
  - Overseas Filipino Worker
  - Farmer
  - Pensioner (retired)
  - Others, please specify: \_\_\_\_\_
-

46. How many in your household, including yourself and OFW, if there are any, earn cash income?

a. Number of male earners	
b. Number of female earners	
c. Number of total earners	

47. Please list the number of household members per age group.

a. Children (<12 yrs of age)	
b. Teens (13-17 yrs of age)	
c. Adults (above 18 yrs of age)	
d. Total household members	

48. How much is the TOTAL MONTHLY INCOME OF ALL HOUSEHOLD MEMBERS including OFWs and yourself? (**Please check ONE**)

*ENUMERATOR: Please be assured that the information you will give us will be held strictly*

<input type="checkbox"/> Mababa sa ₱2,500	<input type="checkbox"/> ₱ 17,001-20,000	<input type="checkbox"/> ₱ 35,001-37,500	<i>confi- dential.</i>
<input type="checkbox"/> ₱ 2,500-5,000	<input type="checkbox"/> ₱ 20,001-22,500	<input type="checkbox"/> ₱ 37,501-40,000	
<input type="checkbox"/> ₱ 5,001-7,500	<input type="checkbox"/> ₱ 22,501-25,000	<input type="checkbox"/> ₱ 40,001-42,500	
<input type="checkbox"/> ₱ 7,501-10,000	<input type="checkbox"/> ₱ 25,001-27,500	<input type="checkbox"/> ₱ 42,501-45,000	
<input type="checkbox"/> ₱ 10,001-12,500	<input type="checkbox"/> ₱ 27,501-30,000	<input type="checkbox"/> ₱ 45,001-47,500	
<input type="checkbox"/> ₱ 12,501-15,000	<input type="checkbox"/> ₱ 30,001-32,500	<input type="checkbox"/> ₱ 47,501-50,000	
<input type="checkbox"/> ₱ 15,001-17,500	<input type="checkbox"/> ₱ 32,501-35,000	<input type="checkbox"/> Mataas sa ₱ 50,000	

49. Ownership of House: (*Choose ONE*) – **Show card**

- Owned  
 Rented  
 Living with relatives  
 Provided by employer  
 Using for free  
 Others, please specify: \_\_\_\_\_

50. How many items does your household own for each of the following:

Item	Number
a. Microwave	
b. Refrigerator	
c. Washing machine	
d. Motorcycle	
e. Air conditioner	
f. Computer	

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g. Car	
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51. Do you have electricity connection?

<input type="checkbox"/> Yes	<input type="checkbox"/> No ( <b>go to Item #53</b> )
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52. How much do you pay per month for electricity ? ₱ \_\_\_\_\_/month

53. How would you classify the economic status of your household relative to others in this country? – **Show card**

- Rich
- Relatively well-off
- Average
- Below average
- Much worse than average

54. Are you a member of any environmental organization?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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55. Would you like to add any comments about the survey or do you have any questions?

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<b>Name of Respondent (optional)</b>	
<b>Address (Brgy/Purok/Sitio/Village)</b>	
<b>Telephone (optional)</b>	

*Thank you very much for your cooperation and help.*

## APPENDIX C

*Household Budget Items.*

*Sample Respondents, Domestic Water Users, Tuguegarao City, 2006.*

*In percent to total respondents.*

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Item	%
Food	68.1
Clothing	0.2
House/Shelter	1.7
Water	2.2
Electricity	17.2
Education	10
No answer	0.50
<b>TOTAL NUMBER OF RESPONDENTS</b>	<b>401</b>

**APPENDIX D**

*Distribution of “Yes” Responses Domestic Water Users, Tuguegarao City, 2006.*

Bid	UNCENSORED			CENSORED (Certainty)			CENSORED (Protest)			CENSORED (Certainty + Protest)		
	No.	%	Number of Respondents	No.	%	Number of Respondents	No.	%	Number of Respondents	No.	%	Number of Respondents
5	62	77.50%	80	60	75.95	79	62	81.58%	76	60	80.00%	75
15	48	59.26%	81	48	59.26	81	48	69.57%	69	48	69.57%	69
30	37	46.25%	80	36	45.00	80	37	53.62%	69	36	52.17%	69
50	40	50.00%	80	38	48.10	79	40	59.70%	67	38	57.58%	66
100	29	36.25%	80	28	35.44	79	29	40.85%	71	28	40.00%	70
<b>Pooled</b>	<b>216</b>	<b>53.87%</b>	<b>401</b>	<b>210</b>	<b>52.76</b>	<b>398</b>	<b>216</b>	<b>61.36%</b>	<b>352</b>	<b>210</b>	<b>60.17%</b>	<b>349</b>

**APPENDIX E**

*Logit Regression Results for Univariate Analyses.*

Variable/Indicator	Uncensored		Censored					
			Certainty		Protest		Certainty and Protest	
	Coeff.	Std.Err.	Coeff.	Std.Err.	Coeff.	Std.Err.	Coeff.	Std.Err.
ONE	0.7364 (4.5583)	0.1616	0.6888 (4.2668)	0.1614	1.1100 (6.1871)	0.1794	1.0503 (5.8896)	0.1783
WTPAMT	(0.0145)* (-4.6234)	0.0031	(0.0145) (-4.5878)	0.0032	(0.0158) (-4.7459)	0.0033	(0.0157) (-4.6897)	0.0033
Median WTP	50.69		47.36		70.35		67.01	
Restricted MWTP	77.62		75.34		88.40		86.15	
Log Likelihood function	-265.4282		-264.0761		-223.0163		-223.0808	
Restricted Log likelihood	-276.7526		-275.2642		-234.8170		-234.6356	
Chi-squared	22.64879		22.37629		23.60132		23.10966	
McFadden R-squared	0.04092		0.04065		0.05025		0.04925	

\*significant at 1% level of significance

**APPENDIX F**

*Summary of Non-parametric and Parametric WTP Estimates Domestic Water Users,  
Tuguegarao City, 2006*

*In Philippine Peso*

Indicator	Non-Parametric				Parametric			
	Lower Bound	Midpoint	95% Confidence Interval		Univariate Median WTP	Restricted MWTP	Multi-variate <sup>1/</sup> Median WTP, Restricted MWTP	
Uncensored	42.39	42.25	37.19	47.60	50.69	77.62	40.78	67.72
Censored for certainty	41.51	41.33	36.38	46.65	47.36	75.34	39.22	66.39
Censored for protest	48.12	48.28	41.89	54.35	70.35	88.40	47.64	66.64
Censored for protest and certainty	47.18	47.29	41.04	53.31	67.01	86.15	48.43	67.11

Note: 1USD=Php50.

**APPENDIX G***Logit Regression Results for Multivariate Analyses.*

Variable/Indicator	Uncensored		Censored					
			Certainty		Protest		Certainty and Protest	
	Coeff.	Std.Err.	Coeff.	Std.Err.	Coeff.	Std.Err.	Coeff.	Std.Err.
ONE	0.2556 (0.3753)	0.6811	0.1929 (0.2794)	0.6905	0.0956 (0.1250)	0.7654	0.0543 (0.0700)	0.7757
WTPAMT	(0.0157)* (-4.8592)	0.0032	(0.0158)* (-4.8260)	0.0033	(0.0184)* (-5.0585)	0.0036	(0.0184)* (-5.0068)	0.0037
TOTHHMEM	0.0282 (0.6718)	0.0420	0.0218 (0.5205)	0.0419	0.0023 (0.0491)	0.0474	(0.0050) (-0.1055)	0.0472
AGE	(0.0036) (-0.3978)	0.0090	(0.0058) (-0.6365)	0.0091	(0.0037) (-0.3669)	0.0101	(0.0068) (-0.6623)	0.0103
GENDER	(0.2950) (-1.2231)	0.2412	(0.3151) (-1.2913)	0.2440	(0.0379) (-0.1342)	0.2823	(0.0608) (-0.2132)	0.2852
INCOME	0.0000* (2.7080)	0.0000	0.0000* (2.9714)	0.0000	0.0001* (4.0479)	0.0000	0.0001* (4.3016)	0.0000
EDUCATTA	(0.0006) (-0.0162)	0.0340	0.0011 (0.0311)	0.0341	0.0395 (1.0468)	0.0378	0.0390 (1.0337)	0.0378
MARRIED	0.3185 (0.9841)	0.3236	0.4252 (1.2893)	0.3298	0.1410 (0.3726)	0.3784	0.2730 (0.7102)	0.3844
ENVTORG	(0.5449) (-0.8097)	0.6729	(0.5150) (-0.7662)	0.6722	0.7117 (0.6322)	1.1257	0.7652 (0.6788)	1.1272
Mean WTP	40.78		39.22		47.64		48.43	
Restricted MWTP	67.62		66.39		66.64		67.11	
Log Likelihood function	-254.9523		-252.4519		-206.2725		-204.4624	
Restricted Log likelihood	-273.0249		-271.6111		-233.3773		-233.2068	
Chi-squared	36.14517		38.31846		54.20975		57.4888	
McFadden R-squared	0.06619		0.07054		0.11614		0.12326	

\*significant at 1% level of significance.