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RESEARCH REPORT

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Valuing Biodiversity Conservation in a World Heritage Site: Citizens' Non-use Values for Tubbataha Reefs National Marine Park, Philippines

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This study assesses the willingness of people in three cities in the Philippines to pay for the conservation of one of the country's most important marine areas. The research was carried out to find alternative sources of finance for the Philippine's marine conservation program. Lack of funds is already placing many of the country's key marine areas in danger from illegal and destructive fishing and other environmental threats.

The contingent valuation method (CVM) was used to find out how much people in Quezon City, Cebu City and Puerto Princesa would be willing to contribute to a conservation trust fund for the Tubbataha Reefs National Marine Park (TRNMP). This is a UNESCO world heritage site covering 33,000 hectares of the Sulu Sea. It has been under threat from illegal fishing and has suffered significant coral loss in recent years.

The report finds that well over 40% of all respondents would be willing to pay money to support conservation in the reserve and in its surrounding waters. It finds that people are most willing to pay because they think that it is important to conserve the marine park for future generations.

Although differences are found in the amount of money people would be willing to give for reef conservation, even the lowest estimate of the overall potential income- PHP141 million (or USD2.5 million) per year – would provide more than enough money to fund conservation work in the TRNMP.

Given this promising revenue source, the report outlines a number of options for collecting this money – including two different tax proposals and a number of suggestions for collecting voluntary donations.

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VALUING BIODIVERSITY CONSERVATION IN A WORLD HERITAGE SITE: CITIZENS' NON-USE VALUES FOR TUBBATAHA REEFS NATIONAL MARINE PARK, PHILIPPINES

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March, 2005

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GLOSSARY OF ACRONYMS

CC	Cebu City
CVM	Contingent Valuation Method
KKP	Kabang Kalikasan ng Pilipinas (WWF-Philippines)
PI	Personal Interview(s)
PPC	Puerto Princesa City
QC	Quezon City
SA	Self-Administered Survey
TEV	Total Economic Value
TRNMP	Tubbataha Reefs National Marine Park
UNESCO	United Nations Educational, Scientific and Cultural Organization
WTP	Willingness to Pay
WWF	World Wide Fund for the Conservation of Nature

VALUING BIODIVERSITY CONSERVATION IN A WORLD HERITAGE SITE: CITIZENS' NON-USE VALUES FOR TUBBATAHA REEFS NATIONAL MARINE PARK, PHILIPPINES

Rodelio Fernandez Subade

EXECUTIVE SUMMARY

The focus of this study is the economic valuation of biodiversity conservation of the Tubbataha Reefs[1], a UNESCO world heritage site located in the Sulu Sea, Philippines. This site is rich in marine biodiversity. A popular scuba diving destination around the globe, it supports the neighboring fishing ground with its teeming fisheries, but has been greatly threatened by society's wasteful and destructive use. Efforts to protect the area need to be sustained and even expanded, but would Filipinos be willing to support the protection of this world heritage site?

The willingness-to-pay (WTP) of Filipinos towards biodiversity conservation of the Tubbataha Reefs National Marine Park (TRNMP) was assessed in three cities: Quezon City, Cebu City, and Puerto Princesa City. Two variants of data collection; personal interviews (PI) and self-administered surveys (SA), were employed in a dichotomous choice contingent valuation method (CVM) involving 3,200 respondents. Of the survey forms, 2591 were found complete and used in the analysis.

Across sites and CVM modes, 41% of the 2591 respondents (47% for PI and 31% for SA) were willing to pay towards a trust fund for biodiversity conservation of the TRNMP. The main motives for positive WTP were: bequest value/motive (concern for future generations), existence value/motive (on the rights of marine plants and animals to exist and on one's pleasure knowing that the Tubbataha Reefs exist), altruistic value/motive, and good cause. The main reasons for non-willingness to pay were: limited income, the belief that conservation would take place without the respondent's contribution, and mistrust of the institutions handling the conservation funds.

Bid price significantly and negatively affected the willingness to pay, while annual income, education, familiarity with marine biodiversity, and education level positively contributed to WTP.

The average WTP values using SA (PHP 233 for Quezon City, PHP 135 for Cebu City, and PHP 278 for Puerto Princesa City) were lower than the values obtained from PI (PHP 437 for Quezon City, PHP 285 for Cebu City, and PHP 496 for Puerto Princesa City).[2] For the household population of the three cities the aggregate WTP ranged from PHP 141 million using SA to PHP 269 million using PI. This amount represents a potential resource to finance the protection of TRNMP. Appropriate mechanisms in order to tap this potential financing resource are, therefore, needed.

[1] The 'Tubbataha Reefs' refer to the Tubbataha Reefs National Marine Park (or marine protected area) which encompasses the popular coral formation in the middle of the Sulu Sea, Philippines.
[2] One US dollar was equivalent to 54.4 Philippine pesos (PHP) in 2003.

1.0 INTRODUCTION

1.1 Background

Biological resources are the fundamental building blocks for development and provide the basis for local self-sufficiency. In particular, biological diversity, which characterizes such resources, is a global asset, bringing benefits to people in all parts of the world. Thus, efforts to maintain the diversity of biological resources are urgently required at local, national and international levels (McNeely et al., 1990).

Biological diversity or biodiversity refers to the variety of life forms, the ecological functions they perform, and the genetic variations they contain (Smith, 1992). Biodiversity has been recognized to be a valuable global resource that the Brundtland Report for the World Commission on Environment and Development (1987) placed high priority in conserving. Subsequent international efforts such as the World Charter for Nature and the World Conservation Strategy (IUCN, 1980), and later, the 1992 Convention on Biological Diversity demonstrate how biological diversity has emerged as a critical goal for environmental conservation and protection.

In response to such environmental imperatives, the Philippines, being a biodiversity hotspot[3] has joined worldwide efforts to conserve various habitats in both terrestrial and marine ecosystems. The enactment of the 1993 National Integrated Protected Area System Act (Republic Act No. 7586) has become one of the leading legal instruments in arresting biodiversity loss and in the establishment of protected areas across the country. Cognizant of the archipelagic nature of the country, the government has gradually increased its efforts in coastal resource management (or integrated coastal zone management) and marine biodiversity conservation.

An inventory of marine protected areas (MPAs) in the Philippines conducted by the Haribon Foundation for the Conservation of Nature (Pajaro et al., 1999) tabulated a total of 439 established MPAs, 106 of which are in Central Visayas. Despite this number, however, not more than 20% are fully implemented MPAs, including the world-renowned Tubbataha Reefs National Marine Park, a UNESCO world heritage site, where the highest level of marine biodiversity is believed to be found.

Funding and the lack of institutional mechanisms have become the major limiting factors in fully implementing MPAs. Non-government organizations and foreign funding agencies have strived to fill in these gaps, but without much success.

1.2 Statement of the Problem

The Tubbataha Reefs National Marine Park (TRNMP) and world heritage site is an environmental resource that is teeming with biodiversity. Sprawling a vast 33,200-hectare area in the middle of the Sulu Sea, the Tubbataha Reefs are the largest coral reef atoll and the only national marine park in the country. It is well-known among fishers in Southern Philippines, and is one of the most coveted and popular dive sites for scuba

[3] According to Myers (1988), "hotsposts" are biodiversity gold veins characterized by high levels of species richness and often, high levels of endemism.

divers around the world. The reefs harbor a rich diversity of marine life equal to or greater than any such area in the world. In a survey in 1983, it was found that there were 46 coral genera, more than 300 coral species, and at least 40 families and 379 species of fish. Large marine fauna such as manta rays, sea turtles, sharks, tuna, dolphins, and jackfish are a common sight in the reefs (Arquiza and White, 1994).

The colorful beauty, high productivity and rich biodiversity of the reefs attracted both admiration as well as habitat destruction, particularly in the late 1980s. Surveys showed that in the said period, fishing, often using destructive methods, began to take place in the reefs during most of the year (Arquiza and White, 1994). In 1989, observations revealed that living coral cover on the outer flats declined by 24%.

Like any resource, the open-access nature of the Tubbataha Reefs has brought forth the wanton use and misuse of the resources therein. Since no particular individual or entity owns them, nobody cares to use them responsibly and in a sustainable manner. The "tragedy of the commons" usually leads to overexploitation and damage to the resource (Hardin, 1968). To arrest the downward trend of habitat destruction, over-fishing and biodiversity loss, a series of measures and laws were implemented in the 1990s by various sectors and the government of the Philippines (White and Vogt, 2000). These included:

1. The issuance of Proclamation No. 306 on August 1, 1988 declaring the Tubbataha Reefs as a national marine park – the Tubbataha Reefs National Marine Park (TRNMP).

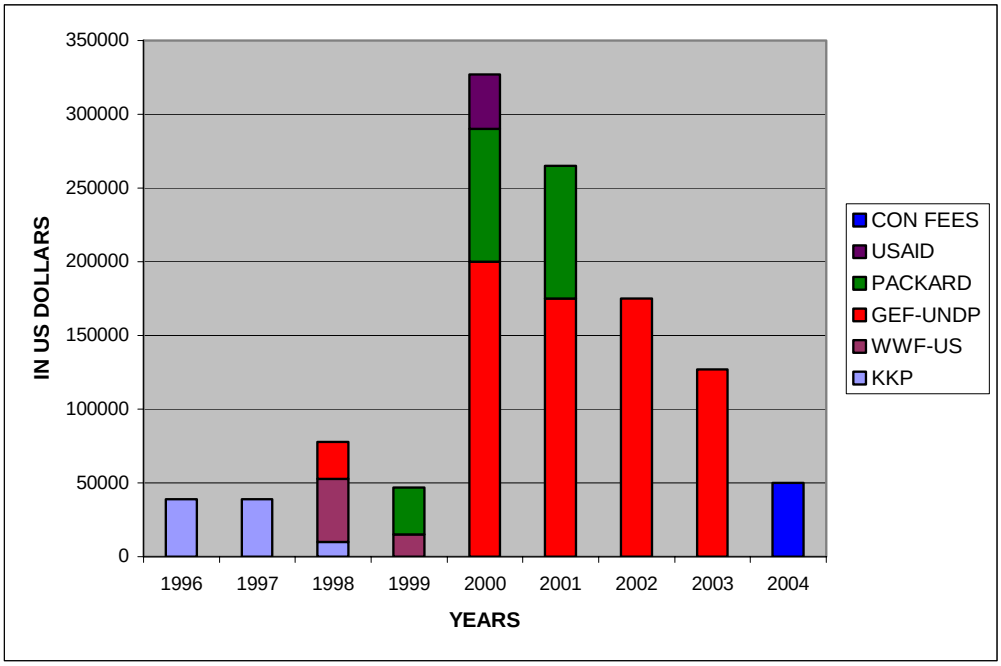
2. The UNESCO declaration of TRNMP as a UNESCO World Heritage Site in December 1993.

3. The creation of a Presidential Task Force for the Tubbataha Reefs National Marine Park by President Ramos on July 20, 1995, which developed and initiated the action plan to reverse its environmental degradation.

Improved reef quality since 1989 was cited as an indicator of success of the above conservation efforts (White and Vogt, 2000). Recent data, however, showed that coral cover declined from 54% in 1998 to 28.17% in 1999, which was attributed mainly to the El Niño occurrence. Though there was slight recovery to 31.48% in 2000, this still leaves much to be desired compared with the 1998 level.

A major constraining factor in sustaining such conservation efforts is the continuous and consistent availability of needed resources, mainly funding. Figure 1 shows the different funding sources for the conservation of the Tubbataha Reefs for the period 1996 to 2004. From an average yearly budget of approximately USD 50,000 in for 1996-1999, funding peaked at USD 327,000 in the year 2000, the start of a four-year Global Environmental Facility (GEF) grant. It should be noted that with the grant-dependent nature of TRNMP conservation budgets, funding for 2001-2003 was projected to diminish annually. In 2000, the TPAMB (Tubbataha Protected Area Management Board) approved and imposed conservation fees to be collected from entrance fees – this was expected to raise some USD 50,000-USD 100,000 per year, half of which would be put into a trust fund, such that in 2004 a lump sum of USD 50,000-USD 100,000 could be made available for the same purpose. However, the outcome is yet uncertain considering political instability and the effect on tourism. A conservative assumption was that USD 50,000 would be raised by 2004, but this is still way below

the minimum of the USD125,000 needed to sustain the current level of conservation operational costs per year. Worse, there are no confirmed funding sources for 2005 and future years. Certainly, the country cannot always rely on limited GEF and foreign funding sources since there are many other biodiversity conservation sites in other parts of the world competing for these funds.



Source: Kabang Kalikasan ng Pilipinas (WWF-Philippines)

Key:
CON FEES = Conservation fees (from 2000-2003) saved through trust funds
USAID = United States Agency for International Development
PACKARD = Lucille Packard Foundation, USA
GEF-UNDP = Global Environmental Facility - United Nations Development Program
WWF-US = Endangered Seas Campaign of the World-Wide Fund for Nature - USA
KKP = Kabang Kalikasan ng Pilipinas (WWF-Philippines)

Figure 1. Funding Sources for the Management and Conservation of the Tubbataha Reefs

Resource insufficiency is highlighted, and even aggravated by the huge area to be conserved, managed and patrolled. The Tubbataha Reefs cover a vast 33,200-hectare area. The government's objective to include the neighboring Bastera and Bezley Reefs under the Tubbataha Reefs jurisdiction would mean more resources needed for an additional 10,000 hectares. In early 2000, a Taiwanese fishing boat was apprehended in the Tubbataha Reefs, an indication that poachers can easily penetrate the protected perimeter of the marine park. Then in early 2001, two fishing boats from China were caught poaching within the area of the reefs. It is believed that poaching and illegal fishing still persist, although at low levels. It is likely that the limited resources for conservation will not be able to support efforts to protect the area from illegal elements as observed by Arquiza (1994) in 1993, when the lack of comprehensive surveillance and the increasing presence of illegal fishers undermined the positive results of conservation efforts started in 1989.

Furthermore, there is an evident lack of government commitment to provide consistent and sufficient funding support to TRNMP conservation. Though not mentioned in Figure 1, government appropriation has been through the Presidential Task Force for the Tubbataha Reefs and through the Philippine Navy patrol. The task force received budgetary allocation to perform its duties but it disbanded later due to lack of funds (Philreefs, 1997). The naval patrol consists of an average of two weekly patrols by a small force with a boat in disrepair (KKP, 1999). It is a well-known fact that the country possesses a long coastline twice that of the United States, which renders the existing Philippine Navy fleet and patrol less effective. Considering this great scarcity, any additional naval patrol for The Tubbataha Reefs remains a dream.

With insufficient government funding for the Tubbataha Reefs, the prospect for TRNMP is not bright. The achievements gained in the past few years of marine conservation will come to naught should this situation persist. This will surely see the return of many poachers and illegal fishers. Consequently, the precious environmental resource, particularly the biodiversity of the area, will be severely affected and will once again be in great danger of being lost. The temporary and unstable nature of conservation funding for the Tubbataha Reefs demands that alternative ways to meet this funding requirement be explored. This is what this study sets out to accomplish.

1.3 Significance of the Study

Indeed, the Tubbataha Reefs are a very unique habitat worth preserving and conserving, a natural heritage that has won the Philippines worldwide recognition. However, in order to sustain the momentum in conserving and protecting the TRNMP and the marine biodiversity therein, sustainable sources of funding are needed. As one of the basic problems in the preservation and improvement of environmental attributes, resource under-valuation or the failure of either the market or government to capture all the benefits of the natural resource / environment, can lead to the misuse, misallocation or ruin of the environmental resource.

The protection and conservation of natural resources involve considerable social costs in terms of foregone direct-use benefits, which the government may be hesitant in giving up. Moreover, the lack of information on how citizens value conservation, particularly non-use values, can easily weaken government resolve in consistently allocating an annual budget for conservation. Dixon and Sherman (1990) explain this phenomenon as follows: “For various economic reasons that economists call market failure, the benefits of protection [and conservation] are only partly accounted for whereas the costs of protection receive thorough coverage. As a result, fewer [and smaller] areas are protected than is socially desirable. And because governments find it difficult to capture these benefits, budget allocation for the management of protected areas are frequently inadequate.”

This study was undertaken to provide information on how citizens value the Tubbataha Reefs through their willingness to pay for its conservation. The results of this study can provide inputs in exploring alternative sources of financing the conservation of TRNMP. As mainly a grant- or donor-driven conservation program, the biodiversity conservation of TRNMP may not be sustained if there is no regular source of funds. On the other hand, Filipinos’ awareness and willingness to pay for its conservation can serve as rationale to outsource local but sustainable financing mechanisms. The research

questions, therefore, are: “Do Filipinos value TRNMP?” and “Are they willing to pay for its conservation?

1.4 Research Objectives

1.4.1 General Objective

This research generally aims to determine how citizens value a world-renowned national marine park and whether motives such as altruism are associated with positive WTP.

1.4.2 Specific Objectives

Specifically, this study aims to:

a) assess the awareness and attitudes of Filipinos towards issues concerning the conservation and management of the Tubbataha Reefs,

b) estimate the economic values of biodiversity conservation in the Tubbataha Reefs,

c) understand the composition of / motivation for non-use values for the Tubbataha Reefs,

d) assess the socio-economic-demographic factors affecting WTP for the conservation of the Tubbataha Reefs,

e) compare WTP estimates of self-administered contingent valuation (CV) surveys versus personal interview CV surveys, and

f) recommend policies for funding conservation efforts in the Tubbataha Reefs.

2.0 REVIEW OF RELATED LITERATURE

2.1 Biological Diversity: Definition and Importance

According to McNeely et al. (1990), biodiversity encompasses all species of plants, animals and microorganisms and the ecosystems and ecological processes of which they are parts. It is an umbrella term for the degree of nature’s variety, including both the number and frequency of ecosystems, species, or genes in a given assemblage. It is usually considered at three different levels: genetic diversity, species diversity and ecosystem diversity. Genetic diversity is the sum total of genetic information, contained in the individual genes of the plants, animals and microorganisms that inhabit the earth. Species diversity refers to the variety of living organisms on earth and has been variously estimated to be between 5 and 50 million or more, though only about 1.4 million have actually been described. Ecosystem diversity relates to the variety of habitats, biotic communities, and ecological processes in the biosphere, as well as the tremendous diversity within ecosystems in terms of habitat differences and the variety of ecological processes. Ecosystems cycle nutrients (from production to consumption to decomposition), water, oxygen, methane, and carbon dioxide (thereby affecting the

climate), and other chemicals such as sulfur, nitrogen, and carbon (McNeely et al., 1990).

Biodiversity plays a critical role in meeting human needs directly while maintaining the ecological processes upon which our survival depends. Moreover, it provides genetic stock to ensure food security and increase productivity of modern agriculture. Furthermore, the recreational opportunities and aesthetic value of biodiverse habitats translate to millions of jobs and hundreds of million dollars worldwide (Biodiversity Support Program, 1996).

The importance of biodiversity to society is a well-known fact. Mitsuo Sato (1995), former President of the Asian Development Bank (ADB), stressed that the direct economic benefits from wild species are so enormous that alone they make up an estimated 4.5 percent of the gross domestic product of the United States. Fisheries, based largely on wild species, contribute annually about 100 million tons of food worldwide. About 80 percent of the people living in developing countries depend on primary health care, which is based mainly on traditional medicine from wild species. Conservation of biodiversity, whether in terrestrial or marine ecosystems, is, therefore, an integral part of the socio-economic well-being of poor rural communities. In many situations, it is the only means of survival, being the sole source of wood, medicine and shelter (ADB, 1995).

2.2 Degradation of Biodiversity: The Continuous Threat

The rapid destruction of the world's most diverse ecosystems particularly in the tropics, has led most experts to conclude that perhaps a quarter of the earth's total biological diversity is at serious risk of extinction during the next 20-30 years (Raven, 1988 as cited in McNeely et al., 1990). There are major threats which will severely ruin the world's biodiversity, if not addressed appropriately. These are: habitat alteration, over-harvesting, chemical pollution, climatic change and species introduction (McNeely et al., 1990). Other authors, like Pearce and Moran (1994) consider these threats as proximate causes of biodiversity loss. Proximate causes are defined as those which show up as the more popular explanations for biodiversity loss.

For marine biological diversity, Thorne-Miller and Catena (1991) virtually identified the same types of threats which McNeely et al. enumerated. Biodiversity in the marine environment is threatened by habitat destruction due to coastal development. Threefold pollution on land – dissolved nutrients, dissolved toxics, and suspended particles (toxic and non-toxic) – wash into the oceans with run-off from agricultural, urban and industrial activities, deforestation, and construction.

In the Philippines, the Investigation of Coral Resources of the Philippines (ICRP, 1976-1982; Gomez et al., 1981) project gathered extensive data on various prevalent impacts, both from human and natural causes, on coral reefs rich in biodiversity. The impacts which present serious threats to marine biodiversity are: siltation due to soil erosion, coastal land development, nutrient enrichment due to agricultural fertilizer run-off and sewage from near-shore inhabitants, industrial pollutants, destructive fishing methods, over-fishing, storms, and global warming.

McNeely et al. (1990) explained several economic factors, which stimulate over-exploitation of biological resources, thereby facilitating biodiversity loss. First,

biological resources, considered as public goods, are often not given appropriate prices in the marketplace. Second, the benefits of protecting natural areas are in practice, seldom fully represented in cost-benefit analyses because the social benefits of conserving biological resources are often intangible, widely spread and not fully reflected in market prices. Third, those who benefit from exploiting a forest, wetland, or coral reef seldom pay the full social and economic costs of their exploitation. Fourth, the species, ecosystems and ecosystem services that are most overexploited tend to be the ones with the weakest ownership, which translates to the open-access nature of the resource. Fifth, the discount rates applied by economic planning tend to encourage depletion of biological resources rather than conservation, i.e. high interest rates. It is worth noting that all these factors can be traced to the problem of determining the correct economic value of biological resources, particularly biodiversity. On the other hand, Adamowicz (2003) opines that actually, the root cause of over-exploitation of biological resources and biodiversity loss is the lack of an institutional framework that allows the value of biodiversity to emerge. Barbier et al. (1997), in determining the values of goods and services of wetlands, explains that it is much more difficult to value biodiversity or the aesthetic beauty of wetlands [and even marine habitats] as the market for such is more elusive and their economic valuation much more difficult to achieve with traditional methods.

2.3 Economic Valuation and Values of Biodiversity: Focus on Coral Reefs

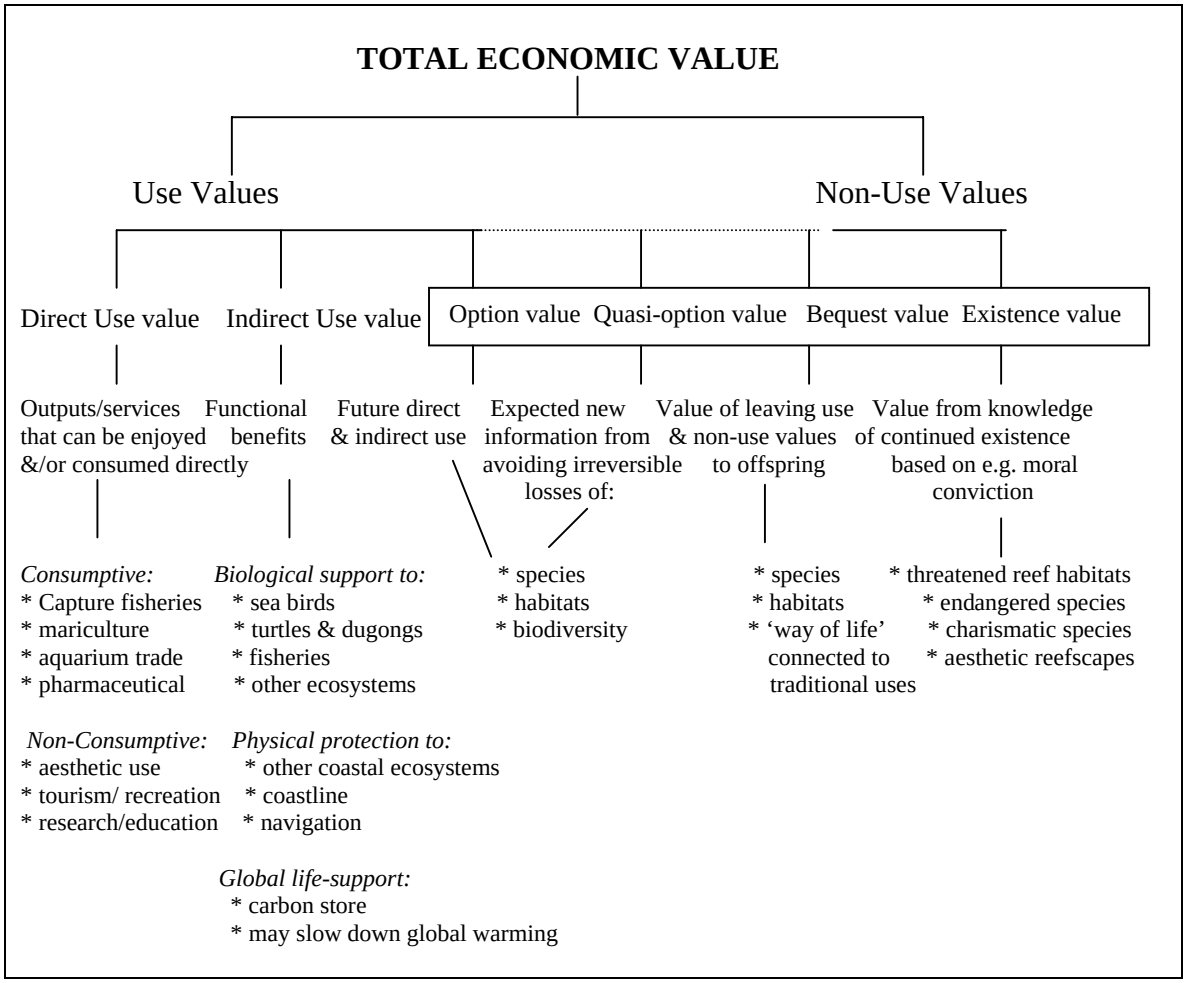
Economic valuation can be defined as the attempt to assign quantitative values to the goods and services provided by environmental resources [biological resources or biodiversity], whether or not market prices are available to assist us. From the economist's point of view, the economic value of any good or service is generally measured in terms of what we are willing to pay (WTP) for the commodity, less what it costs to supply it. Where an environmental resource simply exists and provides us with products and services at no cost, then it is our willingness to pay alone, which describes the value of the resource in providing such commodities, whether or not we actually make any payment (Barbier et al., 1997). Economic valuation is thus, anthropocentric, i.e. based on preferences held by people. The resulting valuation are in money terms because of the way in which preference revelation is sought – by asking what people are willing to pay, or by inferring their WTP through other means (Georgiou et al., 1997).

As suggested in the previous section, a major reason for the excessive depletion of biological / environmental resources (and biodiversity) is often the failure to account adequately for their non-market environmental values in developmental decision-making. Many environmental resources like coral reefs are complex and multi-functional, and it is not obvious how the myriad goods and services (such as seaweeds and element recycling, respectively) provided by these resources affect human welfare. Since many of the benefits or values of natural or managed environmental resources are not bought and sold on markets, they are often ignored in private and public development decisions. In some cases, it might be worthwhile to deplete, over-harvest or degrade environmental resource. In other cases, however, it might be necessary to hold on to these resources. Economic valuation assists difficult decision-making in providing a means for measuring and comparing the various benefits of environmental resources like coral reefs. It serves as a powerful tool to aid and improve the wise use and management of these resources (Barbier et al., 1997).

What are the environmental resources values to be measured? In particular, what are the benefits and/or values of biodiversity? Specifically, what are the different benefits or values of a biodiverse marine habitat such as coral reefs? How do we measure these? The concept of total economic value (TEV) provides a framework in accounting for the many uses and values of environmental resources like biodiversity. The TEV is broadly categorized into use values and non-use values. Typically, use values involve some human interaction with the resource, environment or habitat, whereas non-use values do not (Barbier et al., 1997). Turner and Pearce (1993) explain that use values are derived from actual use of the resource, while non-use values reflect people's preferences, but include concern for, sympathy with, and respect for the rights or welfare of non-human beings. Pearce and Warford (1993) defined use values as pertaining to current or future (potential) values associated with the environmental resource, and rely merely on its continuous existence, unrelated to use. Use values can either be direct or indirect, where the latter pertain to the benefits gained indirectly from natural habitats, usually through support and protection of other economic activities, and are often referred to as natural functions or environmental services. For example, coral reefs provide shoreline/coastal protection from waves and typhoons, and spawning grounds for fish, aside from providing a rich habitat for various marine species. Direct use values, on the other hand involve both consumptive (for example, fish, medicines, and shell craft) and non-consumptive values and benefits (swimming, scuba diving, snorkeling, and other marine eco-tourism activities not involving the extraction or consumption of marine life or habitat).

Another type of use value is option value – the value now of potential future direct and indirect uses of the coral reef ecosystem (Cesar, 2000), like a cure for cancer or AIDS from substances from the flora and fauna of the reefs. Bio-prospecting has become a major means of capturing option value. Quasi-option value is another value of environmental resources, which is classified either under use values or non-use values, just like option values. It is related to option value and is based on the premise that avoiding irreversible destruction of a potential future use gives value today. Several authors classify option values as quasi-option values too (Adamowicz, 2003; Freeman, 1993).

Figure 2 shows the different TEV components and attributes of economic values of coral reefs, a rich and biodiverse environmental resource.



Source: Adapted from Barton (1994)

Figure 2. Total Economic Value and Attributes of Economic Values for Coral Reefs

Barton (1994) as cited by Cesar (2000) discusses in more detail the different economic values of coral reefs. As shown in Figure 2, it is interesting to note that biodiversity falls under option and quasi-option values, yet a closer look at bequest and existence values would suggest that the latter two non-use values also cover biodiversity values for coral reefs.

In a review of several empirical studies on biodiversity valuation which can be applied to coral reefs, Cartier and Ruitenbeek (2000) classified biodiversity valuation measures into three categories: production values, utility values, and rent capture values. Biodiversity production values (BPV) measure biodiversity within an economic production function, and focus on a supply-oriented approach to valuation. BPVs are often used to estimate direct use values like those of fisheries. On the other hand, biodiversity utility values (BUV) measure **within** an economic utility function (i.e. consider consumers' satisfaction), thereby attempting to capture total consumer surplus or demand-oriented values. CVM are often used to capture non-use values while other techniques are used to value the final end-use benefits of biodiversity. Biodiversity rent capture values (BRCV) measure how much value is retained or captured within a country or region, or by a particular interest group. BRCV methods usually concentrate on one part of a profit function, and are more interested in identifying a specific profit share than in identifying total economic value. Estimates derived by BRCV approaches

may be quite small if there are local institutional weaknesses or failures that prevent benefits from being captured.

2.4 Previous Studies on Economic Valuations of Biodiversity

In an attempt to measure biodiversity values and ascertain applicable valuation approaches, Pearce and Moran (1994) reviewed 50 studies on environmental conservation values. Of these studies, 16 measured economic values of tropical forests, 15 of wetlands, 11 of rangelands and wilderness areas, and 8 of marine/coastal ecosystems and heritage sites. Based on these studies, Pearce and Moran observed that:

a) the estimates varied in the degree of sophistication and extent of benefit valuation,
b) non-use benefit estimations were done mostly in developed countries,
c) studies in developing countries mostly dealt with use values estimation, and
d) there had been no systematic coverage of ecosystems or regions.

The implication here is that the studies measured the economic values of conservation, and hence, biodiversity values. However, Pearce and Moran noted that what these economic studies measured is the economic value of "biological resources" rather than "diversity". They argued that, "diversity valuation requires some idea of WTP for the range of species and habitats rather than the specific biological resources they happen to support. Valuing diversity as such will be far more complex. Contingent valuation approaches offer the most promise since individuals can be presented with different ranges of species/habitats to see which they prefer. But information will be paramount since many life scientists believe that this diversity is fundamental to human well-being".

Pearce and Moran (1994) also discussed global values for biodiversity, which can be represented by the debt-for-nature (DFN) swap, some kind of willingness to pay on the part of the conservation body purchasing the debt of an indebted nation, possessing a biodiverse habitat which needs conservation. Ruitenbeek (1992) estimated WTP measures from six DFNs or deals which were virtually DFNs. A range of 18 cents to USD 11 per hectare in present values was derived as implicit prices. However, Pearce and Moran noted that these implicit prices captured only part of the rich world's existence values for the biodiverse habitats concerned.

In the same article which reviewed empirical studies on biodiversity (Cartier and Ruitenbeek, 2000), it was found that existence and option valuations of coral reefs were rare. Moreover, most studies involving coral reefs are concerned with their recreational and tourism values, while no studies estimated the genetic resource use values. Reviewed studies also revealed that the most commonly valued harvested product from coral reefs is fisheries, but the natural systems underlying the harvest (e.g. reef-fish relationship) were simplified; education and research values were based on expenditure estimates or on budget allocations from funding institutions. Lastly, coastal protection afforded by coral reefs is the only ecological function valued.

Hundloe et al. (1987) used CVM to estimate a combined option and existence value of a coral reef habitat – the Great Barrier Reef in Australia. Adult citizens were asked to bid their WTP to ensure that the reef was maintained in its state at that time.

Results showed consumer surplus amounted to AUS$ 45million per year. However, the motives of non-users for WTP were not determined.

De Groot (1992) estimated option value and vicarious non-use values (i.e. "inspirational" and "spiritual") for the Galapagos National Park. The option value was estimated to be at least equal to the combined value of the so-called productive and conservation (ecological) uses of the park. The value of cultural and artistic inspirational use was based on the value of the book and film sales. On the other hand, the value of spiritual use was based on financial donations because, the author argues, at least part of donated money indicates an ethical or intrinsic value attached to the park.

2.5 Non-Use Values

It can be said that in measuring biodiversity, what accords the biggest prospect of valuation, as well as diversity valuation, are the non-use values. Krutilla (1967) first introduced the concept of non-use or existence values into the economics literature. He quoted Pigou (1952) who had earlier written that "It is the clear duty of government….to defend the exhaustible natural resources of the country from rash and reckless spoliation……there is a valid case for some artificial encouragement to investment, particularly to investments the return from which will only begin to appear after the lapse of many years…", with the latter implying resource conservation, which Krutilla defined as the husbanding of natural resource stocks for the use of future generations. He further explained that the preservation and continued availability of a grand scenic wonder or a unique and fragile ecosystem would form a significant part of the real income of many individuals. Then, he noted that there were at least two reasons why people would have values unrelated to their current use of a resource – options for future use, and bequeathing natural resources to one's heirs (Freeman, 1993).

Freeman (1993) noted that "in the economics literature, natural resource values that are independent of people's present use of the resource have been variously termed 'existence', 'intrinsic', 'non-user', and 'non-use' values. These values are said to arise from a variety of motives, including a desire to bequeath certain environmental resources to one's heirs or future generations, a sense of stewardship or responsibility for preserving certain features of natural resources, and a desire to preserve options for future use." He stressed his belief that a majority of environmental and resource economists accept the hypothesis of non-use values, at least in principle, and that many of them believe that non-use values can be large in the aggregate in some circumstances. Thus, if non-use values are large, ignoring them in natural resource policy-making could lead to serious errors and resource misallocations (Freeman, 1993).

Several studies proved Freeman's view on the existence and the significant magnitude of non-use values, such as those of Walsh and Bjonback (1990) on protecting forest quality, Stevens et al. (1991) on non-use values for wildlife, Silberman et al. (1992) on non-users of beaches, Stevens et al. (1994) on wildlife, McConnell (1997) on motives for existence (non-use) values, Kramer and Mercer (1997) on the conservation of tropical forests, and Manoka (2001) on non-use values of U.S. residents for the conservation of tropical forests. In the 1997 study of McConnell, he concluded that one of the goals of contingent valuation research should be to compile empirical evidence on motives for existence (non-use) values.

Though the present study does not undertake a benefit-cost analysis (BCA), an examination of non-use values inquires as to the motives for existence valuation. This study provides empirical evidence for non-use values in a developing country context, on several sites across the country, in the preservation/conservation of the TRNMP.

In this context, the study adheres to the challenge of Freeman (1993) in testing the hypothesis that non-use values are positive, and to the invitation of McConnell (1997) in compiling empirical evidence, by inquiring into the motives behind non-use/existence values.

3.0 METHODOLOGY

3.1 The Contingent Valuation Method

Considering the dominant non-use value and non-market nature of biodiversity conservation, or biodiversity per se, CVM stands out as the most appropriate economic valuation method and is used in this study. CVM is a technique used to estimate the monetary value of environmental amenities such as wildlife, clean air and national parks (Wilks, 1990). Mitchell and Carson (1989) expounds in depth the various aspects of CVM, which may be employed to estimate values not intimately linked to use, for example, the desire of individuals to pass pristine natural environments on to future generations. They claim that CVM "is potentially capable of directly measuring a broad range of economic benefits for a wide range of goods, including those not yet supplied, in a manner consistent with economic theory" (Mitchell and Carson, 1989, p. 295). Moreover, the National Oceanic and Atmospheric Administration (NOAA) panel of the United States, concluded after its evaluation, that, "CVM studies or the application of the contingent valuation method can produce estimates reliable enough to be the starting point of a judicial process of damage assessment, including lost passive values" (NOAA, 1993; Arrow et al., eds.).

Pearce and Moran (1994) believe that interest in CVM has increased because it is the only means available for valuing non-use values and that the estimates obtained from well designed CVM surveys are as good as estimates from other methods. Moreover, the design, analysis and interpretation have improved greatly considering the developments in sampling and benefit estimation theories, and computerized data management. With regards to the first reason, Spash et al. (2000) stressed that CVM has attracted considerable attention in the literature because of its ability to estimate option, existence and bequest values in addition to direct use values. Stevens et al. (1991) also argued that CVM is the only technique capable of measuring existence values.

In the past few years, particularly in the last decade, attribute-based methods (ABM), alternatively called conjoint analysis or choice experiments/modeling approaches (CE/CM), have emerged due to their ability to incorporate preference heterogeneity of consumers/respondents in environmental valuation. The objective of these approaches is to estimate the economic values of a technically divisible set of attributes of an environmental good (Holmes and Adamowicz, 2003). However, these approaches have been used so far in estimating use values of the environment and their application to passive use values (non-use values) have been rare (Blamey and Rolfe, 1998). Moreover, Kristrom and Laitila (2002) stressed that as of now, cost-benefit analyses that need non-market values should rely more on CVM than on CE,

considering the task complexity that the latter imposes on respondents. Moreover, they believe that the CE standard formula does not handle choice probabilities correctly.

The stages involved in conducting a CVM study are designing and pre-testing the survey, carrying out the main survey, estimating willingness-to-pay (WTP) and/or willingness-to-accept (WTA), bid curve analysis, data aggregation and final assessment (Spash et al., 2000; Mitchell and Carson, 1989). Pre-testing can be done thoroughly, particularly when the survey instrument is used in a self-administered (mailed) format. Boyle et al. (1994) conducted a thorough pre-test of their questionnaire, i.e. up to four successive pre-tests and revisions, prior to the final survey, which solicited people's willingness to pay in order to prevent the deaths of the migratory waterfowl.

Mitchell and Carson (1989) thoroughly discussed several biases (and the corresponding solutions) that can be encountered in the use of CVM. Pearce and Moran (1994) discuss these biases and suggested solutions in the context of biodivesity valuation. For example, strategic bias or strategic behavior can be minimized by carefully framing the CVM questions, in an incentive-compatible way such that this type of behavior/bias is not induced. Moreover, the dichotomous choice (take-it-or-leave-it) elicitation format in CVM has been found to be incentive-compatible in that it is in the respondent's strategic interest to say yes if his/her WTP is greater than or equal to the price asked, and to say no otherwise (Hoehn & Randall, 1987, as cited by Mitchell and Carson, 1989). Also, by removing the outliers (observations with extreme values) from the data set gathered, the effect of strategic bias can be reduced.

Boyle et al. (1994) pointed out that there might be greater potential for part-whole bias (embedding) or insensitivity to scope[4] in estimating non-use values because respondents generally do not have choice experience or knowledge of the object being evaluated.

To minimize the part-whole bias problem, Mitchell and Carson (1989) suggest that the survey instrument include a description of the larger and smaller commodities, and then asking respondents to focus their attention on the smaller commodity. Inclusion of graphic aids such as maps and photographs is also proposed (Boyle et al., 1994). Spash et al. (2000) pointed out that the embedding problem or part-whole bias can be remedied by careful survey design. Predo (1995) in dealing with possible embedding or part-whole bias, asked respondents to rank their rating of the attributes for the environmental good being studied – the protection of Lake Danao National Park, Philippines. His approach is believed to aid respondents in proper recognition of the good's scope/size, and the corresponding valuation.

According to Pearce and Moran (1994), hypothetical bias (i.e. the tendency for hypothetical willingness to pay to be bigger than actual WTP) can be minimized by designing the WTP scenario (specified attitude) such that it closely corresponds to the specified behavior (the precise good measured). They also suggest ways of addressing the starting point, anchoring, and discrete bid level bias.

[4] Economic theory suggests that if an individual is willing to pay for a smaller level/scope of conservation (e.g. one species or a smaller area of forests or coral reefs), then he/she will be willing to pay for a bigger level/scope of conservation (e.g. many species or a bigger area of forests or coral reefs). If this does not hold true, then the individual is said to have insensitivity to scope or that he/she suffers from part-whole bias.

Although self-administered (mailed) CVM surveys have been increasingly adopted by CVM researchers in past years, most of the study sites have been in developed countries, where there is a high level of literacy, and people have been exposed to such kind of surveys. In the United States, many self-administered (mailed) CVM surveys have been conducted with satisfactory results. This indicates that language may not be a major impediment since English is widely used by the sample population. In contrast, CVM in developing countries like the Philippines, will have to consider language (or a translation) should a mailed or self-administered CVM be conducted. Considering local unfamiliarity with mailed questionnaires, a few studies adopted the "personally delivered and followed-up" approach for the self-administered CVM. This entails personally delivering the CVM questionnaire kit to the chosen respondent by someone known in the locality, and the same person collecting it back later.

3.2 The WTP Model and Estimation Techniques

In this study, the dichotomous, closed-ended or referendum CVM model was used. The WTP model was specified according to that used by Hanemann (1984), whereby a representative consumer has an indirect utility function V(P,M,Q,S), such that his/her level of utility or satisfaction depends on price (P), income (M), socio-economic characteristics (S or Si), and the quality of the environment (Q). The respondent will vote "yes" if he/she would pay to help conserve the TRNMP at a given price P, expressed as:

$$V(M\text{-}P, Q^1, S) \quad > \quad V(M - 0, Q^0, S) \qquad (1)$$

Equation (1) shows that the respondent will answer or vote "yes" if the utility he will derive from improving the marine coral reefs of TRNMP (Q^1) and paying the price P is higher than not having improved TRNMP biodiversity (Q^0) and paying the price P = 0. If V(P,M,Q,S) is the observable component of the utility, the probability of the respondent saying "yes" can be expressed as:

$$\text{Prob (Yes)} = \text{Prob}\,[\, V(M - P, Q^1, S) + \varepsilon_1 \quad > V(M - P, Q^0, S) + \varepsilon_0 \,] \qquad (2)$$

where ε_i's are unobservable components of the utility. Assuming that the random variable ε_i follows a logistic probability distribution, this can be written as:

$$\text{Prob (Yes)} = \frac{1}{1 + e^{-\Delta}} \qquad (3)$$

where $-\Delta = V(M - P, Q^1, S) \quad > \quad V(M - P, Q^0, S)$

Thus, the non-use value benefit of the hypothetical market (to improve marine biodiversity at TRNMP via conservation) is defined as:

$$[\, V(M - WTP, Q^1, S) \quad > V(M - P, Q^0, S) \qquad (4)$$

Haneman (1984) showed that with a linearly specified indirect utility function V(M - P,Q,S), then

$$\text{Log}\left[\frac{\text{Prob (Yes)}}{1 - \text{Prob (Yes)}}\right] = \alpha_0 + \beta_1 P + \beta_2 Q + \Sigma \beta_i S_i \qquad (5)$$

Parameters α_0 and β_i will be estimated parametrically using logistic regression which can be done with the use of any of econometric software: LIMDEP or SHAZAM. The mean maximum WTP for the conservation and improvement of marine biodiversity in the TRNMP can be calculated using the formula:

$$\text{Mean maximum WTP} = \frac{1}{\beta_1}\left[\ln\left(1+ e^{\alpha 0 + \beta 2\, Q + \Sigma \beta i\, Si}\right)\right] \qquad (6)$$

The theoretical model for this study was based on the total economic value for coral reefs as outlined by Barton (1994), focusing on non-use values as studied by Kramer and Mercer (1997), Manoka (2001) and McConnell (1997). However, unlike Manoka's work, this study will not provide a detailed examination on what he called economic existence use value.

Haab and McConnell (2003) explain that when the pattern of responses for discrete choice models as the CVM model specified by Hanemann (1984) above is well behaved, the estimated mean willingness to pay will not be specially sensitive to the choice of distribution for the unobserved random component of preferences, or for the functional form of the preference function. This is particularly true when the empirical distribution of "no" responses to the WTP question is monotonically increasing as the bid price goes up i.e., a greater percentage of respondents per bid price answer "no" to higher bids. However, there are cases when the distribution can have a substantial effect on the estimates of willingness to pay. Because of this sensitivity of WTP for some CV studies, a least restrictive approach has been developed in estimating WTP. As a distribution-free estimator, the Turnbull estimator (Turnbull, 1976) imposes a monotonicity restriction, and has become an appealing alternative WTP estimator to CVM researchers using the dichotomous choice format. Moreover, it offers a conservative lower bound estimate on willingness to pay for all non-negative distributions of WTP independent of the true underlying distribution (Haab & McConnell, 2003). In CVM studies where empirical results show a small portion of respondents with very high WTP, while majority have very low or zero WTP, the mean WTP using Hanemann's (1984) formula can be misleading (Whittington, 2003).

Haab and McConnell (2003) argued that when samples are large and the offered price increases, the proportion of observed negative responses to each bid should increase ($Fj <= Fj+1$). In other words, as the bid price increases, we would expect the distribution function to monotonically converge to one for large sample sizes. However, in practice, as several CVM studies have found out nothing guarantees this. Because of random sampling, we often observe non-monotonic empirical distribution functions (proportions of "no" responses for some of the offered prices: i.e. $Fj > fj+1$ from some j). In such cases we have two options. We can rely on the asymptotic properties of a

distribution-free estimator and accept the small sample monotonicity problem, or we can impose a monotonicity restriction on the distribution-free estimator. The second approach has come to be known as the Turnbull distribution-free estimator (Turnbull, 1976, as cited by Haab and McConnell, 2003).

Haab and McConnell (2003) showed the derivation of the Turnbull estimator, which can be adapted to this study and is explained as follows:

Consider a random sample of T respondents each offered one of M distinct prices, indexed as {tj | j = 1, 2,…..,M}, for a project, in the case of this study, the biodiversity conservation of the Tubbataha Reefs.

If the individual responds "yes" to the question, "Are you willing to pay tj pesos for biodiversity conservation in the Tubbataha Reefs?", then we know that WTPi (the WTP of an individual i) is equal to or greater than tj

WTPi = or > tj

Otherwise, WTPi < tj. Since WTP is unobservable to the researcher, it can be thought of as a random variable with a cumulative distribution function Fw(W), the probability that willingness to pay is less than W (the distribution function) (Haab and McConnell, 2003). The probability (Pr) of a randomly chosen respondent having willingness to pay less than tj pesos can therefore be written as,

$$\Pr(\text{WTP} < tj \text{ pesos}) = Fw(tj) = Fj \qquad (7)$$

where Fj = Nj / Tj, Nj is the number of people responding "no" to the offered price/bid tj pesos, Tj is the total number of people offered tj, and Fj is the sample proportion (a percentage) of "no" responses to the offered price tj. The consistent estimate of the lower bound on willingness to pay is written as:

$$E_{LB}(\text{WTP}) = \sum_{j=0}^{M^*} tj\,(F^*j+1 - F^*j) \qquad (8)$$

where $F^*j = N^*j / T^*j$, $F^*0 = 0$ and $F^*_{M^*+1} = 1$

Haab and McConnell (2003) explained that by multiplying each offered price (bid) by the probability that WTP falls between the price and the next highest price, we get a minimum estimate of WTP, and thus a conservative estimate. Moreover, the Turnbull estimator solves the problem of estimating negative willingness to pay without resorting to ad hoc distribution assumptions. It has been shown that central tendency measures of WTP from parametric models are sensitive to the assumed distribution, while the lower bound Turnbull estimate is robust across distributions (Haab and McConnel, 2003). Haab and McConnel (2003) discussed and showed in detail through a numerical example from a study by Duffield (1991), how the Turnbull estimator is computed. As will be discussed in the next chapter, this study used the Turnbull estimator to come up with a more conservative WTP estimate.

3.3 Survey Design and Implementation

This study followed the usual procedures undertaken in contingent valuation studies, as outlined by Spash et al. (2000), and Mitchell and Carson (1989):

a) designing and pre-testing of the survey questionnaire,
b) carrying out the main survey,
c) estimating the willingness-to-pay,
d) bid curve analysis (which is usually applied to open-ended CV analysis),
e) data aggregation, and
f) final assessment

In designing and implementing the CVM questionnaire and survey, Adamowicz (2003) stressed the importance of consequentiality, i.e. respondents are made aware that based on the CVM survey, possible payments may be collected by concerned (government or non-government) agencies/institutions from the people to appropriate their WTP. It should be noted that the respondents in this study were told about this during the interviews and self-administered surveys. For CVM studies, unless respondents are aware of consequentiality, the results would be unreliable (Adamowicz, 2003).

3.3.1 Focus Groups, Verbal Protocol, Pre-Testing, and Designing of Questionnaire

Focus group discussions were conducted to determine people's awareness and opinions concerning biodiversity. This avenue was also used to determine what people thought of contributing towards biodiversity conservation, what would be an acceptable payment mechanism and the quantum of their willingness to pay.

The verbal protocol technique, as applied in CV studies by Schkade and Payne (1994), Kramer and Mercer (1997), and Manoka (2001), was undertaken as part of the preparatory steps before finalizing the survey questionnaire. It is a "think aloud" technique where the respondent thinks out loud by literally letting his thoughts speak for themselves on a particular question Manoka (2001). There is no interaction between the interviewer and the respondent, except for occasional interventions by the interviewer when the respondent stops verbalizing for a few seconds.

Pre-testing of the questionnaire was undertaken before finalizing it. The first pre-tests were conducted on 90 personal interview respondents, 30 from Muntinlupa, Metro Manila, 30 from Mandaue, Metro Cebu, and 30 from a non-sampled barangay (village/community) of Puerto Princesa City, Palawan. For the first self-administered pre-test questionnaire, another 90 respondents were solicited from the same sites as the personal interview pre-test. The second pre-test was undertaken in Calamba, Laguna, consisting of 45 personal interview respondents and 45 self-administered respondents. All these pre-tests utilized the open-ended WTP question format. A third personal interview pre-test was also undertaken using the dichotomous choice format of the WTP question.

3.3.2 Sampling and Split Sample Surveys

This study used the multi-stage stratified sampling technique. For the first stage, three sites were selected, i.e. Quezon City, Cebu City, and Puerto Princesa City. For each city, 40 barangays were randomly selected, twenty each for the personal interview and self-administered surveys. These twenty were randomly selected from four sub-groups of barangays ranked from highest to lowest in terms of population.

In each city, there were two kinds of split sample; the personal interview and self-administered survey split, then the smaller scope of the good versus the bigger scope of the good. The latter survey split compares willingness to pay for biodiversity conservation in the Tubbataha Reefs (the smaller scope of the good) and the WTP for biodiversity conservation in the Sulu Sea where the Tubbataha Reefs is located (the bigger scope of the good). Table 1 shows the distribution of sampled respondents across sites, CVM mode, and questionnaire format.

Table 1. Split Sample and Respondents for the Study

CVM Mode and Questionnaire Format	**Study Sites**			
	Quezon City	**Cebu City**	**Puerto Princesa City**	**All Sites**
Personal Interview	400	600	600	1600
Tub. Reefs as 1st Question	200	300	300	800
Sulu Sea as 1st Question	200	300	300	800
Self-Administered Survey	400	600	600	1600
Tub. Reefs as 1st Question	200	300	300	800
Sulu Sea as 1st Question	200	300	300	800
	800	1200	1200	3200

For example, in the case of Cebu City, the total of 1,200 respondents was split into two i.e., 600 for the personal interview and another 600 for the self-administered survey. This per CVM mode number of respondents was further split whereby 300 received questionnaires with the first question being on the WTP for biodiversity conservation in the Tubbataha Reefs, and the other 300 received questionnaires with the first question being on WTP for biodiversity conservation in the Sulu Sea.

3.3.3 The WTP Question

The dichotomous choice format WTP question in the survey questionnaire was as follows:

"*Please keep in mind your personal income constraints when answering the following questions. Remember this is only one of many environmental issues, which may cost you money. Also remember that the following is only a hypothetical situation (that means suppose it happens as such), and that there are no correct or wrong answers and you should answer for yourself.*

Considering the above information (as provided in the early part of the questionnaire) about the trust fund to be set up, <u>let us suppose</u> that citizens will be asked to contribute to it. The trust fund will be jointly managed by WWF-Philippines and the

Tubbataha Reefs Marine Park Management Board, and will be used solely to help restore the marine animal and plant biodiversity of the Tubbataha Reefs, from its current level of 50% coral cover to 75% coral cover, that is, an increase of 25%.

Would you be willing to pay _____ (figure randomly selected) pesos as your yearly contribution to the trust fund for the next five years, in order to conserve and protect marine biodiversity in the TRNMP and world heritage site? Please keep in mind your present income and financial commitments."

To solicit response to the scope tests[5], the following WTP question pertaining to the bigger scope of the good follows:

"*Suppose the trust fund to be set up as pointed out above will be collected from citizens for the conservation and protection of marine biodiversity not only in the Tubbataha Reefs but in the whole Sulu Sea where the TRNMP is located. This much larger area (refer to map) has a total of approximately 140,000 hectares and cover large areas of coral reefs and rich biodiversity. The trust fund will still be jointly managed by WWF-Philippines and the Tubbataha Reefs Marine Park Management Board, and will be used to help restore the marine animal and plant biodiversity of the Sulu Sea.*

Would you be willing to pay ____ pesos as your yearly contribution to the trust fund for the next five years in order to conserve and protect marine biodiversity in the <u>much larger</u> Sulu Sea where the TRNMP and world heritage site is located? Please keep in mind your present income and financial commitments."

3.3.4 Barangays and Respondents of the Study

A total of 120 barangays from three regions in the Philippines were selected for the study. A barangay refers to the basic political unit in the Philippines, and is consisted of one hundred or more households clustered in a certain locality. Sixty of the selected barangays were used for personal interviews, while another sixty were selected for the self-administered survey mode of the contingent valuation survey. Table 2 shows the distribution of the number of barangays and respondents per CVM survey mode, per study site.

Quezon City was selected because it is the most populous city in the country and is located in the national capital region. It is a melting pot of different ethnic groups from all over the country due to migration. Cebu City, on the other hand, was chosen because it is the commercial and educational center of the Visayas and Mindanao. Located in the central Visayas region, Cebu City has attracted many migrants from other provinces in Visayas and Mindanao. Both Quezon and Cebu cities are considered as major influences in the national and (their respective) regional political decision-making processes. The third site, Puerto Princesa City, was chosen since it is the capital of Palawan province of which the Tubbataha Reefs are part of.

[5] A scope test determines whether people will behave as economic theory suggests, in that they will be willing to pay more for the bigger size/scope/scale of a good, which in this study, is the conservation of the bigger marine area (Sulu Sea) versus the smaller one, which is the Tubbataha Reefs.

Table 2. Number of Barangays and Respondents Covered in the Study

	Personal Interview	**Self-Administered**	**Both Modes**
Quezon City	20 barangays 400 respondents	20 barangays 400 respondents	40 barangays 800 respondents
Cebu City	20 barangays 600 respondents	20 barangays 600 respondents	40 barangays 1200 respondents
Puerto Princesa City	20 barangays 600 respondents	20 barangays 600 respondents	40 barangays 1200 respondents
All Cities	60 barangays 1600 respondents	60 barangays 1600 respondents	120 barangays 3200 respondents

For Quezon City, there were a total of 400 sampled respondents who were interviewed and another 400 respondents were asked to complete the self-administered questionnaire. In Cebu City, 600 sampled respondents were interviewed across twenty barangays (at 30 respondents per barangay), and another 600 were given the self-administered questionnaire for them to complete, and be collected within the next one to two days. Puerto Princesa City was also allotted 600 sampled respondents each for the personal interviews and self-administered surveys, as in Cebu City.

Due to the unavailability of the 2000 census data during the time of sampling, the 1995 sampling frame from the National Census and Statistics Office (NCSO) was used. The NCSO undertook the random sampling of respondents across three sites.

3.3.5 Implementing the Self-Administered Survey

Self-administered contingent valuation surveys have been employed in several studies in developed countries like the United States, Canada and Britain with relatively successful return rates. This approach has rarely been done in developing countries, except for a few cases like the one done by Manoka (2001) in Papua New Guinea. In his study, the mailed questionnaire was used with a modest incentive offer (of USD 2 for U.S. respondents, and 2 kinas for Papua New Guinea respondents) for those who returned fully completed questionnaires. Some researchers including Francisco (2002) and Whittington (2001) have commented that this may not be a good approach because it may set a precedent in that people will not participate in a mailed questionnaire survey or other kinds of surveys without being given some incentive or cash.

This study conducted the self-administered survey differently, in not using the mailed questionnaire approach. It must be noted that sometime in 1999, the NCSO conducted a pilot mailed-questionnaire survey to determine whether it would work as a good (and less costly) alternative for gathering survey data. However, the exercise failed as evidenced by the very low return rate of completed questionnaires (personal communication with Sevilla, 2001).

As an alternative to the mailed questionnaire approach, this study employed the "personally delivered, followed-up and personally collected" approach. At first, it was thought that somebody from the locality/selected barangay – like a local leader or a resident – could be tapped to distribute, follow up and collect the survey instrument. However, the pre-tests showed that this would not be a wise or an effective strategy. Rather, a few survey assistants were briefed and trained on how the survey should be

conducted. For Quezon City, the assistants were given on-the-job training during the second pre-test in Calamba. The task involved making courtesy calls to the local officials of the barangay to get their approval or endorsement of the survey. In some barangays, a tanod barangay (security officers or a local version of the police) accompanied the assistant in the distribution of the questionnaire. The distribution tasks involved explaining the study and the survey instrument to the sampled respondents, particularly on how to answer the questionnaire. The respondents were told that the questionnaire would be collected either later on the same day or the following day. If the assistant could still go back to that barangay after a few days for any uncollected questionnaires, he/she would do so.

Two assistants were employed for the first 17 barangays of Quezon City, whereby one assistant per barangay conducted the self-administered survey. The survey in the 18th barangay, Bgy. Ugong, was conducted by the Homeowners' Association staff in coordination with the research assistant. It should be noted that the 18th barangay was originally drawn for personal interview, but the Homeowners' Association did not allow this survey in the plush subdivision for security reasons. So a swap was made with another barangay which was supposed to use the self-administered survey. The surveys for the 19th and 20th barangays were done by the research assistant and another part-time survey assistant.

The unique topography and physical terrain of Cebu City barangays, where 80 percent is considered upland, hilly or mountainous, plus the limited time and resources, necessitated that more survey assistants be employed. A total of eight survey assistants conducted the self-administered surveys, with one assistant assigned per barangay at a time. In four barangays, which were farther from the city proper compared with other barangays, the survey assistants were accompanied by either the research assistant or the project leader. For three neighboring barangays, the assigned survey assistants worked as a team in undertaking the survey.

For Puerto Princesa City, the distance factor across barangays was even worse, in that many of the selected barangays were very remote from the city proper. Although it was classified as a city a few years ago, Puerto Princesa is largely rural and agricultural. Rivaling Davao City as the biggest city in the world in terms of land area, it extends over a very wide area from the South China Sea on its west coast to the Sulu Sea on its east coast, with the main source of livelihood being agriculture and fishing. For security purposes, the "pairing" or "buddy" system was adopted, where two people (an assistant and the project leader or the research assistant) were assigned to each barangay. There were a total of ten barangays where this strategy was adopted. For three very remote barangays, which were accessible by only two jeepney trips per day, the survey team had to stay for two nights in the middle barangay so that the survey could be accomplished in the allocated three-day schedule. A hired vehicle was used to travel across these three barangays, but within the barangay, walking had to be resorted to, even for as far as eight to ten kilometers for distant respondents. Seven barangays were either near or within the city proper; as such, the survey was done by only one assistant per barangay. For two barangays, the survey was done by the research assistant and one or two survey assistants, who were doing it as their on-the-job training. For one barangay, where there was an early encounter between the military and the rebels, the survey had to be done quickly, over one and a half days, and the whole team of seven assistants and one research assistant had to conduct the survey.

Table 3 shows the distribution of respondents according to the completion status of the questionnaires distributed. For all sites, 696 (43%) of 1600 respondents returned fully completed questionnaires. Across sites, Puerto Princesa self-administered respondents provided the highest return rate of 59% of fully completed questionnaires, while Quezon City only had 22%. Among these fully completed questionnaires were partially completed and partially assisted ones, which referred to respondents who returned partially completed questionnaires, and who were asked by the survey assistant for their answers to unanswered questions. Respondents in this category totaled 82 (or 5%) of all respondents in all sites. Across sites, Puerto Princesa City had the biggest number of this type of respondent, i.e. 12.5% of its 600 total respondents.

A big portion of all self-administered respondents, amounting to 571 or 36% of the total 1600, returned partially completed questionnaires, a large non-response rate for the CVM survey. The survey assistant could not ask them for their answers to unanswered questions because the respondents were not around at the time of collection, did not want to answer further questions, or the questionnaire was left with a neighbor or barangay official. These questionnaires could not just be ignored because they provide valuable, although incomplete information.

If we look at the survey response rate, based on the return rate of fully completed and partially completed questionnaires, it can be said that the survey result was quite high at 79% (or 1267) of the total respondents across the three sites. On a per site basis, Puerto Princesa City had the highest survey response rate at 89%.

For all sites, the non-completed and unreturned questionnaires amounted to 21% (or 333 of 1600). Quezon City had the highest at 109 (27%) of 400 respondents.

Table 3. Distribution of Respondents in the Self-Administered Survey According to Status of Completion of Survey Instrument, 2002

	Quezon City	**Cebu City**	**Puerto Princesa City**	**All Sites**
Fully completed	88 (22%)	257 (43%)	351 (59%)	696 (43%)
Partially completed	203 (51%)	188 (31%)	180 (30%)	571 (36%)
Unreturned & returned non-completed	109 (27%)	155 (26%)	69 (11%)	333 (21%)
TOTAL	400	600	600	1600

3.3.6. Completion Status of Personal Interview Survey

For the personal interview survey, a few questionnaires were partially completed, but this amounted to only 3% of the total number of questionnaires. The distribution is shown in Table 4 below.

Table 4. Distribution of Respondents in the Personal Interview Survey According to Status of Completion of Survey Instrument, 2002

	Quezon City	**Cebu City**	**Puerto Princesa City**	**All Sites**
Fully completed	379 (95%)	581 (97%)	589 (98%)	1549 (97%)
Partially completed	21 (5%)	19 (3%)	11 (2%)	51 (3%)
TOTAL	400	600	600	1600

3.4 Data Management and Cleaning

Since the partially completed instruments/questionnaires in both the self-administered and personal interview surveys constituted a big percentage of the total respondents, these could not just be dropped since they could have contained data vital to the analyses. For those with missing data on income only, predicted value of income was computed based on regression results with age and education as explanatory variables and imputed into data sets. For age and education, mean values were used in imputing the missing data. Moreover, mean values were also used to impute missing values for certainty on WTP replies.

However, questionnaires which did not contain answers to the WTP question were removed from the data sets. There was no way to predict what the answers would have been.

4.0 RESULTS AND DISCUSSIONS

4.1 Pooled Regression Analyses

Logit regression analyses of the combined data from the three survey sites showed that willingness to pay varied by CVM modes across the three sites. Moreover, on a per site basis, the two modes also differed in the empirical results. Thus, the results and discussions are presented separately below on a per site and CVM mode basis.

4.2 Socio-Demographic Characteristics

Tables 5 to 7 show some socio-demographic characteristics of respondents grouped into sub-samples of CVM mode per site. It can be noted that fewer females (less than 50% of total respondents per sub-sample) were questioned in all the self-administered (SA) surveys compared with their personal interview (PI) counterparts across sites. This could be explained by the fact that during field interviews, there were several cases when the sampled male respondents were not available (working or resting) and thus, the task of answering the questions was delegated to their wives. It was reasoned out that husbands and wives discussed matters together, and that the wives knew a lot (and sometimes even more) on household matters like budget and expenses.

Table 5. Socio-Demographic Characteristics of Quezon City Respondents Grouped by CVM mode, 2002

	N	Minimum	Maximum	Mean	Std. Deviation
Self-Administered Survey					
AGE	198	16	78	38.55	13.96
EDUCATION	198	1	20	11.65	2.92
INCOME	198	0	2500000	172537.73	256189.06
SEX (Female = 48.5%)	198				
Personal Interview					
AGE	399	18	95	40.82	14.06
EDUCATION	399	1	25	10.82	3.12
INCOME	399	12000	3600000	176374.77	255488.17
SEX (Female = 60.4%)	399	0	1	.60	.49

Notes:
1. Age is measured in years.
2. Education is measured in number of years of schooling/formal education.
3. Income is measured in pesos per year.
4. For coding purpose, male respondents were coded as 0 while female respondents were coded as 1.

Average age across sub-samples did not differ much, ranging from about 39 to 43 years, with the Quezon City SA respondents being younger at an average of 39 years of age. In regard to education, Quezon City respondents had a slightly higher average number of years of schooling at about 12 years and 11 years for the SA and PI respondents, respectively.

Table 6. Socio-Demographic Characteristics of Cebu City Respondents Grouped by CVM Mode, 2002

Self -Administered Survey	N	Minimum	Maximum	Mean	Std. Deviation
AGE	349	15	83	41.05	13.94
EDUCATION	349	0	19	9.44	4.21
INCOME	349	0	1500000	107673.06	167441.63
SEX (Female = 47.6%)	349	0	1	.48	.50
Personal Interview					
AGE	598	17	86	42.43	14.26
EDUCATION	598	0	20	8.69	3.83
INCOME	598	9600	1500000	82530.39	130950.17
SEX (Female = 57%)	598	0	1	.57	.50

Notes:
1. Age is measured in years .
2. Education is measured in number of years of schooling/formal education.
3. Income is measured in pesos per year.
4. For coding purpose, male respondents were coded as 0 while female respondents were coded as 1.

Table 7. Socio-Demographic Characteristics of Puerto Princesa City Respondents Grouped by CVM Mode, 2002

	N	Minimum	Maximum	Mean	Std. Deviation
Self-Administered					
AGE	449	15	85	43.26	13.37
EDUCATION	449	1	17	9.68	3.33
INCOME	449	0	2500000	90669.17	175444.99
SEX (Female = 46.5%)	449	0	1	.47	.50
Personal Interview					
AGE	598	15	86	42.70	13.86
EDUCATION	598	0	20	9.95	3.67
INCOME	598	10400	1500000	102301.32	159768.26
SEX (Female = 60.7%)	598	0	1	.61	.49

Notes:
1. Age is measured in years.
2. Education is measured in number of years of schooling/formal education.
3. Income is measured in pesos per year.
4. For coding purpose, male respondents were coded as 0 while female respondents were coded as 1.

As would be expected, Quezon City respondents were found to have higher annual income on average, at PHP 172,538 and PHP 176,375 for the SA and PI respondents respectively, since this city is the most urbanized and has most of the industrial and commercial establishments. The lowest average annual income was recorded for the Cebu City PI respondents, who claimed to receive only PHP 82,530 as annual income. The next lowest annual income was reported by the Puerto Princesa City SA respondents, at PHP 90,669. It should be noted that for Quezon and Puerto Princesa cities, SA respondents had a lower annual income compared with their personal interview counterparts.

4.3 Knowledge, Awareness and Attitude

To determine respondents' knowledge on marine ecology and environment, ten-item questions were included in the questionnaire to assess understanding of respondents on key concepts and knowledge. Respondents were asked to evaluate the statement as true or false. The perfect score was 10, with one point given for each correct answer. In Table 8 below, the highest score was recorded for Puerto Princesa SA respondents, at an average of 8.42, while the lowest score was garnered by Cebu City SA respondents at 6.97.

Table 8. Knowledge and Awareness of Respondents from Quezon, Cebu and Puerto Princesa Cities, of Marine Ecology/Environment and the Tubbataha Reefs, 2002

	QCSA	QCPI	CCSA	CCPI	PPC SA	PPC PI
Knowledge Index (10-item test)	8.14 (1.59)	8.0 (1.57)	6.97 (1.87)	6.98 (1.76)	8.42 (1.46)	8.28 (1.54)
Familiarity with marine biodiversity (10-scale measure)	4.55 (2.5)	3.66 (2.77)	3.68 (2.87)	2.69 (2.67)	4.36 (2.82)	3.76 (2.67)
Familiarity with causes of coral reef degradation (10-scale measure)	6.18 (2.74)	5.7 (3.12)	4.26 (3.19)	4.98 (3.32)	6.12 (3.1)	6.11 (2.86)
Have heard/learned about the TRNMP Heard Learned	41.4% 8.6%	16.3% 2.3%	24.4% 7.4%	10.4% 1.7%	64.6% 22.9%	57.4% 18.7%
Visited the TRNMP	1.5%	0.3%	0%	1%	3.8%	4.8%
Heard about the concept of biodiversity	34.8%	19.8%	40.7%	23.6%	33.2%	32.6%

Notes:
QCSA = Quezon City Self-Administered
QCPI = Quezon City Personal Interview
CCSA = Cebu City Self-Administered
CCPI = Cebu City Personal Interview
PPCSA = Puerto Princesa City Self-Administered
PPCPI = Puerto Princesa City Personal Interview

Respondents in all the sites were also asked what they thought was their level of familiarity with the concept/idea of marine biodiversity, by rating it on a 10-scale measure. Quezon City SA recorded the highest score, at 4.55 average points. Cebu City PI respondents had the lowest average rating at 2.69. Moreover, respondents were asked to rate their familiarity on the causes of coral reef degradation using a 10-point scale. Quezon City SA respondents had the highest score on familiarity with the causes of coral reef degradation. The lowest score was by Cebu SA, with a 4.26 average score, while the highest was Quezon City SA respondents at 6.18.

The respondents were also asked whether they had heard or learned about the TRNMP, where “learned” is considered a higher level of awareness involving learning about the TRNMP through television and radio, aside from just hearing about it casually.

Table 8 shows that more Puerto Princesa City SA respondents learned and heard about the TRNMP. This would be expected since the TRNMP is under the political jurisdiction of the Palawan province, of which Puerto Princesa City is the capital.

Moreover, it can be noted that in most cases, SA respondents indicated a higher awareness or knowledge level than their PI counterparts. This would be expected since in SA survey, respondents who would likely participate and return answered

questionnaires would be those who knew about the issues/subject matter. Those who had very limited knowledge about these would most likely not return the questionnaire, return it with many non-response items, or return an unanswered questionnaire. This form of self-selection bias is difficult to overcome in self-administered studies like the mailed questionnaire CVM. Mitchel and Carson (1989) mentioned that the most defensible way to handle sample selection bias in mail surveys (if a lower bound WTP is desired) appears to be the procedure used by Bishop and Boyle (1985). In their study of the economic value of an Illinois nature preserve, Bishop and Boyle made a conservative assumption that non-respondents (excluding those for whom addresses were incorrect) to their mail survey (which was more than 30% of the sample) valued the preserve at zero dollars. If they had not made this adjustment/assumption in their population estimates, it is likely that they would have substantially over-estimated the value of the amenity (Mitchel and Carson, 1989). This study adopts the same assumption by Mitchel and Carson (1989) on the SA respondents who did not return their questionnaires.

Knowledge, awareness and attitude about the environmental resource are expected to affect people's WTP levels. The more people are aware and knowledgeable of the resource, the more likely that their WTP will be higher.

4.4 Most Important Environmental Problems Perceived by Respondents

Respondents were also asked on what they thought, in general, were the two or three most important problems related to nature and human impact on the natural environment, which they found personally worrying and felt should be given attention.

Table 9 shows the most important environmental problems perceived by the respondents. Of the fifteen problems, the four most cited by respondents were: deforestation, domestic waste or garbage disposal, air pollution, and general pollution (water/land/sea). On per sub-sample basis, dominant perception varied, i.e. the first ranked problem differed. However, both SA and PI respondents in Cebu City ranked air pollution as the leading environmental problem. In Puerto Princesa City, both sub-samples of respondents identified deforestation as the leading problem.

It can be noted that the restoration of Philippine coral reefs was cited as an environmental problem in all of the six sub-samples across study sites, though at a lower ranking. A relatively higher ranking was noted in Puerto Princesa City; it ranked fifth for SA respondents, and sixth among PI respondents. The seemingly higher awareness of this problem by Puerto Princesa residents is consistent with the citation of dynamite fishing as an environmental problem too by some respondents there (see Table 9).

4.5 Willingness-To-Pay Results

For both CVM modes, 1061 (or 41%) of the total 2591 respondents replied "yes" in that they were willing to pay the specified bid price, which would be put in a trust fund, to be utilized for the conservation of biodiversity at the TRNMP.

PI had a higher percentage of respondents (47%) who replied "yes" compared with SA respondents, of whom only 31% replied so. This seemingly low (i.e. lower than

50%) rate of positive replies in all respondent groups across all three sites is not surprising, as this was also found by previous studies on non-use values (Kramer and Mercer, 1997; Cummings and Taylor, 1999; Giraud, Loomis and Johnson, 1999; Berren et al., 2000; Seenprechawong, 2001).

Table 9. Most Important Environmental Problems Perceived by Quezon City (QC), Cebu City (CC) and Puerto Princesa City (PCC) Respondents, by CVM Mode, 2002

	QC-SA	QC-PI	CC-SA	CC-PI	PPC-SA	PPC-PI
1 Air pollution	32 (16%)	70 (18%)	69 (20%)	112 (19%)	40 (9%)	45 (8%)
2 General pollution (water/land/sea)	50 (25%0	59 (15%)	26 (7%)	63 (11%)	83 (18%)	90 (15%)
3 General water quality	5 (3%)	17 (4%)	18 (5%)	73 (12%)	48 (11%)	93 (16%)
4 Nature conservation (animal/plant)	8 (4%)	9 (2%)	9 (3%)	10 (2%)	21 (5%)	34 (6%)
5 Deforestation	17 (9%)	27 (8%)	57 (16%)	80 (13%)	107 (24%)	103 (17%)
6 Traffic/noise problems	10 (5%)	39 (10%)	10 (3%)	26 (4%)	6 (1%)	23 (4%)
7 Floods due to soil erosion	4 (2%)	12 (3%)	32 (9%)	47 (8%)	3	11 (2%)
8 Domestic waste disposal	25 (13%)	107 (27%)	40 (11%)	68 (11%)	17 (4%)	58 (10%)
9 Sewage disposal	3 (2%)	13 (3%)	7 (2%)	43 (7%)	3	7 (1%)
10 Enhanced green house effect	1	2	20 (6%)	16 (3%)	5 (1%)	7 (1%)
11 Rise of sea level	0	2	0	1	0	2
12 Population growth	11 (6%)	28 (7%)	30 (9%)	33 (6%)	23 (5%)	46 (8%)
13 Thinning of ozone layer	12 (6%)	10 (3%)	17 (5%)	11 (2%)	19 (4%)	25 (4%)
14 Restoration of Philippine coral reefs	1	3 (1%)	3 (1%)	6 (1%)	28 (6%)	45 (8%)
15 Dynamite fishing				6 (1%)	2	5
Others	3 (2%)	0	0	3	22 (5%)	0
No Answer	16 (8%)	1	11 (3%)	0	22 (5%)	4
Total	198	399	349	598	449	598

Note:
Figures in parentheses are percentages of column total. Those without percentage figures had corresponding zero percent.

Across sites and CVM modes, the highest percentage of “yes” responses (60%) was recorded for respondents from Puerto Princesa City who were personally interviewed. On the other hand, the lowest percentage of “yes” responses (24%) was recorded from self-administered survey respondents in Cebu City.

Table 10. Distribution of Responses on Willingness to Pay for Biodiversity Conservation of the TRNMP, by Different Groupings of Respondents, 2002

Respondent Group	WTP Response		Total
	NO	YES	
All Respondents, both CVM Modes	1530 (59%)	1061 (41%)	2591
By CVM Mode:			
Personal Interview	841 (53%)	754 (47%)	1595
Self-Administered Questionnaire	689 (69%)	307 (31%)	996
By Site and CVM Mode:			
Quezon City – Personal Interview	217 (54%)	182 (46%)	399
Quezon City – Self-Admin.	106 (54%)	92 (46%)	198
Cebu City – Personal Interview	385 (64%)	213 (36%)	598
Cebu City – Self-Admin.	264 (76%)	85 (24%)	349
P.Princesa City – Personal Interview	239 (40%)	359 (60%)	598
P.Princesa City – Self-Admin.	319 (71%)	130 (29%)	449

Tables 11 to 16 show responses to WTP question across various price bids in the different CVM modes across the three study sites. For Puerto Princesa City respondents, the general trend was that there were fewer "yes" (or lower percentage of "yes") responses as price bid went up. This follows the *a priori* expected economic theory that as price goes up, less of the good will be bought, or that less will be the willingness to buy by consumers (in this case, respondents). Tables 11 and 12 show this, except for a break in the trend at 1,000 pesos in the personal interview and at 2,000 pesos in the self-administered mode. It should be noted that for the self-administered mode (Table 12), a huge percentage (59%) of the respondents were still not willing to pay the lowest bid price of 50 pesos.

Table 11. Distribution of Personal Interview Responses by Puerto Princesa City Respondents on WTP for Biodiversity Conservation of the TRNMP, 2002

BID PRICE	NO	YES	TOTAL
50	17 (14%)	102 (86%)	119
150	30 (25%)	91 (75%)	121
500	60 (50%)	59 (50%)	119
1000	56 (47%)	63 (53%)	119
2000	76 (63%)	44 (37%)	120
Total	239	359	598

Note:
Numbers in parentheses are percentages of last-column totals.

Table 12. Distribution of Self-Administered Responses by Puerto Princesa City Respondents on WTP for Biodiversity Conservation of the TRNMP, 2002

BID PRICE	NO	YES	TOTAL
50	52 (59%)	36 (41%)	88
150	59 (66%)	31 (34%)	90
500	59 (69%)	27 (31%)	86
1000	71 (82%)	16 (18%)	87
2000	78 (80%)	20 (20%)	98
Total	319 (71%)	130 (29%)	449

Note:
Numbers in parentheses are percentages of last-column totals.

In the case of Cebu City respondents, a consistent trend of decreasing "yes" responses as the bid price increased was recorded. This means that the more it costs, the less willing would Cebuanos be to pay for biodiversity conservation of the Tubbataha Reefs. Similar to the case of Puerto Princesa City, a huge percentage (60%) of the self-administered respondents were not willing to pay the lowest bid price of 50 pesos (see Table 14).

Table 13. Distribution of Personal Interview Responses by Cebu City Respondents on WTP for Biodiversity Conservation of the TRNMP, 2002

BID PRICE	NO	YES	TOTAL
50	46 (38%)	75 (62%)	121
150	72 (60%)	48 (40%)	120
500	85 (72%)	33 (28%)	118
1000	90 (75%)	30 (25%)	120
2000	92 (77%)	27 (23%)	119
Total	385 (64%)	213 (36%)	598

Note:
Numbers in parentheses are percentage of last-column totals.

Table 14. Distribution of Self-Administered Responses by Cebu City Respondents to WTP for Biodiversity Conservation of the TRNMP, 2002

BID PRICE	NO	YES	TOTAL
50	47 (60%)	31 (40%)	78
150	43 (69%)	19 (31%)	62
500	61 (84%)	12 (16%)	73
1000	53 (82%)	12 (18%)	65
2000	60 (85%)	11 (15%)	71
Total	264 (76%)	85 (24%)	349

Note:
Numbers in parentheses are percentages of last-column totals.

There were ten price bids used for Quezon City as shown in Tables 15 and 16, while five price bids were used for Cebu and Puerto Princesa cities. The high non-response rate in the QC questionnaires prompted this researcher to reduce the number of price bids for the other two cities, which were surveyed later. This decrease in the

number of price bids was done to reduce possible estimation bias caused by the reduction in degrees of freedom from having more price bids.

The general pattern of decreasing "yes" (or percentage of "yes") responses as price bid increased is also true for Quezon City, except for some small spikes in bids of 200, 300 and 1000 pesos for PI; and 1500 and 2000 pesos for SA. The small spikes counter the expected increasing monotonicity of the "no" responses as the offered price increased, thus requiring the use of a distribution-free (Turnbull) estimator for computing the WTP in the latter part of this report.

Table 15. Distribution of Personal Interview Responses by Quezon City Respondents on WTP for Biodiversity Conservation of the TRNMP, 2002

BID PRICE	NO	YES	TOTAL
20	7 (18%)	33 (82%)	40
50	14 (35%)	26 (65%)	40
100	17 (44%)	22 (56%)	39
150	25 (62%)	15 (38%)	40
200	18 (45%)	22 (55%)	40
300	23 (57%)	17 (43%)	40
500	27 67%)	13 (33%)	40
1000	24 (60%)	16 (40%)	40
1500	30 (75%)	10 (25%)	40
2000	32 (80%)	8 (20%)	40
Total	217 (54%)	182 (46%)	399

Note:
Numbers in parentheses are percentages of last-column totals.

Table16. Distribution of Self-Administered Survey Responses by Quezon City Respondents on WTP for Biodiversity Conservation of the TRNMP, 2002

BID PRICE	NO	YES	TOTAL
20	3 (18%)	14 (82%)	17
50	3 (20%)	12 (80%)	15
100	9 (39%)	14 (61%)	23
150	12 (52%)	11 (48%)	23
200	9 (56%)	7 (44%)	16
300	14 (64%)	8 (36%)	22
500	12 (52%)	11 (48%)	23
1000	15 (79%)	4 (21%)	19
1500	15 (68%)	7 (32%)	22
2000	14 (78%)	4 (22%)	18
Total	106 (54%)	92 (46%)	198

Note:
Numbers in parentheses are percentages of last-column totals.

4.6 Reasons for Willingness to Pay

In order to distinguish the components or rationale for positive WTP, those who responded "yes" to the WTP question were also asked to state their reasons or motives for such. The categorization of economic values or motives for willingness to pay in Table 17 is based on the work of Stevens et al. (1994), McConnell (1997), and Manoka (2001). Table 17 confirms the *a priori* expected outcome that since most (if not all) the respondents are off-site, their direct use values would be small if not nil.

Table 17. Respondents' Most Important Reason for Willingness to Pay for the Conservation of the Tubbataha Reefs, by CVM Modes, Quezon City, Cebu City and Puerto Princesa City, 2002

Most Important Reason for Respondents' Willingness to Pay	Quezon City		Cebu City		Puerto Princesa City	
	QC-SA	QC-PI	CC-SA	CC-PI	PPC-SA	PPC-PI
1. I want to preserve the Tubbataha Reefs because I visit it (Direct Use Value)	6 (7%)	1 (0.6%)	0	1 (0.5%)	3 (2%)	13 (4%)
2. I want to preserve the Tubbataha Reefs for future generations (Bequest Value)	31 (34%)	89 (49%)	46 (54%)	103 (48%)	62 (48%)	169 (47%)
3. I take personal pleasure in knowing that the Tubbataha Reefs exist (Existence Value)	7 (8%)	13 (7%)	7 (8%)	19 (9%)	6 (5%)	30 (8%)
4. I would like to contribute because I am concerned about the people who depend upon the goods and services of the Tubbataha Reefs (Non-Paternalistic Altruistic Motive)	1 (1%)	10 (5%)	5 (6%)	21 (10%)	3 (2%)	8 (2%)
5. I would like to contribute because the goods and services provided by the Tubbataha Reefs should be available to others (Paternalistic Altruistic Motive)	4 (4%)	11 (6%)	3 (4%)	18 (8%)	2 (2%)	6 (2%)
6. I do not use the Tubbataha Reefs right now, but I am willing to contribute to have the option of visiting or using it in the future (Option Value)	4 (4%)	3 (2%)	0	5 (2%)	5 (4%)	9 (3%)
7. I am contributing because marine plants and animals have the right to exist independent of anyone's use either in the present or the future (Existence Value)	9 (10%)	25 (14%)	5 (6%)	15 (7%)	9 (7%)	32 (9%)
8. It is a good cause and I enjoy contributing to good causes in general (Good Cause)	13 (14%)	14 (8%)	0	9 (4%)	13 (10%)	38 (11%)
9. It is my moral duty to contribute to preserve the Tubbataha Reefs (Moral Duty)	5 (5%)	10 (5%)	8 (9%)	15 (7%)	4 (3%)	20 (6%)
10. I want to preserve the Tubbataha Reefs because I directly consume goods and services such as fish, etc. from it (Direct Use Value)	2 (2%)	1 (6%)	8 (9%)	1 (0.5%)	16 (12%)	33 (9%)
Other Reasons	3 (3%)	1 (0.6%)	0	6 (3%)	1 (0.8%)	0
No Answer	7 (8%)	4 (2%)	3 (4%)	0	6 (5%)	1 (0.3%)
Total "Yes" votes	92	182	85	213	130	359

Note:
Numbers in parentheses are percentages of last row totals. Percentage per column may not add up to 100% because of rounding off.

A small number of self-administered CVM respondents from Quezon City and Cebu City, i.e. 8.6% and 9% respectively, cited direct use values as their main motivation for willingness to pay. Less than 10% of the personally interviewed respondents for both cities cited direct use values as their motivation for their "yes" to the WTP question. For Puerto Princesa City, 14% of the personally interviewed respondents, and 13% of the self-administered survey respondents, expressed that their WTP was driven by direct use values. This higher percentage compared with Cebu and Quezon cities is expected since the Tubbataha Reefs are under the jurisdiction of Palawan province. Thus, residents from this city consider that it is their duty to care for the environmental resource (Tubbataha Reefs) in their own province. Puerto Princesa City hosts many fishers who frequent Tubbataha and its nearby fishing grounds. There was higher direct-use motivation for SA respondents across the three survey sites. This could be attributed to the longer time these respondents had to think of possible direct use value from the TRNMP.

Except for Puerto Princesa City where non-use values were cited by about 86-87%, more than 90% of the respondents in the other two cities cited non-use motives as their reasons for WTP. Across all sites and CVM modes per site, bequest value was the most cited reason (34% of Quezon City SA respondents and 54% of Cebu City SA respondents). This seems to support the finding of other studies on non-use values, like the one done by Walsh and Bjonback (1990), who found that the willingness to pay per household for forest protection was due mainly to non-use values (72.6%), with bequest value as the most cited reason for WTP by 30% of their respondents.

Table 17 also shows that the other non-use motives for WTP, with second highest frequency, were existence values (as to the rights of marine plants and animals to exist/live and the pleasure of knowing that the Tubbataha Reefs exist). Good cause or moral duty was the third most cited motive for WTP by the different sub-groups of respondents across CVM modes per site.

Moreover, for all respondents, the altruistic motive (non-paternalistic and paternalistic altruism as defined by McConnell, 1997) was cited by at least 4% per respondent group, with the biggest attribution to this motive being cited by 18% of personally interviewed respondents in Cebu City. This concern for others (but not the future generation) is indeed a common reason why people, in general, want the environment to be protected or managed properly.

4.7 Reasons for Non-Willingness to Pay and Identifying Protest Responses / Scenario Rejecters

Respondents who indicated unwillingness to pay were asked to check off their reasons why. Of the total 1530 "no" replies across all sub-samples or survey sites, 62% cited economic reasons for non-WTP, i.e., they could not afford to pay or that they did not have spare income to contribute towards the conservation trust fund (see Table 18). This was the highest-cited reason for non-WTP for every sub-sample, across study sites and CVM modes per site. The highest percentage of respondents (75%) who cited this reason was among Cebu City personal interview respondents.

Table 18. Respondents' Most Important Reason for Non-Willingness to Pay for the Conservation of the Tubbataha Reefs, by CVM Modes and Study Sites, 2002 (Scenario rejecters not excluded, all "yes" responses considered as certain)

Respondents' Reasons for Non-Willingness to Pay	QC-SA	QC-PI	CC-SA	CC-PI	PPC-SA	PPC-PI
1. I cannot afford to pay / I have no spare income.	55 (52%)	128 (59%)	160 (61%)	290 (75%)	170 (53%)	150 (63%)
2. I feel the environmental improvement of the Tubbataha Reefs is unimportant.	0	0	1	3 (1%)	4 (1%)	3 (1%)
3. Being far from the place, I feel paying anything is irrelevant to me.	3 (3%)	11 (5%)	11 (5%)	13 (3%)	20 (6%)	18 (8%)
4. I do not believe paying will solve the problem.	8 (8%)	5 (2%)	23 (9%)	15 (4%)	5 (2%)	2 (1%)
5. I feel this improvement will take place without my contribution.	13 (12%)	15 (7%)	23 (9%)	25 (6%)	74 (23%)	33 (14%)
6. I do not trust the institutions that will handle the money for this conservation work.	10 (9%)	36 (17%)	25 (9%)	29 (8%)	10 (3%)	15 (6%)
7. It should be the government's responsibility since it has money from tax revenues.	1 (1%)	4 (2%)	1	1	4 (1%)	4 (2%)
Other reasons	7 (7%)	10 (5%)	9 (3%)	4 (1%)	20 (6%)	12 (5%)
No answer / reply	9 (8%)	8 (4%)	11 (4%)	5 (1%)	12 (4%)	2 (1%)
Total Respondents Not WTP	106	217	264	385	319	239

Note:
Numbers in parentheses are percentages of last-row totals. Those without percentage figures had corresponding zero percent. Percentage per column may not add up to 100% because of rounding off.

As cited in the pre-tests and focus group discussions, the survey results confirmed that many respondents did not trust the institutions that would handle the money for the conservation work (reason number 6). It should be noted here that the survey instrument did not specify whether these institutions would be governmental or non-governmental since the Tubbataha Protected Area Management Board was composed of both government and non-government agencies.

The next highest-cited reason was the belief by the respondent that the conservation of the TRNMP would take place even without his/her contribution. This was accounted for by 183 respondents or 12% of all who replied "no". This reason (number 5 in Table 18) along with reason number 4 ("I do not believe paying will solve the problem"), reason number 6 ("I do not trust the institutions that will handle the money for the conservation work"), and reason number 7 ("It should be the government's responsibility since it has money from tax revenues") are actually considered as "protest votes" or non-zero value reasons by several CVM researchers and are, therefore, not to be included in further analysis particularly in the regression of the WTP function (Loomis et al., 1994; Stevens et al., 1994; Spash et al., 2000; Manoka, 2001). Zero bids (or "no" replies) associated with protests do not necessarily

indicate a zero value for the resource being valued (Manoka, 2001; Stevens et al., 1994). Respondents may be objecting to some aspect of the survey. For example, they may be objecting to or rejecting the way the CV question was asked regarding collecting contributions from people. Alternatively, the respondents could also be rejecting the scenario being hypothesized as to the "good" being "purchased" by their WTP. Thus, these respondents/responses are also called scenario rejecters. Furthermore, respondents who replied "no" to the WTP question may simply be undecided.

While several authors argue that according to convention, protest votes should be removed prior to further analysis, other authors (Adamowicz, 2003; Harrison, 2003) contend that if the reason(s) for "no" is/are valid, then these protest votes should be included. Moreover, most (if not all) protest votes are associated with open-ended CVM questions, and also include a very high WTP or price bids, aside from the zero votes or no reply.

The succeeding WTP regression analyses and WTP estimation compares the results of including the scenario rejecters or protest votes, i.e., "SR in" versus excluding them from the analysis, i.e., "SR out".

4.8 Bid Curve Analysis

Table 19 provides the definition of the variables used in estimating the unknown parameters of the logit model. The estimation was carried out using the maximum log likelihood method with the use of LIMDEP software. The effects on WTP of respondent certainty, interviewers/survey assistants, and removal/inclusion of scenario rejecters (protest votes) from the model were incorporated in the regression runs and subsequent bid analyses, as explained in the subsections below.

Table 19. Definition of Variables Used in the Logit Regression

Variables	***Definition***
INCOME	Respondent's annual income in pesos
CVMMODE	Survey mode; 1 if Personal Interview, 0 if Self-Administered
KNOWIND	Knowledge index / score based on 10-point scale
WTPATU	Bid price (Willingness to Pay Amount for the Tubbataha Reefs) in pesos
SEX	Sex of respondent
HEARD	Heard or learnt about the Tubbataha Reefs
FMMBIOD	Familiarity with marine biodiversity (scale is 1 to 10)
EDUC	Education (number of years)
INTEFFi	Interviewer's effects (where i stands for the number of interviewers)
SAEFFi	Survey assistant's effects (where i stands for the number of survey assistants)

4.8.1 Incorporating Respondent Uncertainty

Boyle (in Champ et al., 2003) identifies the inclusion of respondent's uncertainty (or certainty) in CVM models as one of the frontier issues in non-market valuation of environmental resources. As a less-explored approach in CVM, this will be

useful in understanding how people answer contingent valuation questions, and why differences exist between CVM and actual transaction estimates. Incorporating uncertainty/ certainty would actually qualify those "yes" replies to WTP questions, which were actually "no's" because the respondents were not that certain of their "yes". This means that the number of "yes" responses would be reduced if uncertainty is taken into consideration in the model.

To incorporate response uncertainty, respondents were asked how certain they were about their WTP answer, with 10 as very certain and 0 (zero) as uncertain. All "yes" responses associated with certainty levels 1 to 7 were recoded as "no" i.e., equal to zero. Regression runs were conducted on the model in which certainty levels 1 to 9 were recoded as No = 0, and also for certainty levels 1 to 8 recoded as No = 0, but these regressions did not produce good results, i.e., very high standard errors amounting to millions or even non-estimation of the regression models with the corresponding uncertainty assumption. Thus, this study was constrained to adopt certainty levels 8 to 10 as "yes", while those certainty levels 0 to 7 were counted as "no".

4.8.2 Uncertainty and Scenario Rejecters in Bid Curve Analysis and WTP Estimation

For the logit regressions and WTP estimations, the analyses can be classified into four models per sub-sample:

a) Scenario rejecters are not excluded, and Uncertainty/Certainty is not included in the model (SR in, CERT out)
b) Scenario rejecters are not excluded, and Uncertainty/Certainty is included in the model (SR in, CERT in)
c) Scenario rejecters are excluded, and Uncertainty/Certainty is not included in the model (SR out, CERT out)
d) Scenario rejecters are excluded, and Uncertainty/Certainty is included in the model (SR out, CERT in)

Considering that there were six sub-samples, i.e. two CVM modes per study site, there was a total of 24 final regressions undertaken to verify the applicable model. Appendix Tables 1 to 6 show the four different models per study site (a to d above) and CVM mode. Across all the six sub-samples (i.e. at each CVM mode per site), and in each of the four models, the estimated coefficients for bid/price (WTPATU) were all consistent with the *a priori* economic theory, i.e., negative and significant. This means that as bid price increased, there was less willingness to buy the given good (biodiversity conservation of the TRNMP). Furthermore, except in one instance (QC-SA; SR out, CERT in), the coefficient for INCOME was found to be positive, consistent with the *a priori* economic theory for a normal good in that as income increases, the demand for the good/service or the willingness to pay for it increases.

4.8.3 Preferred Logit Regression Model

Since there were four models (SR in, CERT out; SR in, CERT in; SR out, CERT out; and SR out, CERT in) per sub-sample, it was important to select a preferred logit model per sub-sample, based on which mean WTP could be computed and used as a basis for estimating social benefit.

Based on the four possible logit models per sub-sample, the preferred (or selected) model to be used for covariate analysis as well as WTP estimation is the fourth model where scenario rejecters are excluded and certainty/uncertainty is included (SR out, CERT in). The "no" replies of scenario rejecters, otherwise called protests, are actually non-zero "no's"; as such it does not make sense to include them in the analysis. If these cases/observations with non-zero "no's" are included in the regression, it only means recognizing them as zeroes. Thus, the resulting WTP would be smaller.

Moreover, the "yes" replies need to be qualified since many of these were actually given by respondents whose certainty of their replies were less than 8, and thus the "yes" virtually became a "no" or "zero".

4.8.4 Interviewer Effects and Survey Assistant Effects

Possible effects by specific interviewers and self-administered survey assistants in soliciting information from respondents were incorporated in the models through corresponding dummy variables. In doing personal interview CVM surveys, Whittington (2002) contended that inconsistent results of the CVM could be due to poorly-trained enumerators and the resulting enumerator or interviewer bias. Though the interviewers for this study had undergone thorough training, the interviewer effects dummy variables are used to "clean" the model of any interviewer bias.

Table 20 shows that only the regressions for Cebu City and Puerto Princesa City PI respondents had interviewer effects, manifested by the significant coefficients of interviewer dummy variables. For Cebu City PI, the interviewer effect dummy for interviewer number 38 (a female) was significant (based on the corresponding t-ratio) in positively determining WTP, i.e., those respondents interviewed by this interviewer tended to have higher probability of saying "yes" to the WTP question. Similarly, for Puerto Princesa City PI, it was interviewer number 49 (also a female) who was found to significantly determine WTP, in that respondents interviewed by her had higher probability of responding "yes" to the WTP question. The presence of interviewer bias does not mean that the results are questionable. However, by incorporating interviewer dummy variables, in effect, the regression is cleaned of the bias (personal communication with Adamowicz, 2003).

Table 20. Preferred Logit Regression Model Per Sub-Sample (by CVM mode per site)

Variable	QC-SA	QC-PI	CC-SA	CC-PI	PPC-SA	PPC-PI
Constant	-5.0137 a (-2.5510)	-0.7288 (-0.666)	-3.8318 a (-3.4930)	-2.0542 b (2.090)	-2.9554 b (-2.32500)	-0.5908 (-0.7600)
INCOME	-0.302 E-06 (-0.3930)	0.168E-05 a (2.192)	0.301 E-06 (0.2740)	0.0000013 (1.4720)	0.0000009 (1.17700)	0.0000035 a (3.1430)
AGE	-0.00122 (-0.0800)	-0.01890 c (-1.892)	-0.0079 (-0.5210)	-0.02105 b (-2.380)	-0.00492 (-0.40700)	-0.00341 (-0.4460)
KNOWIND	0.0922 (0.6410)	0.05093 (0.595)	0.1291 (1.1380)	0.1032 (1.3580)	0.11953 (1.07800)	0.0203 (0.2760)
WTPATU	-0.00292 a (-4.1640)	-0.00106 a (-4.385)	-0.00078 b (-2.1910)	-0.00109 a (-5.5180)	-0.00066 a (-2.76600)	-0.000983 a (-5.9170)
SEX	0.0932 (0.2270)	-0.5506 b (-1.994)	0.3744 (0.9210)	0.1185 (0.4960)	-0.5896 (-1.88400)	-0.4378 b (-2.1100)
HEARD	0.5255 (1.4780)	0.4442 (1.535)	-0.1798 (-0.5580)	0.0984 (0.3090)	0.1036 (0.37500)	0.4488 b (2.4000)
FMMBIOD	0.1278 (1.4230)	0.09348 c (1.921)	0.0332 (0.4390)	-0.0168 (-0.3340)	0.1514 a (2.66200)	0.0651 (1.5110)
EDUC	0.2006 b (2.2690)	0.04503 (0.918)	0.1306 b (2.1870)	0.0844 b (2.1970)	0.0671 (1.20900)	-0.0254 (-0.7190)
SAEFF1	1.9413 b (2.1110)	NA	NA	NA	NA	NA
INTEFF38	NA	NA	NA	1.7078 b (2.1490)	NA	NA
INTEFF49	NA	NA	NA	NA	NA	1.2617 b (2.1410)

Notes:
1. Numbers inside parentheses are asymptotic T-ratio.
2. a – significant at 1%; b – significant at 5%; c – significant at 10%

4.8.5 Factors Affecting WTP for TRNMP Conservation

Table 20 shows the logit regression results per sub-sample across three study sites. Age has a negative sign, which implies that the older one gets, the less is the probability to pay towards TRNMP conservation. However, this variable is only significant for sub-samples of Quezon City PI and Cebu City PI respondents.

Except for Quezon City SA, the sign of INCOME is consistent with *a priori* expected positive sign, i.e., higher income means a higher probability of saying "yes" to donating to the TRNMP conservation fund. However, this variable is significant only in the sub-samples of QC-PI and PPC-PI as indicated in Table 20. Knowledge about the marine ecosystem (KNOWIND), which was found significant in pooled regression analysis, did not significantly determine willingness to pay across sub-samples. Bid price (WTPATU) significantly determined WTP negatively across all the six sub-samples. The expected *a priori* negative signs tell us that the higher the bid price, the lower is the respondent's WTP.

The coefficient for SEX was significant only for the sub-samples of PPC-PI and QC-PI, and both had negative signs, implying that women respondents in these two sub-samples tended to say "no" to the WTP question. Across all sites and modes, HEARD

(have heard or learnt about the concept of biodiversity) was positive which means that it increased the probability of saying "yes" to the WTP question. However, HEARD significantly determined WTP only in the sub-sample of PPC-PI. Familiarity with marine biodiversity (FMMBIOD) is a significant determining variable for the sub-samples of QC-PI and PPC-SA. On the other hand, education (EDUC) positively affected WTP, but is significant only for sub-samples QC-SA, CC-SA, and CC-PI.

Across all regressions, only in the sub-samples of CC-PI and PPC-PI were interviewer effects found significant, but only one interviewer was found to be affecting WTP in each of the sub-samples.

4.9 Test of Scope Insensitivity

Both common sense and economic theory predict that people would be willing to pay more for a good that is larger in scope than for one that is smaller ("scope" can refer to the quantity or quality of the good, or both). It has become standard practice to conduct a scope test on the findings of CVM surveys to see if the respondents' reported preferences do in fact conform to these common sense expectations (Desvouges, Hudson and Ruby, 1996).

In the pooled model, the scope test was undertaken by running a regression on all responses to the first question asked. This was across two split samples, where the first group was those respondents who were asked for their WTP to conserve the TRNMP, the smaller scope of the good. The second group of respondents comprised those who were asked their WTP for conserving the bigger scope of the good, i.e., the Sulu Sea, where the TRNMP is located.

This scope test was conducted twice. The first scope test was done by putting dummy variables on all the independent variables itemized in Table 19, aside from the dummy on the questionnaire form (of which the WTP question corresponding to the size/scope of the good, was asked first).

This, however, suffered the dummy variable trap and collinearity resulting in unreasonably high standard errors amounting to millions of pesos. Adamowicz (personal communications, 2003) explained that the dummy variable trap, i.e., non-estimation of the regression model or very high standard errors for variables of the estimated model occurs when there are too many dummy variables being used in the model concerned. In the case of this scope test, the dummy variables used exceeded 100.

The other scope test was done by having a dummy variable on the questionnaire form only, to determine if the likelihood of a "yes" answer differed between the two groups. The result was that it was insignificant, implying that there was no difference between the two groups. This means that the respondents were insensitive to the scope or size of the good i.e., the geographical area of conservation.

The second scope test was conducted for the six sub-samples, and generated the same result each time – insensitivity to scope was thus confirmed.

What is the reason for this? Carson, Flores and Meade (2001), referring to a number of published CVM studies that "failed" the scope test, offer one explanation:

failure to pass the scope test could be due to design factors which include the difference in the perceived probability of the different goods actually being provided. They cited the study of Fischoff et al. (1993), whereby respondents were apt to perceive the likelihood of the government actually being able to provide a large good as less than the likelihood of it being able to provide a smaller good. In the case of this study, it could be that respondents thought the same way, i.e., they perceived that the TRNMP protected area management board and other concerned agencies would not be able to provide the large good, which is conservation of the Sulu Sea coral reefs, in comparison to the smaller good (conserving the TRNMP). As such, they would not value the larger good higher than the smaller good.

4.10 Other Methodological Issues

Some studies undertook the decomposition of economic value (or non-use values for environmental assets/systems (Walsh and Bjonback (1990); Stevens et al., 1994; Predo, 1995; Manoka, 2001). In particular, the work by Walsh and Bjonback, Stevens et al., and Manoka (who followed the approach of Stevens et al.) as cited, decomposed non-use values according to motives or reasons. While these could be modest attempts to examine non-use values, Cummings and Harrison (1995) questioned this approach since there is nothing in the way of operationally meaningful hypotheses, which would permit the estimation of values attributable to specific motives of individuals. Cummings and Harrison further noted that, "We can observe values, but we cannot observe motives. The most that can be said of (early) attempts to effect such decompositions is that they estimate total values for groups of users and/or groups of non-users. The state of the art for empirical decomposition of a resource user's value for an environmental good into use and non-use components is not at all well advanced."

A criticism of the dichotomous choice CVM, is the possibility of "yea saying", where substantial percentages (about 30% or more) of respondents answer "yes" to the highest bid amount, resulting in the so-called "fat tails" problem (Boyle et al., 1994). As will be shown below, the fat tail problem is addressed by employing a conservative WTP estimator, the Turnbull. Moreover, though some of the sub-samples of this study, as shown by Tables 11-16 might exhibit possibilities of "yea saying" the literature is not so clear on what tests can be done to confirm that it is indeed present in the data set.

4.11 Mean Willingness to Pay Estimates

Using coefficients based on regression results, and the corresponding mean of the variables, the mean WTP was computed following the formula of Hanemann (1984) as cited in section 3 above. For example, for the QC-SA:

$$\text{Mean WTP} = \frac{1}{-0.00292}\left[\ln\left(1 + e^{\{-0.5.0137 - 0.000000302\,(182712.29) + \ldots..\}}\right)\right] = 261.37 \text{ pesos}$$

Due to the long equation of logit model estimates, only the constant's parameter estimate, and the product of coefficient for income and the mean income, are written above. However, it indicates (implied by "…..") that products of other variables' coefficients and the corresponding means are to be added to 'e'.

The other mean WTP values as shown in Table 21 are computed in the same manner using the respective coefficients and means of variables used. Note that Table 21 also shows the mean WTP for the four different models as cited in Section 4.8.2, for each of the sub-samples. Although the selected/preferred model is SR out and CERT in, the computed WTP figures indicated in Table 21 show that the different models used would generate different WTP levels.

As to incorporating uncertainty (referring to the second and fourth columns of Table 20 and comparing the corresponding WTP value to that of the third and fifth columns), it can be noted that when the certainty of respondents are considered (CERT in), the mean WTP estimated is lower. In fact, in some cases, like the QC-SA when scenario rejecters are excluded, the second and third column of Table 21 show that the mean WTP was reduced to almost a fifth of the mean WTP estimate (from 1010 pesos to 261 pesos). Incorporating uncertainty reduced the number of "yes" responses thus reducing the mean WTP. In the case of QC-PI, of the 339 usable observations (when scenario rejecters were excluded) the number of "yes" responses reduced from 182 (or 53% of all cases) when certainty was not incorporated in the model, to 117 (or only 35% of all cases) when certainty was incorporated in the model.

Moreover, if scenario rejecters or "protest votes' are not removed from the regression, which means treating their responses as zeroes instead of non-zero "no's", the WTP would be slightly lower or underestimated. For example, for PPC-PI with certainty incorporated in the model (CERT in), retaining scenario rejecters reduce the mean WTP from 751 pesos to 643 pesos (please compare second column with fourth column for PPC-PI mean WTP).

In summary, qualifying which of the "yes" replies are actually "no's" or incorporating uncertainty into the model (CERT in) results in lower (or more conservative) mean WTP. Moreover, retaining scenario rejecters will mean lower estimates of mean WTP.

Table 21. Willingness to Pay Measures by Average Respondent Per Site and CVM Mode, According to Assumptions on Scenario Rejecters and Respondent Uncertainty, 2002

	Scenario Rejecters Excluded		**Scenario Rejecters Included**	
	Incorporates Uncertainty (SR out CERT in)	**Uncertainty not Incorporated** (SR out CERT out)	**Incorporates Uncertainty** (SR in CERT in)	**Uncertainty not Incorporated** (SR in CERT out)
Quezon City Personal Interview				
Mean WTP	562.37	1026.12	485.78	874.34
Median WTP	-185.06	752.00	-517.00	356.00
Turnbull WTP	437.28	780.00	363.17	638.63
Sample size	339	339	399	399
Yes Response to WTP	117 (35%)	182 (53%)	117 (29%)	182 (46%)
Quezon City Self-Administered				
Mean WTP	261.37	1010.99	209.29	829.94
Median WTP	45.80	739.00	-54.71	412.00
Turnbull WTP	233.00	754.99	189.18	618.21
Sample Size	166	166	198	198
Yes Response to WTP	51 (31%)	92 (55%)	51 (26%)	92 (46%)
Cebu City Personal Interview				
Mean WTP	361.50	780.25	310.90	688.00
Median WTP	-668.28	263.88	-938.00	-63.41
Turnbull WTP	285.35	565.85	245.56	503.26
Sample Size	528	528	598	598
Yes Response to WTP	127 (24%)	213 (40%)	127 (21%)	213 (36%)
Cebu City Self-Administered				
Mean WTP	204.68	592.89	157.80	485.75
Median WTP	-2240.00	454.41	-2610.00	-1020.00
Turnbull WTP	135.22	430.27	107.07	339.07
Sample Size	277	266	349	349
Yes Response to WTP	33 (12%)	85 (31%)	33 (9%)	85 (24%)
Puerto Princesa City Personal Interview				
Mean WTP	750.63	1677.03	642.84	1415.00
Median WTP	89.60	1490	-20.52	1180.00
Turnbull WTP	496.33	1025.82	436.90	894.69
Sample Size	544	544	598	598
Yes Response to WTP	205 (38%)	359 (66%)	205 (34%)	359 (60%)
Puerto Princesa City Self-Administered				
Mean WTP	388.17	1099.80	292.90	806.38
Median WTP	-1870.00	-493	-2205.00	-1172.80
Turnbull WTP	278.66	589.34	216.32	456.13
Sample Size	356	356	449	449
Yes Response to WTP	71 (20%)	130 (37%)	71 (16%)	130 (29%)

The distribution of predicted mean WTP figures, which is computed by plugging in coefficients of the respective WTP regression equation in the formula derived by Hanemann (1984) are shown in Appendix Figures 1 to 6. It can be noted that more than half of the QC-SA respondents had less than the computed mean WTP. QC-PI and PPC-PI have few outliers whose very high predicted WTP likely pulled up others' WTP, thereby resulting in a higher mean WTP compared with other sub-samples; QC-PI had 562 pesos while PPC-PI had 751 pesos.

Table 21 also shows that self-administered mean WTP estimates are much lower compared with their personal interview estimates (on a per sub-sample basis, for example QC-SA versus QC-PI). Several CVM researchers explained these higher estimates of personal interview CVM survey as compliance bias, i.e., respondents in the PI are somehow driven by their desire to please the interviewer. Legett et al. (2003) also found the same result and rationale – respondents who were personally interviewed and asked their WTP user fees for Fort Sumter National Park gave a mean WTP which was 23-29% higher than their self-administered counterparts. They explained this as due to "social desirability bias", another nomenclature to compliance bias.

Compliance bias could be an explanation of the difference between the mean WTP of PI and SA respondents of this study, but the data gathered does not provide clear proof on this. It can also be opined that, as Whittington (2003) explains, providing respondents time to think, as in the case of the self-administered respondents, gave them the advantage of expressing a more real WTP since they would have been able to consult family members as well as compute their family expenses and budget between the time of receiving the questionnaire and the time of returning it.

Furthermore, as discussed in section 3 above, recent CVM studies using the dichotomous choice format, which generated non-monotonically increasing WTP distribution results across price bids argue that a lower bound estimate of mean WTP can be derived using the Turnbull approach. Details of this are discussed in Haab and McConnell (2003). Using their formula and computing for each sub-sample under each of the four models (assumption scenarios) per sub-sample resulted in the corresponding Turnbull WTP as shown in Table 21 above. It should be noted that, as Haab and McConnell explain, the Turnbull estimates are lower or more conservative.

4.12 Estimating the Social Benefits of TRNMP Conservation from WTP Results

Tables 11 to 16 show non-monotonically increasing WTP distribution i.e., as the bid price moves from lower to higher, the percentage of "no" replies per total respondents does not consistently go higher. Thus, as discussed in Section 3, the Turnbull estimator is more suited in determining social WTP. Additionally, the Turnbull WTP has been proven to provide a conservative estimate.

Table 22 shows the self-administered and personal interview estimates of results of social WTP using the Turnbull WTP.

Using the self-administered Turnbull WTP, the total social benefits of conserving the TRNMP for all the three sites amounts to about PHP 141 million, a big amount which can cover the annual costs of the present level of conservation efforts in the TRNMP, i.e., PHP 10 million according to Ms. Dygico, team leader of the WWF-Philippines Conservation Project in Tubbataha (personal communication, Tubbataha Management Office, 2003). On the other hand, if social WTP is computed based on the personal interview Turnbull estimate, the amount will be almost double, i.e,. PHP 269 million in all the three sites.

Table 22. Estimation of the Social WTP for TRNMP Conservation, 2002

Study Site/ City	Number of Households (2000 Census) (a)	Turnbull WTP		Social WTP	
		SA (b)	PI (c)	SA (a) x (b)	PI (a) x (c)
Quezon City	480,624	233	437	111,985,392	210,167,263
Cebu City	147,600	135.22	285	19,958,472	42,117,660
Puerto Princesa City	33,306	278.66	496	9,281,049	16,530,767
	Social WTP or Social Benefits of Conserving TRNMP			141,224,914	268,815,689

5.0 SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Summary and Conclusions

This study provides empirical evidence on non-use values for a marine park in the developing country context. In particular, there were respondents who held positive non-use values for biodiversity conservation of the Tubbataha Reefs National Marine Park (TRNMP). Across sites and CVM modes, those who responded "yes" to the dichotomous choice WTP question about contributing towards a trust fund for biodiversity conservation of the TRNMP amounted to 41% of 2591 valid observations. More respondents expressed a willingness to pay when interviewed personally compared with those who were asked to complete the survey instrument on their own. Personal interviews (PI) saw 47% of the respondents replying "yes" to the WTP question, while the self-administered (SA) mode got only 31%. The lower than 50% "yes" replies is consistent with the findings of other studies on non-use values.

The main motives or reasons for WTP were dominantly non-use values. Less than 10% of Quezon City and Cebu City "yes" respondents cited direct use values as their main reason. As expected, more Puerto Princesa City respondents, i.e., 14% and 13% of SA and PI respondents respectively, cited direct use values as their main reason for WTP, as they are nearer the TRNMP compared with the two other sites. Among non-use motives, bequest value/motive (concern for future generations) was the highest ranked, ranging from 34% to 54% of total respondents per sub-sample. This was followed by existence value, altruistic motive and good cause.

Some socio-demographic variables affected the respondents' willingness to pay decision. Annual income, education, familiarity with marine biodiversity, and education level all had positive effects. As expected, bid price had a significant negative effect.

PI respondents had a higher probability of agreeing with the WTP decision, compared with SA respondents. This translated to a higher mean WTP per year per CVM mode per site. This higher WTP estimate could be due to compliance bias or the fact that SA respondents had more time to think. Using the more conservative Turnbull WTP for the SA CVM , the estimated mean WTP (per year) results per site was: PHP 233 for Quezon City, PHP 135 for Cebu City and PHP 278 for Puerto Princesa City. In

contrast, the Turnbull mean WTP results for the PI CVM were: PHP 437 for Quezon City, PHP 285 for Cebu City and PHP 496 for Puerto Princesa City. These amounts were found to be very low compared with the average annual household incomes of the respondents.

The total social WTP, which can be viewed as part of the social benefit of conserving biodiversity in TRNMP, was computed by adding the social WTP per site. The total social WTP for the three study sites using the self-administered (SA) Turnbull WTP amounted to PHP 141 million (or USD 2.5 million) per year. In contrast, the social WTP using the PI CVM Turnbull WTP amounted to PHP 269 million. Either of these estimates would dwarf the required cost of conserving the TRNMP, which is presently PHP 10 million to cover core costs. Thus, tapping just a portion of the non-use values would provide a source of conservation funding for the TRNMP.

PI CVM was found to produce a significantly higher response rate across sites and sub-samples compared with the SA approach, negating this study's hypothesis that there exists no difference. This finding confirms the recent findings of Legett et al. (2003) that the CVM mode matters in the amount of WTP solicited. In contrast to SA, PI requires higher costs per respondent but is prone to interviewer and compliance bias. The SA approach involves lower manpower and costs but could suffer from high non-participation and item non-response.

Further studies need to be undertaken in further probing the reasons why certain respondents expressed protest votes or rejected the hypothesized scenario of the study. Also, a deeper inquiry into compliance bias merits the attention of CVM researchers. Future CVM studies could also look at the advantages and disadvantages of both approaches, with the aim of addressing the disadvantages.

5.2 Policy Implications

Economic valuation is a two-part process in which it is necessary to first, demonstrate and measure the economic value of environmental assets, and second, find ways to capture the value of such. The first part is called the demonstration process, while the second part is called the appropriation process (Georgiuo et al., 1997).

What this research report has accomplished so far in the above sections is the demonstration of economic valuation for conserving biodiversity in the TRNMP. The appropriation of this value requires policies, rules, and regulations on the part of concerned agencies and institutions.

Since 2000, the trust fund hypothesized in this study has already been set up. The introduction of a conservation fee followed a divers' survey asking respondents their WTP for a so-called "conservation fee", which is actually a "user's fee" (Mejia et al., 2000). In that year, a total of USD 31,000 was raised from conservation fees, whereby foreign divers had to pay USD 50 per person while local divers paid USD 25 each before they could enter the TRNMP for scuba diving. The Tubbataha Protected Area Management Board (TPAMB) was appointed as the coordinating agency in cooperation with WWF-Philippines.

However, the period of 2000-2002 was marked by a series of kidnap-for-ransom of foreigners in Southern Philippines, particularly in Sulu and Basilan, not very far from the TRNMP. The consequent drop in the number of tourists is likely to result in decreased number of divers and trust fund contributors towards the TRNMP. Thus, the conservation fee, which is supposed to capture the recreational value (user's value) of the TRNMP, does not seem to provide a stable source of conservation funding for the UNESCO world heritage marine park (personal communication with Dygico, 2003), since the recreational value is very tourist-dependent.

Non-use values for the TRNMP, which this study shows to be substantial, can therefore be captured through appropriate policy instruments. Designing appropriate policy instruments is one big task in itself and there are possible options to be considered like: (a) tax attached to property value, (b) tax attached to utility bills, and, (c) voluntary contributions.

The costs of conservation of the TRNMP amounts to PHP 10 million, which only covers the maintenance of the office and park ranger station as well as law enforcement. Suppose this is increased five-fold in order to significantly affect conservation, total costs would be PHP 50 million. Then, if the government applies either options (a) or (b) above to capture non-use values, measured as the aggregate social WTP from the three sites (PHP 141 million) divided by the total households (15 million) of the country, the annual tax will amount to only PHP 9.40, which means less than a peso per month of surcharge on utility bills. Since approximately 40% of the respondents were found from this study to be willing to pay for conservation, thus only 40% of the households will pay the tax or surcharge. So about PHP 56.4 million (PHP 141 million x 0.40) would be raised, more than enough to cover conservation financing requirements.

For the third policy option, one approach to collect non-use values (or even use values) would be an information-dissemination-cum-donation-collection campaign. This can be undertaken by conservation non-government organizations (NGOs) whereby a vehicle sponsored by certain companies (like Toyota, Kodak or MetroBank) will have information and education campaign (IEC) people who will set-up exhibits on the TRNMP in various schools (elementary, high school and university levels) and even shopping/commercial malls. The exhibits will include films, posters, short lectures, seminars and information materials on the Tubbataha Reefs. People could give their donations and receive IEC materials in return. For example, in exchange for a donation of PHP 500, a T-shirt with TRNMP campaign information and picture print or a VHS/CD on the TRNMP could be given to the donor. For small donations from school children or students from high school or university, Tubbataha stickers or posters could be given in exchange for a PHP 100 or PHP 20 donation, respectively. An alternative approach is to convince people to sign pledge cards for annual donations for five years, which they could channel through banks to the trust fund.

Since education is a determinant that increases WTP, future trust fund raising campaigns should target schools – elementary and high schools, colleges, and universities. Again, these campaigns should be IEC-cum-donation solicitation campaigns. So, while the IEC would increase people's knowledge and awareness, it would also increase people's WTP and the probability of their WTP.

The results of this study also showed that the bequest motive is the main reason for WTP and so, IEC should emphasize the present generation's obligation to protect the Tubbataha Reefs as a legacy for future generations. Conservation themes or mottos can be similar to WWF's "Let's leave our children a living planet".

Moreover, the potential 'capturable' non-use values will be bigger if we consider the Tubbataha Reefs as a global good. In fact, it is already of global importance as a UNESCO world heritage site, thus signifying global non-use values. Following Ruitenbeek's (1992) attempt to derive some global values for biodiversity (as cited by Pearce and Moran, 1994), through the debt-for-nature swaps (DFNs), the GEF-funded conservation project through WWF-Philippines through the period 2000-2004 is one expression of the Tubbataha Reefs' global value. A big chunk of this is non-use values too. Based on the USD 750,000 grant over the period of four years, covering the 10,000 hectares of coral reefs, we can compute the global value of the Tubbataha Reefs as USD18.75 (or PHP 1031) per hectare per year.

From the viewpoint of the government, a regular budget appropriation for TRNMP biodiversity conservation is a step forward in addressing the social benefits of conservation, particularly for those whose non-use values for TRNMP is positive.

Lastly, it should be pointed out that the estimated mean and social WTP significantly differed across sites, thereby posing a warning against benefit transfers of estimates from one place to another. Should there be a last resort to use benefit transfer, careful adjustments need to be made to suit previous results to future study site estimates. However, this may be a difficult task, and would only highlight the need to conduct an actual CVM study in the site(s) concerned.

REFERENCES

Adamowicz, V. 2003. Personal communication.

Arquiza, Y and A. White. 1994. Tales from Tubbataha: Natural history, resource use, and conservation of the Tubbataha reefs, Palawan, Philippines. Rainee Trading and Publishing Inc. . Mandaluyong City, Philippines

Arrow, K.; R. Solow; E. Leamer; P. Portney; R. Randear; and H. Schuman. 1993. Report of the National Oceanic and Atmospheric Administration (NOAA) on the contingent valuation method. Federal Register 58 (10) 4602-4614.

Asian Development Bank. 1995. Biodiversity conservation in the Asia and Pacific region: constraints and opportunities. Proceedings of a regional conference. Asian Development Bank and The World Conservation Union. Manila.

Barbier, E.; M. Acreman; and D. Knowler. 1997. Economic valuation of wetlands: A guide for policy makers and planners. Ramsar Convention Bureau. Gland, Switzerland.127p.

Barton, D.N. 1994. Economic factors and valuation of tropical coastal resources. SMR-Report 14/94. Bergen, Norway. 128pp.

Bennet, J.; R. Blamey; M. Morrison; and J. Rolfe. 1998. The promise and problems of environmental choice modeling: an Australian perspective. Paper presented at the Fifth Biennial Meeting of the International Society for Ecological Economics, Santiago, Chile, November 15-19, 1998

Bergstorm, J.C. 1990. Concepts and measures of the economic value of environmental quality: a review. Journal of Environmental Management 31: 215-228.

Biodiversity Support Program. 1996. Biodiversity: Facts on the foundation of life. WWF/ The Nature Conservance / USAID.

Bishop, R.C. and K.J. Boyle. 1985. The economic value of Illinois beach state nature preserve. Report to the Illinois Department of Conservation. Heberlein and Baumartner Research Services. Madison, Wisconsin.

Bishop, R.C. and M.P. Welsh. 1992. Existence values in benefit-cost analysis and damage assessment. Land Economics 68 (4): 405-417.

Boyle, K.J. 2003. Contingent valuation in practice. *In* P.A.,Champ, K.J. Boyle and T.C. Brown (eds) . A primer on nonmarket valuation. The Economics of Non-Market Goods and Resources. Bateman, I.J. Series Editor. Kluwer Academic Publishers. Dordrecht/ London/Boston.

Boyle, K.J. and R.C. Bishop. 1987. Valuing wildlife in benefit-cost analysis: a case study involving endangered species. Water Resources Research 23 (5): 943-950.

Boyle, K.J.; W.H. Desvouges; F. R. Johnson; R.W. Dunford; and S.P. Hudson. 1994. An investigation of part-whole biases in contingent valuation studies. Journal of Environmental Economics and Management 27 (1): 64-83.

Brookshire, D.S.; L.S. Eubanks; and C.F. Sorg. 1986. Existence values and normative economics: implications for valuing water resources. Water Resources Research 22 (11): 1509-1518.

Bulayog, S. 1998. Economic implications of biodiversity preservation in Mount Pangasugan, Leyte, Philippines. Ph.D. Dissertation. College of Economics and Management, Univeristy of Philippines. Los Baños.

Carson, R.T. 1998. Valuation of tropical rainforests: philosophical and practical issues in the use of contingent valuation. Ecological Economics 24: 15-29.

Carson, R.T.; N.E. Flores; K. Martin; and J.L. Wright. 1996. Contingent valuation and reveal preference methodologies: comparing the estimates for quasi-public goods. Land Economics 72 (1): 80-99.

Carson, R.T.; N.E. Flores; and N.F. Meade. 2001. Contingent valuation: controversies and evidence. Environmental and Resource Economics 19:173-210.

Cartier, C. and J. Ruitenbeek. 1999. Review of the empirical biodiversity literature. *In* Gustavson, R. Huber and J. Ruitenbeek. (eds) Integrated Coastal Zone Management of Coral Reefs: Decision Support Modeling. The World Bank. Washington DC.

Cesar, H.J. 2000. Coral reefs: their functions, threats and economic value. *In* Cesar, H. 2000. Collected Essays on the Economics of Coral Reefs. CORDIO and SIDA. Boras, Sweden.

Champ, P.A.; K.J. Boyle and T.C. Brown. 2003. A primer on nonmarket valuation. The Economics of Non-Market Goods and Resources. Bateman, I.J. Series Editor. Kluwer Academic Publishers. Dordrecht/ London/ Boston.

Cummings, R.G. and G.W. Harrison. 1995. The measurement and decomposition of nonuse values: a critical review. Environmental and resource economics 5:225-247.

De Groot, R. 1992. Functions and values of protected areas: a comprehensive framework for assessing the benefits of protected areas to human society. Climate Change Research Center. Agricultural University. Wageningen, Netherlands.

Desvouges, W.H.; S.P. Hudson; and M.C. Ruby. 1996. Evaluating CV performance: Separating the light from the heat. *In* Bjornstad and Kahn. The Contingent Valuation of Environmental Resources: Methodological Issues and Research Needs. Edward Elgar. Cheltenham.

Dillman, D.A. 1978. Mail and telephone surveys: the total design method. John Wiley and Sons. New York.

Dixon, J. and P. Sherman. 1990. Economics of protected areas: a new look at benefits and costs. Earthscan Publication Ltd. London.

Duffield, J.W. 1991. Existence and non-consumptive values for wildlife: application to wolf recovery in Yellowstone National Park. Western Regional Research Project W-133, Benefits and Costs in Natural Resources Planning. Fourth Interim Report.

Dygico, M. 2003. Personal communication

Fischhoff, B.; M.J. Quandrel; M. Kamlet; G. Lowenstein; R. Dawes; P. Fishbeck; S. Klepper; J. Leland; and P. Stroh. 1993. Embedding effects: stimulus representation and response modes. Journal of Risk and Uncertainty 6:211-234.

Francisco, H.A. 2002. Personal communication.

Freeman, M. 1993. The measurement of environmental and resource values. Resources for the Future. Washington, DC.

Georgiou, S.; D. Whittington; D. Pearce; and D. Moran. 1997. Economic values and the environment in the developing world. Edward Elgar Publishers. Cheltenham.

Giraud, K.L.; J.B. Loomis; and R.L. Johnson. 1999. Internal and external scope in willingness-to-pay estimates for threatened and endangered wildlife. Journal of Environmental Management 56:221-229.

Haab, T.C. and K.E. McConnell. 2003. Valuing environmental and natural resources: the econometrics of non-market valuation. Edward Elgar Publishers. Cheltenham.

Hanemann, W.M. 1984. Welfare evaluations in contingent valuation experiments with discrete responses. American Journal of Agricultural Economics 66:332-41.

Hardin, G. 1968. The tragedy of the commons. Science 162: 1243-1248.

Harrison, G. 2002. Personal communication.

Hoehn, J.P. and A. Randall. 1987. A satisfactory benefit-cost indicator from contingent valuation. Journal of Environmental Economics and Management 14:226-247.

Holmes, T.P. and V. Adamowicz. 2003. *In* P.A.,Champ, K.J. Boyle and T.C. Brown (eds) . A primer on nonmarket valuation. The Economics of Non-Market Goods and Resources. Bateman, I.J. Series Editor. Kluwer Academic Publishers. Dordrecht/ London/Boston.

Hundloe, T.; F. Vanclay; and M. Carter. 1987. Economic and socio-economic impacts of crown of thorns starfish on the Great Barrier Reefs. Report to the Great Barrier Reefs Marine Park Authority, Townsville.

Kabang Kalikasan ng Pilipinas and R. Miclat. 1997. Tubbataha Reefs National Marine Park. http:// www.philreefs

Kahneman, D. and J.L. Knetch. 1992. Valuing public goods: the purchase of moral Satisfaction. Journal of Environmental Economics and Management 22:57-70.

_____. 1992. Contingent valuation and the value of public goods: reply. Journal of Environmental Economics and Management 22:90-94.

Kotchen, M.J and S.D. Reiling 2000. Environmental attitudes, motivations, and contingent valuation of non-use values: a case study involving endangered species. Ecological Economics 32: 93-107.

Kramer, R.A. and D.E. Mercer. 1997. Valuing a global environmental good: U.S. residents' willingness to pay to protect tropical rain forest. Land Economics 73(2): 196-210.

Kristrom, B. and T. Laitila. 2002. Stated preference methods for environmental valuation: a critical look. Monograph submitted to Folmer, H and T. Tietenberg (2003). International Yearbook of Environmental and Resource Economics, Edgar Elgar Publishers. Cheltenham.

Krutilla, J.V. 1967. Conservation reconsidered. The American Economic Review 57: 777-786.

Langford. I.H.; I.J. Batmean; A.P. Jones; H.D. Langford; and S. Georgiou. 1998. Improved estimation of willingness to pay in dichotomous choice contingent valuation studies. Land Economics 74 (1): 65-75.

Larson, D. M. 1993. On measuring existence values. Land Economics 69 (4):377-388.

Lazo, J.K.; G.H. McClelland; and W.D. Schulze. 1997. Economic theory and psychology of non-use values. Land Economics 73 (3): 358-371.

Legett, C.G.; N.S. Kleckner; K.J. Boyle; J.W. Duffield; and R.C. Mitchell. 2003. Social desirability bias in contingent valuation surveys administered through in-person interviews. Land Economics 79 (4): 561-575.

Loomis, J.; A. Gonzalez-Caban; and R. Gregory. 1994. Do reminders of substitutes and budget constraints influence contingent valuation estimates? Land Economics 70 (4)*:* 499-506.

Madriaga, B. and K.E. McConnell. 1987. Exploring existence value. Water Resources Research 23 (5): 936-942.

Manoka, B. 2001. Existence value: a re-appraisal and cross-cultural comparison. Research Report. The Economy and Environment Program for Southeast Asia (EEPSEA). Singapore.

McConnell, K.E. 1997. Does altruism undermine existence value? Journal of Environmental Economics and Management 32: 22-37.

McNeely, J. A.; K.R. Miller; W.V. Reid; R.A. Mittermeier; and T.B. Werner. 1990. Conserving the world's biological biodiversity. International Union for the Conservation of Nature. Gland, Switzerland. 193p.

Mejia, M.N.; R.F. Subade; S. Atkinson; B. Spergel; and M.Dygico. 2000. Paying for marine conservation through sustainable financing: the Tubbataha experience. Paper presented during the 9th International Coral Reef Symposium, October 2000. Bali, Indonesia.

Mitchell, R. and R. Carson. 1989. Using surveys to value public goods: the contingent valuation method. Resources for the Future. Washington DC.

Myers, N. 1988. Threatened biotas: "hotspots" in tropical forests. The Environmentalist. 10(4):243-256.

Neptuno, G. M. 1997. Alternative methods of valuing biodiversity: the case of Mt. Makiling. B.S. Thesis. College of Economics and Management. University of the Philippines. Los Baños.

Pajaro, M.; F. Olano; B. San Juan; and C.M. Nozawa. 1999. Inventory of marine protected areas in the Philippines. *In* Uychiaoco, A., S. Schoppe, P. Aliño and R. Hermes (eds.). Marine protected areas in the Philippines: Proceedings of the workshop on marine protected areas in the Philippines. PCAMRD. Los Baños.

Pearce, D. and D. Moran. 1994. The economic value of biodiversity. Earthscan Publications Ltd. London. 172p.

Pigou, A.C. 1920. The economics of welfare. Mc Millan. London.

Predo, C. 1995. Estimating the recreation and preservation benefits of Lake Danao national park. M.S. Thesis. School of Environmental Science and Management, University of the Philippines. Los Baños.

Ruitenbeek, J. 1992. The rainforest supply price: a tool for evaluating rainforest conservation expenditures. Ecological Econom*ics* 6(1): 57-78.

Schkade, D.A. and J.W. Payne. 1994. How people respond to contingent valuation questions: a verbal protocol analysis of willingness to pay for an environmental regulation. Journal of Environmental Economics and Management 26:88-109.

Seenprechawong, U. 2001. An economic analysis of coral reefs in the Andaman sea of Thailand. Research Report. No. 2001-RR7. Economy and Environment Program for Southeast Asia. Singapore.

Sevilla, A. 2001. Personal communication.

Silberman, J.; D.A. Gerlowski; and N.A. Williams. 1992. Estimating existence value for users and nonusers of New Jersey beaches. Land Economics 68 (2): 225-236.

Smith, V.K. 1992. Arbitrary values, good causes and premature verdicts. Journal of Environmental Economics and Management 22: 71-89.

_____. 1993. Nonmarket valuation of environmental resources: an interpretive appraisal. Land Economics 69 (1): 1-26.

Spash, C.L. and N. Hanley. 1995. Preferences, information and biodiversity preservation. Ecological Economics 12: 191-208.

Spash, C.; J.D. WerfftenBosch; S. Westmacott; and J. Ruitenbeek. 2000. Lexicographic preferences and the contingent valuation of coral reef biodiversity in Curacao and Jamaica. *In* Gustavson, K., R. Huber and J. Ruitenbeek (eds.) 2000. Integrated coastal zone management of coral reefs: decision support modeling. The World Bank. Washington DC.

Stevens, T.H.; J. Echeverria; R.J. Glass; T. Hager; and T.A. More. 1991. Measuring the existence value of wildlife: what do CVM estimates really show? Land Economics 67 (4): 390-400.

Stevens, T.H.; T.A. More; and R.J. Glass. 1994. Interpretation and temporal stability of CV bids for wildlife existence: a panel study. Land Economics 70 (3): 355-363.

Thorne-Miller, B. and J.G. Catena. 1991. The living ocean: understanding and protecting marine biodiversity. Washington, D.C.: Island Press

Turnbull, B. (1976). The empirical distribution function with arbitrarily grouped, censored, and truncated date. Journal of the Royal Statistical Society, 38B: 290-95.

Turner, R.K. and D.W. Pearce. 1993. Sustainable economic development: economic and ethical principles. *In* E. Barbier (ed). Economics and ecology: new frontiers and sustainable development. Chapman and Hall. London.

Uychiaco, A.; P.M. Aliño; E.F.B. Miclat; and R.T. Campos. 1997. Coral reef science and management in the Philippines. http:// www.philreefs

Walsh, R.G. and R.D. Bjonback. 1990. Estimating the public benefits of protecting forest quality. Journal of Environmental Management 30: 175-189.

White, A. and H. Vogt. 2000. Philippine coral reefs under threat: the economic losses caused by reef destruction. Marine Pollution Bulletin 40 (7): 598-605.

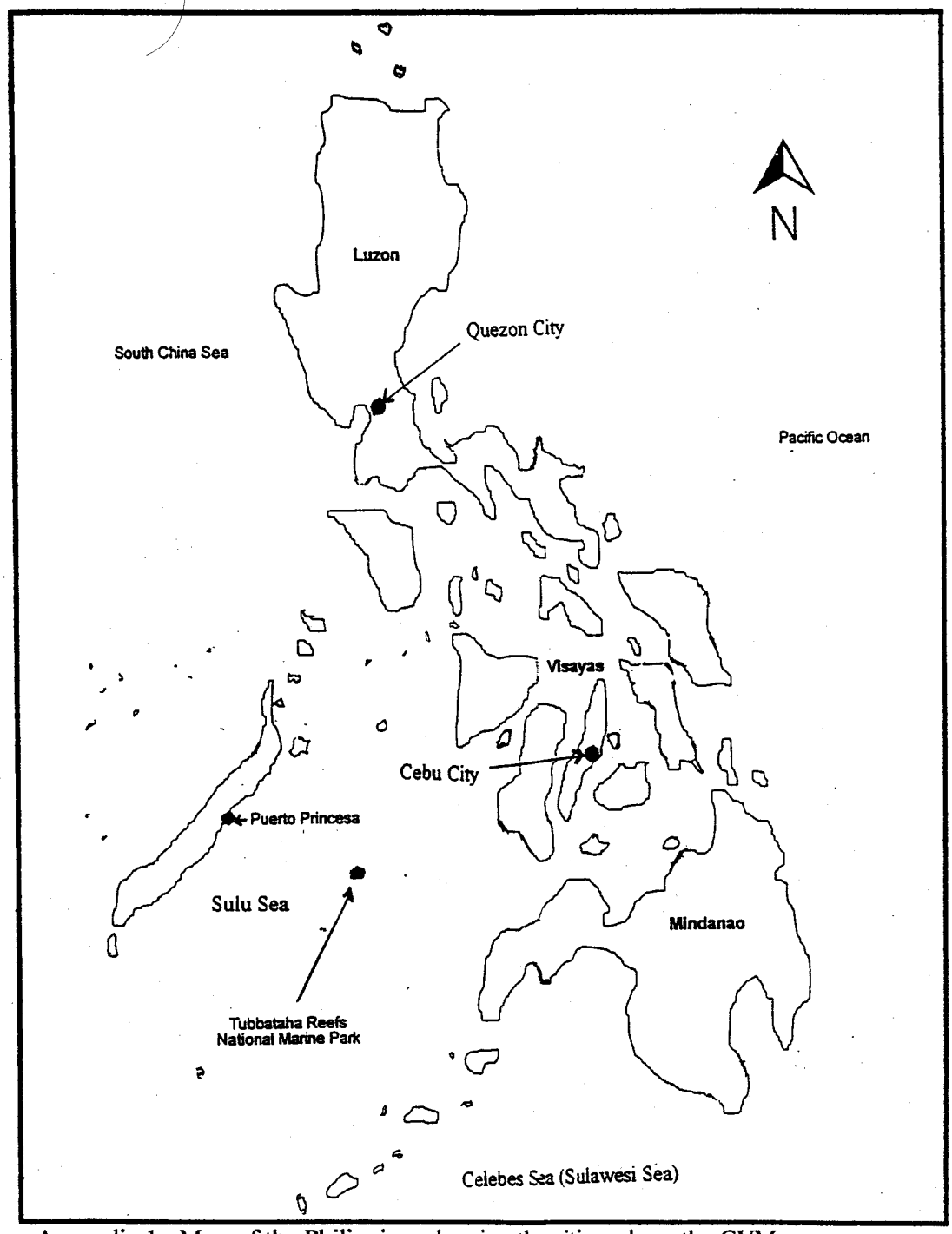
Whittington, D. 2002. Improving the performance of contingent valuation studies in developing countries. Environmental and Resource Economics 22:323-367.

Whittington, D. 2003. Personal communication.

Wilks, L.C. 1990. A survey of the contingent valuation method. Resource Assessment Commission Research Paper No. 2. Australian Government Publishing Services. Canberra.

WWF Philippines. 2000. Conservation of the Tubbataha Reef National Marine Park and World Heritage Site. A Project Proposal submitted to the UNDP-GEF.

_____. 2000. Tubbataha Reef National Marine Park and World Heritage Site: Management Objectives, Strategies and Actions. 15p.



Appendix 1. Map of the Philippines showing the cities where the CVM survey was conducted and the Tubbataha Reefs National Marine Park, Sulu Sea

APPENDIX TABLES

Appendix Table 1. Logit regressions results for Quezon City self-administered survey respondents, 2002

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
Constant	-5.0137	-4.2514	-0.2399	0.3453
	(-2.5510)	(-2.5070)	(-0.9940)	(-1.2510)
INCOME	-0.00000030	0.00000104	0.000000013	0.00000018
	(-0.3930)	(1.0870)	(0.1090)	(1.3040)
AGE	-0.00122	-0.00969	-0.00142	0.00209
	(-0.0800)	(-0.6880)	(-0.6550)	(-0.8450)
KNOWIND	0.0922	0.10027	0.0177	0.0242
	(0.6410)	(0.8150)	(0.9170)	(1.0930)
WTPATU	-0.00292	-0.00124	-0.000235	0.000223
	(-4.1640)	(-4.0330)	(-5.2560)	(1.0930)
SEX	0.0932	0.00826	-0.00598	0.00696
	(0.2270)	(0.0220)	(-0.1010)	(-0.1030)
HEARD	0.5255	0.3493	0.0583	0.0709
	(1.4780)	(1.1440)	(1.2150)	(1.2930)
FMMBIOD	0.1278	-0.0229	0.01609	0.000168
	(1.4230)	(-0.2900)	(1.3090)	(-0.0120)
EDUCATION	0.2006	0.2280	0.0266	0.0413
	(2.2690)	(2.9430)	(2.4120)	(3.2810)
SAEFF1	1.9413	2.3630	0.2244	0.3680
	(2.1110)	(2.9430)	(1.8740)	(2.6890)
SAEFF2	0.7222	1.5408	0.0622	0.2335
	(0.8220)	(1.9130)	(0.5370)	(1.7650)
SAEFF4	1.7521	1.5335	0.2179	0.3395
	(1.4760)	(1.4620)	(1.3560)	(1.8500)

Appendix Table 2. Logit regressions results for Quezon City personally interviewed respondents, 2002

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
Constant	-0.7288	-0.4566	-1.2990	-1.0436
	(-0.666)	(-0.418)	(-1.234)	(-1.059)
INCOME	0.00000168	0.00000253	0.00000184	0.00000230
	(2.192)	(2.375)	2.539	(2.675)
AGE	-0.01890	-0.0233	-0.0152	-0.0164
	(-1.892)	(-2.387)	(-1.636)	(-1.917)
KNOWIND	0.05093	0.1003	0.0971	0.1426
	(0.595)	(1.186)	(1.167)	(1.825)
WTPATU	-0.00106	-0.00122	-0.000973	-0.00102
	(-4.385)	(-5.671)	(-4.203)	(-5.228)
SEX	-0.5506	-0.5418	-0.3045	-0.2136
	(-1.994)	(-1.901)	(-1.188)	(-0.875)
HEARD	0.4442	0.3302	0.3740	0.20009
	(1.535)	(1.039)	(1.414)	(0.756)
FMMBIOD	0.09348	0.07486	0.07698	0.0489
	(1.921)	(1.504)	(1.680)	(1.119)
EDUCATION	0.04503	0.08535	0.0166	0.03498
	(0.918)	(1.726)	(0.355)	(0.795)
INTEFF1	-0.5825	-0.02531	-0.5141	-0.00747
	(-0.899)	(-0.040)	(-0.852)	(-0.014)
INTEFF2	0.1822	0.3420	0.1129	0.2496
	(0.319)	(0.572)	(0.213)	(0.487)
INTEFF3	-0.06555	-0.1429	-0.04105	-0.04361
	(-0.113)	(-0.248)	(-0.075)	(-0.086)
INTEFF4	-0.6194	-1.3558	-0.90069	-1.5067
	(-0.951)	(-2.064)	(-1.489)	(-2.595)
INTEFF7	-0.2514	0.8896	-0.2276	0.7061
	(-0.447)	(1.513)	(-0.433)	(1.419)
INTEFF8	-0.7236	-0.3196	-0.6372	-0.1846
	(-1.170)	(-0.532)	(-1.090)	(-0.353)
INTEFF9	0.9597	0.7103	0.4144	0.0919
	(1.440)	(1.044)	(0.698)	0.162
INTEFF35	0.5998	0.2498	0.7991	0.5715
	(1.106)	(0.441)	(1.566)	(1.143)
INTEFF36	0.7686	1.0759	0.4717	0.5952
	(1.386)	(1.793)	(0.941)	(1.210)

Appendix Table 3. Logit regressions results for Cebu City self-administered survey respondents, 2002

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
Constant	-3.8318	-2.0431	-4.1041	-2.3152
	(-3.4930)	(-2.647)	(-3.7670)	(-3.2310)
INCOME	0.00000030	0.00000171	0.000000639	0.00000208
	(0.2740)	(2.015)	(0.6010)	(2.6180)
AGE	-0.0079	-0.00929	-0.0108	-0.0133
	(-0.5210)	(-0.816)	(-0.7210)	(-1.2690)
KNOWIND	0.1291	0.0194	0.1560	0.0693
	(1.1380)	(0.248)	(1.3810)	(0.9510)
WTPATU	-0.000782	-0.000869	-0.000779	-0.000771
	(-2.1910)	(-3.539)	(-2.2330)	(-3.4330)
SEX	0.3744	-0.0451	0.4945	0.0905
	(0.9210)	(-0.148)	(1.2570)	(0.3280)
HEARD	-0.1798	-0.0094	-0.2017	-0.1078
	(-0.5580)	(-0.04)	(-0.6250)	(-0.4850)
FMMBIOD	0.0332	0.100312	0.0423	0.0810
	(0.4390)	(1.702)	(0.5770)	(1.5960)
EDUCATION	0.1306	0.1436	0.1111	0.1130
	(2.1870)	(3.338)	(1.9210)	(2.9030)

Appendix Table 4. Logit regressions results for Cebu City personally interviewed respondents, 2002

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
Constant	-2.0542	0.1687	-2.1351	0.1542
	(0.9760)	(1.0360)	(-2.22)	(1.0090)
INCOME	0.0000013	0.00000057	0.0000015	0.00000058
	(1.9680)	(3.6000)	(1.692)	(3.7880)
AGE	-0.02105	-0.00145	-0.0228	0.00178
	(-2.1390)	(-0.9940)	(-2.619)	(-1.3250)
KNOWIND	0.1032	0.00634	0.1228	0.01077
	(1.0200)	(0.5050)	(1.662)	(0.9200)
WTPATU	-0.00109	-0.000176	-0.00103	0.000157
	(-5.8670)	(-6.6620)	(-5.339)	(-6.2530)
SEX	0.1185	-0.0431	0.1374	0.0295
	(0.4910)	(-1.0820)	(0.588)	(-0.7920)
HEARD	0.0984	0.0891	-0.0594	0.0399
	(0.2130)	(1.6820)	(-0.19)	(0.8240)
FMMBIOD	-0.0168	0.0045	-0.00966	0.00623
	(-0.0260)	(0.5630)	(-0.196)	(0.8210)
EDUCATION	0.0844	0.0217	0.0666	0.0159
	(2.1010)	(3.5280)	(1.783)	(2.7750)
INTEFF12	0.9039	0.1076	0.8328	0.0770
	(1.0640)	(0.8180)	(1.045)	(0.6200)
INTEFF13	0.8421	0.0611	0.8773	0.0649
	(0.9520)	(0.4480)	(1.071)	(0.4910)
INTEFF14	-0.4500	-0.0737	-0.6842	0.1034
	(-0.1630)	(-0.5200)	(-0.673)	(-0.7960)
INTEFF15	1.3206	0.1722	1.3179	0.1713
	(1.4710)	(1.3330)	(1.669)	(1.3610)
INTEFF16	1.1791	0.2138	1.1319	0.2035
	(1.3460)	(1.6820)	(1.457)	(1.6530)
INTEFF17	-1.6094	-0.0471	-1.7180	0.0621
	(-0.7820)	(-0.3670)	(-1.409)	(-0.5090)
INTEFF18	1.5975	0.3711	1.6577	0.3600
	(1.6170)	(2.0680)	(1.704)	(2.1090)
INTEFF19	-0.3766	0.2152	-0.6466	0.0932
	(-0.2300)	(1.2790)	(-0.516)	(0.6130)
INTEFF20	1.1044	0.3815	0.8710	0.2927
	(1.3920)	(2.9430)	(1.132)	(2.4110)
INTEFF22	0.2756	0.4028	0.3302	0.3971
	(0.3160)	(2.9890)	(0.382)	(3.0440)

Appendix Table 4 continued…

Appendix Table 4 concluded.

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
INTEFF23	-0.2347	-0.0550	-0.3906	0.0768
	(-0.2320)	(-0.4220)	(-0.451)	(-0.6210)
INTEFF24	1.0146	0.2111	1.0494	0.2126
	(1.1310)	(1.5680)	(1.306)	(1.6460)
INTEFF25	1.1456	0.2585	1.2095	0.2738
	(1.5750)	(2.0130)	(1.57)	(2.1970)
INTEFF38	1.7078	0.2109	1.6180	0.1875
	(2.2590)	(1.5880)	(2.078)	(1.4720)
INTEFF39	1.0658	0.1624	1.1780	0.1852
	(1.2470)	(1.2720)	(1.526)	(1.4860)
INTEFF40	0.3045	-0.0889	0.3775	0.0681
	(0.2380)	(-0.6500)	(0.429)	(-0.5150)
INTEFF41	0.9423	0.0857	0.6011	0.0149
	(0.9100)	(0.5460)	(0.68)	(0.1070)
INTEFF42	0.4338	0.2003	0.5373	0.2029
	(0.3720)	(1.2170)	(0.512)	(1.3090)
INTEFF43	1.4182	0.3766	1.3328	0.3491
	(1.0300)	(2.0690)	(1.235)	(2.0220)
INTEFF44	0.5132	0.0979	0.4124	0.0740
	(0.4120)	(0.6550)	(0.441)	(0.5310)

Appendix Table 5. Logit regressions results for Puerto Princesa City self-administered survey respondents, 2002

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
Constant	-2.9554	0.2358	-3.1991	-1.5794
	(-2.32500)	(1.08600)	(-2.55900)	(-1.61500)
INCOME	0.000000913	0.0000000729	0.000000988	0.000000535
	(1.17700)	(0.52800)	(1.30700)	(0.87400)
AGE	-0.00492	-0.00162	-0.00354	-0.00721
	(-0.40700)	(-0.80300)	(-0.30500)	(-0.77400)
KNOWIND	0.11953	0.00427	0.1058	0.0158
	(1.07800)	(0.23300)	(0.96900)	(0.18500)
WTPATU	-0.000660	-0.0000986	-0.000683	-0.000532
	(-2.76600)	(-2.80600)	(-2.96400)	(-3.17300)
SEX	-0.5896	-0.07028	-0.4942	-0.2316
	(-1.88400)	(-1.35300)	(-1.64100)	(-0.98400)
HEARD	0.1036	0.0626	0.0742	0.3207
	(0.37500)	(1.32200)	(0.27600)	(1.49200)
FMMBIOD	0.1514	0.0153	0.1227	0.0509
	(2.66200)	(1.55900)	(2.25800)	(1.16200)
EDUCATION	0.0671	0.0183	0.0826	0.0940
	(1.20900)	(2.01400)	(1.50600)	(2.19700)
SAEFF17	0.3123	-0.0847	0.2952	-0.4140
	(0.36800)	(-0.53400)	(0.36500)	(-0.60600)
SAEFF18	0.1190	-0.0371	-0.5449	-0.6317
	(0.13300)	(-0.24500)	(-0.64100)	(-0.97600)
SAEFF19	0.0614	0.00853	-0.0175	-0.0699
	(0.06800)	(0.04900)	(-0.02000)	(-0.09700)
SAEFF20	0.4227	-0.0294	0.4678	-0.0466
	(0.52900)	(-0.20000)	(0.60800)	(-0.07200)
SAEFF21	-0.1057	-0.1010	-0.0909	-0.4909
	(-0.12700)	(-0.66900)	(-0.11400)	(-0.75300)
SAEFF22	-1.0998	-0.1553	-0.8410	-0.7291
	(-0.88500)	(-0.89400)	(-0.68900)	(-0.80500)
SAEFF23	0.3572	0.0376	0.3851	0.1793
	(0.44300)	(0.25400)	(0.50100)	(0.28600)
SAEFF24	0.2088	-0.0428	0.3273	-0.0109
	(0.24900)	(-0.27500)	(0.40500)	(-0.01600)
SAEFF25	-0.1791	-0.1027	-0.2682	-0.5673
	(-0.20500)	(-0.64100)	(-0.32300)	(-0.82200)
SAEFF26	-0.1404	0.0301	-0.0789	0.1137
	(-0.17400)	(0.20000)	(-0.10100)	(0.18000)

Appendix Table 5 continued…

Appendix Table 5 concluded.

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
SAEFF27	1.1975	0.2226	1.3063	1.1589
	(1.62800)	(1.56300)	(1.83800)	(1.86100)
SAEFF28	-1.0467	-0.2708	-0.9126	-1.1127
	(-1.16000)	(-1.76900)	(-1.04400)	(-1.59300)
SAEFF29	-0.6261	-0.0179	-0.7002	-0.2035
	(-0.49800)	(-0.09100)	(-0.57800)	(-0.24500)
SAEFF30	-1.9033	-0.1264	-1.8340	-0.4768
	(-1.52300)	(-0.84800)	(-1.49400)	(-0.71500)
SAEFF31	-1.0406	-0.2426	-0.9947	-1.2527
	(-1.06800)	(-1.67400)	(-1.04800)	(-1.75500)
SAEFF32	-0.7099	0.1026	-0.8974	0.0248
	(-0.80200)	(0.66000)	(-1.04100)	(0.04000)
SAEFF34	-0.1461	0.0044	0.0758	0.2767
	(-0.17700)	(0.03100)	(0.09400)	(0.44800)
SAEFF36	-1.9147	-0.1506	-1.6614	-0.5772
	(-1.57800)	(-0.98700)	(-1.39300)	(-0.82500)
SAEFF37	-1.0673	-0.2087	-1.2028	-1.2828
	(-0.87400)	(-1.18800)	(-1.01400)	(-1.45700)

Appendix Table 6. Logit regressions results for Puerto Princesa City personally interviewed respondents, 2002

	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
Constant	-0.5908	-1.2240	0.3777	-1.5794
	(-0.7600)	(-1.188)	(2.65800)	(-1.61500)
INCOME	0.00000358	0.00000040	0.000000368	0.000000535
	(3.1430)	(0.63)	(2.98400)	(0.87400)
AGE	-0.00341	-0.00943	-0.00110	-0.00721
	(-0.4460)	(-0.95)	(-0.78600)	(-0.77400)
KNOWIND	0.0203	0.0264	0.00645	0.0158
	(0.2760)	(0.298)	(0.47100)	(0.18500)
WTPATU	-0.000983	-0.000521	-0.000180	-0.000532
	(-5.9170)	(-2.914)	(-6.95500)	(-3.17300)
SEX	-0.4378	-0.3622	-0.0973	-0.2316
	(-2.1100)	(-1.426)	(-2.54100)	(-0.98400)
HEARD	0.4488	0.2984	0.0788	0.3207
	(2.4000)	(1.308)	(2.36000)	(1.49200)
FMMBIOD	0.0651	0.07999	0.00988	0.0509
	(1.5110)	(1.697)	(1.27300)	(1.16200)
EDUCATION	-0.0254	0.0916	-0.00287	0.0940
	(-0.7190)	(2.053)	(-0.45200)	(2.19700)
INTEFF26	0.6834	-0.4050	0.1032	-0.4140
	(1.1610)	(-0.549)	(0.93700)	(-0.60600)
INTEFF29	-0.6137	-0.1307	-0.1117	-0.6317
	(-0.9640)	(-0.185)	(-0.98000)	(-0.97600)
INTEFF30	-0.1606	-0.00506	-0.0320	-0.0699
	(-0.2620)	(-0.006)	(-0.29300)	(-0.09700)
INTEFF31	0.0277	-0.1474	-0.0119	-0.0466
	(0.0470)	(-0.215)	(-0.11000)	(-0.07200)
INTEFF32	-0.6863	-0.4740	-0.1217	-0.4909
	(-1.0670)	(-0.675)	(-1.09500)	(-0.75300)
INTEFF34	0.9741	-1.0033	0.1471	-0.7292
	(1.5440)	(-1.067)	(1.30100)	(-0.80500)
INTEFF45	0.4786	0.1716	0.0599	0.1793
	(0.8250)	(0.253)	(0.56200)	(0.28600)
INTEFF46	0.0436	-0.1770	0.0266	-0.0109
	(0.0670)	(-0.249)	(0.22700)	(-0.01600)
INTEFF47	0.3084	-0.5192	0.0379	-0.5673
	(0.4790)	(-0.7)	(0.32800)	(-0.82200)

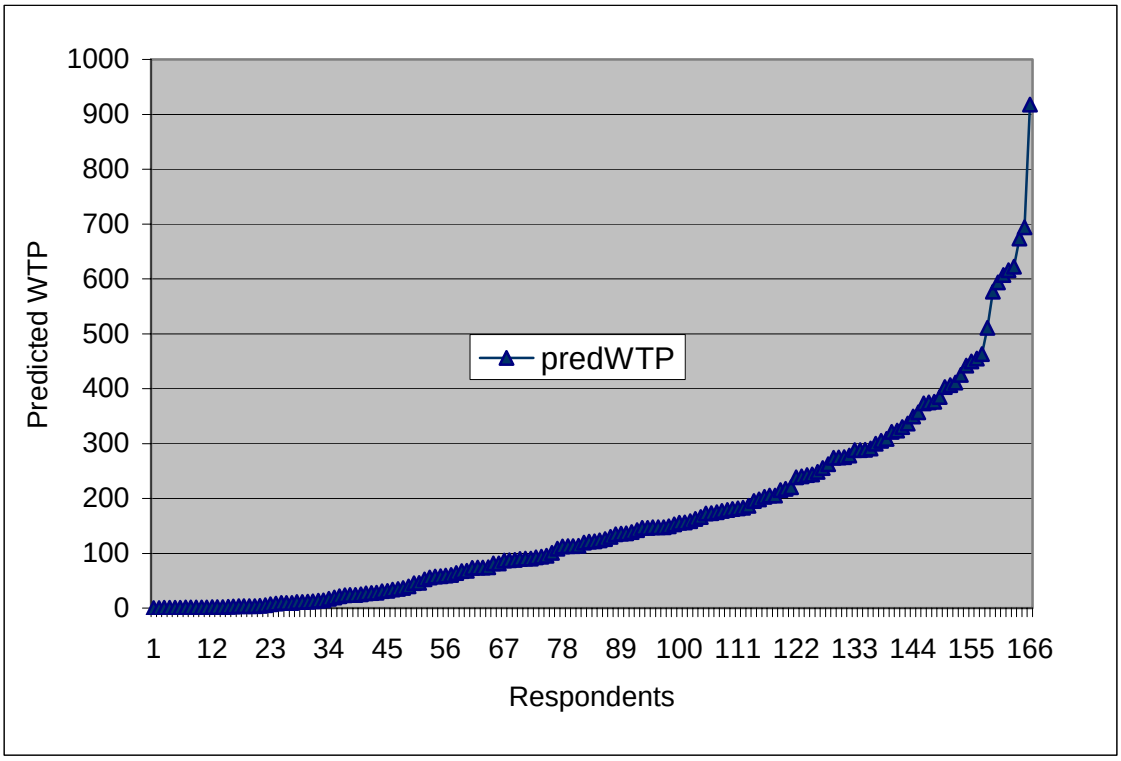
Appendix Table 6 continued…

Appendix Table 6 concluded.

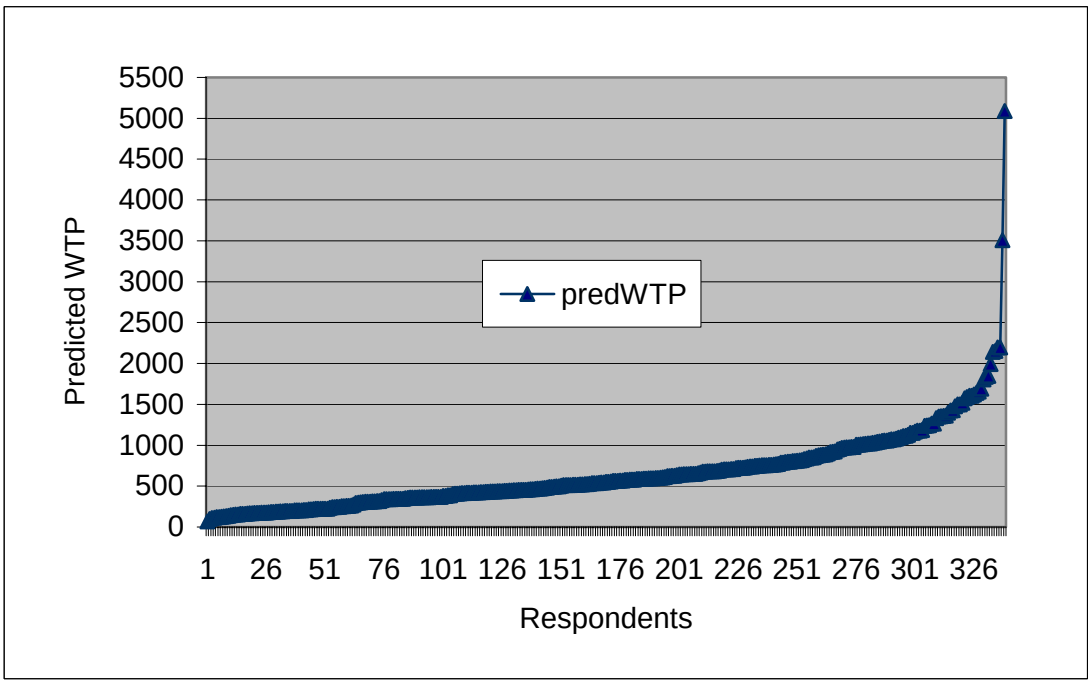
	SCENARIO REJECTERS EXCLUDED		SCENARIO REJECTERS INCLUDED	
Variable	Certainty Model SR out CERT in	Original Model SR out CERT out	Certainty Model SR in CERT in	Original Model SR in CERT out
INTEFF48	0.8584	0.0529	0.1637	0.1137
	(1.4970)	(0.077)	(1.53500)	(0.18000)
INTEFF49	1.2617	0.9730	0.2870	1.1589
	(2.1410)	(1.471)	(2.56800)	(1.86100)
INTEFF50	0.6870	-1.3398	0.1147	-1.1127
	(1.1570)	(-1.822)	(1.04700)	(-1.59300)
INTEFF51	-0.9912	-0.0906	-0.1560	-0.2035
	(-1.5400)	(-0.1)	(-1.40800)	(-0.24500)
INTEFF52	0.6137	-0.6132	0.1468	-0.4769
	(1.0030)	(-0.874)	(1.25400)	(-0.71500)
INTEFF53	0.2349	-1.3173	0.0215	-1.2527
	(0.3830)	(-1.757)	(0.19900)	(-1.75500)
INTEFF54	-0.0899	0.3690	-0.000325	0.0248
	(-0.1320)	(0.526)	(-0.00300)	(0.04000)
INTEFF58	0.2212	0.0275	0.0847	0.2767
	(0.3190)	(0.042)	(0.64900)	(0.44800)
INTEFF56	-0.6030	-0.7870	-0.0930	-0.5772
	(-0.9220)	(-1.065)	(-0.82300)	(-0.82500)
INTEFF57	-0.9578	-1.1023	-0.1418	-1.2829
	(-1.1730)	(-1.192)	(-1.03300)	(-1.45700)

APPENDIX FIGURES

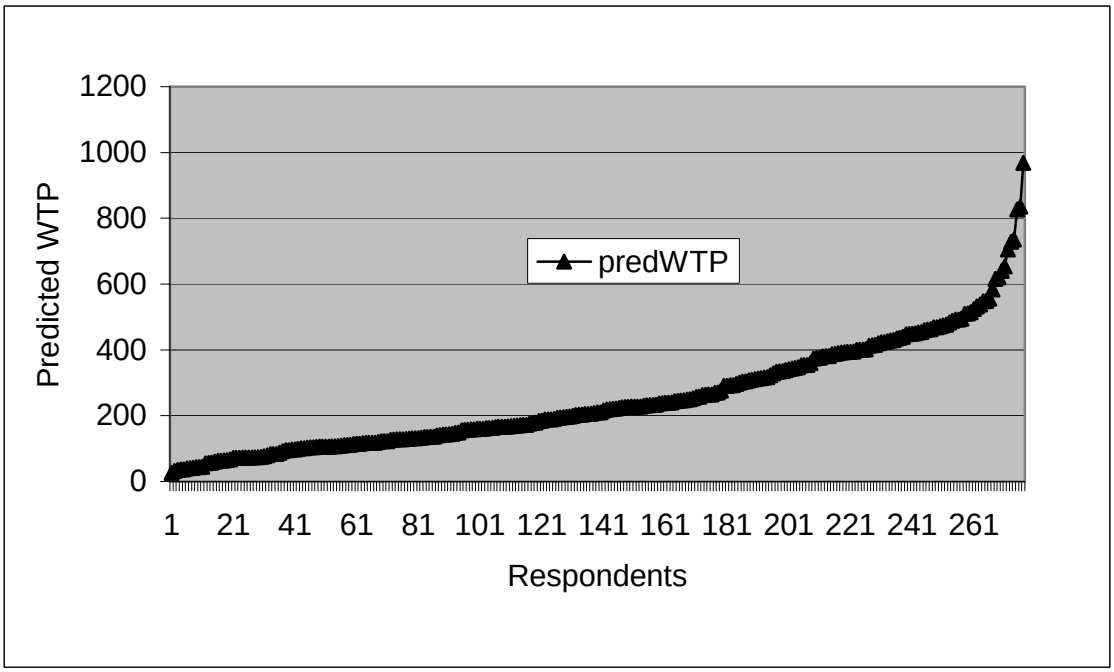
Appendix Figure 1. Predicted WTP for QC SA



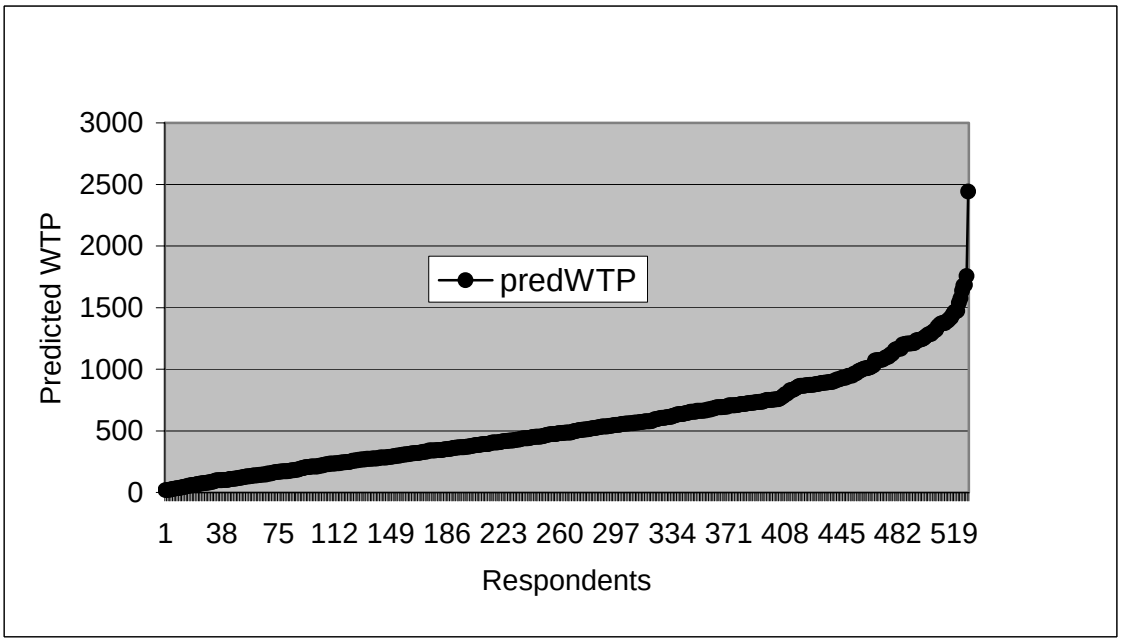
Appendix Figure 2. Predicted WTP for QC PI



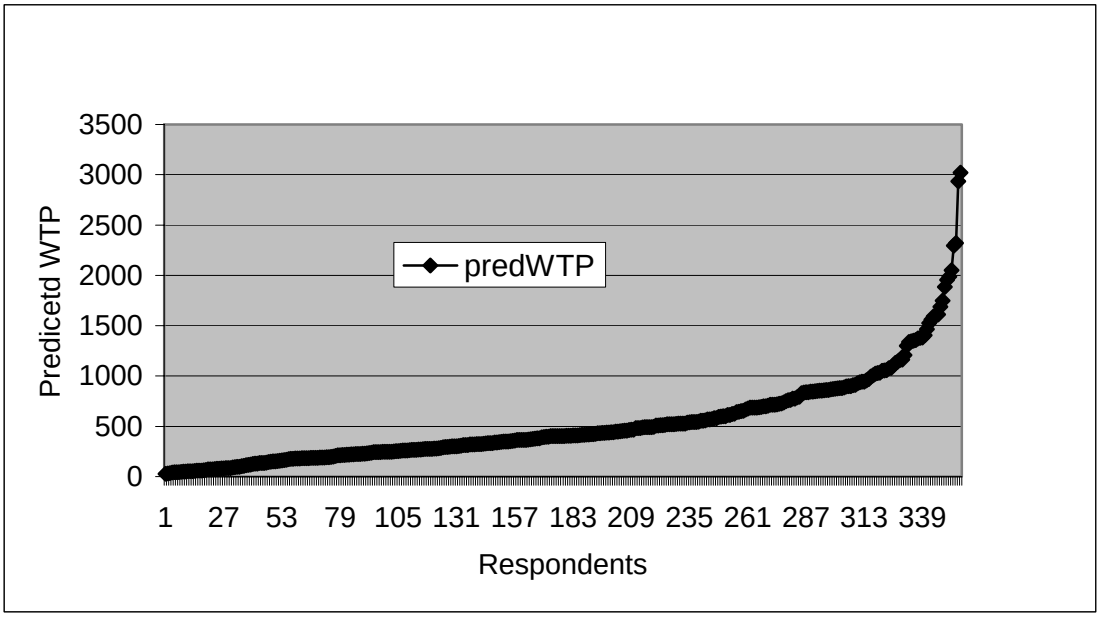
Appendix Figure 3. Predicted WTP for CC SA



Appendix Figure 4. Predicted WTP for CC PI



Appendix Figure 5. Predicted WTP for PPC SA



Appendix Figure 6. Predicted WTP for PPC PI