ESTIMATING THE BENEFITS OF WATERSHED PROTECTION FOR SUSTAINABLE WATER SUPPLY IN SIBALOM NATURAL PARK SIBALOM, ANTIQUE

NOVLLOYD ELLO CELESTE

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APPROVAL SHEET

The thesis manuscript entitled, "**ESTIMATING THE BENEFITS OF WATERSHED PROTECTION IN SIBALOM NATURAL PARK FOR SUSTAINABLE WATER SUPPLY, SIBALOM, ANTIQUE",** prepared and submitted by **NOVLLOYD E. CELESTE**, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (Development Sociology)** is hereby accepted.

BUENAVENTURA B. DARGANTES
Adviser and Chairman
Graduate Advisory Committee

_____
Date Signed

BEVERLO P. PASCUAL
Member, GAC

_____
Date Signed

MA. SALOME B. BULAYOG
Member, GAC

_____
Date Signed

JUDE NONIE A. SALES
Observer
Graduate School Representative

_____
Date Signed

Accepted as partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (Development Sociology).**

EDGARDO E. TULIN
Dean, Graduate School
Visayas State University
Baybay, Leyte

_____
Date Signed

BIOGRAPHICAL SKETCH

The author was born in November 20, 1981 in Cagayan de Oro City, Misamis Oriental. He is the second of the three children of Lito Nolasco Celeste and Dinah Ello Celeste.

He attended different elementary schools and graduated at Linao Community School, Linao, Ormoc City Leyte in 1994. He obtained his secondary education at the Franciscan College of the Immaculate Conception in Baybay, Leyte in 1998. In 2003 he graduated from Leyte State University with a degree of Bachelor of Science in Agribusiness major in Business Management.

After college, he was eager to get a job but he realized that pursuing graduate studies will give him a more competent qualification and future in community service.

In 2006 he was admitted as graduate student at the Leyte State University now the Visayas State University which opened the door for him to pursue his interest in dealing with the community. He became one the pioneering students of Master of Science in Development Sociology formerly MS in Rural Sociology.

While studying he was hired as interim graduate research assistant at the Institute of Strategic Research and Development Studies (ISRDS). His network with Dr. Dargantes paved the way to venture into studying water resources and by facile negotiation with an NGO he was granted with a fund for his research.

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Duro guid nga salamat!!!!

The author

ABSTRACT

Celeste, Novlloyd E. Visayas State University, ViSCA, Baybay, Leyte. October 2009. **"ESTIMATING THE BENEFITS OF WATERSHED PROTECTION FOR SUSTAINABLE WATER SUPPLY IN SIBALOM NATURAL PARK SIBALOM, ANTIQUE".**

This study was conducted in the municipalities of Belison, Hamtic, San Jose, San Remegio, and Sibalom in the Province of Antique which were directly benefited from the irrigation and domestic water supply coming out of Sibalom Natural Park (SNP). The study focused on the households' willingness to pay for the protection of the watershed as source of domestic water supply. Both qualitative and quantitative approaches were employed to ascertain the water use behaviour, current situation of water supply, and environmental programs and projects. The data were collected through Focus Group Discussions (FGD's) and Key Informant (KI's). Survey interviews of 309 respondents from the five municipalities were conducted to determine the household's willingness to pay for protection watershed using the Contingent Valuation Method (CVM). Statistical and econometric analysis using Logit model was used to estimate the respondents mean willingness to pay using an open source packages for econometric (e.g. GRETL v.1.8).

Half of the respondents (55.3%) knew the Sibalom Natural Park, 56.6 percent knew about watersheds while 60.2 percent did not know that Sibalom

Natural Park is also a watershed reservation.

Two models were tested, one without calibration and the other is the adjusted. Both models were run with the same independent variables while only the dependent variable (WTP) were adjusted based on the response. The adjusted model revealed that the respondents were willing to pay for P7.23/ mo as incremental water bill which is relatively lower compared to the uncensored or uncalibrated response with P40.36/mo.

Meanwhile, motivation to pay for watershed protection for both model is influenced by bid amount used, water quality common for both model while age and awareness of program was observed to affect willingness to pay only in uncensored model.

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CHAPTER I

INTRODUCTION

Statement of the Problem

Many people think that water is an infinite resource which is the reason why many would take for granted the value of water and thus exploitation of water resources is common in many areas around the world leading to what is called the 'tragedy of the commons' (Hardin 1968) particularly the water commons (Barlow 2007).

According to the report of NSCB (1994), initial estimates have shown that the total groundwater demand or withdrawal throughout the country grew from 4.3 billion cubic meters (bcm) in 1988 to 5.8 bcm in 1994. This is very alarming because the recharge of the country's groundwater stocks declined from 1.9 bcm in 1988 to 1.5 bcm in year 1994 with an average annual rate of 3.7% (www.nscb.gov.ph/peenra/results /water/default.asp).

The overexploitation of groundwater resources resulted to the reduction of groundwater level, spring and river denudation/wetland surface reduction, degradation of groundwater quality such as salt water intrusion (Stavric 2004).

A blatant example is in the Municipality of Sibalom, wherein its impact to aquifers made wells and springs dried up in dry seasons which is observable in areas closer to the watershed (PROCESS 2007). In addition, 20 feet shallow wells can still provide potable water but at present water is seldom available even

up to 30 feet deep (personal communication, GM SWD). This prompted private pump owners to dig deeper more than the usual depth of wells to extract water while others walk for minutes and hours to fetch water from doubtful sources (e.g. springs). Hence, households without water connection experience less and sometimes no water supply in springs and wells during the summer season prompted them to connect to the water district.

On the other hand, reduction in water yield which directly affect irrigation, domestic and industrial dependencies on water has caused insufficient supply of water for irrigation during the months of November, December and January (personal communication, NIA personnel 2008) in the southern part of Antique.

Sibalom Natural Park being the natural influences of water recharge in the Province of Antique is faced by many threats like unregulated cutting and poaching of timber and non-timber forest products, hunting of wildlife, unregulated conversion of forest lands into agricultural lands, and continuous grazing of animals in the cultivated land (DENR 2008) all of which contributed to the deterioration of soil infiltration capacity likewise affecting the natural recharge of groundwater (Kiersch 2000). In addition, overexploitation is further complicated with changes in natural recharge due to land-use modifications and different forms of artificial changes (Custodio 1986 as cited by Stavric 2004).

Consequently, upstream activities like slash and burn, gathering of woods used for charcoal making, commercial logging and shifting cultivation, invasion of exotic species, extensive use of synthetic fertilizer and pesticides and

unregulated tourist influx has likewise threatened the pristine attributes of Sibalom Natural Park. Moreover, different mining companies were enticed to mine the park because it is rich in minerals.

Conflicts from upland communities within the watershed area like land tenurial rights, no general management plan, and reduction of budget allocation for watershed management (DENR 1998) hindered development institutions to impose strict land use regulation regarding the use of natural resources which could affect directly to water.

In this sense, Sibalom Natural Park's influence to water supply is important, hence this study estimates the value of watershed protection services for sustainable water supply. The study hoped to provide answers to the following questions:

a) Are the residents of the five municipalities aware of the Sibalom Natural park environmental values?

b) Are the residents willing to pay for the protection of the Sibalom Natural Park?

c) What are the factors affecting resident's willingness to pay for the protection of Sibalom Natural Park?

Objectives of the Study

Valuation of environmental changes measures the benefits of environmental goods and services to demonstrate the importance of

environmental policy (Bulayog 1998) which could provide preventive measures to protect the environment from further degradation to attain sustainable development. Undervaluation of environmental goods and services are often overlooked, both in national and local level which resulted to instability of management plans and poor implementation of environmental policy.

Furthermore, the benefits of Natural Park as protected area are considered intangible, hence economic valuation is difficult (Predo 1995). Valuation of non-marketed goods and services is even more difficult because price of a good does not in general measure the true economic value, and that water value cannot only be measured by its market price (Hanemann 2005) but also in its social and environmental aspects. Generally, the purpose of the study is to conduct valuation of water resources, particularly watershed that collect and supplies water. This study tries to capture and estimate the economic benefits of watershed protection for sustainable water supply. More specifically, the study is addressed to the following objectives:

1) To assess the awareness of the respondents to the economic, social and environmental values of watersheds and forests in ensuring sustainable water supply
2) To determine the respondents' willingness to pay for the protection of Sibalom Natural Park to ensure a continuous supply of water
3) To identify and analyze the factors affecting the respondents' willingness to pay for the improved management of the watersheds

Importance of the Study

Water as one of the basic needs in human life require immediate attention such as efficient resource use allocation. The fact that water is a common good, it offers people the opportunity to use and exploit it till it leads to the tragedy of the Commons (e.g. water resources). Likewise, because raw water is not currently priced; it leads to inefficient allocation and to wasteful practices (Dargantes 2008).

Today, many of the natural resources are not properly managed and in doing so, both development institutions and stakeholders should participate in the management of the resource for sustainable development. Following the definition of World Commission on Environment and Development (WCED) 1987 as cited by Barbier (2003) sustainable development is the development that meets the present needs without compromising the future generation needs.

As pointed out in Agenda 21, sustainable development is constrained with the degradation of watershed functions, because of the intricate relationship of economic, ecology as well as social dimensions. Degradation on the one hand as defined by Food and Agriculture Organization (FAO) is the consequence of using land today without investing in tomorrow (FAO 1993).

In response to this, the Medium-Term Philippine Development Plan (MTPDP) adapted the Integrated Water Resource Management (IWRM) as general strategy approach to price raw water for efficient and sustainable allocation for sustainable development (Dargantes 2008). And in compliance with

the Millennium Declaration of 2003, the Philippines adapted the Millennium Development Goal (MDG) specifically Number 7- Ensure Environmental Sustainability as guiding principle for ensuring environmental sustainability targeted to integrate sustainable development and at least halve the proportion of people without access to safe drinking water.

But on the other hand, problems connected to water resources protection is hindered by first, absence of deliberate land use and management plans in watershed areas (Cruz 1999). Second, poor implementation and lack of delineation of protected areas gave ideas to farmers to harbor in different land use options to sustain their livelihood unknowingly affecting the watershed functions (e.g. water supply). Lastly, watershed management activities are implemented in upland areas but the major beneficiaries of water and power produced are found in lowland areas (Dixon and Sun 1990) which causes conflict of interest between the two stakeholders (e.g. upland and lowland). Hence a strategic watershed management plan is required for an effective watershed management for sustainable water supply (Calderon et al., 2004).

However, considering that human component played a major role in the water system (Craswell 2007), community participation is also important in implementing environmental policy for sustainable development in order to account the social and environmental dimensions in providing safe, affordable, acceptable, and sustainable water to the people. Craswell (2007) put it this way:

"*These are the sum of water-related organizations, engineering works, and water use sectors. Society is not only a component of the global water system but also a significant agent of change within the system because, apart from being exposed to changes in water availability, it also takes various actions to mitigate or adapt to these changes".*

In the Province of Antique where majority of water service providers use ground water, protection of water sources and watershed management plan has never been deliberately addressed. Consequently, overexploitation of groundwater for domestic and other use is detrimental to the environment such that it invites salt water intrusion especially that the users of groundwater is unregulated (Ebarvia 2003).

This study hopes to provide value to water resources by quantifying the benefits of watershed protection from the perspective of economic, social and environmental dimensions that will bolster watershed management plan for sustainable water supply. In addition, the data gathered will help to promote the existence of importance of environment to the economic system of a country (Hodgson and Dixon 1988, as cited by Pearce and Warford 1993).

Furthermore, the study can provide valuable information to policy makers, development institutions, water concessionaires and irrigator's to fully realize the value of water from improved management of the Sibalom Natural Park. The agencies that are likely to use the results of this study are PROCESS Foundation, who has spearheaded the protection of Sibalom Natural Park, and Department of Environment and Natural Resources.

Scope and Limitations of the Study

This valuation study was conducted in the five municipalities namely: Belison, Hamtic, San Jose, San Remegio and Sibalom which were the direct beneficiaries of Sibalom Natural Park in the Province of Antique.

Qualitative (e.g. FGD's and KI's) and quantitative approaches were used to analyze the current water situation in the study area. More specifically, a contingent valuation method (CVM) was used to estimate the benefits of watershed protection of household respondents for sustainable water supply.

Time and Place of the Study

The study was conducted at the Province of Antique, particularly in five municipalities that benefited the water supply in Sibalom Natural Park located in Sibalom, Antique from October 9, 2008 to January 19, 2009.

Definition of Terms

Aquifer - is the storage for ground water supply found under soil, bounded by subsurface divides similar to surface features that separate watersheds. Conditions and characteristics are determined by the hydrologic cycle and anthropogenic modifications.

Contingent Valuation - is a stated preferences approach that uses survey questions to elicit individual’s preference for public goods and services by finding out their willingness to pay for the good.

Exploitation - intense over extraction of water from aquifers in excess of net recharge in the current period

Groundwater - refers to the water extracted under the soil or from confined water aquifers used for household, irrigation and other purposes.

Natural Park - refers to a protected area abundant with biodiversity preserved for scientific, education and scenery purposes as well as its economic and social importance.

Non- use Values – otherwise known as passive use values, which are either not actively use and preserved for future needs

Water Resource Valuation - is the process of accounting the value of resources from the perspective of ecology, economic and social dimensions use to bring about efficient resources allocation and environmental policy

Total Economic Value - refers to the value of a resource that are derived from both use and non use values

Use Values - is the direct or indirect utilization of a particular resource in a specific time and place by an individual for its economic subsistence

Watershed - is a land area that collects water and drained it to a common point, includes lakes, rivers, wetlands and estuaries and streams.

Watershed Management - is a process of protecting the resources from adverse exploitation, degradation and pollution aimed to achieve ecological and social balance.

CHAPTER II

CONCEPTUAL AND THEORETICAL FRAMEWORK

Watershed provides the quintessential good for human beings such as water. Water in a universal sense is a natural resource and has many attributes that are of economic and social importance. The essentialness, mobility, heterogeneity and variability of water in terms of space, time and quality (Hanemann 2005) contributes to the economic and social activity of human for sustainable development.

Natural resources such as water provides inputs to our economic system (Hartwick and Olewiler 1998) and because of its intricate interconnectedness it could affect the status of the others (e.g. land, soil) in various ways (White 1992) as influenced by biophysical characteristics vulnerable to artificial modifications present in the area. While watershed provides multifarious functions to human beings, it is also vulnerable to degradation and exploitation because of the upland dwellers different farming systems, particularly land use practices. These can affect downstream users through hydrology, carbon stocks and biodiversity.

Water (surface and groundwater) used for agriculture, commercial and domestic uses pose greater demand as population increases. The demand for water globally increases such that many countries are now having hard time to allocate water efficiently. But if these resources are exploited, as in the case in Antique, where conjunctive use of groundwater is ubiquitous, it may affect the

quality and quantity water stocks in the future. Thus, withdrawal of water from the aquifer must be regulated to conserve supplies for future use (Ebarvia 2003). Moreover the protection of watershed which plays crucial role in the recharge of aquifers must also be addressed. Protection of natural resources is a multidisciplinary task that involves watershed stakeholders and professionals from all fields of specialization. It is hard to implement such actions that both upstream and downstream users can benefit the water resources, such that, assessing the potential for watershed management needs to consider two key elements according to White (1992). First, the vested interests are asymmetrically interdependent (i.e. upstream activity affects downstream value); and second the degree of uncertainty (behavioral and physical) exists as to the impact of this interdependence (i.e. downstream owners are uncertain of upstream owner behavior and of the physical impacts of that behavior) (White1992).

However, all these conflicts between the interest of upland and lowland stakeholders, and externalities corollary to the development is due to the intricate interdependencies and interactions in the ecosystem (Falkenmark 1994 as cited by Boberg 2005: pp.99). This is also aggravated with the lack of policy mechanism to promote conservation of resources (Ngugi et al., 2008) and its open access scenario added to the opportunity of every individual exploit the resources which would give way to market failures, which makes economic valuation of watersheds and other ecosystems complicated (Ngugi et al., 2008).

Failure to account the benefits and cost of environmental goods and services would lead to degradation if there is no proper government intervention.

One of economic methods used to estimate the benefits of environmental change- for specific increases or decreases in the level of the service (Boberg 2005) using hypothetical market for non-marketed goods is called contingent valuation method. Contingent valuation method (CVM) is a stated preferences approach that uses survey questions to elicit individual's preference for public goods and services by finding out their willingness to pay for the good and has the capability in capturing both use and non-use values that comprises the total economic value (TEV) of watershed. This valuation of water resources measures environmental benefits that are directly hinged to the economics welfare theory that a certain change in environmental quality will likely to influence the preference of the people to remain in his/her utility level.

Thus, the study was guided by the assumptions underlying the valuation framework shown in Figure 1 which shows the Sibalom Natural Park total economic value which has both use and non-use values as influenced by social space (location, age, gender, etc) and habitus (taste, preferences, exposure). Hence, this study wanted to ascertain the dependency of people's willingness to pay for the protection of watershed (SNP) as affected by socio demographic and socio demographic characteristics and taste preference (habitus).

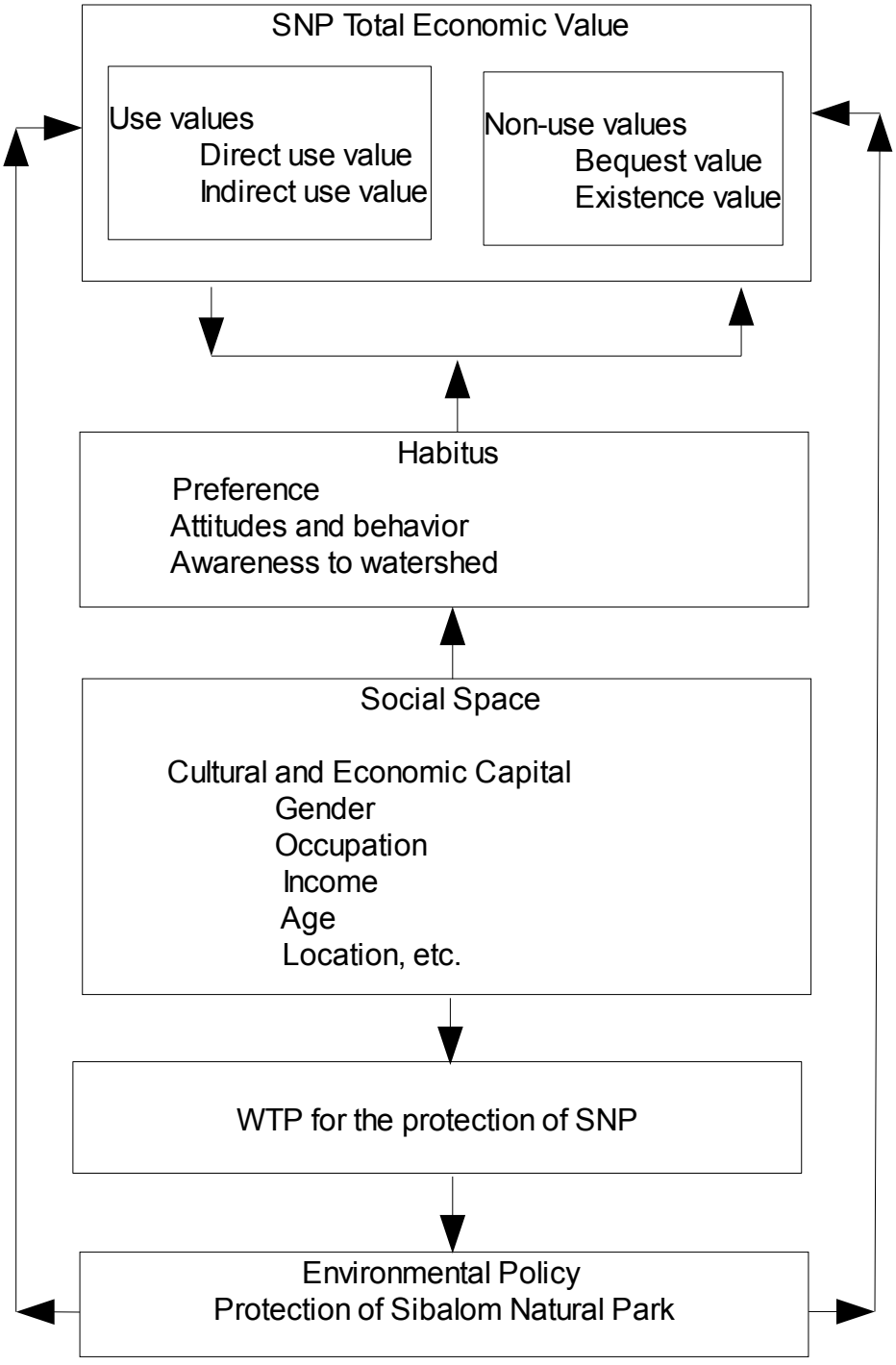

Figure 1. Conceptual model of the Study

THEORETICAL FRAMEWORK

In standard utility theory, motives, affect, attributes, perceptions, beliefs and preferences produce a choice which maximizes utility. The increase or decrease in environment goods and services has its core issues in the social agents' preferences that is derived from Hicksian welfare measures (Ahlheim and Buchholz n.d). Albeit some contends that it is attitude based, these two are intertwined and are affected by price of goods being questioned. From the economic utility theory, the demand of any good can be derived from consumer's utility function. Given income and price of goods they consumed, the utility function is expressed in:

$$U= U [X, Y]$$

Where: U= consumer maximization (taste and preference)

X= is the vector of private goods quantities

Y= is the vector of environment and resource service given to the individual

Thus, the consumer utility maximization problem is defined as

Max U= U[X,Y]

Subject to M= PX; Y

Where: X= private goods ($X_{i.....}X_n$)

M= money income

P= price of goods consumed ($P_{i.....}P_n$)

Y= environmental commodities/goods

The demand curve for private goods is derived from the first order condition of utility maximization from Lagrangian equation.

$$L= U (X,Y)+ \lambda (M-\Sigma PY)$$

λ = lagrange multiplier

From the first order condition for maximum utility, utility is now expressed in terms of income, price and set of environmental quality that is:

$$L_{Xi}= \delta U/\delta X_i - P_i = 0$$

$$L_{Yi}= \delta U/\delta Y_i - P_i = 0$$

$$L_M = M-\Sigma PX$$

This leads to the solution to the utility maximization problem which derives a set of ordinary demand function.

$$X_i = X_i (P,Y, M)$$

Following Ahlheim (2004) household's utility level or stated preference is directly affected with the changes in market price, quantity and quality of environmental goods.

This is expressed in the equation:

$$\Delta^{01} \quad U_h = u^{1} - u^{0} = u_h (p^1, z^1, i^1) - (p^0, z^0, i^0)$$

where: $p^0 \longrightarrow p^1$ = market prices

$z^0 \longrightarrow z^1$ = quality and quantity of environmental goods

$i^0 \longrightarrow i^1$ = income of households (h=1,2,.....H)

Hence, the Hicksian approach evaluates these changes as welfare change that is measurable by its compensating variation (CV) that is an individual with fixed income is affected by the price and quantity of goods being marketed, otherwise can be interpreted as the willingness to pay for the good in

question (Ahlheim and Buchholz n.d.) and equivalent variation (EV).

The former is the money income adjustment necessary to keep an individual at his initial level of utility (U_o) through the change of provision while the equivalent variation is the money income adjustment (U_1) in order to maintain an individual at his final level of utility (Bateman and Turner 1992). Figure 2 illustrates the willingness to pay affected by the changes in environmental goods e.g. quantity and quality (adapted from Ahlheim 2004).

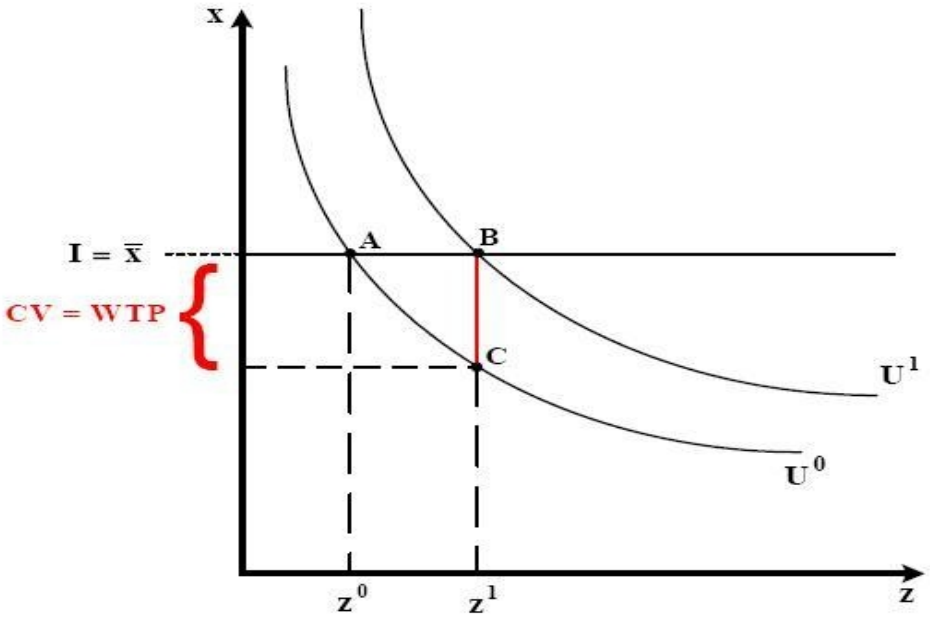

Figure 2. Graphical presentation of willingness to pay

Statement of Hypotheses

The related literature included in this study has significant relationship with

study in a sense that water, as a common good produced from an improved management in watersheds, needs careful attention for efficient allocation. And by protecting water sources, it will follow that the non-use values of watershed services will be protected for sustainability. However, non-use values which is non-marketed is also difficult to capture because this is not being traded in the market, hence a stated preference with contingent valuation method using WTP format is used to elicit the estimates of benefits of protecting the watershed. Understanding its components in the watershed from community level is beneficial to policy makers to impart the interventions based on the perceptions of individual for sustainable water supply. Thus, intervention with proper timing and allocation of resources to the society is deemed important in planning process.

Contingent valuation method thus applies to the rules in eliciting the benefits of certain environmental changes like the protection of Sibalom Natural Park for an improved water supply.

The study hypothesizes two factors that affect willingness to pay like the habitus and social space.

1. Respondent's willingness to pay is expected to have has positive relationship between habitus (taste, exposure, preference) or awareness and attitudes towards environment and watershed functions.

- Respondents who are aware of Sibalom Natural Park as a watershed will be likely much willing to pay for its protection.

- Social space (socioeconomic profile) such as income, age, educational attainment, gender, residency and location is expected to have a positive relationship with WTP. Those with higher income are expected to pay for the protection because they have extra money to pay, while those with matured age is more likely willing to pay because of the importance of watershed functions for the next generation.
- Education: High level of education of respondents also were hypothesized to affect their WTP because of their knowledge about watershed.
- Gender on the other hand, is expected to affect WTP in favor of women. Because they bear the burden of storing and fetching water, therefore want women may be more willing to pay than men.
- Residency and location of respondents will have a positive willingness to pay if they are closer to the watershed.

2. Respondents willingness to pay on the other hand is negatively related to the water availability, alternative water source, bid amount and water quality. Respondents experiencing water shortage will be more willing to pay for sustainable water supply while those with alternative source of water will be less likely willing to pay while households with low water quality will be more willing to pay to avoid inconvenience.

- Bid amount is hypothesized to affect WTP negatively, means that as the bid amount increases, respondents will be less likely willing to pay.

CHAPTER III

REVIEW OF LITERATURE

The importance of sustainable development in every country is subsumed into country's policy as a guiding principle to achieve balance environment and sustainable agriculture for the betterment of human beings. This was addressed to mitigate the looming environmental degradation which is escalating as far as population and globalization is concerned. The influence of humans to our natural resources has paved way for degradation and exploitation of resources which is deemed to be an important issue because humans need nature to survive and it influence human life (Jeong 1997). Thus, if there is no mechanism to regulate the use of a particular resource such as water resources (Ebarvia 2003) environmental degradation will outweigh preservation of environment (Jeong 1997).

Overtime, resource valuation has been proven as an effective tool in providing naturally sound environmental policy from society, economic and environmental purview for sustainable development (Arrow et al., 1993). This chapter reviews the basic concept of economic values of watershed services; willingness to pay approach, and factors that could affect willingness to pay.

Economic Values of Environmental Watershed Services

In the Philippines, there are 93 protected areas with an aggregate of 2. 9 million hectares and 22 are proclaimed as Natural Park under NIPAS (PAWB 2003). There are 41 out of 59 proclaimed watersheds classified as critical (Dixon and Sun 1990). Meanwhile, only 80,272 hectares out of 264,514 hectares in Region 6 that contributes to the total forest cover in Antique (http://forestry.denr.gov.ph/landuse6.htm). Forest contributes to the total land area in a watershed which could affect recharge of groundwater stored in an aquifer.

Watershed is a land-based ecosystem (David 1985) that collects, converts large amount of rain and drains water to a single exit point also known as catchments. While soil type, slope and climate also influence the dynamics of surface and sub-surface water including infiltration rate, water storage and availability (Bassi 2002). It provides myriad functions from economic, environment and social aspects (e.g. plants, timber, animals, minerals and water and many intangible goods such as aesthetics and tourism).

From the economist point of view, this myriad functions of watershed services is composed of total economic value such as intrinsic and instrumental values (Pearce and Warford 1993) or commonly known as use and non- use values.

Types of Use Values

Use values are those that are consumed or utilized directly or indirectly by people (e.g. timber, recreation) whether they are planning to use it or are with possible use in the future. These are direct and indirect use values (Barbier 2003).

Direct use values are derived from actual use includes non-timber forest products, fuel wood, fodder, fruit, and various medicinal and aromatic plants, recreational value, watershed protection, and micro climatic effects (Pagiola 1996). Meanwhile, direct use values of water arise from direct interaction with water resources which are divided into productive, consumptive (use of water for irrigation) and non-consumptive (recreational swimming, or the aesthetic value of enjoying a view) use. Furthermore, the direct use values for groundwater is derived from the direct use of water for irrigation, and domestic use (Goldberg 2007), commercial, and other purposes that is directly consumed by human to satisfy their wants.

Indirect use values of watershed are inherent in ecological systems which provide different functions like the ability to store and regulate flow of water, hold the soil intact in spite of heavy rains (soil retention), ability of the forest trees to sequester carbon, to store a wide diversity of plant and animal species. Other functions of the forest include nutrient cycling and microclimate regulation (Francisco and Espiritu 1999), erosion control, enhanced soil quality, and improved water yield, stabilisation of stream flows.

Option value are the goods and services maintained for future use which arises due to uncertain demand (Barbier et al., 1997). Deals with individual's preference or willingness to pay (WTP) for the preservation of natural resource or for ensuring that the good will be available in future use which also affected by various socioeconomic trends and the welfare change to keep the option open of being able to avail oneself of the direct and indirect uses of the forest at some future time.

Types of Non-use Values

Non-use values are derived from the services that exist as a consequence such as preservation of watershed areas. It comprise a significant portion of a watershed system's total economic value (Goldberg 2007) that is important in implementing policy for watershed management.

Non use values are derived from the knowledge that a resource is maintained for future use intertwined to ethical and altruistic preferences which often times can be more of self interest of preserving the resource for own and society's (bequest and existence) benefits. Non-use values also called instrumental values is something a person willing to maximize from knowing that the good can offer him/her something in the future, mostly considered as anthropocentric or human centered. Because these values are given for those goods and services that are not actually consumed making it hard to quantify the benefits of environmental goods and services such as water (surface and

groundwater).

Bequest value measures what a person is willing to pay to protect the resource for the legacy of environmental attributes or is derived from the knowledge that a feature of a nature resource (e.g. water resource) will be passed on to future generations so that they will have the opportunity to enjoy it.

Existence value is the desire to have the resource intact or preserved in its own right or wanting to have the resource available to mankind for some altruistic or humanitarian reasons irregardless of any personal use.

Attitude and Awareness towards Environment

According to Hackett (1993) cited by Shen and Saijo (2007) personal and social awareness and concern regarding natural environment are the core issues of environmental protection in which sociodemographic determinants have a great influence.

The growing literature in environmental psychology studies about how sociodemographic variables affect individual perceptions and concern towards the environment (White and Hunter n.d.; Shen and Saijo 2007; Cinner and Pollnac 2004) has long been explaining the factors that influence environmental attitudes and behavior which pinpointed sociodemographic variables such as age, income and education and location are the drivers of familiarity with and concern for the natural environment (Brody et al., 2004) which also explains a broad scale of environmental perceptions such as attitudes, views awareness

and concern (Buttell 1987 as cited by Brody et al., 2004). This coincides to the notion of Robson (1969: 199-200) as cited by Jeong (1997) that physical and social environment in which people live was perceived as an important source of forces which influences the development of attitude, behavior and personality.

Nazarea et al., (1998) for example as cited by Cinner and Pollnac (2004) noted that utilization of natural resources based on a variety of social and cultural factors shaped there perception of the resource of which perception also determines its value (Cinner and Pollnac 2004) hence acknowledge perception is already a source of knowing (Chisholm 1977: pp122). Proximity also influence knowledge and perception (Brody et al., 2004), exposure to such resource can cause one an exchange in people's preference (referred as transformative properties) Saggoff (1988) cited by Bateman and Turner (1992).

According to Brown et al., (2002), environmental valuations or values are manifestations of cultural values constructed from a given perspective in time and space based on place based theory. This values (cultural) is important in determining our attitudes (Rogers et al., 1988). However, as we move to this modern world characterized by risk society (Beck 1992 as cited by Picou 1999) modern man becomes reflexive and that 'choice and calculation' becomes viable in structural societal change (Picou 1999).

In addition, Saggoff (1988) as cited by Bateman and Turner (1992) argues that it is 'attitudes' not just preference that determine people's environmental valuations. Because attitudes influences behavior from a theory of

reasoned and planned behavior mediated by intention (Kaiser et al., 1999). Such that environmental concern becomes environmental attitude (Vining and Ebreo 1992 cited by Kaiser et al., 1999; Takács- Sánta 2007).

Willingness to pay approach

Water resource valuations are important in environmental policy because it offers a strategy in providing direction and allocation of resources to the best possible use without degrading the environment. Globally, the number seven goal of MDG has addressed the issue of degraded environment by ensuring environmental sustainability. Conversely, sustainability has a relationship with market failure. Without proper pricing of the resource, individual may not have anymore the incentive to conserve the good they consumed. These issues were not tackled especially that natural resources like water is considered a free resource in the people's minds. In addition, pricing natural resources can be a burden on the side of the consumers, but proper pricing of the resource can also give value to the goods and services (Ebarvia 2003).

Resource valuations has its roots in welfare economics which seeks to develop better procedures for allocating the total resource base among potential uses and users to meet individual group needs (James and Lee 1971).

Non-use values can be elicited under a stated preference approach using contingent valuation method (CVM) with willingness to pay (WTP) format that capture both use and non use values using hypothetical markets to estimate the

benefits of environmental changes.

Willingness to pay has a direct relationship with demand curve for a good or service. This demand curve indicates how much a consumer is willing to pay for an extra unit the good in question which price of the good affect individual preference (Turner et al., 2004). In economic theory, WTP has the usual assumption of a downward sloping demand curve, meaning as the offered price increases, the percentage of 'yes' response also decreases (Hartwick and Olewiler 1998). This is referred as compensating variation (CV) or the willingness to pay, or the measure transfer from an individual to keep his utility constant (Alberini and Cooper 2000).

There are several studies that have been made to value non-marketed goods and services using CVM (Alberini and Cooper 2000) in developing countries in which the widely used technique in eliciting WTP in developing countries is the dichotomous choice approach using different bid value for different social spaces of respondents. Boardman et al., (1996) as cited by Gunatilake et al., (2007) summarizes major strengths and weakness of elicitation techniques on CV method in which, dichotomous choice approach weakness is that it requires large sample size but it has very small starting point and strategic point bias. In addition, 'take it or leave it', reduce hypothetically and approximate the market as compared to open ended and closed ended iterative bidding method which are have generic weakness on startin point, strategic, embedding and hypothetical bias. Closed ended iterative bidding may lead to some higher

valuation (Gunatilake et al., 2007).

On the other hand, there is also measurement of individual's willingness to forego under the scenario of decreasing environment changes called willingness to accept (WTA). However, the former was widely used in developing countries because of the issues connected to it. One criterion suggested in choosing the format is on the issue of property right (Predo 1995). Willingness to pay is said to be appropriate if one losses access to the resource due to increase in non-use benefits (Shyamsundar 1993 as cited by Predo 1995).

In the Philippines, contingent valuation was utilized in various ways such as for valuing watershed protection services (Calderon et al., 2004, Amponin et al., 2007), estimating economic benefits for recreation, biodiversity preservation (Predo 1995; Bulayog 1998), measuring surface water quality (Choe et al., 1995), used to obtain WTP for watershed function (Soguilon 1996, as cited by Francisco and Espiritu 1999), and utilized for the development of market-based instrument for watershed management fee (Cruz et al., 2000).

In foreign countries, CVM is also used to capture the preference regarding flood control measures (Zhai 2006). In addition, CVM is used to assess health effects of pesticides among Nicaraguan vegetable farmers to measure their willingness to pay (WTP) for low toxicity pesticides (Garming and Waibel 2006). It is noted that farmers are willing to spend about 28% of current pesticide expenditure for avoiding health risks while WTP depends on farmers' experience with poisoning, income variables and pesticide exposure (Garming and Waibel

2006).

Calderon et al., (2004) was able to estimate the WTP of Manila residents placed on the water supply improvements that will result from better management of the four watersheds Angat, Ipo, Umiray and La Mesa watersheds . The results shows that Metro Manila residents have a low level of awareness about watersheds, but possess a good grasp of the role forests play in sustaining water supply as compared to the study of Amponin et al., (2007) which the residents could not link the relationship of the degraded water resource to the supply of water, but on the one hand Tuguegarao domestic water users have a positive willingness to pay to ensure a reliable water supply and may possibly be used as potential revenue for watershed protection (Ibid).

Calderon et al., (2004) found out that 60% of the respondents revealed a willingness to pay for improved watershed management which the logit model comes up to P29/month/household while Cruz et al., (2000) had similar findings based on the analysis that users are willing to pay an additional amount ranging from $0.03 to $0.04 per cubic meter of water they use which is about 67% of the domestic water users agreed to pay for the amount.

Predo (1995) on the other hand showed significant estimates of people's willingness to pay for the preservation and protection of Lake Danao National Park in Ormoc City using CVM, where the mean total WTP for environmental attributes protection was estimated to be P118.44 for urban respondents and P89.29 for rural respondents. Furthermore, Choe et al., (1995) has employed

non-market valuation techniques other than CVM travel cost method in Davao. The result revealed that the estimates are close to each other which imply that households in Davao are not really concern of the water pollution control. Soguilon (1996) as cited by Francisco and Espiritu (1999) used the CVM to obtain how much current users are willing to pay to protect the MFR for its watershed function. The results of the study showed that WTP varies by type of users and by the mode of collection. For instance, household sector WTP averages to P95.88 for a one-shot donation to protect the area while farmers would be willing to pay the least with none for monthly fee to P11l .07 for a one-shot payment and resort owners have an average WTP for P251.67 for a one-time fee or P68 for a yearly donation and an estimated monthly donation was P10.67 since they have direct business interests for the protection of the area; hence they are willing to pay more.

CVM were also conducted to investigate public preferences regarding flood control measures (Zhai 2006) which found out that most residents expect some flood control measures and have diverse interests in river management where nearly half of the respondents accept no flood risk at all. The WTP levels for different measures range from 2,887 to 4,861 in terms of the mean and from 1,000 to 2,000 in terms of the median.

CVM approach has also been conducted in comparison with other approaches; an example closely related to the method is the choice experiment. For instance, the Danish Government employed CVM and choice experiment to

estimate the willingness to pay for the protection of groundwater versus purification water before it will be distributed to households. The results showed that there ground water protection are greater than the willingness to pay for purified water. It also resulted to the water service payments in addition to households' present annual water bills, and reflects the respondents' willingness to pay for the good, "good drinking water quality"- obtained by protection or purification, as well as good living conditions for flora and fauna in lakes and watercourses. The initial average payment of 4,000 DKK/year represents the present cost of water delivery and wastewater disposal, as well as some of the costs for the present level of drinking water protection (Hasler et al., 2005).

Factors Affecting Willingness to Pay

Several studies about CVM have shown wide literature on independent socioeconomic variables that can affect the choice of the respondents willingness to pay for environmental protection. Choe et al., (1995) for example found out that location (e.g. near in flood zone) and use of the resource (Times Beach Resort) will have a positive willingness to pay for the plan proposed in the study. Another study also found out that location such as close to the river were observed as significant factor that affect willingness to pay (Vaughan et al., 1999) in Tietê River in City of São Paulo, Brazil. It was noted that households closer to the river expressed an estimated WTP for P4.74/mos while those that were far from the river has WTP of (-1.27) lower than that of the former (Ibid).

In addition, like many studies income and age were also great factor that is significant in the results of the positive WTP.

Calderon (2008) for example studied the willingness of residents surrounding Mt. Isarog shows that bid amount, income and age affect their WTP, while some of them were not willing to pay because it is assumed that it's the government that should shoulder the cost of protecting the environment. Predo (1995) found that the preservation demand and total willingness to pay for environmental attributes were influenced by age, household income, sex, rate of forest visitation, for entrance fees and the concern of the respondents environmental preservation. Likewise, respondents with higher education were likely had positive willingness to pay for the preservation of the environment (Predo 1995).

CHAPTER IV

METHODOLOGY

A. Selection of the Study Sites

This study was focused in Sibalom Natural Park, Sibalom, Antique. The initial tasks involved determining the municipalities supported by Sibalom Natural Park (SNP) through irrigation, domestic and industrial use. The sources of information of this activity included:

a) base maps of Antique showing boundaries between municipalities

b) documents from DENR Region 6 showing the watershed tributaries of Sibalom Natural Park

c) data on watershed delineation in SNP

Based on this activity, five municipalities namely Belison, Hamtic, San Jose, San Remegio and Sibalom were identified as direct beneficiaries of irrigation and domestic water from the SNP (Figure 3).

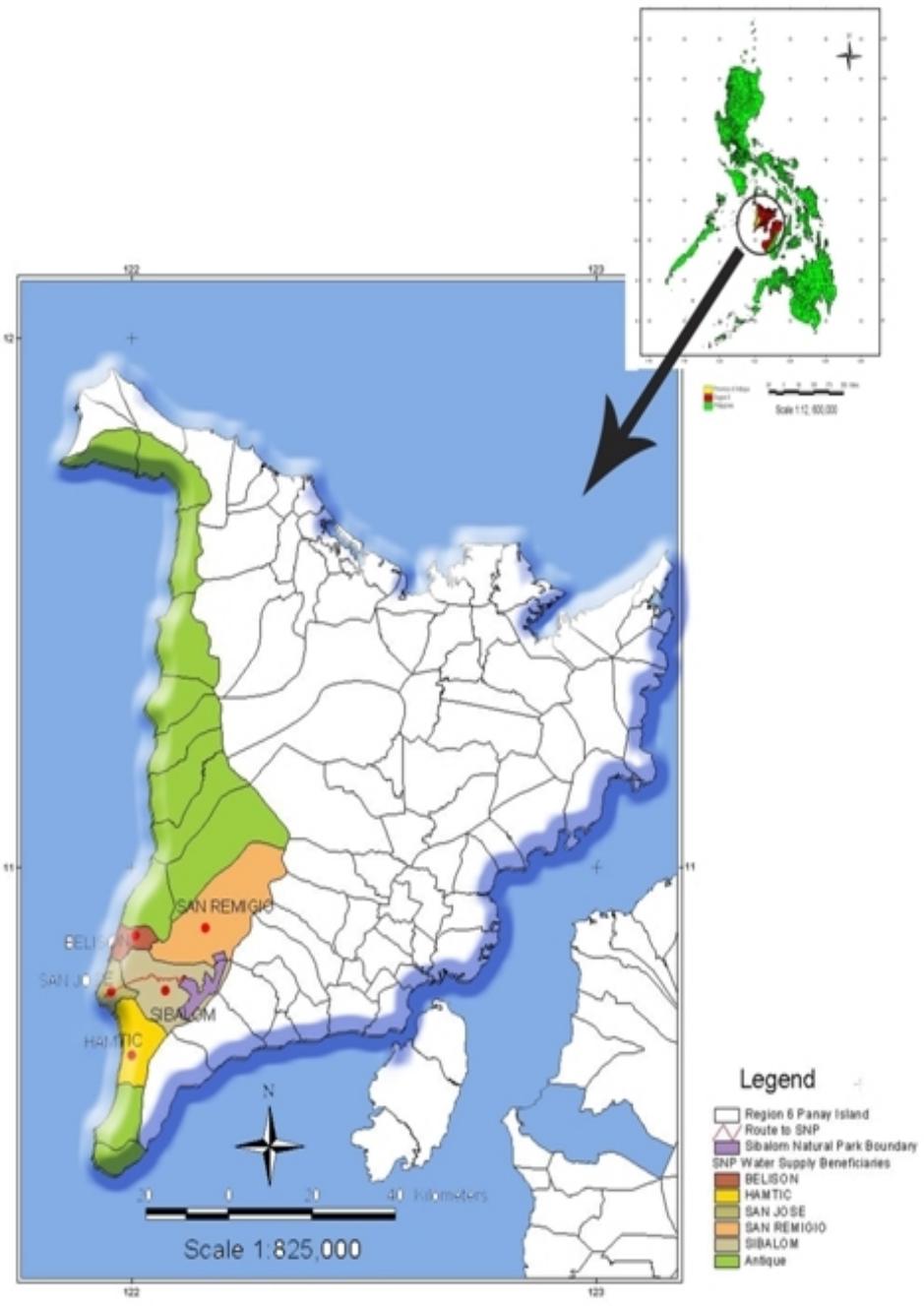

Figure 3. Map of Antique showing five municipalities benefited by SNP

B. Selection of Study Villages and Respondents Beneficiaries

Each of the five municipalities was visited to obtain the names of the villages and a complete list of water consumers connected to water districts.

The data collected from different government offices includes municipal profile obtained mostly from Municipal Planning and Development Offices (MPDO) in each municipality. After consolidating the data from these sources each municipality was found out having its own water system such as water districts, water works and water systems operated by LGU.

Since the study is only interested in household water users, the list of water consumers were collected from Belison Water District, Hamtic Water District, Sibalom Water District, San Jose Rural Waterworks Sanitation Association and San Remegio Water System mostly assisted by the managers and staff of their respective offices. Forty three (43) villages were identified with water connection from these water districts, water works and water system operated by LGU's with a total of 6,610 household connections (see Appendix Table 1b). Although household with water connections were the focus of the study, it was observed during the field survey that some of the names from the list were not anymore active members to their water service providers (Appendix Table 3b). However, they were still considered to be part of the respondents since they were connected previously to water service provider.

C. Selection of Survey Respondents

The computation of sampling size followed the formula by Cochran (1977) as cited Bartlett et al., (2001) used for the household survey. The computation of sample size was determined using the formula:

$$n = \frac{(t)^2(p)(q)}{(d)^2}$$

Where: n= total sample size

t = value for selected alpha level of .025 in each tail =1.96 (the alpha level of .05 indicates the level of risk the researcher is willing to take that true margin of error may exceed the acceptable margin of error

(p)(q) = estimate of variance

d = acceptable margin of error =.05, error that the researcher is willing to accept

p = maximum possible proportion households with water connections

q = 1-p, produces the maximum possible sample size

The proportion of household with water connection was estimated at 50% from the five municipalities, but it turned out to be 53.66% (Table 1). This was used to come up with the maximum variance to which will also produce maximum sample size (Bartlett et al., 2001).

Table 1. Summary of household water connections and by municipality

Municipality	No. of HH in Barangays Served	No. of HH Connections	% to total households	No. of Respondents
Belison	1513	81	5.35	5
Hamtic	445	299	67.19	17
San Jose	7272	4496	61.88	263
San Remegio	484	210	43.38	12
Sibalom	2602	1524	70.21	103
Total	12318	6610	53.66	400

The computed and corrected sample size based on the formula and values used was 382 adjusted with a 95% response rate. This was computed using the corrected minimum sample size of 363 using the formula:

Where: population size = 6610

n_o= required return sample size (363)

n_1= required minimum sample size

The corrected sample was then computed based on the required minimum sample size and its response rate using this formula:

$$n_{2=} n_1/rr$$

Where: rr= anticipated return rate= 95%

n_1= minimum sample size corrected (363)

n_2= sample size adjusted for response rate (382)

Table 2 summarizes the total number of barangays which has water connections by municipality. Only 20.6% of the out of total barangays with water

service connection were found out from the five municipalities. The respondents per municipality were selected based on the proportion of households with water connection from water districts and water works. Thus the municipality with higher number of consumers has the higher number of respondents.

Table 2. Summary of service area by municipalities

Municipality	No. of Barangays in the Municipality	No. of Barangays served	Percent
Belison	11	6	54.5
Hamtic	47	5	10.63
San Jose	28	20	71.4
San Remegio	45	2	4.44
Sibalom	77	10	12.98
Total	208	43	20.67

Source: BWD. HWD, SJRWSA, SRWS, SWD 2008

D. Household Interview and Survey Protocol

A random sampling without replacement was observed during entire survey. In some cases where household head or a representative of their household (e.g. spouse or child with 18 years of age) is not available for interview, the team proceeded to another household based in the master list.

The individual interview were carried out in Sundays through Fridays and holidays to ensure that the heads of the family/household would be available.

Proper protocol such as written notice from the Office of the Mayor and courtesy calls were made through collaboration of local officials in the survey

villages. In addition, to obtain a hundred percent participation, local official such as Villages Patrol Officer (Barangay Tanod) and Villages Councilor accompanied the team. Despite to the strong engagement between the team and village officials there were still households which were not interviewed because of the following reason (Appendix Table 3a).

E. Collection of Secondary Data

The study utilizes the following data to define the Sibalom Natural Park and its beneficiaries. The sources of data includes Haribon Foundation Report (Sibalom Natural Park), DENR Mau-it Tipuluan watershed profile, National Irrigation Administration (NIA), population data from NSO, and rice farmers data from Provincial of Agriculture Office in Antique. Moreover, the collection of data pertaining to the study area were gathered such as:

1) Physical characteristics

2) Social, political and demographic characteristics

3) Economic conditions

4) Projects and activities regarding SNP and the watershed

5) Population for the years 1980, 1985, 1990 1995, 2000 and 2007

6) Land area of various land uses and classes

7) Number of water consumers connected to water district, waterworks, and water system operated by LGU per municipality

This information was obtained through a careful review of existing

municipal records, CLUP and personnel interviews with MPDC, MPDO. List of names of water consumers were collected from water districts in each municipalities and personal interview with General Managers of the districts and personnel from NIA.

F. Key Informant Interviews

Initial consultation with water service providers and agencies from five municipalities that uses groundwater as source of drinking water was conducted to know the current water situation, water use behavior, existing water sources, characteristics of existing water sources in terms of quality and quantity and associated expenditures.

G. Focus Group Discussions

Focus group discussions (FGD's) were conducted before the CV survey took place. These FGD's were used to elicit and discuss the current status of the watersheds, the programs and activities that were being implemented to maintain the health of the watersheds and any problems that had been encountered and the bid amounts that will be used in the questionnaire (Appendix 5a). In most cases, the FGD's were assisted by Barangay Officials from the selected barangays in the five municipalities attended by 5-14 persons both men and women. The FGD participants were asked whether they would be willing to pay for improved watershed management. Those who answered "yes" were asked

with an open-ended question about the highest amount that they would be willing to pay per month. The FGD were able to elicit bid amounts of P1, P5, P10, P20, P50, P100 and P200. Some participants suggested that the bid amount for the elicitation of WTP for watershed protection is five percent (5%) of the monthly bill but were disputed by the participants because it is too high for the low income users.

H. Training of Enumerators and Pre-test

Training of enumerators was conducted to brief and orient them about the valuation study and good interview practices. Enumerators from the five municipality were contacted from the Municipal Agriculture Office. After the briefing, a pre-test was conducted to hone the enumerators' skill in interviewing. Careful review of questionnaires was also encouraged to the enumerators for accuracy. After the pre-test, editing of the questionnaire was done based on the feedbacks and opinions from the enumerator's personal survey trials.

I. Selection of Bid Amounts

The bid amounts that were generated from FGD's were randomly assigned among the respondents in such a way that each bid was presented to an equivalent sub-sample. On the other hand, unrealistic bid amounts like P300 that arise during the FGD were not considered because it is too high for the average monthly water bill.

J. Description of the Protection Program of SNP

The willingness to pay by respondents for the protection of watershed was determined using binomial Logit model with a dichotomous or discrete choice valuation format. In this case, the respondent were asked whether or not he or she would be willing to contribute to a trust fund that would be used for the protection and improved management of the Sibalom Natural Park supplying water to their municipality. The description of the protection program was introduced as follows:

The proposed protection program of SNP will help reduce or eliminate illegal logging, kaingin (slash-and-burn cultivation), forest fires, wildlife poaching, squatting, and other destructive activities in the watershed. In the long run, you will have a more stable water supply because of the improved management of the watershed. There will be more water during the dry months, and occurrence of floods will be minimized. Aside from these, the watersheds will also become a more reliable source of hydroelectric power and a source of recreation services. In other words, improved watershed management will provide a whole package of benefits to you and to the society as a whole.

Suppose a trust fund for the improved management and protection of the Sibalom Natural Park will be created. The trust fund will be managed by a council composed of various stakeholders - water users like you, water distributors, government (Department of Environment and Natural Resources/National Water Resources Board), Local Water Utilities Administration and local water districts, local government units, non-government organizations. This council will decide the activities that will be supported by the fund, all of which should directly be related to watershed management.

K. Willingness to Pay Elicitation

The willingness to pay for a change in environmental quality is computed using Logit regression model (Calderon et al., 2008) shown in the formula below.

$$\Pr(\text{WTP} = \text{Yes}) = \frac{1}{1 + e^{-z}}$$

Where : WTP = 1 is the equivalent to 'yes' response

$z = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + A$

$X_1, X_2 \ldots\ldots X_6$ = are the independent variable

A = bid amount

α , β ' *s* = parameters to be estimated

Following Calderon (2008), the mean willingness to pay was determined using the formula:

$$\text{Mean WTP} = \alpha/\beta$$

Where: α= is the constant plus the coefficients of other variables multiplied by their respective mean values

β= coefficient of bid amount variable

The definitions of dependent and independent variables are coded as shown in Table 3. In this study the dependent variable was willingness to pay (WTP) of households for the protection of watershed (SNP) for sustainable water supply while independent variables were divided into socioeconomic characteristics, attitude, awareness and perception of watershed functions, water use, source and expenditure and categorical and other variables.

Socioeconomic variables include age, educational attainment, household size, and income, number of year's residency, gender and civil status. Awareness of environmental programs, reading books or listening to concerning environment, membership of any environmental groups, and awareness of SNP and watershed were among the independent variables included in attitudes and perceptions about watershed functions. Independent variables under water use, source and expenditure includes water connection, perception of main water source, alternative source of water, availability of water, water quality acceptability, and safety of water. Location of residents and the form of CV questionnaire used were in the categorical independent variable.

Table 3. Definition of variables used in the willingness to pay for the protection of Sibalom Natural Park

Variable	Description
Dependent Variable	
Willingness to pay (WTP)	Willingness to pay of household for the protection of watershed (SNP) for water: 1 if yes, 0 otherwise
Independent Variable	
A. Socioeconomic characteristics	
AGE	Age of respondent (years)
EDUC	Number of school years of household head or representative
HH SIZE	Number of household members
INCOME	Households monthly income (P)
RESIDYEAR	Number of years the household is residing in the area
GENDER	A dummy variable for gender: 1 if female, 0 otherwise
CSTAT	A dummy variable for civil status: 1 if single, 0 otherwise

Table 3. (Con't...Table 3)

Variable	Description
B. Attitude, awareness and perception of watershed functions	
PROGAWARE	A dummy variable if household is aware about environmental programs and projects: 1 if yes, 0 otherwise
READBOOK	A dummy variable if household or household representative read nature books or listen to environmental news: 1 if yes, 0 otherwise
PERCEPT	A dummy variable if household perceived ground water as main source of water: 1 if yes, 0 otherwise
MEMORG	A dummy variable if household or representative is a member of environmental groups: 1 if yes, 0 otherwise
SNPAWARE	A dummy variable of awareness about SNP of respondent: 1 if aware, 0 otherwise
WSHEDAWARE	A dummy variable of watershed awareness of household: 1 if aware, 0 otherwise
SNPWAWARE	A dummy variable of awareness about SNP as watershed of household: 1 if yes, 0 otherwise

Table 3. (Con't...Table 3)

Variable	Description
C. Water Use, Source and Expenditure	
CONNECTION	A dummy variable of water connection of household: 1 if connected, 0 otherwise
BILL	Households monthly water bill
SOURCE	A dummy variable of alternative water source of household:1 if used only water districts, 0 otherwise
AVAILABILITY	A dummy variable of water availability of household: 1 if less than 24 hrs of water supply, 0 otherwise
QUALITY	A dummy variable water of household: 1 if highly accepted, 0 otherwise
SAFETY	A dummy variable of water safety of household: 1 if safe, 0 otherwise
D. Categorical and other variables	
RESLOC	A dummy variable for location of household: 1 if HH within Sibalom, 0 otherwise
CVFORM	A dummy variable for questionnaire format of household: 1 if CV1, 0 otherwise
BIDAMT	Bid amount used in willingness to pay elicitation

L. Contingent Valuation Question Format

There were two sets of CV questionnaire used in this study which was guided with the ones used by Calderon et al., 2004 and Amponin et al., (2007) with a dichotomous-choice referendum format (see Appendix 6). The first CV question (CV Question I) did not mention that other users of watershed services would also pay for their upkeep while the second CV Question II, respondent will be made aware that other users would pay. This was done in order that the respondent will not have an incentive to misrepresent their valuation to the environmental good (Calderon et al., 2004)

The questionnaire was divided into four parts presented in the following 1) brief background information of the study, particularly details of their water sources, uses and expenditures and their awareness about watersheds 2) assessment of the respondents WTP for improved watershed management, presentation of the information in their water supply situation in their municipality, the role of forests and watersheds in sustainable water supply and the proposed trust fund, and WTP elicitation 3) assessment of the respondents payment vehicle or institutional arrangements 4) the last part includes socioeconomic profile of the of the respondents. The questionnaire used was translated into Filipino (Tagalog version) as suggested during the training because it is the national language. The English version of the questionnaire is shown in Appendix 6.

Prior to the elicitation of the willingness to pay question, an illustration of water cycle and watershed function was shown to the respondents to shun misconception of the natural resource being valued (see Appendix 7).

M. Data Entry, Processing and Analysis and Presentation

Both qualitative and quantitative approaches were used in analyzing the data gathered from the survey and field observations. The management and analysis of data from the survey proceeded in three sets of subtasks corresponding to: (i) data entry and processing, (ii) calculation of descriptive statistics, and (iii) cross-tabulation of summary statistics.

Arcview 3.2 were used to digitize base and index map of the municipalities and the Sibalom Natural Park, while the data recorded on the questionnaires are transferred into the selected data management software (e.g., Microsoft Excel and SPSS v.15) using codes developed during the survey design.

Open source software for econometrics (i.e. GRETL v.1.8) was used to estimate mean WTP from the result of Logit regression analysis while statistical tools (e.g. SPPS 15) was used to describe data on the household descriptive statistics (e.g., mean, median, standard deviations, and range) to understand and describe all of the variables in the data set to ensure additional quality assurance and quality control measure (Gunatilake et al., 2007).

BACKGROUND INFORMATION OF SIBALOM NATURAL PARK

History of Establishment

Sibalom Natural Park (SNP) was established as Mau-it Tipuluan Watershed Forest reserved 10 years ago under Presidential Proclamation No. 605 June 28, 1990 by President Corazon C. Aquino (DENR 1998, Haribon 2004). It was proclaimed as Natural Park in Region 6 under the NIPAS (http://www.pawb.gov.ph/PAWB_Policies/STAT_CY2003.pdf) Act on April 23, 2000 with the Presidential Proclamation No.282.

Sibalom Natural Park/Mau-it Tipuluan Watershed has an area of 5,511.47 hectares which is 20% of Municipal Area of Sibalom (26,984 has) 10 km from San Jose the capital town of Antique geographically situated at 120^0 and 04' to 122, 11'and 10" longitude with the latitude of 10 and 49. The park is bounded on the north by the Municipality of San Remigio and Belison, on the east by the Province of Iloilo, on the south by the Municipality of Hamtic, and San Jose on the west (Figure 4). SNP is famous and is recognizable by people as Mt. Banagon the old growth rainforest and Mt. Poras. Fifty years ago about 500 hectares was planted to Mahogany, Teak, Lumbay, Palosanto, etc. and presently it is one of the priority sites for the proposed KFW project.

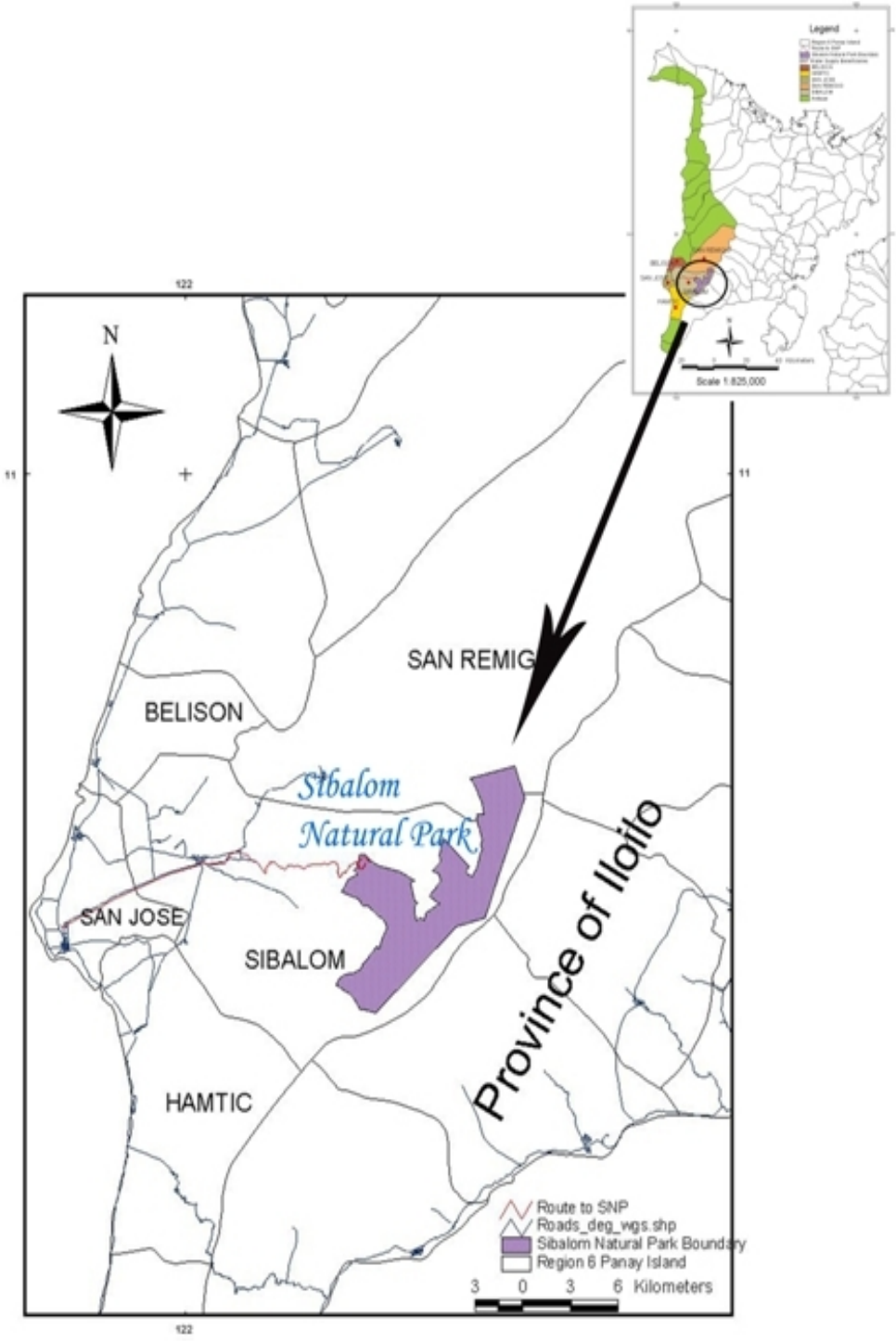

Figure 4. Map of Sibalom Natural Park showing the five municipalities

Topography ranges from flat, slightly rolling to very steep slopes which ranges from 0 to above 50%. Its elevation ranges from 80 to 800 meters above sea level. The bedrock of the watershed that comprises the primary and secondary layers is sedimentary rocks specifically of quaternary alluvial formation. This is composed of unconsolidated deposits of sand and gravel along stream beds, banks and lowlands. Whereas, the upland are of Pakol which are igneous and sedimentary rock formation (DENR 1998).

Socioeconomic Characteristics

The park is composed of 16 barangays namely:Cabladan, Bontol, Luna, Tordisellas, Imparayan, Tula-tula, Igpanulong, Luyang, Calo-oy, Bugnay, Cabanbanan, Indag-an, Lambayagan, Grasparil, Igparas, Bulalacao. It has a total of 3,317 populations in the forest edge barangays or 1815 households (see Appendix Table 6.1). However, the population in 2007 doubled from the year 2006 based on the data from NSO which is about 7, 422 (Table 4) as compared from the data from Bureau of Agricultural Statistics (BAS 2006).

Farming remains the primary source of income of households wherein 53. 28 percent of the households in the forest edge barangays were engaged into it with 987.28 hectares of total farm area which most of the farming households also owned the lot. From the PAO (2008) data, there were 576 who owns the farm while only 243 household lease for farm lot for their livelihood generation.

While rice farming remains to be the major farming in (52.01%) the barangays in the SNP, farmers rely mostly on rain fed for their water supply in lowland area with approximately 84.7 percent and 7.5 percent of the upland areas. A lesser percentage were observe that benefits irrigation water in the forest edge barangays in SNP, which agreed to the findings during the key informant interview that the barangays near the SNP have less or no water at all especially during drought season (Appendix 3a). Table 4 presents the summary of socio economic profile of forest edge barangays in Sibalom Natural Park.

Table 4. Summary of forest edge barangays in Sibalom Natural Park

Variable	Total	% to total households	% to total farm area
Population (as of 2007)	7422		
Number of households (as of 2006)	1815		
Number of barangays	16		
Total farming households	967	53.27	
Total farm area	987.28		
Land tenure			
Owned	576	59.56	
Lease-holder	243	25.12	
Ecosystem			
Irrigated			7.68
Rain fed			
Lowland			84.7
Upland			7.50

Source: Provincial Agriculture Office, San Jose Antique 2008, NSO 2007, BAS 2006

Figure 5. Rice farm area in some areas in the park

Accessibility and Transport

Sibalom Natural Park can be reached from the town proper of Municipality of Sibalom by jeepney through barangay/feeder road that could be reached up to the barangays of Imparayan and Igpanulong which is 11 km distance during summer. Barangay Imparayan serves the main entrance for tourist who wants to visit and experience the wonderful scenery of the park and to witness the famous Rafflesia speciosa. On the one hand, some of the people who are already familiar about the access road of the park, tends to go the other way. In some instances Barangay Luna which is located at the foot of Mt. Poras also served as an alternate route in going to some other barangays inside the park. This barangay can also be reached by motorcycle approximately 7 kilometers from Sibalom.

However, the easiest way to visit the park is through Barangay Imparayan and Igpanulong. But during rainy season, the jeepney transport is available only up to the Barangay of Villafont while the remaining 5 kilometers distance to the site can be reached by hiking or by motorcycle. Hiring motorcycle cost only P40 per person and double for special trip. Transportation going to Imparayan is readily available particularly on Tuesday which is the market day of Municipality of Sibalom.

a) Mt. Poras viewed from Barangay Luna

b) Closer view of Mt. Poras from Barangay Imparayan

Figure 6. Mt. Poras inside the natural park

Soil Characteristics

The soil in the area is composed of two groups namely: alluvial soils and miscellaneous land types. The alluvial soils consist of two soil series of (a) Sta. Rita and b) Umingan type fine clayey family moderately deep and poorly drained soils. These soils have a gray to dark gray horizon with reddish and dark yellow brown mottles. Solum depth ranges from 50-100 cm gray to dark gray, very dark grayish brown and grayish basic colors with few pale olive to olive yellow mottles (DENR 1998).

Flora and Fauna

The park is abundant in natural resources of flora and fauna. The famous biggest flower in the world Rafflesia speciosa & Amorpophallus as the tallest flower is also found in the forest inside the park particularly in Mt. Poras. There are a hundred (100) species of birds were found in the park and half are dependent on the forest for their survival while 30 were found to be endemics (DENR 2008). In addition, a globally endemic species like Visayan Spotted Deer (Cervus alfredi) endemic to Panay Island only Panay Bushy Cloud Rat (Crateromys heaneyi),Tarictic Hornbill(Penelopides panini) Waldens Hornbill (Aceros waldeni) is present in the park.

Hydrology

The watershed being the headwater source of Sibalom River supports municipalities of Sibalom, San Jose, San Remegio, Belison, Hamtic and some part in Patnongon for irrigation, domestic and industrial water use (NIA 2008) including other tributaries such as Indag-an creek, Cabladan Creek , Simsim Creek, Lakyan Creek, Imparayan and Cogon Creek.

Mauit-Tipuluan has an average flow of 20,000 m^3 daily stretches of about 564 kms with surface run-off of the area estimated to reach 100 cu.m./year used for domestic industrial and irrigation, supporting 5,416 hectares of agricultural lands and 4,191 farmers (NIA 2001) in the southern part of Antique. It also supplies domestic water demand of influenced barangays and a potential source of domestic water supplies of the 5 municipalities (AHDP 2008).

National Irrigation Administration (NIA 2001) updates showed a total of 4,191 farmers and 3, 451 landowners served with irrigation with an average lot size of 1.2085 hectares (Ibid). The firmed up service area to date is 5, 065 hectares that supported irrigation for rice as their main crop. The National Irrigation System (NIS) have recorded an average yield of 86 (cav/ha) during wet season and 79 cav/ha in dry season.

In the forest edge villages of SNP, a total of 7.68 % out of 987.28 hectares are irrigated based on the data from Provincial Agricultural Office (PAO) [as shown in Table 4]. The average yield depends on two seasons which is wet and dry with an average temperature of 27.2 degrees centigrade and recorded rainfall

data of 130 mm with peak rainfall during typhoons and minimum input during summer of 179.7 mm -200 mm (DENR 2008).

In 2006, the highest average daily rainfall recorded is 25.04 mm in the month of September while on this same month in year 2007 it has 33.18 mm of rainfall that was recorded (see Appendix Table 2c). The diagram below shows the monthly rainfall distribution in millimeter from Tipuluan Rain Station (Geerling 20 08). The service area of Sibalom river is shown in figure eight.

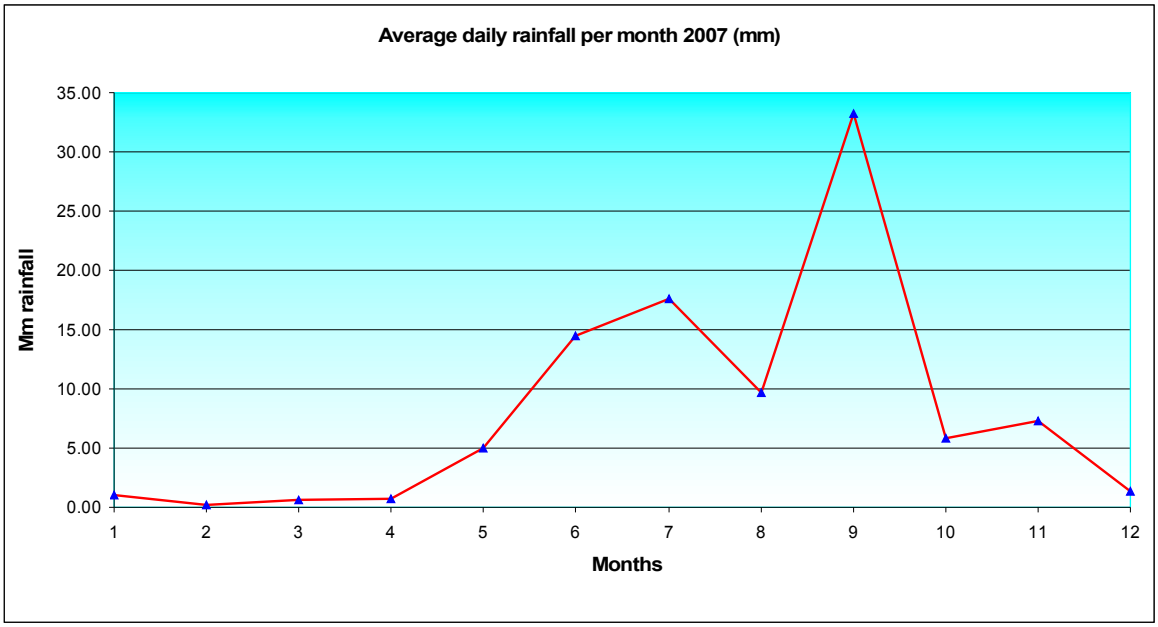

Figure 7. Average daily rainfall per month in 2007

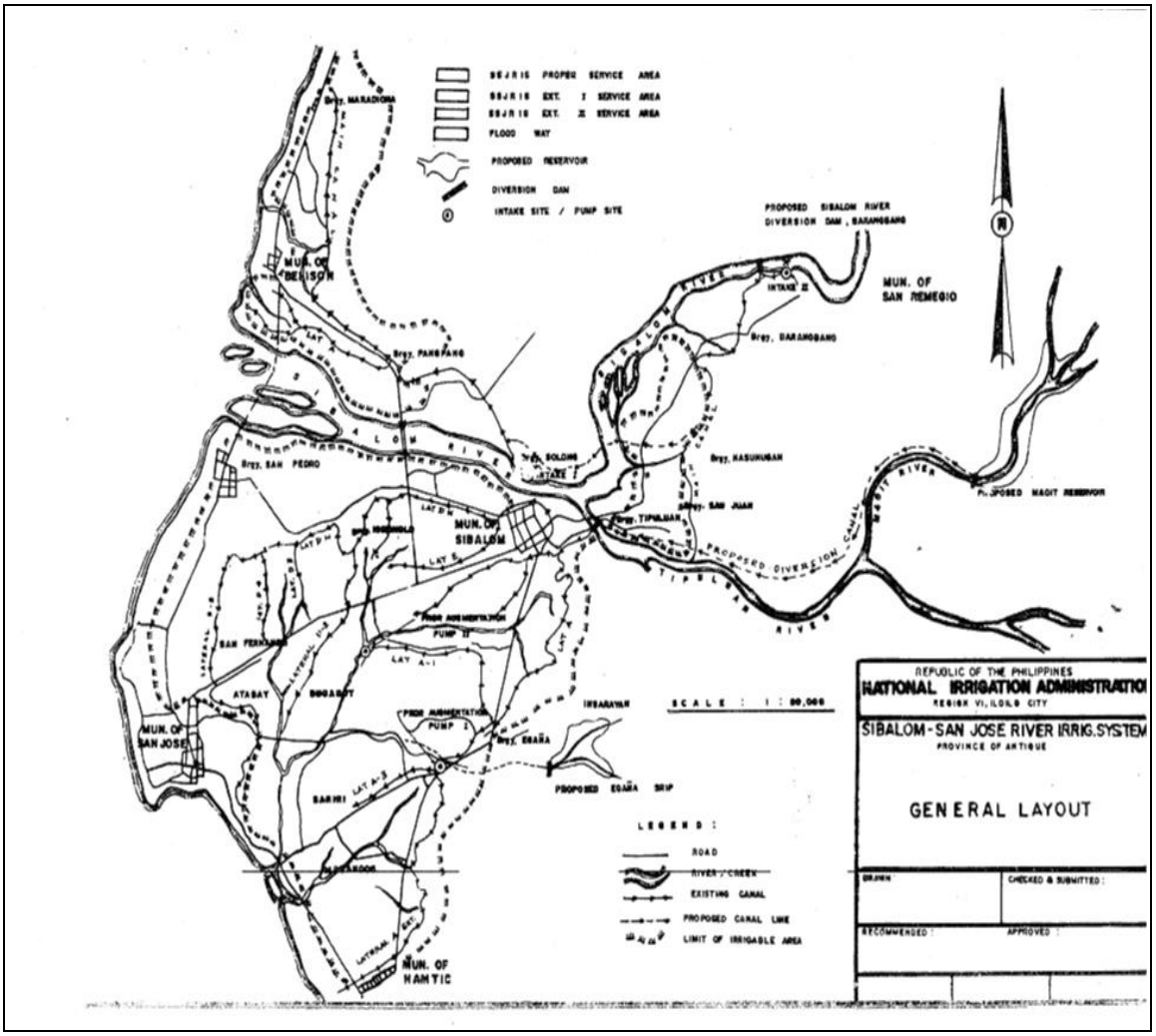

Figure 8. Service area of Sibalom River coming from SNP

Land Cover Types

The park has a total of 5,511.508 hectares of land divided into different land cover types (Figure 9). Majority of the land is devoted into cultivated areas mixed with brushlands/grasslands of about 76 % of the total land area. While grasslands constitute 4% of the total land area or merely 208 hectares, arable lands mainly cereals and sugar were only .011 hectare of the area and the rest is classified into open canopy, maturely covering ≤ 50% of the area or 1090 hectares. The figure below shows the present land use in the park.

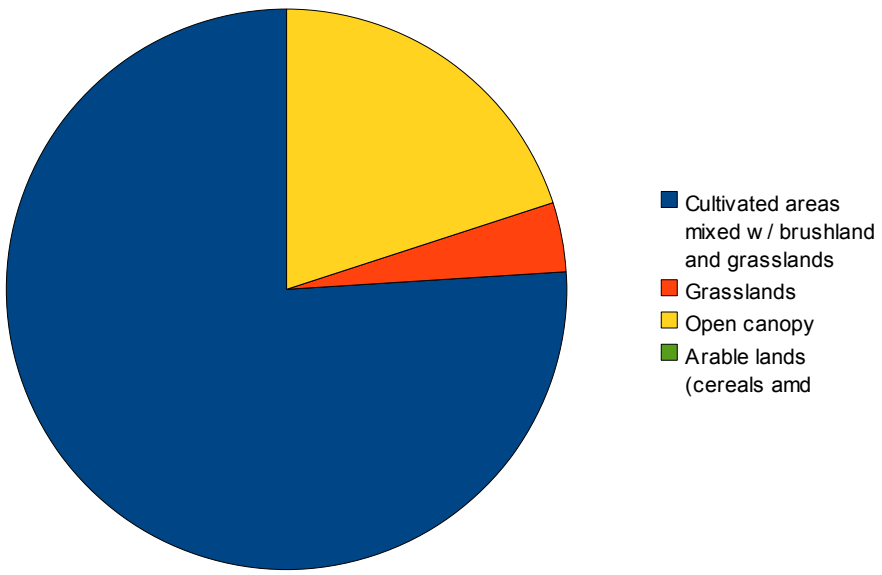

Figure 9. Land cover types of SNP

Vegetative Cover

The park is composed of old growth forest about 672 hectares (12 %) located at So. Tig-iro and Costan. Open Cogonal contribute 947.79 hectares (17%) located in some portion of Barangays Cabladan, Luna, and Bad-as, while alienable and disposable lands is only 25 % or 1,345.44 This can be found in some portion of Cabladan, Imparayan, Igpanolong, Luna, Tordesillas, Bulalacao, Bad-as.

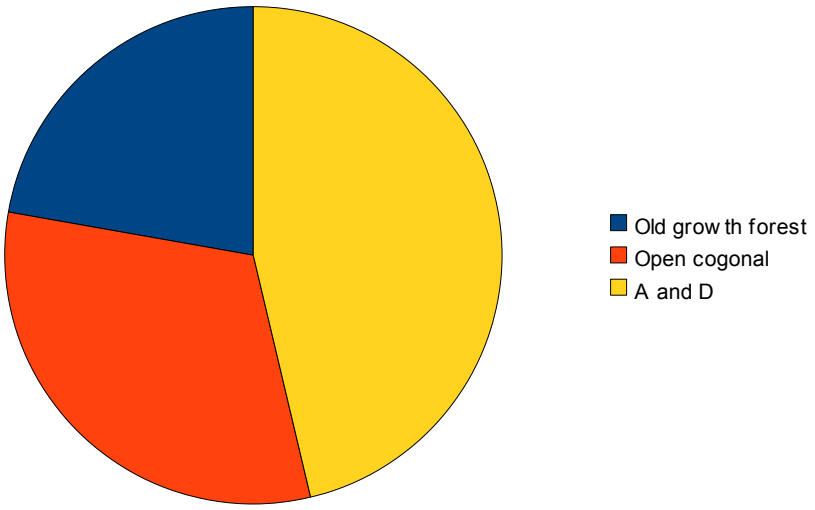

Figure 10. Vegetative cover of SNP

Development Initiatives in Sibalom Natural Park

The Local Government Code of 1991 (RA 7160) stipulated that the LGU must create CENRO to establish, maintain, preserve and protect communal forest, watershed, tree parks, mangroves, greenbelts and similar projects.

In response to this, many programs and projects from government and non-government organizations were highly appraised. One of which was the regular reforestation project found in Mt. Igmatindog and Mt. Poras with 38% or 2,057.47 hectares. Gabions were also constructed in Brgy. Cabladan for about 126 w.m, facines, witling hedgerows about 120 square meter and 23 square meter in Brgy. Luna whilst a proposed 100 hectares is to be reforested in Barangay Cabladan. Moreover, watershed rehabilitation and Integrated Social Forestry (ISF) were also done in Barangay Cabladan of which 6% were rehabilitated and 2 % were subject to ISF (DENR 2008).

Among the active non-government organizations spearheading to the rehabilitation of SNP is Antique Human Development Program (AHDP), Process Foundation Panay and Haribon Foundation. AHDP has conducted reforestation project of about 97 hectares and introduced Sloping Agricultural Land Technique (SALT) that covered 137 hectares of the project. In addition, rain forestation, Sustainable Tourism Product Development Workshop, Paralegal training, Gender and Development Leadership Training were also initiated by the said NGO.

Haribon Foundation made SNP as a priority site in Integrating Forest Conservation with the Local Governance and Rapid Site Assessment and full

Biological Survey in 2002 were carried through.

Process Foundation also initiated its Local Economic Development in the Park which focused on the 3 barangays particularly on the tenured migrants. Its vision is to give the tenured migrants sustainable livelihood at the same time preserving the watershed areas for sustainable use.

Meanwhile, as a water service provider responsibility, San Jose Rural Water Works Sanitation Association contributed to reforest 60 hectares in Barangay Cabanbanan since 1997.

Figure 11. Hanging bridge constructed inside the park

CHAPTER V

RESULTS AND DISCUSSION

Socio demographic profile of respondents

There were 309 out of 400 randomly selected households who participated in the survey (Table 5). A large percentage of respondents (54.4%) come from Municipality of San Jose which is also the capital town of Antique province followed by Municipality of Sibalom with 24.6 percent. Municipality of San Remegio has 14.6 percent of the total respondents, while Hamtic and Belison has only 5.5 and 1 percent of the respondents. The number of respondents per municipality varies by location depending on the number of water consumers listed in the master list of each water district from each municipality (Appendix Table 1b).

Table 5. Distribution of respondents by municipality

Municipality	n	Percent
Belison	3	1
Hamtic	17	5.5
San Jose	168	54.4
San Remegio	45	14.6
Sibalom	76	24.6
Total	309	

Table 6 presents the summary of respondents socioeconomic profile, wherein the average age of respondents who participated in the survey was 49 years old composed mostly of women (60.5%), because they were the ones present during the survey. This observation coincides to the role of women in Filipino culture as housekeepers' (Castillo 1976; pp.238).

There are 56.6 percent of respondents that are married, most of them have achieved college education with an average of 11 years and 33.3 percent are college graduate (see Appendix Table 3c) while there mean monthly income is P15598.87.

The average household size is of the surveyed population is five members per household which has 65.4 percent of the total population while the average years of residency is 33. There were 40.7 percent unemployed that includes; student's pensioner and have retired from there work and housewives, 30.1 percent were self employed, while 22.7 percent were government employee and only 6.8 percent were private employee.

Table 6. Summary of respondents socioeconomic profile

Variable		(Years)	Percent
Average Age		49	
Gender:	Female		60.5
	Male		39.5
Civil Status:	Married		56.6
	Single		27.5
	Widow/er		15.5
	Separated		0.3
Mean Monthly Income:	P 15598.87		
Average Household Size: 5			65.4
Average Educational attainment		11	
Average Residency		33	
Occupation:	Self employed		30.1
	Government employee		22.7
	Private employee		6.8
	Unemployed		40.7

Attitudes and awareness towards Watershed and SNP

Most respondents have different perception of main water source based on their responses in which 42.7 percent of them perceived that think their main source of water supply comes from barangay water system or reservoir. While only 38.2 percent perceived that their water comes from underground, and a relatively lower percentage (6.5%) said it comes from springs and only 10.4 percent perceived that water source comes from Sibalom watershed. Only a very small percentage (2.3%) were not aware where does their water is coming from (Table 7).

Table 7. Perceived main water source

Source	n	Percent (to n=309)
Ground water	118	38.2
Sibalom Watershed	32	10.4
Springs	20	6.5
Reservoir, Brgy. Water System	132	42.7
Don't Know	7	2.3

The awareness of main water source from the perception of respondents maybe attributed to the lack of awareness to the watershed and the Sibalom Natural Park. The study reveals that most respondents of the five municipalities were not aware of the watershed and the SNP (Table 8). It shows that only 171 (55.3%) are familiar with Sibalom Natural Park and about 56.6 percent were aware or are knowledgeable what a watershed is, and only 39.8 percent were aware about SNP as a watershed reserved protected area. There is also a lower percentage of respondents (7.8%) who were involved or member of any environmental organization. Being a member of any environmental advocacy group is related to mans ecological behavior (Kaiser et al., 1999) to his environment.

In addition, there is very low awareness of respondents (33.7%) to the programs and projects implemented from government and NGO's. Some of these were mostly assisted by non-government organization (see Appendix 3c) and only 14.9 percent were aware of the problems in some project.

Table 8. Summary of awareness and attitudes towards watershed and SNP

Indicator	n	Percent
Familiar with SNP	171	55.3
Know what a watershed is	175	56.6
Aware that SNP is a watershed reserved area	123	39.8
Aware about programs and projects	104	33.7
Aware about problems encountered	46	14.9
Membership in environmental organization	24	7.8
Environmental problems linked with human activities	307	99.4
Read nature books/listen to news	227	73.5
Importance of forest and watershed	301	97.4

The respondents who were aware about SNP as a watershed area also expressed the importance of watershed protection mainly because of the following reasons (Table 9). Forty four (14.2 %) of them expressed that it is important to protect the watershed because it ‘provides livelihood opportunities’ while 10 percent said that it ‘helps maintain balance the ecosystem’. About 4.5 percent of the respondents think that 'it helps prevent soil erosion, and degradation of watershed function. While a lower percentage of respondents considers important reason for watershed protection because it provides amenities, beautiful scenery and a place for wildlife species (0.6%). Although it was not included in the choices, many respondents were aware that watershed should be protected because it provides water to the people (3.2%) and is important in water supply during dry season (1%).

Table 9. Important reasons why watershed should be protected

Reason	n	Percent (to n=309)
Provides livelihood opportunities	44	14.2
Helps maintain balance the ecosystem	31	10
Provides amenities and beautiful scenery	2	0.6
Home for wildlife species	2	0.6
Helps prevent soil erosion, degradation of watershed function	14	4.5
Others (important in water supply during dry season)	3	1.0
Provide water to the people	10	3.2
Answered all of the above	17	5.5
Total	123	39.8

Albeit, there is low awareness about the watershed and SNP, majority of the respondents (94.7%) were aware that forest and watersheds are important in water supply and 99.4 percent perceived that human activities were directly linked to environmental problems [as shown in Table 8] such as pollution, water quality deterioration, soil erosion and among others (see Appendix Table).

When it comes to the function of forest and watershed, the study revealed that 47.2 percent of the respondents were aware that watersheds and forest 'absorb water and make this reserved for future use'. While 26.5 percent of them said that watersheds and forest minimizes flood during rainy season, some (13.1%) said that it prevents soil erosion and improve water quality (9.1%) and only four respondents stated that all of the above choices are the role of forest and watershed to water supply (Table 10).

Table 10. Role of forest and watershed

Role	n	Percent (to n=309)
Absorb water and make this use in the future	146	47.2
Minimize floods during rainy season	82	26.5
Improve water quality	28	9.1
Prevent soil erosion	41	13.1
others (all of the above)	4	1.3

On the other hand, the insufficiency of water supply is caused by the following reasons shown in table below. There are 21.7 percent of the respondents that pointed 'deforestation' as one of the causes of insufficient water supply while a relatively high percentage (23%) as compared to 'deforestation', have attributed the problem of insufficiency of water supply to 'busted pipes'. This is followed by dry season and also technical aspects (e.g. price of crude oil, power interruption and cleaning) from their water service providers (Table 11).

Table 11. Perceived causes of insufficient water supply

Indicator	n	Percent
Busted pipes	71	23
Illegal connection	10	3.2
Insufficient water during dry season	52	16.8
Deforestation	67	21.7
Price of crude oil, brownout, cleaning	37	12.0
Damaged pump machine	11	3.6
Answered more than one choices	21	6.8
Not good payee	1	0.3
Population increase (many water users, pipe is small)	15	4.9
Not yet experiencing water shortage	24	7.8

Water Use, Source and Expenditure

The average monthly bill of respondents was P344.19 ranging from P100 to P5, 000/ month. Municipality of San Jose has the highest average water consume in liters per day (160.73) followed by Sibalom with 105.16 (lpd). The three municipalities, Belison, Hamtic and San Remegio have almost the same average water consumption per capita per day (see Appendix Table 4b).

Majority of the respondents (86.7%) said that their water is available 24 hours a day and 76.7 percent of them have alternative water sources (Table 12) mostly have both water pump and deep wells (see Appendix Table 4c) while only 23.3 percent of the respondents used only water from water service providers.

With regards to water quality, majority of the respondents (83.2%) from the five municipalities perceived that their water is potable and highly acceptable. Water quality criterion in the study is indicated with the acceptability of water from source (e.g water districts) (see Appendix Table 4d).

Table 12. Summary of respondents water use, source and expenditure

ITEM		n	Percent
Average Monthly bill	344.19 (Php/mos)		
Water availability: 24 hours		268	86.7
With alternative source		237	76.7
Highly acceptable (potable from faucet)		257	83.2

Analysis of Contingent Valuation bids

There were two models used to elicit willingness to pay for watershed protection, censored or adjusted and uncensored model. The adjusted model was used to test for hypothetical bias (Appendix 4a) since CV is prone to such bias and criticisms like this (see Appendix 2b). Likelihood ratio test was used to check for model specification, multicollinearity, heteroskedasticity problem, and goodness of fit (Appendix 4b).

Logit regression revealed that both models were significant by its likelihood ratio test with an estimated chi-square value of 85.4 percent and 78. 6 percent for uncensored and adjusted models respectively (Table 13) greater than its critical value at 1 % confidence level.

This means that the model was able to explain well with the actual data because it is heterogeneous or they do not share a common value (Gomez and Gomez 1984; pp.466) based on chi-square value (computed) which is greater than the corresponding tabular value (Gomez and Gomez 1984) or the significance level of chi-square (computed) is less than 0.01 (Predo and James 2006 unpublished).

However, GRETL version 1.8 reported that the logit regression rejected four observations for both models due to missing or incomplete data response in the case of monthly income (see Appendix Table 7b and 7c).

Nevertheless, household monthly income was still included as independent variable in both model since most of the contingent valuation

studies have positive effect on respondents WTP (see for example Choe et al., 1996, Calderon et al., 2008, Predo 1995). In addition, even if the independent variable (income) is deleted as one of explanatory variable, it does not affect too much in the model specification and still the model is best fitted at 1% confidence level based on logit regression analysis (see Appendix Table 7d). Furthermore, Hanemann and Kanninen (1998) pointed out that an observation can be influential if its deletion from the data would cause major changes in coefficient estimates, likewise an out lier observation need not be influential and vice versa (Ibid).

Table13. Summary of Logit regression for both models

Test	Uncensored	Adjusted
Mean dependent var	0.54	0.52
McFadden R-squared	0.2	0.19
Log-likelihood	-167.66	-171.72
Schwarz criterion	472.6	480.73
S.D. dependent var	0.25	0.25
Adjusted R-squared	0.09	0.07
Akaike criterion	383.31	391.44
Hannan-Quinn	419.03	427.15
Likelihood ratio test: Chi-square (d.f. 23)	85.4536 [0.0000]	78.6412 [0.0000]

Note: Four observations were dropped because of undeclared monthly income

Willingness to pay

For uncensored model, there are 53 percent of respondents that are willing to pay for, while non-response (not WTP) has 46 percent. Upon calibrating for certainty, the percentage of 'yes' response slightly decreased to 1% or about only 52 percent of respondents were willing to pay and 48 percent were not willing to pay (Table 14).

Table 14. Summary of WTP for uncensored and adjusted model

Response	Uncensored	Percent (to n=309)	Adjusted	Percent (to n=309)
Willing to pay (Yes)	166	53	161	52
Non-willing to pay (No)	143	46	148	48

Comparing all these percentages by bid level, it shows that uncensored WTP has 68.96 percent roughly 69 percent of respondents expressed WTP in the lowest bid (P5.00) while only 22.22 percent expressed WTP at the highest bid level. On the other hand, the adjusted WTP for the lowest and highest bid level is unchanged and only bid level P10, P20 and P50 has decreased.

This result revealed that the CV study does not exhibit 'fat tail' problem which is common in many CVM studies (see Appendix 2b for details) Since there is a lower percentage (22.22%) who expressed WTP in the highest bid level both in uncensored and adjusted data sets. Theoretically, this means that bid amounts will have an effect on households WTP, that as price of good or services

increase, household utility decreases. This proves that the two models showed significant relationship between the bid amount and WTP with p-value of 3.88E-006 and 6.25E-006 (Table 15). It just follows the theoretical probability of WTP that is downward sloping, means that the lower the bid amount higher the probability of respondents willingness to pay, and the higher the bid amount the less likely respondents will be willing to pay (Hartwick and Olewiler 1998).

Table 15. Percent distribution of WTP by bid amount for uncensored and adjusted model

BID AMT	UNCENSORED		ADJUSTED	
	WTP	NWTP	WTP	NWTP
5	69	31	69	31
10	69	30.7	67	32.7
20	59	41	53	46.4
30	56	43.7	56	43.8
50	40	60	38	62
100	22.2	77.7	22.2	77.7
Pearson chi square		32.93		31.89
p-value		3.88E-006		6.25E-006

Reasons for watershed protection

In the aspects of watershed protection, respondents has different reason why they are willingness to protect and willing to pay for such protection. The study considers the adjusted model to show the reasons for watershed protection since it has already been calibrated for certainty as discussed in previous section and in Appendix 4a.

The survey reveals that out of 52.1 percent of respondents who voted to pay for the protection of watershed only 19 percent them indicated that they want for continuous benefits from the watershed (e.g. livelihood, recreation and flood prevention) followed by respondents who want to have more reliable water supply (16.2%). Some respondents gave multiple answers based on there perception that watershed is important to avoid pollution and make use of water in future generations.

Table 16. Reason for WTP for watershed protection using the adjusted model

Reasons	n	Percent (to n=309)
Want more reliable water supply	50	16.2
Want continuous benefits from watershed functions (livelihood, recreation, prevent flood)	59	19
Want that the future generation will have water supply	30	9.7
Believed that the work of people managing the watershed will continue	12	3.9
For continuous fund of this project	3	1
For the benefit of everybody	3	1
Maintenance for water and watershed	7	2.3
Answered more than one choice	2	0.6
Total	161	52.1

Reasons for non willingness to pay

While many were willing to pay for the protection of SNP as a social responsibility, there were also not willing to pay for the protection of watershed (46.3%) because of the following reason categorized into valid zero bidder and

protest zero bidder (Table 17). Valid zero bidders are those that cannot afford to pay while protest bidders are those that believed it's the government that should provide funds for watershed protection.

There are 20.1 percent that were considered as valid zero bidders or those that can't afford to pay while 26.2 percent belong to protest zero bidders which constitutes to the non willingness to pay for Sibalom Natural Park. The reasons behind protest zero bidders includes; government should lobby funds for watershed protection (16.7%), which is found to be the common reason for non willingness to pay for most CVM studies conducted (see for example Amponin et al., 2007; Predo 1995; Calderon et al., 2008).

Moreover, respondents don't trust to the council or people that will hold the money (3.2%) and 1.9 percent of the respondents were cynical whether their contribution will for the protection will have an effect on watershed improvement. Some of the respondents brought out that 'they are already paying for water and that their water tariff is very high.

Table 17. Reasons for non willingness to pay using the adjusted model

Valid zero bidder	n	Percent (to n= 309)
Cannot afford to pay than the present bill (not enough income)	63	20.4
Protest zero bidder		
Their water tariff is high as of now	9	2.9
Government job to fund the project, cynical	51	16.5
Do not trust the council/people that will hold the money	13	4.2
Don't believe that the payment for protection will result to the improvement of watershed (SNP)	6	1.9
Paying already for water	5	1.6
Total for both bidders	148	47.9

Factors affecting Respondents willingness to pay

Based on the logit regression analysis, the results revealed that bid amount (BIDAMT) and water quality (QLTY) are significant factor affecting willingness to pay for respondents for the protection of Sibalom Natural Park both for uncensored and adjusted model. While program awareness and age showed significant coefficients to affect willingness to pay in uncensored model (Table 18) significant at 1% and 5% significance level [as shown in Table 13].

Multicollinearity problem among regressors do not exist based on variance inflation factor (VIF) because it has a value of less than 5.0 as suggested by Judge et al., (1988) cited by Predo (1995) (see Appendix 4d). Moreover, GRETL v. 1.8 considers 10 as a maximum tolerable value based on inflation factor (see Appendix Table 7a).

Table 18 . Significant variables affecting willingness to pay for watershed protection

Model	Variable	Coefficient	p-value
Uncensored	Bid amount	-0.03	<0.0000
	Age	-0.03	0.02
	Water Quality	-1.54	0
	Program aware	0.69	0.37
Adjusted	Bid amount	-0.03	<0.00001
	Water Quality	-1.42	0.01

The positive sign on the coefficients from Logit regression denotes a direct relationship, while the negative one is the opposite. All other variables which are not significant do not directly affect respondents willingness to pay and not different from zero.

As hypothesized, bid amount is expected to influence willingness to pay with a negative coefficient. This suggests that the higher the bid amount the less likely the respondents willingness to pay for protection. This is partly because of income constraint of households which has a positive though insignificant coefficient (see Appendix Table 7a and 7b). Meaning, households with extra and larger income would be more willing to pay as compared with those with low income households.

On the one hand, water quality has a negative coefficient both in the uncensored and adjusted model. Meaning WTP decreases as more and more household's experienced low water quality. This only suggests that the

respondents would pay if they get more highly potable water supply, and by cross tabulation, highly acceptable water encourages more willingness to pay by respondents as shown in its negative correlation by Pearson chi square test showed 11.6185 (4 df, p-value = 0.0204258) significant at 5% level.

The negative coefficient indicated in age suggest that willingness to pay would be lower as respondents grows older. Although it is hypothesized that as men grows older they will be willing to pay not just for their own good but for their posterity, the results revealed the opposite.

Awareness of programs and projects in uncensored model also suggests that when respondents are knowledgeable or aware about environmental programs implemented, willingness to pay may likely increase indicated by a positive coefficient. This suggests that people will support any government or non-government program as long as they are fully informed. In addition, continuous monitoring and support is deemed important for any programs implemented (Appendix 3c).

Elicitation of Willingness to pay for watershed protection

The expected willingness to pay for the protection of watershed in each model was computed from the significant coefficient variable results in GRETL v.1.8 through logit regression analysis [as shown in Table 18]. Based on the methodology following Calderon et al., (2008) and Choe et al., (1996) the computation for each model to elicit Mean (WTP) is represented in the formula:

$$M\ (WTP) = \acute{\alpha} / b$$

This can be written as M (WTP)= b (QLTY)/ BIDAMT for the adjusted model while M (WTP) = ά + b (QLTY)+ c (AGE) + d (PROGAWARE) / BIDAMT for uncensored data set. Meanwhile, the aggregate WTP or the societal economic value of a good or service (Turner et al., 2004) can now be computed from the result of mean (WTP). Aggregate WTP is computed from the total number of households (HH) in the target population.

In this case, the total number of households from the five municipalities was used in the formula (Appendix 4e).

Aggregate WTP = NHH x M (WTP) x % HHPV

Where: NHH= total number of households from the five municipalities

M (WTP) = expected mean willingness to pay

% HH PV= percentage of households with positive valuation or those who answered ‘yes’

The aggregate willingness to pay of environmental goods and services in for the uncensored model is far greater than that of the adjusted model. Perhaps so this is affected by the variables used in computing the Mean (WTP) of which the adjusted model has only two significant variable included in the computation while the uncensored has four explanatory variable. Moreover, the calibrated or adjusted variable is reduced by one percent in the total respondents who answered to the referendum question as 'yes'.

For uncensored model, the mean (WTP) is P40.36/mo. and P7.23/mo. for the adjusted model. Its aggregate willingness to pay per year is P 9, 859,190.88 and P 1, 732,829.76 for uncensored and adjusted model respectively (Table 19).

Table 19. Summary of mean and aggregate willingness to pay for uncensored and adjusted model

Model	Mean (WTP)/mo (in Php)	Aggregate (WTP)/mo (in Php)	Aggregate (WTP)/yr
Uncensored	40.36	821, 599.24	9, 859,190.88
Adjusted	7.23	144, 402.48	1, 732,829.76

Payment mechanism for watershed protection

The result of Logit regression analysis showed significant variables that were inputted to compute for the mean WTP of respondents in the five municipalities. As included in the survey questionnaire, respondents were asked were should be the most appropriate mode of payment if they are willing to pay for the trust fund for watershed protection?

The results in Table 20 shows that most of the respondents (63.6%) expressed that an incremental amount to their water bill to avoid onerous transactions and as they said ‘they are sure that the money is used for that purpose’. While despite to the cynicism to the government, 9.5 percent of respondents want that the money will be handled by the Municipal treasurer’s office, some also said that it should be directly given to the recipients of the project with 9.1 percent and 8.6 percent said that the money should be given to

people's organization (PO's). While 2.7 percent and 4.5 percent wants the money be given or channeled through PAMB or a separate agency, respectively. According to them, they are much assured if a separate agency would handle the funds for the watershed protection.

Table 20. Payment mode for watershed protection

Response	Frequency	Percent
Added to water bill	140	63.6
Money to be transferred to PO's	19	8.6
Channeled through PAMB	6	2.7
To the Municipal Treasurer's Office	21	9.5
Directly to the recipients of the project	20	9.1
Special separate agency	14	4.5
Total	220	100

With regards to the basis of collecting a water fee for the protection of watershed, half of the respondents (49.6%) expressed considerable favor that a that a fixed amount will be added in their water bill if ever a water fee will be impose regardless of any cubic meter of water consumed and the size of family. While, some (34.5%) said that volume of water consumed is most likely fair enough as basis for the collection of water fee, provided that this should be demarcated clearly of how many percent will they pay for a particular amount of water used, the same also with the income and household's size.

On the other hand, a very small percentage (1.3%) said that protecting the watershed and paying an amount to it should be voluntary.

Table 21. Basis of payment

Response	Percent
Volume of water use	34.5
Income	8.8
HH members	4
Fixed rate	49.6
Others (Brgy. treasurer)	1.8
Voluntary	1.3
Total	100

SUMMARY, CONCLUSION AND RECOMMENDATION AND POLICY IMPLICATION

Summary

The study was focused in valuing non-use values such as watershed protection for sustainable water supply in the five municipalities in Antique that are the direct beneficiaries of Sibalom Natural Park. Given the current situation in watershed area that water is becoming scarce as regarded by many as a free resource. The study aimed to assess the respondents' awareness on natural resources such as water more specifically to: 1) assess respondents awareness economic, social and environmental values of watersheds and forests in ensuring sustainable water supply; 2) determine respondent's willingness to pay for the protection Sibalom Natural Park for continuous supply of water; 3) identify and analyze the factors affecting willingness to pay for the improved management of the watersheds.

The study was conducted in municipalities of Antique namely: Belison, Hamtic, San Jose, San Remegio and Sibalom. The study employed both qualitative and quantitative methods in describing the study area in order to come up with a contingent valuation scenario to be used in the survey. FGD's and Key Informant interviews were the qualitative tools used to describe the current water supply situation in the study area, Furthermore, careful review of secondary data from government offices and water service providers were done to determine water use behavior and the programs and projects that were implemented by

government and non-government agencies.

After FGD's and personal interviews were conducted, a CV questionnaire was developed. The study was guided by a study of Manila water users fee by Calderon et al., (2004) and a handbook on Good Practices for Estimating Reliable Willingness-to-Pay Values in the Water Supply by Gunatilake et al., (2007).

Sampling size computation was also guided by the formula of Cochran (1981) as cited by Bartlett et al., (2001). Based on this computation, a survey of 400 respondents was conducted although the computed value of sampling size is only 382. However, due to field limitations only 309 out of 382 were able to participate in the survey.

Statistical tools for descriptive analysis (e.g. mean, and standard deviation) were employed using statistical packages for social science (e.g. SPSS 15). Likewise logit regression analysis was conducted using open source software for econometrics (e.g. GRETL v. 1.8) to estimate the mean WTP of respondents for watershed protection.

Results revealed that the average age of respondents were 49 years old and 60.5 percent were female and 39.5 percent male from the five municipalities in which most of them were married (56.6%) while only 39.5 percent single individuals. Most of them have achieved a education with an average of 11 years in schooling and 33.3 percent of these were college graduate while 17.2 percent were HS graduate.

Thirty- one percent (31.1%) of the respondents belong to unemployed/retired or pensioner, while 24.3 percent were self-employed and 16.2 percent are government employees with a minimum mean income of P15598.87/mo.

On an average there is low awareness of watershed and Sibalom Natural Park from the respondents. The survey showed 55.3 percent were aware about SNP, while 56.6 percent of them were aware what a watershed is and 39.8 percent only were aware that SNP is a watershed reserved area. Most of them also perceived that there main water source is from their barangay reservoir with 42.7 percent while only 38.2 percent said that the main source of water is ground water and 10.4 percent said it comes from Sibalom watershed.

Based on the survey there were 161 (52%) that are willing to pay for the protection of watershed while 148 (48%) of them were not willing because of some reasons categorized into valid zero (20.1%) and protest zero bidders 26.2%).

On the one hand, respondents reason for protection were guided by their perceived importance of watershed that provides multifarious functions (e.g. livelihood opportunities, recreation and prevent flood) and more especially they want more reliable water supply.

Logit regression analysis also proved that the models tested were significant at 1% level. This indicates that the data were able to explain well with the model even though if some variable were deleted (for instance, income) still

likelihood showed best fit to the model.

The logit model showed that common for both uncensored and adjusted model, bid amount and water quality is significant factor affecting willingness to pay with a negative coefficient. But on the one hand, age and awareness of program emerge as a factor in WTP in the uncensored model.

For both models, the mean (WTP) is P40.36 and P7.23/mo in uncensored and adjusted model respectively. The latter is expected to be lower than the former because of certainty debriefing to avoid hypothetical bias.

The aggregate social willingness to pay is P9, 859,190.88 and P1, 732,829.76 for uncensored and adjusted.

Conclusion

The following conclusions can be drawn in this study, first the respondents were less aware of Sibalom Natural Park as a watershed reservation such that many of them were not able see the relationship between how watershed serves as main drainage for water supply in there area. Many of them perceived that there water is just coming from their barangay reservoir and some said that it is drawn underground. However, this does not affect their valuation of watershed for sustainable water supply.

Second, there is not enough evidence that respondents from the five municipalities are willing to pay for the protection of watershed since only 52 percent of them expressed willingness to pay for protection. However, based on

the logit analysis, respondents willingness to pay is indirectly related to bid amount and water quality for both model. Utility theory thus conforms to this finding that as the offered price of the good increases, households will be less likely willing to pay.

Albeit, there are only few of them that are aware of certain programs and projects and low awareness of watershed, this does not hinder their participation in implementing new programs as long as they will be properly informed.

Policy Implications

The mean willingness to pay of respondents in the adjusted model suggest that for the five municipalities an average of P7.23/mo is conservative enough for the trust fund of protection of the watershed. However, this should not be considered as an end in the formulation of a new water user fee if ever that might happen. The value can be inputted in future benefit-cost analysis for policy formulation especially in environmental protection and can be treated as the societal benefits of watershed protection.

The findings in the study can also be used to compare for the cost of the Sibalom Natural Park Management Plan, for example in the aggregate willingness to pay in the five municipalities which is P1, 732,829.76/ year. Whether or not this is lower or higher than their proposed management plan, this will tell whether the residents in the five municipalities are favorable of whatever programs that will be implemented because this is the maximum amount of

respondents that they put value for preserving or protecting the environment.

But if in the extreme cases where the aggregate willingness to pay is lower than the proposed management plan budget, there should be an effort from the development agency or government to cater this problem (like social acceptability problem).

The low percentage awareness of the Sibalom Natural Park continues to be a problem in the future if their will be no education campaign among the people in the five municipalities. Though the awareness of the watersheds does not in one way or another affect willingness to pay, this might be a factor that could affect local participation of the protection program since most of them were not aware that they are part of the beneficiaries in the watershed, the sense of ownership might be a problem otherwise.

Recommendation

For this study, the following recommendations were drawn:

1. Programs and projects that are implemented should have monitoring and evaluation to evaluate the sustainability of such projects. People will be more willing to participate for programs that are always active in the community. There must be constant linkage between the government, community and external institutions.

2. Intensive education campaign regarding watershed protection should be done to inform the community about such projects.

3. There must be transparency of the funds handle by the agencies involved in managing the watershed to gain trust and cooperation from stakeholders.

4.The study is focused only on households' domestic water supply, other users such as irrigators, power users, and industrial users should be studied in the future. Upland residents should be investigated regarding watershed valuation to provide convergence planning for future payment of environmental services.

5. Proper demarcation of incremental water user fee should be specified in the water bill for transparency if ever in the near future there will be water user fee for the five municipalities under Sibalom Natural Park.

6. Using this CVM data would entail other experiments before it can be applied into policy making. Economic valuations such as Cost-Benefit Analysis and choice experiment can be employed in the near future for other enthusiast of economic and environmental studies.

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APPENDICES

APPENDIX 1

LIST OF ABBREVIATIONS AND ACRONYMS

A and D - Alienable and Disposable
ADB - Asian Development Bank
AHDP - Antique Human Development Program Inc.
BWD - Belison Water District
BAS - Bureau of Agriculture Statistics
CLUP - Comprehensive Land Use Plan
CVM - Contingent Valuation Method
DENR - Department of Environment and Natural Resources
FAO - Food and Agriculture Organization
FGD - Focus Group Discussion
GIS - Geographical Information System
GM - General Manager
GRETL - Gnu Regression, Econometrics and Time-series
HH - Households
HWD - Hamtic Water District
LGU - Local Government Unit
MAO - Municipal Agriculture Office
MDG - Millennium Development Goals
MPDC - Municipal Planning and Development Center
MPDO - Municipal Planning and Development Office
MTPDP - Medium Term Philippine Development Plan
NIA - National Irrigation Administration
NIPAS - National Integrated Protected Areas System
NIS - National Irrigation System
NSO - National Statistics Office
IWRM - Integrated Water Resource Management
IA - Irrigation Association
PAWB - Protected Areas and Wildlife Bureau
SALT - Sloping Agricultural Land Technique
SWD - Sibalom Water District
SJRWSA - San Jose Rural Waterworks Sanitation Association
SRWS - San Remegio Water System
SNP - Sibalom Natural Park
TEV - Total Economic Value
WHO - World Health Organization
WTA - Willingness to Accept
WTP - Willingness to Pay

APPENDIX 2

RELIABILITY, VALIDITY AND BIASES OF CONTINGENT VALUATION METHOD

2a. Reliability and Validity of CVM

Contingent valuation methods (CVM) ability to provide information through hypothetical program that would likely reduce environmental damage (Arrow et al., 1993) is not excuse from many criticisms from other fields of researchers because of its hypothetical nature. For example Sagoff (1988) as cited by Bateman and Turner (1992) contended that economics cannot measure the true value of individual preference. Likewise, Burgess, Clark and Harrison (1998) as cited by Turner et al., (2004) questioned the use of CVM in decision making for environmental policy, but instead recommended to use appropriate standards and acceptability based on social consciousness rather than WTP.

On the other hand, practitioners and supporters of CVM (Turner and Pearce n.d.) widely addressed issues on reliability, validity and biases of hypothetical question. According to Brouwer and Bateman (2000) validity refers to what extent a method measures what it is intended to measure or the degree to which the evaluation indicates its ‘true’ value of the good in question (Bateman and Turner 1992). Reliability on the other hand refers to the consistency of the CVM estimates across different points in time associated with the degree to which variability in CVM responses can be attributed to random error (Bateman

and Turner 1992; Brouwer and Bateman 2000).

Thus, in order for a contingent valuation to be valid, CVM needs to consider important aspect like, a clear understanding of the good in question both from the researcher and the respondent, and there should be a payment vehicle for willingness to pay like for example new user fee (Duberstien and Steguir n.d). In addition, Cumimngs et al., (1986) as cited Mitchell and Carson (n.d.) originally proposed ROC which serves as a criteria to evaluate the accuracy of CVM studies. According to them, first to consider is that 1) the subject must have also understand or be familiar with the good being valued, 2) there must have had prior valuation and choice experience with respect to the consumption level of the commodity, 3) there must have little uncertainty and 4) WTP measure should be used.

Moreover, Gunatilake et al., (2007) suggested that a multivariate regression analysis should be done to examine validity based on the statistical significance of test hypothesis. The WTP values can only be considered valid if independent variable is statistically significant to the hypothesized relationship between independent variable (Ibid).

2b. Biases in Contingent Valuation Method

Like all other empirical studies, CVM are prone to different biases that causes low validity because of the interviewer and respondents way of understanding the question being addressed. These biases are derived not just

from the interviewee but also from the interviewer and the use correct CV question format. As suggested by NOAA Panel (Arrow et al., 1993; Ahlheim and Buchholbz n.d.), willingness to pay (WTP) with close ended or take it or leave it format should be used because it is a most realistic and close to actual scenario. While open ended invites respondents to overstate their WTP for the good in question and it is unlikely to provide reliable valuation (Arrow et al., 1993). In person or face to face interview is most desirable approach (Gunatilake et al., 2007) and self- administered survey (Whittington) should be avoided.

Kneese (1984) pointed some of the biases that are connected to CV studies especially in using bidding game format. These are strategic bias, information bias, starting point-bias and hypothetical bias. Hypothetical bias is the failure to present the hypothetical scenario to the respondents as in actual situation. Calderon et al., (2004) minimizes this bias by integrating 'cheap talk' in the questionnaire, use colored pictures and a dichotomous choice method to minimize hypothetical bias. Furthermore, newspapers were also used to provide description of the watershed in metro manila respondents regarding water supply situation (Calderon et al., 2004). This approach minimizes the bias from which information of the good being value is not complete on the part of the respondents known as information bias which could certainly affect the responses of respondents that may influence their WTP bid.

On the other hand, respondents of CV studies influence by the opening bid usually suggested by the interviewer in a bidding game approach which is

called starting point-bias. This arises if respondents interpret the initial bid as an indicative of market information. This bias was minimize using three bidding scheme (Predo 1995) in an iterative bidding game format.

Strategic bias is the result when respondents may attempt to influence the outcome or result by not responding truthfully or by not stating their true WTP. This happens most in open ended CV studies when respondents strategically overstate their WTP, hence influencing the values reflected in WTP. Another way of influencing the result of the survey can be found in the study of Cruz et al., (2000), where commercial users of watershed puts more value to its protection because they have interest on the watershed.

Payment of environmental goods and services can sometimes influenced peoples WTP known as payment vehicle bias. This bias arise in the form payment mechanism such as cash price, entry charge, indirect tax, property tax supplement and so on. It means the bias between various forms of payment may reflect people's genuine preferences.

Another very important problem connected to the hypothetical nature of CVM is the whole part bias or embedding effect. This bias can confused the subject of the equity with wider questions (Mobarghei and Sharzehi 2007). Respondents may not be clear when they express their WTP whether they have actually looked where could their incomes be spent which could possibly include all environmental goods before deciding to pay (Hartwick and Olewiler 1998).

It is also suggested by Gunatilake et al., (2007) to carry out debriefing

questions to further verify his/her answer to the elicitation question. Likewise, certainty debriefing response is explored to adjust certainty ‘yes’ WTP response from respondents (Amponin et al., 2007), to check if the response of WTP has ‘fat tail’ problem which is common to many CVM studies (Ibid). According to (Amponin et al,, 2007) with more than 30% of ‘yes’ response in the higher bid level results indicates that there is 'fat tail problem', which implies that the upper tail distribution is not asymptotic within bid levels provided within survey (Day, and Mourato n.d.).

APPENDIX 3

NOTES ON FOCUS GROUP DISCUSSION (FGD's), FIELD OBSERVATION AND PERSONAL COMMUNICATION

3a. Water Use, Source and Quality

According to Dargantes and Dargantes (2007:55), water use depends on availability and access to water sources, which in turn determines convenience and time allocation. In the five municipalities they have multiple use of water from their source (either in springs, shallow well and water pipe). Some of them used water pumps for watering plants, washing, cleaning and other domestic use. However, some respondents said that they also drunk water directly from the water pumps without any sterilization or treatment. Although half of them perceived that there water is very safe and do not recommend to sterilize water before drinking. Some households especially with babies bought mineral water and some do boil water for security purposes.

Water availability on the other hand, varies across location. For example households nearby coastal area like Malaiba, Maybato North and South and San Angel in San Jose has succumbed uneven distribution of water because of competing uses among households especially in the morning where most of the time water is used for bathing. In this cases, alternative water sources such as water pumps and deep wells are the immediate solution to the household experiencing water supply shortage.

Meanwhile in the Municipality of Sibalom, barangays outside the poblacion which are located at the foot of the Sibalom Natural Park like Catmon and Cubay Sermon have less or no water at all which proves that those who are near the watershed were the ones without water (personal observation).

To cope with the problem of water supply shortage, some of the household prefer to pay five pesos (P5.00) per month for water in their barangay water system aside from their common water sources such as such as springs, mechanical hand pumps and deep wells especially for those in the far flung areas. And the reason why households who opted to upend their water connection in water district is that barangay water system is more accessible to them particularly for San Remegio respondents.

3b. Water quality

From the personal interview conducted to Belison Water District (BWD) and Hamtic Water District (HWD) personnel, it was found out that they have almost the same water quality problems.

Municipality of Hamtic has been experiencing low water quality characterized by foul smell due to swampy area and the presence of hydrogen sulfide (H_2S) based on the engineering study conducted by Hamtic Water District in 1998. According to World Health Organization (2003), hydrogen sulfide is often found common in groundwater which is transported by natural sources and industrial processes depending on the rock mineralogy of the area (WHO 2003).

Most of them prefer water from their dug wells and water pumps compare to water from the water district because it is not potable. Likewise, the management of Hamtic Water District (HWD) does not recommend to drink from their water, but rather for cleaning purposes only, reason why many refilling station and dug wells proliferate in the town (personal interview of General Manager, HWD).

Belison Water District on the other hand faced water quality problems when they district started billing on January 2007. Their water consumers had a lot of clamor about the water that is drawn from their drill pump because of suspended sand particles. As a result, private deep well flourished in the town which also hampers the profitability of the water district (BWD personnel).

3c. Awareness to the watershed and environment

As observed during the discussions, respondents have different perceptions about water and watershed. Some also didn't know what the watershed is all about, the reason why the concept about watershed and water cycle was subsumed in the questionnaire. After the FGD, it was found out that residents from the four municipalities and even in the Sibalom have different perceptions about their main water source.

On the other hand, with regards to the programs and projects implemented, respondents raised that usually the project has less funding and lacks support from present administration (e.g. MLGU). They also claimed that Filipino values such as '*ningas cogon'* were a great factor why there is no follow-

up activities, no maintenance and monitoring of the program after it has been implemented. Another respondent said that 'watershed degradation and environmental destruction should be everybody's concern and that environmental protection is individual's responsibility'. However, the cynical attitude of respondents towards the government (personal observation) has made people incredulous about the programs implemented by the government.

Most of the respondents known programs and projects implemented were carried out through NGO's. These are preservation of aquatic resources, irrigation for farmers which they said spearheaded by Haribon and NIA. On the other hand, Municipal and Barangay LGU's have also led environmental programs and projects such as;

1. Clean and green (Barangay and Municipal LGU's)
2. Critical area protection program
3. Environmental consciousness
4. Green Brigade
5. Luntiang Pilipinas
6. Microwatershed, watershed identification area
7. Tree planting (Barangay and Municipal LGU's)
8. Solid waste management
9. Reforestation and rehabilitation

Cynicisms arise due to the unsustainable programs that were implemented. As raised by the one respondent, tenured migrants and squatters

in SNP were the biggest problem that the government should settle in order to implement proper development intervention. This is because their livelihoods (e.g. cutting of trees, charcoal making) will be affected if the park will be fully protected.

From this, it can be inferred that cooperation from the stakeholders and the government is important for sustainable policy intervention. Failure to gain cooperation from the stakeholders and society is attributed with the failure of governments to provide better service to the people as someone once said. While community were willing to cooperate, the government also failed to support and supervised the activities being implemented.

APPENDIX 4

NOTES ON WILLINGNESS TO PAY ELICITATION

4a. Minimizing biases in CVM

The study used closed ended dichotomous choice referendum approach as best method in CVM (Arrow et al., 1993; Ahlheim and Buchholbz n.d.; Whittington). Certainty debriefing was explored to adjust hypothetical bias (following Amponin et al., 2007; Calderon et al., 2004). Respondents who answered 'yes' to the hypothetical question was further asked for certainty about their decisions, hence it is called the adjusted model. Responses that are sure or not sure were scrutinized based on the respondent's reasons why they are not sure or sure. Those who gave reasons such as 'doubtful as to where the money should go, mismanagement of the contribution, who will create the council to manage the fund, willing to pay but no money and no money at all', were treated as 'no' response. Based on these adjustments there were five respondents that were found out to have such reasons, and as expected certainty adjustment will decrease WTP percentage (Amponin et al., 2007).

4b. Logit regression analysis

The Logit model was estimated in GRETL via maximum likelihood estimation. But, maximum likelihood estimation of a misspecified model can bring large errors in coefficient estimates and response predictions (Hanemann and

Kanninen 1998; pp. 50) if the logit model generated from a true distribution that departs significantly from an ogive (S-shaped) curve is bi-modal or heteroscedastic (Hanemann, and Kanninen 1998).

Heteroskedasticity is defined as the dependence of the conditional variance on the observables X_i. Notably, an error (ei) is heteroskedastic if σ_2 (x) depends on x, and in contrast when σ_2 (x) is constant we can say that the error (ei) is homoskedastic (Hansen 2006).

Hansen (2006) pointed that misspecification arise in several ways, such as including the wrong response probability model, omitting relevant regressors, or errors in variables used as regressors. Misspecification is more severe in nonlinear models such as logit or probit than in conventional linear regression models. In nonlinear models, the maximum likelihood estimator is not consistent if the model is misspecified (Hanemann, and Kanninen 1998). This could undermine the reliability of both point estimates and confidence intervals for model coefficients and welfare measures. According to Horowitz (1993) as cited by Hanemann and Kanninen (1998), as long as the WTP distribution has the same qualitative shape as the true distribution or homoskedastic, errors in estimating are likely to be small.

4c. Measures of goodness of fit

Measures of goodness of fit and hypothesis testing was explored to check if the model is adequate for this study. Likelihood ratio-test was used to further

test if the models is misspecified such as inclusion of variables or function specification or heteroskedasticity. The likelihood ratio test compares the maximum loglikelihood function under hypothesized restriction (LR) with the unrestricted maximized likelihood function (L). The greater the difference between these two values, the less likely the restriction is to be true (Hanemann and Kanninen 1998).

Log likelihood function provides immediate feedback on whether the restrictions are compatible with the data (Davidson and MacKinnon 1999) maximum subject to the restrictions: There is no commonly accepted threshold value for the pseudo-R^2 that denotes a satisfactory or well-specified model; but higher values are preferred (Hanemann and Kanninen 1998).

In order to ascertain that the model fitted well to the data especially the regressors used in explaining the dependent variable. In particular in the distribution of Y_i (bid amount) whether it varies with the variables X_i in the population. Hansen (2006) suggested to use conditional mean to test whether the distribution varies across observation. But he added, though conditional mean is a good measure of the location of a conditional distribution, it does not provide information about the spread of the distribution, hence conditional variance was used to measure the dispersion. This is important feature of the test to see if there exist heteroskedasticity in the model. In this case, the regressor bid amount was tested for heteroskedasticity in the sampled population using the likelihood ratio test.

4d. Multicollinearity problem

Multicollinearity happens when columns of X are linearly dependent or set of regressors included are identically related (Davidson and MacKinnon 1999; Hansen 1996) or a large degree of covariance is exhibited thereby making it difficult to estimate the effect of a change in one variable (Predo 1995). If this occurs, the more collinear the regressors, the worse the precision of the individual coefficient estimates when regressors are highly dependent (Hansen 2006).

Variance inflation factor was determined to test if the model exhibit multicollinearity problem. Judge et al 1988 cited by (Predo 1995) used a value of 5.0 to indicate severe multicollinearity, however others suggested that 10 is the acceptable rule of the thumb. In GRETL v 1.8, a value greater than 10 is suggested to indicate that regressors have multicollinearity problem (see Appendix Table 7a for the result).

4e. Aggregate willingness to pay computation

The aggregate willingness to pay were computed based on the secondary data collected from the five municipalities (Appendix Table 1. However, since the total number of households per municipality is from in a different year due to data limitations. The number of households from the five municipalities were computed using the total population in the year 2007 of the five municipalities divided by the average household size of the five municipality which is 5.

APPENDIX 5

Focus Group Discussion and Key Informant Guide Questions

5a. Groundwater and Watershed Awareness

1. What are the main sources of water in your area? Is it potable or not?
   What is your alternative source of water?

2. Where do you think does your water supply come from? And how is it drawn?
   Is it by using pipes or pumps?

3. Has there been an incidence where water is less available during summer season or drought? When was this or what particular month in a year?

4. What do you think are the causes of increase or decrease in water supply?
   __Busted pipes
   __Insufficient raw water during dry season?
   __Illegal connections
   __Deforestation due to lack of watershed management plan

5. In the past 10 years, what problems have you encounter regarding your water supply (e.g. for digging deep wells and pumping water)?

5a. During what month have you experienced water shortage?
5b. Alternative source of water during dry seasons? Water vendor, wells,
   springs, etc.

6. What did you do in order to solve the problem of water supply in your area? Are there efforts from the community to solve this problem? If so, what are these?

7. Do you know what a watershed is?

8. Are you aware that the water coming from groundwater is also generated from the watershed?

9. Are you aware that the activity (logging, kaingin, mining, quarrying etc.) in the watershed also affects the availability of groundwater supply stocks?

APPENDIX 5 (Continued)

5b.Background of the Trust Fund

At present, the money paid by water concessionaires to the water systems is mainly for distributing water to households and its cost include the rehabilitation of pipe lines, maintenance of pump machine and there is no budget allocation for the watershed management. The agencies responsible for managing and protecting the watersheds lack the financial resources necessary to effectively carry out their tasks. If these agencies have additional funds, they can:

1) reforest a bigger area in the watershed per year;
2) hire more forest guards to protect the watershed;
3) construct more look-out towers;
4) install more soil erosion control structures (vegetative and engineering);
5) acquire communication and transportation facilities for better patrolling and protection of the watershed;
6) conduct other activities to enhance the awareness of people about the benefits derived from the watersheds; and
7) involve various stakeholders in watershed management and protection activities.

In the short term, these will help reduce or eliminate illegal logging, *kaingin* (slash-and-burn cultivation), forest fires, wildlife poaching, squatting, and

APPENDIX 5 (Continued)

other destructive activities in the watershed. In the long run, you will have a more stable water supply because of the improved management of the watershed. There will be more water during the dry months, and fetching water from doubtful sources will be reduced and occurrence of floods will be minimized. This could also result in lower water charges, since there will be no more cost of water treatment that will result from the improved management of watershed. Aside from these, the watersheds will also become a more reliable source of hydroelectric power, produce recreation services, and contribute to biodiversity conservation and carbon sequestration. In other words, improved watershed management will provide a whole package of benefits to you and to society as a whole.

5c. The CV Question

Now, we know that watershed also provides water both surface and groundwater, suppose a trust fund for the improved management and protection of the Sibalom Natural Park will be created. The trust fund will be managed by a council composed of various stakeholders - water users like you, water distributors, government (Department of Environment and Natural Resources/National Water Resources Board), Local Water Utilities Administration and local water districts, local government units, non-government organizations. This council will decide the activities that will be supported by the fund, all of

which should directly be related to watershed management. Under no circumstance will the fund be used for any other purpose.

1. Will you be willing to vote for a legislation that will create the trust fund if its passage will require all water users to contribute ___ pesos/household/month to this trust fund for the protection and improvement of management in the watershed? Y___ N___

1.How much are you willing to pay per month? P_____

2. What is your most favorable mode of payment (payment vehicle for the protection)?

5. Which do you think is the most appropriate mechanism to collect the watershed management and protection fee? (Please check only one)

_____ Amount will be added to water bill
_____ peoples organization
_____ other means, pls. Specify.

6. What do you think should be the basis of charging the fee?
_____ volume of water use
_____ Income
_____ Number of members in the household
_____ Fixed rate
_____ Others, pls. specify

APPENDIX 6

INTERVIEW SCHEDULE

Estimating the Benefits of Watershed Protection for Sustainable Water Supply in Sibalom Natural Park, Sibalom, Antique

Name of Respondent: _____ Respondent Number: _____
Date of Interview: _____ Municipal: _____
Interviewer:_____ Barangay:_____
Time Started: _____ Time Finished: _____

I. Introduction

Good day! I am _____, member of research team in Process Foundation that is currently funding a natural resource valuation of a student from the Visayas State University, Visca, Baybay, Leyte. I'm here to ask you some questions regarding the use of water in your municipality and the utilization of watershed. But before I will proceed, let me tell you the background and purpose of the study.

Despite the myriad functions of watershed from providing economic, environmental and social functions in society, many of watersheds today are not properly managed. One of the environmental goods that are produced by watershed is water (surface and groundwater) used for irrigation, domestic, municipal and commercial purposes. It also provides ambient scene for recreation and a home for many wildlife species in the watershed area that helps maintain the biodiversity of the ecosystem.

However, it is observed that during dry season the supply of water in your municipality is experiencing water shortages. This is caused by increasing population, unsustainable agricultural practices in upland areas and the conversion of lands to different land use can influence water hydrology.

Currently, we are to assess the willingness of people to protect the watershed as the main drainage of water. But respondents refuse to cooperate because they might actually be made to pay, on the one hand this survey is conducted to describe how you value water in your own importance that will result to the protection of Sibalom Natural Park or in other words willingness to pay for the protection of SNP that will continue to ensure sustainable water supply. In addition, this study was not commissioned by the water distributors but came merely from researchers desire to find out how water users feel about protecting the basic resource that produces water.

Your household is one of the samples selected randomly to represent the

APPENDIX 6 (Continued)

thinking of the people in your town. I will be extremely grateful if you can spend some of your precious time to answer my questions honestly as possible. There are really no right or wrong answers to the questions that I will pose. Your answers will be reported as sample averages and all information will be kept confidential.

Part I. Background Information

A. Water Source, Use and Expenditures

1. Please rank the following needs based on the difficulty you have in availing or buying them (1 is the most difficult to avail or buy)?
   _____ Food
   _____ Clothing
   _____ House/Shelter
   _____ Water
   _____ Electricity
   _____ Others, pls. Specify

2. What do you think is the primary source of raw water ?
   _____ Groundwater
   _____ Sibalom Watershed (SNP)
   _____ Forest or watershed
   _____Others, pls. specify

3. What is your average water consumption/month?
   _____ cubic meters
4. How much do you pay for water/month on the average?
5. What is your alternative source of water supply?

Type	Volume	Frequency	Owned	communal
Water vendor				
Water pump				
Deep well				
Others, specify				

6. If deep well, did you register with NWRB?
   Yes ___ No___

APPENDIX 6 (Continued)

7. If water is bought, how much do you spend/month on the average?

8. How would you rate the availability of water in your household? (Please check one)
   _____ Highly available (24 hrs)
   _____Moderately available(16 hrs)
   _____ Available (8 hrs)
   _____ Not available (have to buy from water vendors

9. How would you rate the quality of water in your household? (Please check one)
   _____ Highly acceptable (water can be drunk straight from the faucet)
   _____ Moderately acceptable (water can be used for cooking, cleaning but not for drinking)
   _____ Acceptable (water can be used for cleaning but not for cooking or drinking

10. For drinking water, do you boil first before using or used bottle water?
    Yes ___ No___

11. What are the major uses of water in your household? (Please rank the following choices with 1 as the highest)
    _____ Drinking
    _____ Cooking
    _____ Bathing
    _____ Cleaning
    _____ Others, pls. specify
12. What do you think are the causes of water supply problems?
    _____ Busted pipes
    _____ Illegal connections
    _____ Insufficient raw water during the dry season
    _____ Deforestation
    _____Others, pls. specify
13. What are the negative effects of the unstable water supply to your household?
    _____ Health problems
    _____ Higher expenditures for water (buying or boiling water)
    _____ Delays in doing household chores
    _____ Personal hygiene is affected
    _____ Others, pls. specify

APPENDIX 6 (Continued)

B. Respondents general attitude, behavior and awareness of watershed

1. Do you know any environmental programs and projects from the government?
   1a .What are these?

2. Did you encounter any problems about such programs and projects especially in the managing of natural resources (e.g. watershed)?

3. Do you know what a watershed is?
   ___ Yes (Proceed to #4,5,6,7)
   ___ No (Proceed to #10)

4. What benefits do you think watershed can provide to you and in the society?
   [ ] livelihood opportunities
   [ ] place for picnic
   [ ] recreation and tourism
   [ ] others

5. How important is the watershed to you and protection of natural resources?
   Very important __
   Not so important __
   Don't care __

6. Why and what do you think why should watershed areas be protected?
   [ ] it provides livelihood opportunities
   [ ] it helps maintain balance the ecosystem
   [ ] it provides amenities and beautiful scenery
   [ ] a home for wildlife species
   [ ] helps prevent soil erosion, degradation of watershed functions, etc.

7. How would you rate the importance of managing and protecting these watersheds to ensure a sustainable water supply your municipality?
   _____ Important (Please proceed to #8)
   _____ Not important (Please proceed to #9)
   _____ I don't know

8. Well-managed and protected watersheds are important because they:
   _____absorb water and make this available for future use

APPENDIX 6 (Continued)

_____minimize floods during the rainy season
_____improve water quality
_____others, pls. specify

9. Well-managed and protected watersheds are not important because:
   _____they don't directly affect my household
   _____I don't believe in their role in improving water supply
   _____others, pls. specify

10. What do you think are the problems linked to natural resources and impact of human activities to environment?
    [ ] pollution
    [ ] water quality deterioration
    [ ] soil erosion
    [ ] wildlife habitat loss
    [ ] others

11. How safe are your with the water supply in your area?
    safe __
    very safe __
    not safe __
    Cannot explain __

Part II. Assessment of the Willingness to Pay for the Protection of SNP

A. Presentation of the Water Supply Situation in Antique

The residents in Sibalom and neighboring towns (including your town) are experiencing problems with their water supply during dry season. The owners of dry up wells tend to get connected to water districts for stable supply of water while others go on walking just to fetch water from doubtful sources. The growing population in the province signals the increasing demand for water for drinking and other purposes. But the unfortunate thing is that the quantity and quality of water demanded also threaten the water storage under ground. And overtime if overexploited can be depleted without natural recharge.

The domestic water supply in Antique specifically the beneficiaries of water from Sibalom Natural Park comes from groundwater sources which the watershed has a great contribution in the natural recharge process in the hydrological system. The Process Foundation, the Department of Environment and Natural Resources has been give the task help in organizing communities for

APPENDIX 6 (Continued)

the protection and managing of watershed to ensure that activities cannot contribute to the destruction of watershed functions.

(Describing the SNP by showing photographs and its present condition)

1. How would you feel if their will be increase in water tariff?
   _____ Happy (Please proceed to #2)
   _____ Unhappy (Please proceed to #3)
   _____ I have no feeling about the tariff increase

2. What is the reason for you to be happy if their will be increase in water tariff? (you can choose more than one answer):
   _____ I am sure this will result in a better water service
   _____ I found the previous tariff too low
   _____ I found the increase insignificant because my income is high enough
   _____ Other reasons, please specify

3. If you are unhappy about the increase in water tariff, it is because (you can choose more than one answer):
   _____ In general, I don't want a price increase
   _____ I think the water company is passing on its inefficiency to consumers like me
   _____ An increase in water tariff in the past did not result in improved water service
   _____ There was no corresponding increase in my income, and the increase has reduced the amount of money left for my other needs
   _____ Other reasons, please specify

B. Description of the Hydrological Role of Watersheds in Sustainable Water Supply

(Describe the role of forests and watersheds in sustainable water supply)
(Present diagrams of the watershed and the hydrologic cycle)

A watershed is like a kitchen sink that catches water from the faucet and drains this into an outlet. In a similar manner, the watershed also works like catching water. It also catches water, though from the rain and not from the faucet, and drains the water through a network of rivers and streams in the area, until it reaches a common outlet. You can also think of the soil in the watershed

APPENDIX 6 (Continued)

as a sponge that absorbs water. If you cover the sink with a sponge and turn on the faucet, it will take some time before water will be drained because the sponge will absorb most of it first. Thus, the more water is absorbed, the less will go down the drain. In the case of watersheds, the more water it absorbs, the less water will go to the lowlands. In effect, the more water is absorbed, the fewer floods there will be. Also, the more water is stored in the watershed, the better will be the water supply during times when there are no rains. We are not saying, however, that a well-managed watershed will prevent the occurrence of floods and droughts. With prolonged rains, floods can result even from the best-managed watersheds. Likewise, droughts can happen during extremely long dry seasons.

However, 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 increases the capacity of the watershed to store water and regulate its flow. But as you may already know, our country is fast losing its forest cover. Deforestation and poor land use practices are common and these have damaged the hydrologic condition of many of our watersheds. As a consequence, floods during the rainy season and droughts during the dry season are common.

C. Description of the Protection Program of Sibalom Natural Park

The community inside the Natural Park identified salient problems that includes, burning (grass fire), idle lands, deforestation, landslide, absence of technology on organic farming, some lands were converted into open grass lands, denuded areas in the watershed of inadequate vegetative cover contribute to the siltation of rivers, continuous cultivation and grazing of animals in the cultivated lands which degrade the soil absorption capacity, absence of minimize soil erosion. Unsustainable practice of farmers in their agricultural lands like cutting of trees, slash and burn and unsustainable farm activity also contributed to the drying up of springs and limited supply of water during dry season. Reduction of budget in the reforestation project, and reduction of water yield which directly affect irrigation domestic and industrial dependencies on water which is vital for sustainable development were among the existing watershed problems.

At present, the money paid by water concessionaires to the water systems is mainly for distributing water to households and its cost include the rehabilitation of pipe lines, maintenance of pump machine, turbine and there is (if any) no budget allocation for the watershed management. The absence of General Management Plan for Sibalom Natural Park (SNP), limited capacities of

APPENDIX 6 (Continued)

newly elected officials and budget constraints also hindered the formulation of Community Resource Plan for SNP that could help manage and protect the watersheds, in addition agencies that manage and protect the watersheds lack the financial resources necessary to effectively carry out their task. If these agencies have additional funds, they can:

1. reforest a bigger area in the watershed per year
2. hire more forest guards to protect the watershed;
3. construct more look-out towers;
4. install more soil erosion control structures (vegetative and engineering);
5. acquire communication and transportation facilities for better patrolling and protection of the watershed;
6. conduct other activities to enhance the awareness of people about the benefits derived from the watersheds; and
7. involve various stakeholders in watershed management and protection activities.

The interviewer will show pictures of the additional activities that can be done with increased budget for watershed management and protection.

In the short term, these will help reduce or eliminate illegal logging, *kaingin* (slash-and-burn cultivation), forest fires, wildlife poaching, squatting, and other destructive activities in the watershed. In the long run, you will have a more stable water supply because of the improved management of the watershed. There will be more water during the dry months, and fetching water from doubtful sources will be reduced and occurrence of floods will be minimized. This could also result in lower water charges, since there will be no more cost of water treatment that will result from the improved management of watershed. Aside from these, the watersheds will also become a more reliable source of hydroelectric power, produce recreation services, and contribute to biodiversity conservation and carbon sequestration. In other words, improved watershed management will provide a whole package of benefits to you and to society as a whole.

Suppose a trust fund for the improved management and protection of the Sibalom Natural Park will be created. The trust fund will be managed by a council composed of various stakeholders - water users like you, water distributors, government (Department of Environment and Natural Resources/National Water Resources Board), Local Water Utilities Administration and local water districts, local government units, non-government organizations. This council will decide the activities that will be supported by the fund, all of which should directly be related to watershed management.

APPENDIX 6 (Continued)

The following question will be asked for split sample 1, where there will be no mention of other user groups being made to pay.

1. Will you be willing to vote for a legislation that will create the trust fund if its passage will require all water users to contribute ___ pesos/household/month to this trust fund?

_____ Yes (Proceed to #2)
_____ No (Proceed to # 4)

The following question will be asked for split sample 2, where the respondents will be informed that other user groups will be made to pay.

1. Will you be willing to vote for a legislation that will create the trust fund if its passage will require all water users to contribute ___ pesos/household/month to this trust fund? I would like to inform you that the legislation will also make other groups benefiting from the watershed, e.g. hydroelectric power consumers, industries, recreationists pay a corresponding amount?

_____ Yes (Proceed to # 2)
_____ No (Proceed to # 4)

The following questions will be asked of respondents for both split samples.

2. How sure are you of your decision to contribute an additional P____ per month to the fund?

_____ Very sure
_____ Some what sure
_____ Sure (Proceed to #2b)
_____ Not sure (Proceed to #2b)

2a. If you answered sure or not sure, please explain why you have some doubts about your willingness to pay.

_____

2b. If you are not willing to pay P____/per month as your contribution, are you willing to pay any amount at all?

_____ Yes => If yes, how much? _____
_____ No (Proceed to #4)

3. Please indicate the reason/s why you are willing to contribute to the fund.
_____ I want more reliable water supply.

APPENDIX 6 (Continued)

_____ 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 too.
_____ I believe that the council will do a good job in administering the fund.
_____Other reasons, please explain _____

4. If you are not willing to contribute any amount to the fund, please identify your reason/s. _____ I cannot afford to pay any additional amount to what I am currently paying.

_____ I think the water tariff I am paying at present is already too high.
_____I think it should be the government that should finance the watershed management activities
_____ I do not trust the council that will administer the fund.
_____ I do not care about the reliability of water supply.
_____ I do not believe that paying will result in improved watershed management.
_____ I do not believe that improved watershed management will result in more reliable water supply.
_____ I do not fully understand the question.
_____ Other reasons, please identify _____

Part III. Assessment of Institutional Arrangements

1. Which do you think is the most appropriate mechanism to collect the watershed management and protection fee? (Please check only one)

_____ Amount to be added to the water bill, to be managed by the council
_____ peoples organization
_____ PAMB
_____ treasures office (for san remegio respondents)
_____ other means, pls. specify

2. What do you think should be the basis of charging the fee?

_____ volume of water use
_____ Income
_____ Number of members in the household
_____ Fixed rate
_____ Others, pls specify _____

APPENDIX 6 (Continued)

Part IV. Socio-economic Information

1. Age: _____
2. Gender: _____ Male _____ Female
3. Civil Status: _____ Single _____ Married _____ Widow/er
4. No. of years of residency:_____
5. Educational attainment:
_____ No formal schooling
_____ Elementary level (indicate grade)
_____ Elementary graduate
_____ High school level (indicate year)
_____ High school graduate
_____ Vocational
_____ College level (indicate year)
_____ College graduate (indicate course)
_____ Master's degree units (indicate field)
_____ Master's degree holder (indicate field)
_____ PhD/MD/DDM/DVM/LIB units (please encircle)
_____ PhD/MD/DDM/DVM/LIB graduate (please encircle)
_____ Others, please specify _____

6. Occupation
_____ Unemployed
_____ Self-employed
_____ Government employee
_____ Private sector employee
_____ Others, please specify _____

7. Household Size:
_____ Adults
_____ Children (15 yrs and below)

8. How many in your family, including yourself, is/are gainfully employed? __

9. Please check the annual income bracket where your family belongs. Include the earnings of all members of the family who are working or gainfully employed, including yourself. Please be assured that the information you will reveal is for research purposes only.

APPENDIX 6 (Continued)

Monthly Income of Households

Income Range	Pls. Check	Estimated Value	Source of Income
Less than 2,500 Php			
2,500- 5000 Php			
5,000-7,500 Php			
7,500-10,000 Php			
10,000-15,000 Php			
15, 000-20,000 Php			
20,000-25, 000 Php			
25,000-30,000 Php			
30,000 up			

Thank you for your cooperation!

APPENDIX 7

Illustrations used in the study

a. Watershed cycle

b. Eroded river bank inside the park

APPENDIX TABLE 1

NOTES ON THE STUDY SITES AND SECONDARY DATA USED IN THE STUDY

Appendix Table 1a. Summary of the five municipalities benefited by Sibalom Natural Park

Item	MUNICIPALITY				
	Belison	Hamtic	Sn. Jose	Sn. Remegio	Sibalom
Population (Census 2007)	12467	42,375	54,871	28, 401	53934
Classification	5th	5th	2nd	3rd	3rd
Total Land Area	1978	12, 051.86	4450	40,698	26984
Average growth rate	.97	1.43	1.79	1.18	1.06
No. of villages	11	47	28	45	77
No. of Household	2654	7479	10856	5178	11361
% HH water connections	3	3	29	4	14
Ave. HH size	5	5.19	6	5.3	5

Sources: NSO Population Census 2007, CLUP of Belison, San Jose, Hamtic
Master List of Household Connections from BWD, HWD, SJRWSA, SRWS, and SWD

Note: The number of households per municipality were at different year since household data were not yet available from NSO, hence municipal profile and CLUP were utilized.

APPENDIX TABLE 1 (Continued)

Appendix Table 1b. List of barangays with water service connection and the number of water consumer by municipality

Municipality	Service Area	Population	Number of Consumer's
Belison	Concepcion	1163	5
	Ipil	747	2
	Poblacion East	4423	42
	Poblacion West	No data	22
	Salvacion	427	1
	Sinaja	807	9
Hamtic	Poblacion 1	821	143
	Poblacion 2	787	79
	Poblacion 3	620	77
San Jose	Atabay	1997	94
	Badiang	2533	28
	Barangay 1 (Pob)	2467	361
	Barangay 2 (Pob)	1802	564
	Barangay 3 (Pob)	2953	475
	Barangay 4 (Pob)	2798	393
	Barangay 5 (Pob)	1037	272
	Barangay 6 (Pob)	557	118
	Barangay 7 (Pob)	365	97
	Barangay 8 (Pob)	4674	805
	Kamangahan	No data	48
	Purok Pigado	No data	72
	Cansadan	1597	111

Source: BWD, HWD, SJRWSA, SRWS, and SWD

APPENDIX TABLE 1 (Continued)

Appendix Table 1b. (Continued)

Municipality	Service Area	Population	Number of consumers
	Cansadan -Tubudan	No data	72
	Funda-Dalipe	4852	90
	Madrangca	2204	260
	Malaiba	1515	147
	Maybato Norte	3318	173
	Maybato Sur	1626	140
	San Angel	2269	180
San Remegio	Calag-itan	1455	166
	Iguirindon	967	44
Sibalom	Bari	864	142
	Catmon	945	130
	Cubay-Napultan	955	4
	Cubay-Sermon	848	92
	District I (Pob)	1340	305
	District II (Pob)	1204	260
	District III (Pob)	3072	534
	District IV (Pob)	2085	264
	Nagdayao	1140	70
	Pasong	560	26
	Total		6610

APPENDIX TABLE 1 (Continued)

Appendix Table 1c. List of Irrigator's Association per municipality

Name of Irrigators Association	Service Area (has)	Municipality	Villages Covered
1. SIBEL IA	714	Sibalom	12
		Belison	10
		Patnongon	1
2. SIBALOM-SAN REMEGIO IA	384	San Remegio	2
		Sibalom	4
3. SIHAMSA NORTH IA	438	Sibalom	10
4. SIHAMSA SOUTH IA	482	Hamtic	5
		San Jose	1
		Sibalom	1
5. CASIBO NORTH IA	337	Sibalom	6
6. PIBIC IA	281	Sibalom	5
		San Jose	1
7. BISTO IA	475	Sibalom	1
		San Jose	4
8. DIV. A IA	501	San Jose	8
9. DIV. A IA 2	231	San Jose	4
10. CASIBO SOUTH	545	Sibalom	6

Source: National Irrigation Administration 2008

APPENDIX TABLE 2

Appendix Table 2a. List of Farming Households in Forest edge Barangays in Sibalom Natural Park

Barangays	Total Households	Farming HH	Non farming HH	Rice Farming	Corn Farming
Bontol	220	120	100	120	1
Bugnay	52	35	17	35	2
Bululacao	97	48	49	48	48
Cabanbanan	59	57	2	57	43
Cabladan	156	156	0	146	50
Calo-oy	45	33	12	33	17
Igparas	85	67	18	67	10
Igpanolong	202	65	137	52	13
Imparayan	259	67	192	67	8
Indag-an	136	42	94	42	14
Lambayagan	98	60	38	60	20
Luna	94	59	35	59	0
Luyang	54	42	12	42	0
Tordesillas	66	30	36	30	5
Tula-tula	132	26	106	26	0
Grasparil	60	60	0	60	0
Total	1815	967	848	944	231

Source: MAO, Sibalom Antique, BAS 2006

APPENDIX TABLE 2 (Continued)

Appendix Table 2b. Types of Ecosystem and Land Tenure of Households in Forest edge Barangays in Sibalom Natural Park

Forest edge Villages	Total Farm Area (has)	Ecosystem			Land Tenure	
		Irrigated	Rainfed		Owner	Lease-holder
			Lowland	Upland		
Bontol	152.73	20.10	132.63	27	48	72
Bugnay	40.25		40.25		32	7
Bululacao	65.00		38.00		25	5
Cabanbanan	37.75		37.75	8.75	37	
Cabladan	157.75		157.75		124	
Calo-oy	49.55		40.80		39	1
Igparas	49.00		49.00		20	44
Igpanolong	31.00	15.25	15.50		36	
Imparayan	97.00		97.00	3	46	9
Indag-an	41.25	18.75	22.50		7	34
Lambayagan	60.50	14.75	42.75	7.75	42	17
Luna	42.50	1.50	41.00	1	10	33
Luyang	31.00	5.50	17.75		22	12
Tordesillas	81.00		80.00	1	62	9
Tula-tula	24.00		24.00		26	
Grasparil	27			27	n.d.	
Total	987.28	75.85	836.68	74.50	576	243

Source: MAO, Sibalom Antique, BAS 2006
Provincial Agriculture Office, San Jose Antique 2008

APPENDIX TABLE 2 (Continued)

Appendix Table 2c. Rainfall data in Sibalom Watershed

Month	Average daily rainfall (mm)	
	2006	2007
January	No data	1.08
February	0.37	0.21
March	1.19	0.58
April	1.03	0.77
May	17.17	4.97
June	13.45	14.48
July	18.07	17.63
August	24.37	9.64
September	25.04	33.18
October	10.25	5.80
November	0.29	7.28
December	3.23	1.35

Source: Tipuluan Station from Dr. Geerling (2008)

Note: This data was gathered by the students of Dr. Geerling during their study in the Sibalom Watersheds.

APPENDIX TABLE 3

Appendix Table 3a. Reasons for the non-interview of the respondents identified to be included in the survey

Reason	Frequency	Percent (to n=400)
Absent in the house during the survey,	27	6.75
Migrated to another place	8	2
Deceased	3	0.75
Working abroad	3	0.75
Transients	4	1
Cannot be located	26	6.5
Busy and no time for interview	18	4.5
Refused to be interviewed	2	0.52
Total	91	22.75

Appendix Table 3b. Summary of non active members to water service providers during the survey

Municipality	Non active member	Percent (to n=309)
BWD	0	0
HWD	2	0.64
SJRWSA	4	1.29
SRWS	9	2.91
SWD	1	0.32
Total	16	5.16

Note: Non active users were identified during the survey due to data limitations. Data from water districts were not yet updated as to who is still active and non-active members.
Non active members are those that are not anymore paying there monthly water bill and some have been disconnected.

APPENDIX TABLE 3 (Continued)

Appendix Table 3c. Respondents educational attainment

Educational Attainment	Percent
Elementary level	3.9
Elementary graduate	8.1
HS level	6.8
HS graduate	17.5
Vocational/2yr Course Graduate	8.4
College level	17.8
College graduate	33.3
with Master's unit	0 .6
Master's degree holder	2.9
with PhD units	0 .6

Appendix Table 3d. Distribution of bid amounts used in the study

BID AMT	Frequency	Percent (to n=400)
5	58	14.5
10	52	13
20	56	14
30	48	12
50	50	12.5
100	45	11.25

APPENDIX TABLE 4

WATER USE, SOURCE AND QUALITY

Appendix Table 4a. Summary of water consumption per municipality

Water District/ Municipality	Total billed (in peso)	Total no of Consumers	Cubic meter used
BWD	31,095.00	81	1,091.00
HWD	No Data	299	4,678.00
SJRWSA	1,900,776.25	4496	130,073.00
SRWS	32, 349.42	210	3,135.58
SWD	589,571.70	1524	28,849.00

Source: Belison Water District, Hamtic Water District, San Jose Rural Waterworks Sanitation Association, San Remegio Water System, Sibalom Water District

Note: The values in total billed column were not an average and based only on the month when the study is on going.

Appendix Table 4b. Summary of water consumption per capita by municipality

Water District/ Municipality	Ave. Water consume/HH/m^3	Ave. Water consume pc	Ave. Water consume pc (lpm)	Ave. Water consume pc (lpd)
BWD	13.47	2.24	2244.85	74.83
HWD	15.65	2.61	2607.58	86.92
SJRWSA	28.93	4.82	4821.80	160.73
SRWS	14.93	2.49	2488.55	82.95
SWD	18.93	3.15	3154.96	105.16

Note: Values were computed based on the data available as shown in Appendix Table 4a.

APPENDIX TABLE 4 (Continued)

Appendix Table 4c.List of alternative water sources

Category	n	Percent
Water vendor	51	16.5
Water pump (motor)	96	31.1
Deep well	39	12.6
Springs	23	7.4
Free flowing, communal, shallow well	7	2.3
Both deep well and pump	5	1.6
Both pump and water vendor	11	3.6
Both deep well and water vendor	5	1.6
Others (used only water from water districts and water works)	72	23.3

Appendix Table 4d. Perceived water quality

Criteria	n	Percent
Highly acceptable (potable from faucet)	257	83.2
Moderately acceptable (need to boil first before drinking)	25	8.1
Not so acceptable (used only for cooking, cleaning not for drinking)	11	4.5
Not acceptable (for cleaning, not for cooking and drinking)	3	1.0
Store in refrigerator before drinking	1	0.3
Drunk water from water pumps	2	0.6
No answer	7	2.3
Total	309	100

APPENDIX TABLE 5

PERCEIVED EFFECTS OF INSUFFICIENT WATER SUPPLY AND ENVIROMENTAL PROBLEMS

Appendix Table 5a. Negative effects of insufficient water supply

Indicator	Frequency	Percent (to n=309)
Health problem	98	31.7
Additional cost for water	56	18.1
Additional burden on household chores	52	16.8
Affects personal hygiene	39	12.6
Affects rice production, fetch water from other source	24	7.8
Total	269	87

Note: There were 9.1 percent or 28 respondents answered all of the above choices while 12 or 3.9 percent of them indicated that they don't feel any shortage or insufficiency of water supply

Appendix Table 5b. Perceived environmental problems linked to human activities

Indicator	Frequency	Percent (to n=309)
Pollution	106	34.3
Water quality deterioration	57	18.4
Soil erosion	74	23.9
Flash flood, shortage of water	36	11.7
Natural calamities	5	1.6
Answered more than one of the choices	29	9.4
No answer	2	.6

Note: There were two respondents that didn't answer to the question while 9.4 percent of the respondents answered more than one of the choices

APPENDIX TABLE 6

Appendix Table 6. Summary statistics of dependent and independent variable used in the study

Variables	Mean	Std. Dev.
Dependent		
WTP	.52	0.5
Independent		
AGE	49.00	14.78
GENDER	.61	0.49
CSTAT	.28	0.44
RESID	33.62	19.88
EDUC	11.34	3.16
HHSIZE	5.02	2.52
INCOME	P15,598.87	60903.88
PERCEPT	.90	0.3
CONNECTION	.95	0.22
BILL	344.185	447.37
SOURCE	.77	0.42
AVAILABILITY	.13	0.34
QUALITY	.15	0.35
SAFETY	.07	0.25
PROGAWARE	.34	0.47
SNPAWARE	.55	0.49
WSHEDWARE	.57	0.49
SNPWAWARE	.40	0.49
READBOOK	.73	0.44
MEMORG	.08	0.26
BIDAMT	33.56	31.17
CVS	.75	0.43
RESLOC	.25	0.43

Note: Means of each independent variables were used to compute for the Mean (WTP)

APPENDIX TABLE 7

LOGIT REGRESSION ANALYSIS RESULTS

Appendix Table 7a. Variance inflation factor for both models

Variable	Variance Inflation Factor	
	Uncensored	Adjusted
AGE	1.59	1.59
GENDER	1.13	1.13
CSTAT	1.18	1.18
RESID	1.52	1.52
EDUC	1.24	1.24
HHSIZE	1.1	1.1
INCOME	1.06	1.06
PERCEPT	1.09	1.08
CONNECTION	1.18	1.18
BILL	1.11	1.11
SOURCE	1.09	1.09
AVAILABILITY	1.16	1.16
QUALITY	1.32	1.23
SAFETY	1.32	1.17
PROGAWARE	1.19	1.19
SNPAWARE	2.22	2.25
WSHEDWARE	2.41	2.41
SNPWAWARE	2.86	2.86
READBOOK	1.18	1.17
MEMORG	1.08	1.08
BIDAMT	1.15	1.15
CVS	1.18	1.18
RESLOC	1.24	1.24

Note: Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

APPENDIX TABLE 7 (Continued)

Appendix Table 7b.Logit regression result for adjusted model

Variable	Coefficient	Std. Error	z-stat	p-value
CONST	1.25	1.23	1.0129	0.31110
AGE	-0.02	0.01	-1.8018	0.07157*
GENDER	-0.04	0.3	-0.1420	0.88706
CSTAT	0.36	0.32	1.1254	0.26043
RESID	-0.00135724	0.01	-0.1669	0.86744
EDUC	-0.04	0.05	-0.9837	0.32524
HHSIZE	0.09	0.06	1.5508	0.12095
INCOME	1.21E-005	1.40E-005	0.8685	0.38514
PERCEPT	0.09	0.41	0.2076	0.83557
WATERCON	0.21	0.83	0.2499	0.80266
BILL	0	0	-0.3767	0.70639
SOURCE	0.3	0.3	0.9959	0.31931
AVAIL	0.8	0.46	1.7378	0.08225*
QUALITY	-1.42	0.43	-3.3321	0.00086***
WATERSAFETY	0.22	0.73	0.3065	0.75922
PROGAWARE	0.48	0.31	1.5327	0.12535
SNPAWARE	0.4	0.39	1.0200	0.30772
WSHEDAWARE	0.27	0.41	0.6535	0.51343
SNPWAWARE	0.03	0.49	0.0534	0.95745
BOOKREAD	0.24	0.3	0.8085	0.41879
MEMORG	-0.32	0.54	-0.5872	0.55707
BIDAMT	-0.03	0	-5.9996	<0.00001***
CVS	-0.53	0.34	-1.5545	0.12007
RESLOC	0.03	0.34	0.0893	0.92888

Number of cases 'correctly predicted' = 216 (70.8%)
f(beta'x) at mean of independent vars = 0.249
Likelihood ratio test: Chi-square(23) = 78.6412 [0.0000]
Logit estimates using 305 observations from 1-309
Missing or incomplete observations dropped: 4

APPENDIX TABLE 7 (Continued)

Appendix Table 7c. Logit regression result for uncensored model

Variable	Coefficient	Std. Error	z-stat	p-value
CONST	1.68	1.28	1.31	0.19
AGE	-0.03	0.01	-2.33	0.0199**
GENDER	-0.02	0.31	-0.05	0.96
CSTAT	0.36	0.33	1.1	0.27
RESID	0	0.01	0.3	0.76
EDUC	-0.03	0.05	-0.71	0.47
HHSIZE	0.06	0.06	0.99	0.32
INCOME	1.12E-005	1.35E-005	0.82	0.41
PERCEPT	0.22	0.49	0.53	0.6
WATERCON	-0.15	0.82	-0.19	0.85
BILL	-6.78E-005	0	-0.25	0.81
SOURCE	0.3	0.35	0.99	0.32
AVAIL	0.69	0.41	1.54	0.12
QUALITY	-1.54	0.47	-3.61	0.0000***
WATERSAFETY	0.17	0.75	0.23	0.82
PROGAWARE	0.69	0.32	2.11	0.037**
SNPAWARE	0.36	0.38	0.96	0.34
WSHEDAWARE	0.17	0.42	0.43	0.67
SNPWAWARE	0.2	0.5	0.42	0.68
BOOKREAD	0.25	0.31	0.81	0.42
MEMORG	-0.2	0.55	-0.37	0.71
BIDAMT	-0.03	0	-6.21	<0.0000***
CVS	-0.46	0.34	-1.34	0.18
RESLOC	0.06	0.34	0.17	0.87

Number of cases 'correctly predicted' = 218 (71.5%)
f(beta'x) at mean of independent vars = 0.247
Likelihood ratio test: Chi-square(23) = 85.4536 [0.0000]
Logit estimates using 305 observations from 1-309
Missing or incomplete observations dropped: 4

APPENDIX TABLE 7 (Continued)

Appendix Table 7d. Logit regression result for adjusted model without income as independent variable

Variable	Coefficient	Std. Error	z-stat	p-value
CONST	0.9	1.15	0.7881	0.43062
AGE	-0.02	0.01	-1.9557	0.05050*
GENDER	-0.14	0.3	-0.4676	0.64004
CSTAT	0.4	0.32	1.2569	0.20878
RESID	0	0.01	-0.2167	0.82843
EDUC	-0.03	0.04	-0.7096	0.47796
HHSIZE	0.11	0.06	1.9088	0.05628*
PERCEPT	-0.01	0.41	-0.0125	0.99007
WATERCON	0.46	0.74	0.6210	0.53459
BILL	-4.34E-005	0	-0.1606	0.87238
SOURCE	0.34	0.29	1.1506	0.24990
AVAIL	0.81	0.45	1.7896	0.07351*
QUALITY	-1.27	0.42	-3.0703	0.00214***
WATERSAFETY	0.16	0.73	0.2088	0.83463
PROGAWARE	0.39	0.3	1.3109	0.18989
SNPAWARE	0.45	0.39	1.1357	0.25608
WSHEDAWARE	0.19	0.4	0.4807	0.63076
SNPWAWARE	0.1	0.48	0.2102	0.83348
BOOKREAD	0.34	0.3	1.1233	0.26129
MEMORG	-0.19	0.53	-0.3502	0.72619
BIDAMT	-0.03	0	-5.7920	<0.00001***
CVS	-0.52	0.33	-1.5823	0.11358
RESLOC	0.02	0.32	0.0752	0.94007

Mean dependent var	0.52	S.D. dependent var	0.25
McFadden R-squared	0.17	Adjusted R-squared	0.07
Log-likelihood	-176.83	Akaike criterion	399.66
Schwarz criterion	485.53	Hannan-Quinn	433.99

Number of cases 'correctly predicted' = 215 (69.6%)
f(beta'x) at mean of independent vars = 0.250
Likelihood ratio test: Chi-square(22) = 74.1571 [0.0000]