

Economy and Environment Program
for Southeast Asia
Tanglin PO Box 101
Singapore 912404
Phone: (65) 6831-6854
Fax: (65) 6235-1849
E-mail: eeepsea@idrc.org.sg
Web site: www.eepsea.org

RESEARCH REPORT

No. 2005-RR2

A Water User Fee For Households in Metro Manila, Philippines

**Margaret M. Calderon, Leni D. Camacho, Myrna
G. Carandang, Josefina T. Dizon, Lucrecio L.
Rebugio and Noel L. Tolentino College of
Forestry & Natural Resources, University of the
Philippines at Los Banos, College, Laguna 4031
Philippines
(bargecal@yahoo.com)**

This report provides an assessment of whether residents in Metro Manila would be willing to pay a fee for the protection and conservation of the four main watershed areas that provide them with water. It also investigates how such a 'water user fee' would best be organized and implemented and suggests a potential mechanism for its management.

The research was done in response to the growing water supply problem in the Philippines. This problem is partly caused by the environmental destruction of watershed areas, which in turn is exacerbated by a lack of finance for watershed management.

The report finds that a majority of residents would be willing to pay such a fee. It shows that this is due to a general desire for both a regular and sustainable water supply and for the conservation of the watersheds themselves. The report also finds that most people questioned would prefer the fee to be added to their water bills and would be happiest if the money was channeled into a special fund earmarked for watershed conservation – not merely absorbed by central government, which many do not trust.

The report therefore recommends that such a fee be introduced and concludes that if it is put in place, it should go a long way towards ensuring a sustainable supply of water for Metro Manila.

Published by the Economy and Environment Program for Southeast Asia (EEPSEA)
Tanglin PO Box 101, Singapore 912404 (www.eepsea.org)
tel: +65-6235-1344, fax: +65-6235-1849, email: eepsea@idrc.org.sg

EEPSEA Research Reports are the outputs of research projects supported by the Economy and Environment Program for Southeast Asia. All have been peer reviewed and edited. In some cases, longer versions may be obtained from the author(s). The key findings of most *EEPSEA Research Reports* are condensed into *EEPSEA Policy Briefs*, available upon request. The Economy and Environment Program for Southeast Asia also publishes *EEPSEA Special Papers*, commissioned works with an emphasis on research methodology.

Library and Archives Canada Cataloguing in Publication

Main entry under title :

A water user fee for households in Metro Manila, Philippines

(Research report, ISSN 1608-5434, 2005-RR2)

Co-published by the International Development Research Centre.

Includes bibliographical references.

ISBN 1-55250-163-9

1. Water-supply – Economic aspects – Philippines – Metropolitan Manila.
2. Watershed management – Philippines – Metropolitan Manila.
3. Water quality management – Philippines – Metropolitan Manila.
- I. Calderon, Margaret M.
- II. Economy and Environment Program for Southeast Asia.
- III. International Development Research Centre (Canada)
- IV. Title.
- V. Series: Research report (Economy and Environment Program for Southeast Asia); 2005-RR2.

HD1698.P6W37 2005 333.91'22'0959916 C2005-980093-3

The views expressed in this publication are those of the author(s) and do not necessarily represent those of the Economy and Environment Program for Southeast Asia or its sponsors. Unless otherwise stated, copyright for material in this report is held by the author(s). Mention of a proprietary name does not constitute endorsement of the product and is given only for information. This publication may be consulted online at www.eepsea.org.

**A WATER USER FEE FOR HOUSEHOLDS
IN METRO MANILA, PHILIPPINES**

Margaret M. Calderon

Leni D. Camacho

Myrna G. Carandang

Josefina T. Dizon

Lucrecio L. Rebugio

Noel L. Tolentino

June 2004

Comments should be sent to:

Margaret M. Calderon, Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños, College, Laguna 4031 Philippines. Telefax: (63 49) 536 2557

Email: bargecal@yahoo.com

EEPSEA was established in May 1993 to support research and training in environmental and resource economics. Its objective is to enhance local capacity to undertake the economic analysis of environmental problems and policies. It uses a networking approach, involving courses, meetings, technical support, access to literature and opportunities for comparative research. Member countries are Thailand, Malaysia, Indonesia, the Philippines, Vietnam, Cambodia, Lao PDR, China, Papua New Guinea and Sri Lanka.

EEPSEA is supported by the International Development Research Centre (IDRC); the Danish Ministry of Foreign Affairs (DANIDA); the Swedish International Development Cooperation Agency (Sida); the Canadian International Development Agency (CIDA); and the MacArthur Foundation.

EEPSEA publications are also available online at <http://www.eepsea.org>.

ACKNOWLEDGMENT

We would like to express our gratitude to the Economy and Environment Program for Southeast Asia (EEPSEA) for funding this project. We are especially indebted to Dr. David Glover and Dr. Hermi Francisco for their support, and to Ms. Cathy Ndiaye for making our transactions with EEPSEA easy.

We would like to thank Dr. Vic Adamowicz for his valuable comments and suggestions from the start until the end of the project.

We would also like to express our deepest gratitude to the following persons: Dean Ramon Razal of the UPLB College of Forestry and Natural Resources for his all-out support; For. Marlo Mendoza of Bantay Kalikasan; the representatives of the Department of Environment and Natural Resources, National Power Corporation, National Water Resources Board, Local Water Utilities Administration, Metropolitan Waterworks and Sewerage System, Manila Water Company, Inc., and Maynilad Water Services, Inc., as well as the water users who participated in our focus group discussions; the officials of the local government units who facilitated the conduct of our survey; and the ASEAN-Korea Environmental Cooperation Project in the Philippines for providing support in the dissemination of the project results.

TABLE OF CONTENTS

EXECUTIVE SUMMARY		1
1.0 INTRODUCTION		2
1.1 Description of the Problem		2
1.2 Significance of the Study	3	
1.3 Scope of the Study		4
1.4 Research Questions		4
1.5 Research Objectives		5
1.6 Limitations of the Study	5	
2.0 METHODS		6
2.1 Focus Group Discussions	6	
2.2 Training of Enumerators	6	
2.3 Pre-Tests		6
2.4 Selection of Bid Amounts	7	
2.5 Generation of Sample Respondents	7	
2.5.1 Sample Size Determination		8
2.5.2 Sample Selection Procedure		8
2.6 The Questionnaire		9
2.6.1 Contingent Valuation Question Format	9	
2.6.2 Possible Sources of Bias	9	
2.7 Household Interviews		10
2.8 Survey Hypotheses		10
2.9 Data Processing and Analysis		11
2.10 Development of the CV Model	11	
2.11 Non-Parametric Estimation of Mean WTO	12	
2.12 Sensitivity Analyses		13
2.13 Development of the Economic Instrument	13	
2.14 Development of Institutional Arrangements	13	
3.0 RESULTS AND DISCUSSION		14
3.1 Estimation of Respondents' Willingness to Pay	14	
3.1.1 Socio-economic Characteristics of the Respondents	14	
3.1.2 Water Source, Use and Expenditures		16
3.1.3 Awareness about Watersheds and Forests	19	
3.1.4 The CV Model	23	
3.1.5 Reasons Why Respondents are Willing or Not Willing To Pay		32
3.1.6 Comparison of Watershed Management Costs and Potential Revenues		33
3.2 Institutionalization of Water User Fee	34	
3.2.1 Respondents' Preferred Collection Mechanism	34	
3.2.2 Typology of Financial Mechanisms	35	
3.2.3 The Proposed Water User Fee	36	
3.2.4 Legal Framework of the Water User Fee	38	
3.2.5 Water User Fee Collection and Administration Mechanism		39

4.0	CONCLUSIONS	43
5.0	RECOMMENDATIONS	45
	REFERENCES	46
	APPENDIX A	49
	APPENDIX B	55

LIST OF TABLES

Table 3.1	Distribution of respondents by zone, city or municipality	14
Table 3.2	Respondents' socio economic characteristics	15
Table 3.3	Respondents' main sources of water	17
Table 3.4	Respondents' needs, uses for water, and perceptions regarding water supply	18
Table 3.5	Consumption and availability of water	19
Table 3.6	Awareness about watersheds and forests	20
Table 3.7	Respondents' awareness about the four watersheds	21
Table 3.8	Perceived functions of watersheds and forests	22
Table 3.9	Description of models generated	23

Table 3.10	Definition of variables	24
Table 3.11	Significant variables affecting WTP for different models	25
Table 3.12	Goodness of fit measures from the binomial logit analysis	28
Table 3.13	Equations of the different discrete choice models	28
Table 3.14	Econometric and non-parametric estimates of mean and median WTP	30
Table 3.15	Probability of saying “Yes” to given bid amounts	31
Table 3.16	Reasons why respondents are willing or not willing to pay	32
Table 3.17	Comparison of watershed management costs and potential revenue	33
Table 3.18	Preferred institutional arrangements for the water user fee	35

LIST OF FIGURES

Figure 3.1	Angat's critical water level	22
Figure 3.2	Mean willingness to pay of the different models	30
Figure 3.3	Probability of saying "yes" to given bid amounts	31
Figure 3.4	Proposed institutional framework	41
Figure 3.5	Proposed flow of water user fee	42

A WATER USER FEE FOR HOUSEHOLDS IN METRO MANILA, PHILIPPINES

Margaret M. Calderon, Leni D. Camacho, Myrna G. Carandang,
Josefina T. Dizon, Lucrecio L. Rebugio, Noel L. Tolentino

EXECUTIVE SUMMARY

This study consists of two parts. Part I discusses the results of a contingent valuation (CV) survey. This CV survey estimated the value that Metro Manila residents placed on the water supply improvements that will result from better management of the Angat, Ipo, Umiray and La Mesa watersheds. Part II focuses on the institutionalization of the proposed water user fee developed in Part I.

The contingent valuation study was conducted among 2,232 respondents. These people were drawn from the 13 municipalities and cities in Metro Manila that draw water from the four watersheds. There are two water distributors in the area: Maynilad Water Services, Inc. and the Manila Water Company, Inc. About two thirds of the respondents were connected to either of these two water distributors.

The study found that Metro Manila residents have a low level of awareness about watersheds, but possess a good grasp of the role forests play in sustaining water supply. About 60% of the respondents revealed a willingness to pay for improved watershed management.

The mean willingness to pay, estimated through a logit model, was found to be P29/month/household. The respondents' willingness to pay was affected by factors such as bid amount, the water distributor serving the household, additional water expenses, age, income and house ownership. They were willing to pay mainly because they wanted a reliable water supply for both present and future generations, and also because they wanted the watersheds to continue providing a range of environmental services. Some respondents were not willing to pay because of income constraints and because they thought that watershed management should be the government's responsibility.

The respondents said that they would prefer a water user fee to be added to their monthly water bills, with the proviso that this should be used solely for the management of the four watersheds supplying water to Metro Manila.

1.0 INTRODUCTION

1.1 Description of the Problem

Metropolitan Manila, with a population of more than 11 million, has been experiencing problems supplying water to its residents and industries. These problems are especially pronounced during the dry season, when water rationing becomes common in many areas of the metropolis. Rapid population growth, growing incomes, industrialization, commercialization and urbanization have all contributed to an overall increase in demand for municipal and agricultural water (Tabios and David 2002). Unfortunately, this increase in demand has not led to a parallel improvement in the quantity and quality of water available.

The domestic water supply of Metro Manila comes from the Angat, Ipo, Umiray and La Mesa Watersheds. The National Power Corporation has jurisdiction over the Angat Watershed, the Department of Environment and Natural Resources manages the Ipo and Umiray Watersheds, while the ABS-CBN Foundation, through its Bantay Kalikasan program, has the task of managing the La Mesa Watershed.

Water distribution in Metro Manila used to be the job of the Metropolitan Waterworks and Sewerage System (MWSS), a government agency. Distribution has now been privatized and is handled by two water distribution concessionaires, the Manila Water Company, Inc. (MWCI) for the east zone of the metropolis and the Maynilad Water Services, Inc. (MWSI) for the west.

These water concessionaires do not pay any fee for raw water to the agencies that manage the watersheds. Metro Manila water users pay mainly for the treatment and conveyance of water to their houses or business establishments. This is not to say that the agencies managing the watersheds are not financially burdened. In fact, a common complaint is that the budget allocation for watershed management is insufficient considering the size of the resources that have to be managed (thousands of hectares) and the threats and pressures that have to be dealt with.

The watersheds experience various levels of encroachment. For example, La Mesa is situated within Metro Manila, and is facing tremendous population pressure. The La Mesa Watershed management team has to fend off attempts by people from surrounding communities to settle or establish farms in the watershed. The fence built around the perimeter of this 2,700 ha watershed has not stopped people from getting in and the management has already lost one of their workers due to the squatter problem. There are reported incidents of timber poaching in Angat and slash-and-burn farming (locally called *kaingin*) in Ipo.

David and Inocencio (2001) wrote that one of the major weaknesses prevalent in water resource management in Metro Manila is “the failure to adopt

an integrated, holistic approach in addressing the inherently interrelated issues of water supply planning and operation, demand management, pollution control, watershed and groundwater protection.” Their study reveals that the government’s water pricing policy does not in any way seek to recover the full economic cost of producing water. For example, 97% of the raw water distributed by the city’s two water concessionaires comes from the Angat Dam, but they do not pay anything to use this resource. This is despite the fact that this water is needed for a number of other uses, such as irrigation. Therefore, any opportunity costs are completely ignored. The authors recommended that if raw water revenues can be generated, these should be used to strengthen environmental protection and specifically to support part of the cost of watershed protection.

The head of Bantay Kalikasan, the non-government organization in-charge of managing the La Mesa Watershed, has actually broached the idea of charging environmental fees or raw water prices with officials from the water concessionaires (personal communication with Marlo Mendoza 2002). The officials recognize the merits of the proposal. However, they are afraid to include the price of raw water in their water tariff rates because any increase could become a political issue. This fear is largely based on the perception that Metro Manila residents will resist any increases in the water tariff regardless of the reasons for those increases.

This study aimed to generate empirical evidence that could inform decisions about pricing the raw water provided by the watersheds that supply Metro Manila.

1.2 Significance of the Study

The proper pricing of natural resources has been identified as an important component of the Philippine Strategy for Sustainable Development which was adopted in 1989. Among other things, this strategy advocates a price reform plan for environmental resources like water, which have traditionally been viewed as being free. Consequently, then President Fidel V. Ramos created the Philippine Council for Sustainable Development in 1992 through Executive Order 15. Among the tasks of this Council was the establishment of guidelines and mechanisms to expand, consolidate and put into practice the sustainable development principles embodied in the Rio Declaration, UNCED Agenda 21, the National Conservation Strategy and the Philippine Agenda 21. In 1997, the Philippine Economic, Environmental and Natural Resources Accounting System was set up to put in place the proper pricing of natural and environmental resources.

The Philippine Strategy for Improved Watershed Management was formulated in 1998 under the Water Resources Development Project. This strategy stresses the need to price raw water and other watershed resources based

on their true economic values. It emphasizes that this valuation should include the full cost of protecting and harnessing individual resources (Javier 2001).

Despite these developments, it can be said that there has been very little effort made to price and collect fees for raw water in the Philippines. In response to this situation, this study represents a positive step forward in the country's efforts to price raw water, a resource which is becoming increasingly scarce.

The need for such action is underlined by the fact that, because of budgetary constraints, the government can no longer afford to subsidize the provision of raw water. Nor should it allow water users to continue thinking that water is abundant and cheap — the very signal it is sending if it does not correctly price raw water. Instead, the price of water should reflect the opportunity costs of competing uses, as well as the environmental costs of resource extraction and consumption (Francisco 2002).

The results of this study should help policy makers and water concessionaires make Metro Manila water users fully aware of the importance of the correct management of the Angat, Ipo, Umiray and La Mesa Watersheds¹. The information it contains should also help shape policies that will institutionalize raw water pricing and plough revenues back into watershed ecosystem protection and conservation.

This study focused on domestic water users in Metro Manila, many of who have been suffering from unstable water supplies, especially during the summer months and when the El Niño phenomenon has hit the country. Many residents belonging to the lower-income groups end up paying much higher prices for water when supplies are short because they have to buy their water from delivery trucks.

This study did not look into industrial water use in Metro Manila. Some work has already been done on this: Ebarvia (2003) estimated the marginal opportunity cost of meeting the demand requirements of the industrial sector in Metro Manila. This sector draws 80% of its requirements from groundwater and 20% from MWSS.

Given the importance of water in people's lives, it is high time that every citizen in the Philippines should realize the need to protect watersheds and also that they have the responsibility to help in these efforts. The government alone cannot shoulder full responsibility, although it must work to change the traditionally low priority given to forest and watershed protection. All stakeholders should realize that the key to a sustainable water supply is effective watershed management.

¹ For a brief description of the four watersheds, Metro Manila and the two water concessionaires, please see Appendix A.

1.3 Scope of the Study

The valuation study focused on the Angat, Ipo, Umiray and La Mesa Watersheds. Concessionaires draw raw water from these areas. This water is then treated and distributed to Metro Manila users.

The agencies that are likely to use the results of this study are the National Power Corporation, Bantay Kalikasan, the Department of Environment and Natural Resources, the Metropolitan Waterworks and Sewerage System, the National Water Resources Board, the Local Water Utilities Administration and the two water concessionaires, Manila Water Company, Inc. and Maynilad Water Services, Inc.

While watersheds provide various goods and services, this study focused on the value of water to its users. In particular, the contingent valuation (CV) section of this study sought to estimate the willingness of Metro Manila water users to pay for improvements in the management of the watersheds that supply them; in other words, their willingness to pay to ensure a sustainable water supply.

The respondents were also informed that improved watershed management would generate a host of other benefits such as biodiversity conservation, carbon sequestration, outdoor recreation and the like. Therefore, they were aware that their contribution to the trust fund described in the CV scenario would result in a whole package of environmental services that would not only be enjoyed by their own communities but also by future generations.

1.4 Research Questions

The study sought to answer the following questions:

- 1 Are Metro Manila residents aware of the importance of watersheds and forests in ensuring a sustainable water supply?
- 2 Are Metro Manila residents willing to contribute to the protection of the four  watersheds to benefit present and future generations?
- 3 If they are, what is the maximum amount that they are willing to pay for the improved management of these watersheds?
- 4 If they are not, what are the reasons they give?
- 5 What is the most acceptable mechanism of collecting and administering a watershed management and protection fee?

1.5 Research Objectives

To address these questions, the study estimated the value, to Metro Manila residents, of the improved water supply that would result from the improved management of the Angat, Ipo, Umiray and La Mesa Watersheds.

Specifically, the study sought to:

- 1 Evaluate the level of awareness of Metro Manila residents about the importance of watersheds in ensuring a sustainable water supply.
- 2 Determine their willingness to pay for the improved management of the Angat, Ipo, Umiray and La Mesa Watersheds.
- 3 Identify the factors that affect their willingness to pay.
- 4 Identify the reasons why water users may not be willing to pay for the improved management of the watersheds.
- 5 Develop an economic instrument that will allow Metro Manila residents to contribute to the management of the watersheds.
- 6 Develop a mechanism by which a fund for improved watershed management will be collected and utilized.

1.6 Limitations of the Study

The limitations of the study are the following:

1. *The exclusion of barangays with rich subdivisions from the sample.* The National Statistics Office (NSO) excluded barangays with rich subdivisions from the sample that was used because, based on experience, these subdivisions do not allow surveys for security reasons.
2. *Some information was based on memory recall.* Some information, e.g. income, water consumption, and water expenditures, was based solely on respondents' recollection.

2.0 METHODS

2.1 Focus Group Discussions

Two focus group discussions (FGDs) were conducted before the CV survey took place. The first was with government agencies and water distributors, namely: The National Power Corporation; The Department of Environment and Natural Resources; The Metropolitan Waterworks and Sewerage System; The Local Water Utilities Administration; The National Water Resources Board; The Manila Water Company, Inc.; Maynilad Water Services, Inc.; and Bantay Kalikasan (ABS-CBN Foundation) .

The purpose of the first FGD was to brief the agencies and companies involved in the management, regulation and distribution of raw water in Metro Manila on the objectives of the project. The FGD provided a forum in which to discuss the current status of the watersheds, the programs and activities that were being implemented to maintain the health of the watersheds and any problems that had been encountered. It was also an opportunity to draw up a ‘wish list’ with the participating organizations about the management of the four watersheds.

The second FGD was attended by 14 household water users from different parts of Metro Manila. The participants were recruited through friends and officemates of the research team. There were representatives from both the city’s east and west zones and from different income levels.

This FGD served as a venue to discuss the objectives of the project with the invited household water users, to determine their level of awareness regarding the watersheds and to generate bid amounts. It was also used to solicit opinions and suggestions about the implementation of a proposed trust fund for the management of the four watersheds.

The FGD participants were first asked whether they would be willing to pay for improved watershed management. Those who answered “yes” were asked an open-ended question about the highest amount that they would be willing to pay per month. The bid amounts generated from the FGD were P50, P75 and P100 per month and 1%, 5% and 10% of the monthly water bill.

2.2 Training of Enumerators

Thirty enumerators attended training. These included junior and senior students from the UPLB College of Forestry & Natural Resources and College of Economics and Management and new forestry graduates. The training of enumerators combined classroom lectures and field activities (pre-test). The topics discussed and activities undertaken were based on Whittington (2002).

2.3 Pre-Tests

To further hone the skills of the trainee enumerators, pre-tests were conducted in three separate areas. The first was conducted in the UPLB campus. The second was in a barangay² (Anos) in Los Baños and the third was in barangays in Quezon City and Marikina City, both of which lie within Metro Manila. The enumerators were introduced to a number of different types of communities in these areas, in preparation for the actual conditions they would meet when doing their valuation studies in the field.

Aside from skills training, the pre-tests were also an opportunity to review the study questionnaire. In meetings after the pre-tests, the trainees and research team gave feedback to improve the questionnaire and the interview strategy. Subsequent changes and revisions were made to the questionnaire. In particular, the pre-test was used to evaluate the best format for the CV question which, at this stage, was presented using both a referendum and a public hearing format.

Problems over the referendum format were raised by one water user who, while he was willing to pay for improved watershed management, saw the referendum as a waste of time. In addition, it was felt that voters might not vote in favor of the issue or that there might be a low voter turnout. However, overall, there was no adverse reaction among the pre-test respondents to the referendum format and the team decided to use it in the final version of the questionnaire.

The respondents of the third pre-test, which was conducted in the study area, were asked an open-ended question about the maximum amount that they would be willing to pay for improved watershed management. This generated the following bid amounts: P1, 1.5, 3, 5, 6, 10, 20, 25, 30, 50, 100, 200, 500, and 1,000 per month.

The questionnaire was also translated into Filipino. The English version of the questionnaire is given in Appendix B.

2.4 Selection of Bid Amounts

A total of 18 bid amounts, three expressed as percentage of the monthly water bill, were generated from the FGD for water users and the pre-test. Of these, ten bids were selected. These were P5, 10, 20, 25, 30, 50, 75, 100, 150 and 200 per month. While P150 was not generated in the pre-test process, the team decided to include it because the difference between P100 and P200 was deemed to be too large. The bid amounts of P500 and P1,000 were excluded because they were not considered to be realistic, given that the average monthly water bill is only P300.

² A barangay is the smallest political unit in the Philippines

2.5 Generation of Sample Respondents

The National Statistics Office generated the sample used in the study. The following are the municipalities and cities that were included in this process: City of Manila, Makati City, Mandaluyong City, Marikina City, Pasay City, Pateros, Quezon City, San Juan, Taguig, Kalookan City, Malabon, Navotas and Valenzuela. Muntinlupa City, Las Piñas City and Parañaque were not included in the list because these areas draw their water from ground water sources and not from the four study watersheds. All in all, the sample covered 13 municipalities/cities, 168 barangays and 2,240 respondents.

The design of the sample used a two-stage process. The first stage involved the selection of sample barangays per zone, while the second stage focused on the selection of sample households.

The frame used in the first stage of the sample selection process was the list of barangays per zone. The frame used in the second stage (sample households) was the 2000 Census of Population of the NSO.

2.5.1 Sample Size Determination

The following sample sizes were used: 1,030 households for the east zone and 1,210 households for the west zone. These values were calculated in the following way:

The proportion of households whose source of water supply came from the community water system was estimated to be about 80 percent for the east zone and about 75 percent for the west zone. This was based on the results of the 2000 Census of Population and Housing (CENSUS 2000 - NSO) for which the following parameters applied: Standard error of 2 percent; Response rate of 95 percent; Design effect of 2 percent; Coverage rate of 80 percent.

The formula used to determine the sample size per zone was:

$$n = \frac{p * 100 * q * 100}{(s.e)^2} \quad \text{Equation 2.1}$$

where: p = proportion of households with water supply coming from the community water system and q = 1-p

The sample size was adjusted further as follows:

$$n = \frac{n}{RR} * DEFF * \frac{1}{Cov Rate} \quad \text{Equation 2.2}$$

where: DEFF - design effect
RR - response rate

2.5.2 Sample Selection Procedure

To determine the number of sample barangays to be drawn from each area, the number of sample households per barangay was fixed at 12. This was deemed to be sufficient for the survey purposes. Barangays with high-income subdivisions were excluded by NSO from the sample because, based on past experience, such barangays usually do not allow surveys.

It was found that 75 sample barangays were required in the east zone and 93 in the west zone. These sample barangays were selected with a probability proportional to size (pps). The number of households per barangay was used as the measure of size. The sample households, on the other hand, were selected systematically with a random start.

2.6 The Questionnaire

The questionnaire had four parts. The first part asked the respondents for background information, particularly details of their water sources, uses and expenditures and their awareness about watersheds. The second part assessed the respondents' WTP for improved watershed management. At this point respondents were presented with information about the water supply situation in Metro Manila, the role of forests and watersheds in sustainable water supply and the proposed trust fund. The CV question was also presented. The third part of the questionnaire assessed which institutional arrangements the respondents would prefer. The fourth asked about the respondents' socio-economic details.

The original version of the questionnaire only asked the respondents whether they were aware about watersheds. However, preliminary data analysis after eight interview-days indicated that only a few respondents knew what a watershed was. Upon probing, however, most of them revealed that they knew the role of forests in ensuring a sustainable water supply. The team decided to make this a follow-up question for those who did not know what a watershed was. This follow-up question was asked from August 30, 2003, and was included in the questionnaires of 1,472 respondents (66% of the total).

2.6.1 Contingent Valuation Question Format

Two contingent valuation questions were presented to the respondents using the dichotomous-choice referendum format. Many CVM studies have made use of this format because it helps ensure that a respondent does not have an incentive to misrepresent his or her valuation of an environmental good.

The first CV question (CV Question I) did not mention that other users of watershed services would also pay for their upkeep. CV Question II informed the respondents that other users would pay.

The bid amounts generated from the FGDs and pre-tests were used. The chosen bids were randomly assigned among the respondents in such a way that each bid was presented to an equivalent sub-sample.

2.6.2 Possible Sources of Bias

The use of the dichotomous choice method minimized the occurrence of biases in the study. However, hypothetical bias is one of the criticisms often levelled against the CVM approach. ‘Cheap talk’ was incorporated in various sections of the questionnaire to mitigate this problem. ‘Cheap talk’ is designed to eliminate hypothetical bias in CVM studies by making the hypothetical bias an integral part of the CV questionnaire.

In order to provide information that was easy to understand, the CV scenario was extensively pre-tested. For example, the acceptability of using a sponge metaphor as a way of helping people understand the importance of watersheds was evaluated during the pre-tests. This metaphor was found to be useful in communicating what forested and denuded forests do.

The proposed payment vehicle, i.e. an additional amount per month, was also something that the respondents could easily relate to. The research team decided not to use a fixed lump sum donation to the fund as a payment vehicle because this might have raised equity issues amongst the respondents.

The enumerators’ bias was tested through logit analysis (the logistic regression model). The different enumerators were included in the model as independent variables to see whether they affected WTP values.

2.7 Household Interviews

Interviews were carried out on Saturdays, Sundays and holidays to increase the likelihood that heads of the family/household would be available. When the household head could not be interviewed, the spouse, oldest child (18 years or older) or other relative present in the house was interviewed instead. If, for any reason, a listed household could not provide an interviewee, the nearest house to it was approached and an appropriate substitute respondent was chosen.

To obtain support and cooperation and to ensure security the research team paid courtesy calls to barangay chairpersons before conducting interviews. In some instances, the barangay officials assigned some of their personnel to accompany the enumerators.

The actual number of respondents interviewed was 2,232. Barangay San Lorenzo in Makati City, with eight respondents, was excluded from the survey

after the team failed to get clearance from the Barangay Captain. San Lorenzo is a high-income subdivision, so this lack of assistance was predictable.

2.8 Survey Hypotheses

The following two hypotheses were made:

1. There is a positive relationship between WTP and the following factors:

Additional expenses from other sources: Water users who buy water from other sources end up paying more and suffer more inconveniences. They will therefore prefer more reliable water provider 

Awareness of the function of watersheds and forests: Water users who know what watersheds and forests do have a greater appreciation of their importance and will be more willing to pay for their improved management.

Socioeconomic characteristics such as:

- Income: Water users with higher income levels have a greater capacity to pay.
- Age: Older people are more financially stable, and may also attribute a bequest value to improved watershed management.
- Number of household members employed: Having more employed household members will mean a higher household income.
- Educational attainment: Respondents with higher education have more knowledge and a better appreciation of the environment in general.
- House ownership: This is an indicator of capacity to pay.
- Water distribution by the Manila Water Company, Inc.: This company charges lower rates and is perceived to provide better service.

2. There is a negative relationship between WTP and the following:

Volume of water consumed and water expenditures: Households consuming higher volumes of water have higher expenditures and may be less willing to pay for another expenditure such as watershed management.

Water availability: Households with an unreliable water supply have experienced water rationing and other inconveniences, e.g. having to buy water from other sources. They will therefore be more willing to pay for improved watershed management.

Water quality: Households with poor water quality are more willing to pay because they have experienced the inconvenience of having to boil water or buy potable water from other sources.

Bid amount: Respondents will become less willing to pay for improved watershed management as the bid amount increases.

Household size: The bigger the household size, the more expenses the household has and the less money it has available for additional expenses.

2.9 Data Processing and Analysis

All filled-out questionnaires were vetted for consistency and completeness. A prediction equation was derived for those respondents who did not supply income data and for those who reported very low incomes (less than P 1,000 per month). However, the model that was generated resulted in a very low value of R-square (R^2). This meant that it could not be used to predict income using independent variables such as age, educational attainment, house ownership, occupation and civil status. Because of this, these respondents were assigned an income equivalent to the mean income of the barangay to which they belonged.

Positive WTP responses that were submitted with conditions were treated as “no” responses. For example, responses from people who said they were WTP but that they did not trust the council or who said that payments should be voluntary were treated in this way. Likewise, responses of people who were willing to pay an amount other than the given bid amount were also treated as “no” responses.

2.10 Development of the CV Model

The binomial logit model was used in the study to determine the WTP of respondents using the dichotomous or discrete choice valuation format. In this case, a respondent was asked whether or not he or she would be willing to contribute to a trust fund that would be used for the improved management of the four watersheds supplying water to Metro Manila. Based on Hanemann’s formula, as cited in Jacobsson and Dragun (1996), the willingness to pay for a change in environmental quality can be expressed as:

$$\log\left(\frac{\Pr(WTP=1)}{1-\Pr(WTP=1)}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m + \beta_n A \quad \text{Equation 2.3}$$

where: WTP = 1 is equivalent to the “yes” response,

$X_1, X_2, \dots, X_m$ are the independent variables, and
A is the bid amount.

The equation can also be expressed as :

$$\Pr(WTP = 1) = \frac{1}{1 + e^{-Z}} \quad \text{Equation 2.4}$$

where: Z is given by the linear equation,
 $Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \beta_m X_m$ and
 $X_1, X_2, \dots X_m$ are the independent variables.

From the model, the mean WTP was determined using the formula:

$$\text{Mean} = \alpha/\beta \quad \text{Equation 2.5}$$

where: α is the constant plus the coefficients of the other variables multiplied by their respective mean values;
 β is the coefficient of the bid amount variable.

Several models were generated using subsamples of the data set. In these cases WTP was the dependent variable. The bid amounts posed to respondents in the discrete choice question were explanatory variables, as were each respondent's water source, uses and expenditures and their socio-economic characteristics. To gain an indication of how well each model explained the actual data, their 'goodness of fit' was evaluated based on the chi-square value and on how well each model classified the data. The latter criteria gave the proportion of predicted zero (0) responses that were actually 0 and the proportion of predicted one (1) responses that were actually 1. In addition, this also showed the predictive power of the equation. The probability values for the different bid amounts were also computed.

2.11 Non-parametric Estimation of Mean WTP

The non-parametric mean WTPs of the different models were also estimated following procedures described by Bateman et al. (2002) for the lower bound estimate and procedures described by Haab and McConnell (2002) for the Turnbull estimate. In cases where the monotonicity assumption was violated, the pooled adjacent violators algorithm (PAVA) was employed (Bateman et al. 2002).

2.12 Sensitivity Analyses

Sensitivity analyses were conducted to test the effects of the following factors on willingness to pay:

- Knowledge that other users of watershed services must also pay for these services (CV Question I and CV Question II);
- Identity of water distributor;
- Combination of CV question and water distributor;

- Income group of respondent. For this, the respondents were classified into four monthly income groups: <P20,000; P20,000 to P39,999; P40,000 to P59,999; and >P60,000; and
- An outbreak of typhoid and cholera in October 2003.

Sensitivity analyses involving socio-economic variables like age, education, sex, occupation and house ownership were not done because they were not significant in the general model.

2.13 Development of the Economic Instrument

The UNEP (2000) template for assessing important factors affecting instrument choice was used, along with other literature, to develop the appropriate economic instrument for financing watershed management. Among the possible options, a water user fee was identified as the most appropriate. It was found to be suitable for Philippines' conditions given the prevailing political, social, institutional and environmental circumstances. The proposed fee level was based on the mean willingness to pay of the respondents.

2.14 Development of Institutional Arrangements

In the environment and natural resources sector in the Philippines, there are two fund mechanisms that are currently being implemented. These are the Community-Based Forest Management Special Account (CBFMSA) and the Integrated Protected Area Fund (IPAF). A review of these two fund mechanisms and their implementation was undertaken. The lessons learned were used to help develop the appropriate institutional mechanism for the proposed water user fee.

3.0 RESULTS AND DISCUSSION

3.1 Estimation of Respondents' Willingness to Pay

3.1.1 Socio-economic Characteristics of the Respondents

The distribution of the respondents by zone, city or municipality is given in Table 3.1. These cities and zones are part of the National Capital Region (NCR). The highest number of respondents came from Quezon City (600) followed by the City of Manila (336), areas where both water distributors operate. Pateros had the smallest number of respondents (12).

Table 3.1 Distribution of respondents by zone, city or municipality

CONCESSIONAIRE/ AREA	NUMBER OF RESPONDENTS		CONCESSIONAIRE/ AREA	NUMBER OF RESPONDENTS	
MWCI	No.	%	MWSI	No.	%
Makati	108	11	Makati	24	2
Mandaluyong	96	9	Kalookan	240	20
Manila	12	1	Manila	324	26
Marikina	132	13	Malabon	60	5
Pasig	132	13	Navotas	60	5
Pateros	12	1	Pasay	72	6
Quezon City	288	29	Quezon City	312	25
San Juan	60	6	Valenzuela	132	11
Taguig	168	17			
TOTAL	1008		TOTAL	1224	

Table 3.2 summarizes the socio-economic characteristics of the respondents. The overall mean age was 43 years. The mean age of the respondents served by MWCI and MWSI was 43 and 42 years, respectively. The relatively high mean ages can be explained by the way in which preferred respondents were selected, i.e., heads of families or respondents who were at least 18 years of age. For the same reason, 77% of the respondents were married. For both zones, 56% of respondents were female while 44% were male. The sex ratio for the NCR was 97 males for every 100 females (NSO 2003).

The data regarding educational attainment showed that most of the respondents had attended school. Only seven respondents (0.3%) had no formal schooling. Many had finished high school (34%), while some had reached or finished college (17% each). Very few respondents had degrees beyond college level.

Table 3.2 Respondents' socio-economic characteristics

CHARACTERISTIC	HOUSEHOLDS SERVED BY MWCI		HOUSEHOLDS SERVED BY MWSI		TOTAL	
	No.	%	No.	%	No.	%
Age (years)						
Mean	43	n/a	42	n/a	43	n/a
Standard Deviation	13	n/a	13	n/a	13	n/a
Minimum	18	n/a	18	n/a	18	n/a
Maximum	82	n/a	86	n/a	86	n/a
Gender						
Female	558	55	679	55	1237	56
Male	450	45	545	45	995	44
Civil Status						
Single	144	14	173	14	317	14
Married	785	78	939	77	1724	77
Widow/er	61	6	77	6	138	6
Separated	18	2	35	3	53	2
Educational Attainment						
No formal schooling	2	0.2	5	0.5	7	0.3
Grade school level	33	3	77	6	110	5
Grade school graduate	83	8	132	10	215	9
High school level	102	10	150	12	252	11
High school graduate	358	36	408	33	766	34
Vocational	54	5	51	4	105	5
College level	178	18	205	17	383	17
College graduate	185	18	189	15	374	17
Masters units	6	0.6	2	0.3	8	0.5
Masters degree	5	0.4	4	0.3	9	0.4
Phd/DM/DD/DVM/LIB degree	2	0.2	0	0	2	0.1
Phd/DM/DD/DVM/LIB graduate	0	0	1	.1	1	.05
Occupation						
Unemployed	348	35	449	37	793	36
Self employed	343	33	432	35	759	34
Government employee	93	9	97	8	186	8
Private employee	182	19	197	16	384	17
Retired/pensioner	35	3	43	4	78	4
Others	6	0.5	6	0	11	0.5

Table 3.2 Respondents' socio economic characteristics (continued)

CHARACTERISTIC	HOUSEHOLDS SERVED BY MWCI		HOUSEHOLDS SERVED BY MWSI		TOTAL	
	No.	%	No.	%	No.	%
Household Size						
Adult	4	n/a	4	n/a	4	n/a
Children	2	n/a	2	n/a	2	n/a
Mean Number of Employed Household Members	2	n/a	2	n/a	2	n/a
Income (P/mo)						
Mean	15,648	n/a	14,505	n/a	15,021	n/a
Standard Deviation	15,612	n/a	26,137	n/a	22,019	n/a
Minimum	1,000	n/a	1,000	n/a	1,000	n/a
Maximum	213,000	n/a	700,000	n/a	700,000	n/a
House Ownership						
Owned	635	63	746	61	1381	62
Rented	282	28	365	30	647	29
Living with relatives	88	9	112	9	200	9
Others	1	0.1	0	0	1	0.05
No answer	2	0.2	1	0.1	3	0.09

About one-third of the respondents were unemployed, and another third were self-employed. The overall unemployment rate in the NCR was, however, only 17% (National Statistical Coordination Board 2002). The high proportion of unemployed respondents can be explained by the fact that unemployed people are most often at home and therefore available for interview. The same reasoning can be applied to the self-employed respondents who had more flexibility when it came to time. The remaining respondents were either employed in the private sector (17%), government (8%) or were retired (4%). There were eleven student-respondents who, it should be noted, met the minimum age limit of eighteen years set by the team.

On average, there were four adults and two children per household, and two household members who were employed. The mean incomes for the MWCI and MWSI areas were P15,648 per month and P14,505 per month, respectively; or an average of P15,021 per month for both zones. Sixty-two percent (62%) of the respondents had their own houses, while the rest rented houses (29%) or lived with relatives (9%).

3.1.2 Water Source, Use and Expenditures

The respondents' main sources of water were MWCI (31%), MWSI (38%) and other suppliers like water vendors and deep wells (12%) (Table 3.3). There were a few respondents who said they were connected to their neighbors' water lines. There were 419 respondents (19%) who were not connected to either of the concessionaires. It is interesting to note that 147 respondents did not know that their water supplier had actually changed. These respondents thought that it was still the National Waterworks Sewerage Administration (NAWASA) that supplied them with water. This implies that some water subscribers are not interested in finding out from where they get their water.

Table 3.3 Respondents' main sources of water

SOURCE OF WATER	NO.	%
MWCI	693	31
MWSI	841	38
Others (e.g. water vendor, deep wells, pump, connected to neighbor)	279	12
Not connected	419	19
TOTAL	2,232	100

The respondents ranked food as the basic resource, or 'need', that they found most difficult to buy or avail themselves of (Table 3.4). This was followed by electricity, water, education, shelter and clothing.

The perceived water quality for both zones was reported to be quite high, with 72% of respondents saying that their water supply was 'highly acceptable'. In other words, they felt that it could be drunk straight from the faucet. Several respondents from Tondo, Manila reported that their tap water contained sediment and had a foul smell. It is worrying to note that this area suffered from a gastroenteritis outbreak in October 2003 and that contaminated drinking water was identified as the culprit.

The respondents ranked health problems as the most significant negative effect of an unstable water supply. Interrupted supplies also caused a lot of inconvenience by disrupting household chores, washing and bathing. They also incurred additional expenses for householders since, for example, water had to be boiled first before it could be drunk, or bottled water had to be purchased.

Broken or burst pipes were ranked as the number one cause of water supply problems, followed by insufficient water during summer and illegal connections. Deforestation ranked fourth, showing that most of the respondents were unable to relate water supply problems with forest destruction.

Table 3.4 Respondents' needs, uses for water, and perceptions regarding water supply

ASPECT/RESPONSE	RESPONDENTS SERVED BY MWCI	RESPONDENTS SERVED BY MWSI	ALL
Ranking of needs			
▪ Food	1	1	1
▪ Clothing	6	6	6
▪ Shelter	5	5	5
▪ Water	3	3	3
▪ Electricity	2	2	2
▪ Education	4	4	4
▪ Others	7	7	7
Perceived water quality (in %)			
▪ Highly acceptable (can be drunk straight from the faucet)	70	74	72
▪ Moderately acceptable (can be used for cooking, cleaning but can not be drunk straight)	27	22	24
▪ Acceptable (can be used for cleaning but not for cooking or drinking)	3	4	4
Ranking of the negative effects of unstable water supply			
▪ Health problems	1	1	1
▪ Additional expenses	4	4	4
▪ Delay in household chores	2	2	2
▪ Personal hygiene is affected	3	3	3
Ranking of causes of water supply problems			
▪ Busted pipes	1	1	1
▪ Illegal connection	3	2	3
▪ Insufficient water during summer	2	3	2
▪ Deforestation	4	4	4
▪ Others (water pump, road repairs, concessionaire itself)	5	5	5

Table 3.5 shows the consumption and availability of water in the areas covered. The mean volumes consumed in the areas covered by MWCI and MWSI were 37 m³/mo and 33 m³/mo, respectively, resulting in an average for both areas of 35 m³/mo. The respective mean water bills were ₱ 361/mo and ₱345/mo, with an overall average of ₱353/mo.

On average, the study results reveal that water was available 21 hours a day for MWCI areas and 18 hours a day for MWSI areas. The reported water availability in these areas in 2001 was 21 hours a day (Santos 2003). MWSI was beset with problems of burst or broken pipes and illegal connections. Its percentage of non-revenue water (NRW) in 2001 was also higher (66%) than that of MWCI (48%) (Santos 2003).

Table 3.5 Consumption and availability of water.

CONCESSIONAIRE/ AREA	WATER VOLUME (m ³ /mo)				WATER EXPENDITURE (₱ /mo)				WATER AVAILABILITY (hours/day)			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
MWCI	36.98	28.42	4	264	360.95	256.63	48	2200	20.91	6.04	1	24
MAKATI	44.09	32.10	8	220	432.74	326.08	70	2200	20.05	6.37	4	24
MANDALUYONG	38.29	28.34	4	100	401.97	287.28	50	1000	18.06	7.20	2	24
MANILA	37.50	16.52	15	72	400.00	174.51	150	800	23.10	2.57	15	24
MARIKINA	32.72	25.31	5	125	304.53	232.71	50	1250	22.06	5.58	1	24
PASIG	39.09	19.56	4	110	306.30	212.11	48	1000	22.79	4.14	2	24
PATEROS	16.50	10.94	9	46	174.00	92.79	90	355	20.29	7.13	5	24
QUEZON CITY	39.86	25.81	5	140	395.78	252.75	48	1400	21.37	4.98	2	24
SAN JUAN	31.47	24.29	8	100	319.64	253.67	78	1000	23.14	3.85	2	24
TAGUIG	41.74	42.25	5	264	338.60	226.14	50	900	17.75	8.39	1	24
MWSI	33.39	24.16	3	185	346.70	260.22	50	3345	17.98	7.48	1	24
KALOOKAN	31.35	21.86	5	126	307.28	207.02	64	1257	17.38	8.46	1	24
MAKATI	46.13	28.24	7	100	419.13	305.58	64	1000	18.26	7.75	3	24
MALABON	33.47	20.48	8	80	309.68	187.75	80	800	21.48	5.78	4	24
MANILA	32.42	27.23	3	185	379.66	333.89	50	3345	18.12	6.72	1	24
NAVOTAS	30.20	22.28	9	102	286.95	202.55	77	950	20.05	6.85	3	24
PASAY	37.76	26.56	6	100	388.85	266.76	95	1000	14.19	7.46	1	24
QUEZON CITY	33.95	21.99	3	109	343.05	216.24	50	1200	17.58	7.88	1	24
VALENZUELA	33.15	22.42	6	126	314.93	204.07	80	900	19.15	6.81	1	24
TOTAL	35.05	26.27	3	264	353.31	258.59	48	3345	19.33	7.00	1	24

3.1.3 Awareness about Watersheds and Forests

Among other things, the study sought to evaluate the levels of awareness about watersheds. Out of the total number of 2,232 respondents, only 16% knew what a watershed was (Table 3.6). This lack of awareness was slightly higher among those served by MWSI than MWCI (86% and 81%, respectively). On the other hand, 91% of respondents knew about the role of forests in ensuring a sustainable water supply.

Table 3.6 Awareness about watersheds and forests

ITEM	RESPONSE	RESPONDENTS SERVED BY MWCI		RESPONDENTS SERVED BY MWSI		ALL	
		No.	%	No.	%	No.	%
Watersheds	Aware	195	19	171	14	366	16
	Not aware	813	81	1053	86	1866	84
	Total	1008	100	1224	100	2232	100
Forests*	Aware	636	87	769	94	1405	91
	Not aware	93	13	47	6	140	9
	Total	729	100	816	100	1545	100

*The awareness about forests question was asked from August 30, 2003 to 1,545 respondents.

Table 3.7 shows the familiarity of the respondents with the four watershed areas included in the study, and their sources of information. The most well known was the La Mesa Watershed, with 87% of all respondents indicating that they knew about this area. Of this number, however, only 11% knew about La Mesa's function as a watershed.

La Mesa is well known because of its proximity to Metro Manila (it is located within the metropolis). It is also the most photographed of the four watersheds and often features in news reports on issues such as typhoons (when the safe water level is about to be or being exceeded) and droughts (when the water level is just at or even below the critical level). Furthermore, the group that manages the area, Bantay Kalikasan, is connected with the Lopez Group of Companies, a national media giant. This company has conducted several highly publicized fund-raising campaigns over the past years, mainly through television (ABS-CBN Channel 2, ANC News Channel, Studio 23) and radio. Despite this, the fact that La Mesa is a watershed appears not to have been fully communicated.

Table 3.7 Respondents' awareness about the four watersheds

RESPONSE	LA MESA						ANGAT					
	MWCI		MWSI		Total		MWCI		MWSI		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Familiar	881	87	1058	86	1939	87	683	68	813	66	1496	67
Not Familiar	127	13	166	14	293	13	325	32	411	34	736	33
Aware as a watershed	130	13	121	10	251	11	119	12	94	8	215	10
Not aware	878	87	1103	90	1981	89	889	84	1128	92	2017	90
Source of Information												
• TV	611	69	762	72	1373	71	461	67	551	68	1012	68
• Radio	275	31	317	30	592	31	214	31	238	29	452	30
Familiar	51	5	77	6	128	6	173	17	239	19	412	18
Not Familiar	957	95	1147	94	2104	94	835	83	985	81	1820	82
Aware as a Watershed	16	2	18	1	34	2	46	5	34	3	80	4
Not aware	992	98	1206	99	2198	98	962	95	1190	97	2152	96
Source of Information												
• TV	27	53	33	43	60	47	84	49	115	48	199	48
• NP ¹	20	39	12	16	32	25	51	29			51	12
• R/F ²			23	30	23	18			53	22	53	13

¹Newspaper

²Relatives and friends

The second most well known watershed was Angat (67%), from which Metro Manila gets more than 90% of its water supply. Angat featured prominently in the news from December 2003 until summer 2004 when Metro Manila residents were warned about an impending water crisis. Many newspapers and television programs showed pictures of Angat's critical water level (Figure 3.1). Only a few respondents knew about Ipo (18%) and Umiray (6%). Overall, the most important sources of information were television, radio, newspapers and relatives and friends.

Most of the respondents who were aware about watersheds thought that they are a primary source of water (88%) and that good forest cover is necessary for them to function well (76%) (Table 3.8). There were fewer respondents who knew that watersheds also provide tangible economic and ecosystem services.

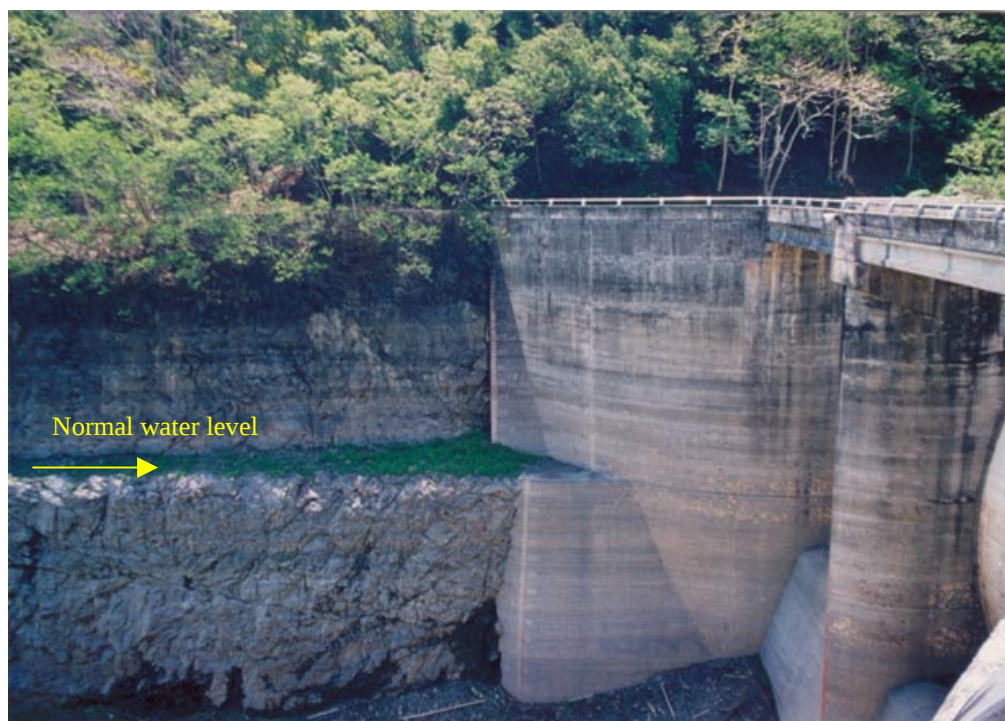


Figure 3.1 Angat's critical water level

Table 3.8 Perceived functions of watersheds and forests

FUNCTION	RESPONDENTS SERVED BY MWCI		RESPONDENTS SERVED BY MWSI		TOTAL	
	No.*	%	No.*	%	No.*	%
Primary source of raw water	173	90	146	86	319	88
Provide other goods like timber, rattan, and animal and plant products	104	54	91	54	195	54
Provide other services like hydroelectric power, biodiversity, recreation, and carbon sequestration	126	65	119	70	245	68
Good forest cover enhances watershed	147	76	128	76	275	76

*With multiple answers

The respondents were also asked what they thought was the source of Metro Manila's water. The top three answers were dams (La Mesa or Angat, 1017 respondents), Balara (137 respondents) and NAWASA (90 respondents). Balara is the location of a water filtration plant, while NAWASA is the old name of MWSS.

3.1.4 The CV Model

Different models were generated using different data sets. These data sets are described in Table 3.9. Model A is the general model that does not distinguish between CV questions or water distributors, which are treated as independent variables. The sensitivity of this model was evaluated through models B to J₄ which look into the effects on mean WTP of factors like the CV question, water distributors, and income. In addition, models were developed to test enumerator bias as well as the effect of a recent disease outbreak on the respondents' willingness to pay. The results showed that the last two variables were not significant and did not affect the respondents' WTP.

Table 3.9 Description of models generated

MODEL DESCRIPTION	NOTATION	NUMBER OF RESPONDENTS
General Model	A	2232
CV Question I	B	1109
CV Question II	C	1123
Maynilad Water Services, Inc.	D	1224
Manila Water Company, Inc.	E	1008
CV Question I - Maynilad Water Services, Inc.	F	611
CV Question I - Manila Water Company, Inc.	G	498
CV Question II - Maynilad Water Services, Inc.	H	613
CV Question II - Manila Water Company, Inc.	I	510
Income Group 1 (below ₱ 20,000)	J ₁	1732
Income Group 2 (₱ 20,000 – ₱ 39,999)	J ₂	387
Income Group 3 (₱ 40,000 – ₱ 59,999)	J ₃	68
Income Group 4 (₱ 60,000 and above)	J ₄	45

The significant variables included in the models are described in Table 3.10. After running the models, the following variables were dropped because they were consistently found not to be significant: enumerators; water bill; water quality; number of household members employed; and household size.

Table 3.10 Definition of variables

CHARACTERISTIC	CODE IN THE MODEL	DESCRIPTION
Bid Amount	BA	Bid amount presented to the respondent (P5, 10, 20, 25, 30, 50, 75, 100, 150, 200)
Mean Age (years)	Age	Respondent's age in years
Gender	Sex	Respondent's gender (1 if female, 0 if male)
Civil Status	CS1	Respondent's civil status
Single	CS2	100
Married	CS3	010
Widow/er	CS4	001
Separated	CS5	000
Educational Attainment	Educ	Respondent's number of years spent in school
Occupation	Occ	Respondent's occupation
Unemployed	Occ1	10000
Self employed	Occ2	01000
Government employee	Occ3	00100
Private employee	Occ4	00010
Retired/pensioner	Occ5	00001
Others	Occ6	00000
House Ownership	O	
Owned	O1	100
Rented	O2	010
Living with relatives	O3	001
Others	O4	000
CV Question	CVQ	1 if CV Question 1; 0 if CV Question 2
Water Expenses	WExp	Additional expenses for water
Connection to Water Distributor	WDCon	Connection to water distributor (1 if connected, 0 if not)
Water Availability	WAvail	Number of hours water is available in the household
Water Consumption	WCons	Volume of water consumed in m ³ /mo
Water Distributor	WDist	Water distributor serving the household (1 if MWCI, 0 if MWSI)
Mean Income (P/mo)	Inc	Household income of respondent per month

The coefficients and probability values of the significant factors affecting the WTP are given in Table 3.11. The only significant variable common to all models is bid amount (BA), the negative sign of which is consistent with the study hypotheses. The other variables whose coefficients are consistent with the hypotheses in at least one model are: additional water expenses (Model J₁),

income (Models A and E); house ownership (Models C and I); education (Model G); connection to water district (Models H and J₃); and, water availability (Model F).

The variables whose coefficients did not come out as expected in more than one model are:

- *Water distributor.* For Models A, C and J₁, the respondents under MWSI were more willing to pay. This was probably because they were hoping for better water services with improved watershed management.
- *Volume of water consumed.* For Models C, H, J₁, and J₃, the respondents' WTP increased with an increase in the volume of water they consumed. This could indicate the high level of importance they give to water.
- *Age.* For Models C, D, H and J₃, younger respondents were more willing to pay, probably because they had a higher level of both income and environmental awareness than older people.

The variables 'house ownership' and 'occupation' were not included in the hypotheses as factors that could affect WTP, but actually turned out to be significant in some of the models.

Table 3.11 Significant variables affecting WTP for different models

SIGNIFICANT VARIABLE	COEFFICIENT	EXPECTED SIGN	PROBABILITY VALUE
Model A			
BA	-0.0117403	-	0.000
WDist	-0.2052112	+	0.025
WExp	0.0002374	+	0.027
Occ1	0.1735257	+	0.088
Occ3	0.3637454	+	0.004
Inc	0.0000038	+	0.101
Model B			
BA	-0.0105034	-	0.000
WExp	0.0002536	+	0.069
Sex	-0.2281394	+	0.084
Occ3	0.3249100	+	0.052

Table 3.11 Significant variables affecting WTP for different models (continued)

Model C			
BA	-0.0120422	-	0.000
WDist	-0.2448227	+	0.062
WDCon	-0.4686500	-	0.008
WCons	0.0043053	-	0.098
Age	-0.0111331	+	0.035
O1	13.070900	*	0.000
O2	13.058120	*	0.000
O3	12.987710	*	0.000
Model D			
BA	-0.0122318	-	0.000
WDCon	-0.3723940	-	0.023
Age	-0.0108988	+	0.027
Occ3	0.3877312	+	0.023
O1	-17.5141000	*	0.000
O2	-17.6247600	*	0.000
O3	-17.5257200	*	0.000
Model E			
BA	-0.0113695	-	0.000
Inc	0.0000007	+	0.098
Model F			
BA	-0.0112343	-	0.000
Sex	-0.3731125	+	0.034
WAvail	-0.0186131	-	0.084
O1	-20.016440	*	0.000
O2	-20.235420	*	0.000
O3	-20.179590	*	0.000
Model G			
BA	-0.0101407	-	0.000
Educ	0.0661358	+	0.058
Model H			
BA	-0.0138491	-	0.000
WDCon	-0.6459929	-	0.006
WCons	0.0075029	-	0.068
Age	-0.0150375	+	0.039
Occ1	0.3227748	+	0.098
Occ3	0.5672764	+	0.033
Model I			
BA	-0.0122509	-	0.000
O1	16.083190	*	0.000
O2	16.150390	*	0.000
O3	15.859150	*	0.000

Table 3.11 Significant variables affecting WTP for different models (continued)

Model J ₁			
BA	-0.011993	-	0.000
WDist	-0.237173	+	0.026
WCons	0.005017	-	0.205
WExp	0.000453	+	0.001
Occ3	0.355135	+	0.013
Model J ₂			
BA	-0.011202	-	0.000
Occ1	0.406216	+	0.078
Model J ₃			
BA	-0.014143	-	0.067
CV Question	4.291559	-	0.010
WDCon	-4.757380	-	0.049
WCons	0.054408	-	0.038
WAvail	0.209707	-	0.014
Aware	-2.305694	+	0.050
Age	-0.235003	+	0.016
Sex	-2.211758	+	0.047
CS2	6.804436	*	0.019
CS3	13.502220	*	0.024
Occ1	-3.898054	+	0.021
O1	5.429500	*	0.005
Model J ₄			
BA	-0.009181	-	0.078

*No hypothesis

The ‘goodness of fit’ statistics from the binomial logit analysis are given in Table 3.12. The significance levels of the models range from 0.082 (Model J₂) to 0.907 (Model J₃). Models with lower significance levels have better ‘goodness of fit’ than those with higher values. The percentages of correctly classified responses range from 57.78% (Model J₄) to 89.71% (Model J₃). Models with higher percentages of correctly classified responses have better predictive power. Furthermore, the equations of the different logit models generated to estimate mean WTP are summarized in Table 3.13.

Table 3.12 Goodness of fit statistics from the binomial logit analysis

MODEL	PEARSON'S CHI SQUARE	SIGNIFICANCE LEVEL	N	CORRECTLY CLASSIFIED RESPONSES (%)
A	1990.51	0.2411	2232	65.41
B	439.40	0.0849	1109	64.29
C	1128.18	0.3299	1123	65.00
D	1227.49	0.3052	1224	65.36
E	635.41	0.1003	1008	64.58
F	266.99	0.6718	611	66.94
G	95.53	0.4943	498	64.46
H	626.39	0.2292	613	66.07
I	34.42	0.1248	510	62.55
J ₁	1555.69	0.2449	1732	64.49
J ₂	25.62	0.0818	387	60.72
J ₃	41.72	0.9067	68	89.71
J ₄	4.76	0.7826	45	57.78

Table 3.13 Equations of the different discrete choice models

MODEL	EQUATION
A	0.341710610 – 0.0117403 BA
B	0.253072444 – 0.0105034 BA
C	0.416517086 – 0.0129422 BA
D	0.464655000 – 0.0122300 BA
E	0.219609228 – 0.0113695 BA
F	0.375849000 – 0.0112343 BA
G	0.165402854 – 0.0101407 BA
H	0.514492000 – 0.0138500 BA
I	0.218134000 – 0.0122509 BA
J ₁	0.318530794 – 0.0117403 BA
J ₂	0.511352695 – 0.0117403 BA
J ₃	0.588682822 – 0.0117403 BA
J ₄	0.761299736 – 0.0117403 BA

Table 3.14 and Figure 3.1 summarize the mean WTP estimates for the different models from the econometric (logit) analysis, as well as the non-parametric analysis (lower-bound, mid point and Turnbull). The econometric mean WTP estimates for all models were consistently lower than the non-parametric estimates.

The mean WTP for Model A, the general model, was P29.11/mo. The mean WTP for CV Question II (Model C) was higher at P32.18/mo than that of CV Question I at P24.09/mo. This implies that knowledge about other watershed service users being made to pay has a positive effect on mean WTP. Furthermore the mean WTP of MWSI water users was about twice that of MWCI's (i.e. P37.98/mo and P19.31/mo, respectively.)

This finding was contrary to the research team's expectation that MWCI respondents would be more willing to pay. One of the reasons for this could be that MWSI subscribers would be more willing to pay as long as the services of the company are improved.

Models F and G looked into the interaction between CV Question I and water distributor, while Models H and I were for CV Question II and water distributor. In both cases, the mean WTPs of MWSI respondents were much higher than those of MWCI respondents. Furthermore, the mean WTPs of CV Question II for both water distributors were higher than the equivalent mean WTPs for CV Question I. This implies that when people are aware that other users of watershed services will also pay, they will themselves exhibit a higher mean WTP.

Models J₁ to J₄ estimated the mean WTP for different income groups. The highest income group (Model J₄) also had the highest mean WTP of P64.84/mo. The mean WTP decreased with a decrease in income. These findings imply that water users with higher income levels have higher WTPs for improved watershed management. This also implies that the mean WTP would probably have been boosted if rich subdivisions had been included in the survey.

The non-parametric mean WTP estimates (lower bound, midpoint and Turnbull) were all higher than the logit estimates. This may have been because the econometric mean and median WTPs considered different factors affecting WTP, while the non-parametric estimates were calculated using the actual response data.

Table 3.14

Econometric and non-parametric estimates of mean and median WTP

MODEL	Mean and Median WTP (Logit)	Non Parametric Mean		Turnbull	
		Lower Bound	Midpoint	Mean	Median
A	29.11	57.34	64.55	69.46	20-25
B	24.09	60.12	65.63	58.41	25-30
C	32.18	55.48	62.87	57.58	20-25
D	37.98	59.86	66.64	59.86	50-75
E	19.31	60.23	67.76	53.26	20-25
F	33.46	53.22	61.85	58.96	30-50
G	16.31	60.57	69.59	55.90	20-25
H	37.15	59.91	66.36	60.38	50-75
I	17.81	48.32	57.50	47.65	20-25
J ₁	27.13	54.43	59.70	54.11	25-30
J ₂	43.55	65.31	75.27	64.17	20-25
J ₃	50.14	66.29	78.77	66.45	75-100
J ₄	64.84	54.37	69.65	63.69	50-75

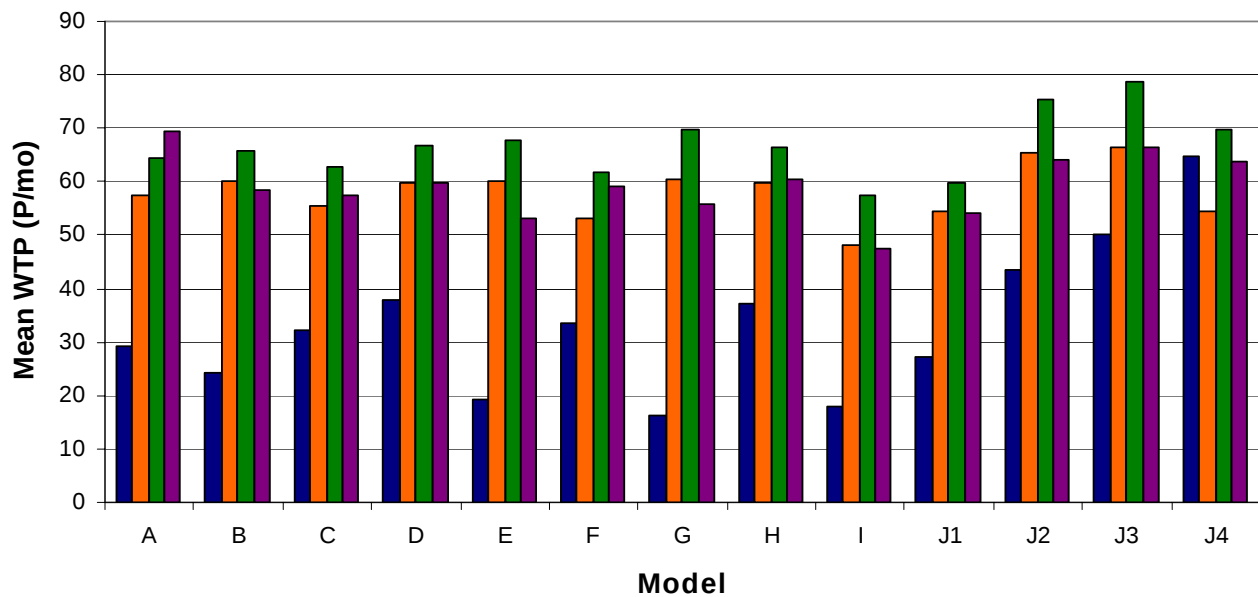


Table 3.15 and Figure 3.2 show that the probabilities of respondents saying “yes” to the various bid amounts for the different income groups. For example, at the lowest bid amount of P5, Model A had a probability that 0.57 would say “yes”. The highest probability for this bid amount was for Model J₄ (0.67), while the lowest was for Model H (0.50). At the highest bid amount of P200, the highest “yes” probability was for Model J₃ (0.79), while the lowest was for Model I (0.48). Figure 3.2 Mean willingness to pay of the different income groups.

were willing to pay this amount compared to the lower income groups. For Models A to I, all models except H had “yes” probabilities that were equal to or greater than 0.10 at the highest bid amount.

Table 3.15 Probability of saying “yes” to given bid amounts

BID AMOUNT	MODELS												
	A	B	C	D	E	F	G	H	I	J ₁	J ₂	J ₃	J ₄
5	0.57	0.55	0.59	0.60	0.54	0.58	0.53	0.50	0.54	0.56	0.61	0.63	0.67
10	0.56	0.54	0.57	0.58	0.53	0.57	0.52	0.48	0.52	0.55	0.60	0.62	0.66
20	0.53	0.51	0.54	0.55	0.50	0.54	0.49	0.45	0.49	0.52	0.57	0.59	0.63
25	0.51	0.50	0.52	0.54	0.48	0.52	0.48	0.44	0.48	0.51	0.55	0.57	0.61
30	0.50	0.48	0.51	0.52	0.47	0.51	0.47	0.42	0.46	0.49	0.54	0.56	0.60
50	0.44	0.43	0.44	0.46	0.41	0.45	0.42	0.36	0.40	0.43	0.48	0.50	0.54
75	0.37	0.37	0.36	0.39	0.35	0.39	0.36	0.30	0.33	0.36	0.41	0.43	0.47
100	0.30	0.31	0.29	0.32	0.29	0.32	0.30	0.24	0.27	0.30	0.34	0.36	0.40
150	0.19	0.21	0.18	0.20	0.18	0.21	0.20	0.14	0.17	0.19	0.22	0.24	0.27
200	0.12	0.14	0.10	0.12	0.11	0.13	0.13	0.08	0.10	0.12	0.14	0.15	0.17

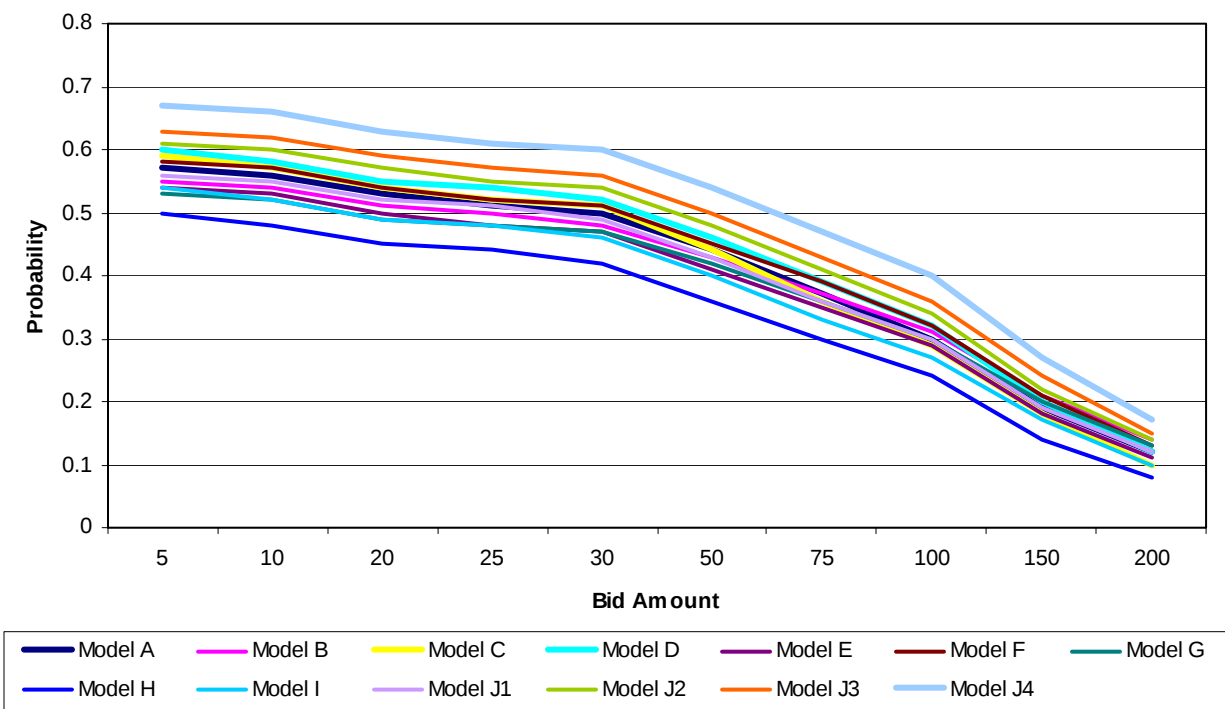


Figure 3.3 Probability of saying “yes” to given bid amounts

3.1.5 Reasons Why Respondents are Willing or Not Willing to Pay

A total of 1,301 respondents (58%) expressed willingness to pay for the ten bid amounts. The main reasons for their decisions are given in Table 3.16. These included a desire for a reliable water supply (43%). Respondents also wanted the watersheds to continue producing environmental services (16%) and they wanted a reliable water supply for future generations (13%). There were also some who believed that the council would do its job well. Other respondents felt that it was their obligation to pay because they would be the ones to benefit anyway. There were also those who hoped that this would result in lower tariff rates in the future.

The respondents who were not willing to pay said they could not afford any additional charges (9%), believed that watershed management is the government's responsibility (9%) and also reported that they found the water tariff to be already too high (4%). A small number argued that any additional payment would not result in improved watershed management. Other reasons given by respondents were: they were already paying taxes and any fee should be taken from these payments; they did not trust the government because of corruption; the private sector should pay; and, the payment should be voluntary.

Table 3.16 Reasons why respondents are willing or not willing to pay

REASON*	RESPONDENTS SERVED BY				ALL (n=2232)	
	MWCI (n=1008)		MWSI (n=1224)			
	No.	%	No.	%	No.	%
WILLING TO PAY	576	57	725	59	1301	58
Want reliable water supply	408	41	536	44	944	43
Continue to produce environmental services	168	17	180	15	348	16
Reliable water supply for the future generation	135	13	160	13	295	13
Believes in the council	28	3	42	3	70	3
Others	29	3	40	3	69	3
NOT WILLING TO PAY	432	43	499	41	931	42
Cannot afford to pay	83	8	105	9	188	9
Water tariff is already too high	40	4	38	3	78	4
Government's responsibility	89	9	106	9	195	9
Don't care about reliable water supply	1	0.1	0	0	1	.05
Don't believe additional payment will improve watershed management	14	1	18	1	32	1
Don't understand the question	0	0	0	0	0	0
Others	33	3	33	3	66	3

*Some respondents did not give reasons, others gave multiple answers

3.1.6 Comparison of Watershed Management Costs and Potential Revenues

The cost of watershed management was based on the following information and assumptions:

For La Mesa, Ipo and Angat Watersheds, a protection cost of P17,600/ha was used. This corresponds to 20% of the watershed management cost of La Mesa Watershed (personal communication, Marlo Mendoza, March 28, 2004).

The protection and management cost used for Umiray Watershed was P5,000/ha/yr. The figure used was based on For. Mendoza's estimate of the cost of protecting and managing watersheds that are less susceptible to encroachment and fire. The current budgetary allocation of DENR for watershed protection is P15/ha/year, which is deemed too low for effective protection and management.

The protection and management costs/ha/year were multiplied by the respective watershed areas to give the total figures required. Following on from these cost assumptions, Table 3.17 shows the management costs of the four watersheds. These were valued at approximately P1.5 billion/year.

The potential revenue was estimated based on the mean WTP of Model A (P29/mo), multiplied by the total number of households in Metro Manila (about 2.1 million). This amounted to about P730 million/year.

This means that revenue could potentially cover about half of the estimated yearly management costs of the four watersheds. Aside from a possible subsidy from the government, the outstanding management costs could be borne by other sectors like agriculture, industries, power, and others.

Table 3.17 Comparison of watershed management costs and potential revenue

WATERSHED	AREA (ha)	COST	
		P/ha/year	P/year
Angat	62,000	17,600	1,091,200,000
Ipo	6,600	17,600	116,160,000
Umiray	53,800	5,000	269,000,000
La Mesa	2,700	17,600	47,520,000
		Total	1,523,880,000

3.2 Institutionalization of the Water User Fee

Pricing raw water is a move that is long overdue. Francisco (2002) observed that the water situation in the Philippines should be addressed both on the demand and supply sides. She advised that this should include, on the demand side, a pricing or policy scheme that reflects the opportunity costs of competing water uses, as well as the environmental costs of water's extraction and consumption. She predicts that such a policy will most likely increase the current subsidized price of water, and that it could be met with resistance because, traditionally, water has been provided as a social good.

On the supply side, efforts have focused on engineering solutions to improve access to water. The inherent assumption appears to be that the only problem associated with water supply is access and not its growing scarcity.

3.2.1 Respondents' Preferred Collection Mechanism

Table 3.17 shows the institutional arrangements preferred by the respondents. For both MWCI and MWSI respondents, the preferred collection mechanism was for any payment to be added to the monthly water bill (48% and 46%, respectively). The respondents explained that this would be convenient as it would require them to only make one payment. However, they also felt that the water user fee should be highlighted in their bills so that their payments would be used as intended.

Conversely, some of the respondents (39% for MWCI, 44% for MWSI) said they would prefer another agency to collect their payments, mainly because they did not trust the concessionaires. The few who did choose neither the first nor second collection mechanisms said that they would like their payments to be voluntary or channeled through their barangay.

Regarding the basis of the water fee payment, 43% and 44% of the respondents from MWCI and MWSI respectively said that they would prefer it to be based on the volume of water consumed. This means that the total water user fee payment would be directly proportional to the volume consumed. Thirty-one per cent and 32% of the respondents from MWCI and MWSI opted for a flat rate system, where they would pay the same amount regardless of the volume of water consumed.

Table 3.18 Preferred institutional arrangements for the water user fee

ASPECT	RESPONSE	MWCI	MWSI	FOR ALL
		(%)	(%)	(%)
Collection mechanism	▪ Include in water bill	48	46	47
	▪ Create a separate agency	39	44	42
	▪ Others (e.g. voluntary, barangays)	3	3	3
	▪ No answer	10	7	8
	Total	100	100	100
Basis of payment	▪ Volume of water consumed	43	44	44
	▪ Income	8	9	9
	▪ Number of household members	6	7	7
	▪ Flat rate	31	32	32
	▪ Others (e.g. voluntary)	1	1	1
	▪ No answer	10	7	7
	Total	100	100	100

3.2.2 Typology of Financial Mechanisms

A wide variety of financial mechanisms for watershed services are available. To categorize them Perrot-Maitre and Davis (2001) and Forest Trends et al. (http://www.forest-trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf)

adopted the typology of financial incentive mechanisms used by Powell and White (2001). This typology organizes such financial mechanisms into three categories depending on the degree of government intervention in their administration. These categories are: 1) self-organized public deals; 2) trading schemes; and, 3) public payment schemes.

Self-organized public deals require little or no government involvement. Under such deals, members of the private sector who benefit from water services voluntarily pay those who manage and protect the relevant watersheds. Financing is from private sources and may take a number of forms, such as user fees, transfer payments, land purchases, cost sharing arrangement and/or low interest rate loans.

Trading schemes occur when the government sets either a very strict water quality standard or a cap on total pollutions emissions. Generally, individual facilities or landowners are given a limit to the amount of emissions they can release. Trading occurs when companies or landowners who cannot meet this standard buy credits from those who are able to do so. Authority for trading schemes comes from the national or local regulatory agencies. Strong regulatory systems and effective monitoring systems are key requirements.

Public payment schemes such as the one proposed in this study are the most common financial mechanism used to pay for watershed services (http://www.forest-trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf)

[trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf](http://www.forest-trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf)). Financing is in the form of general tax revenues, bond issues or user fees. This money is paid to private landowners and private or public resource managers. New York City is an example where the federal, state, and municipal governments work together to protect water quality in the watersheds supplying the city. However, this American example shows that intensive negotiations between downstream and upstream parties are often needed to establish such a payment mechanism, especially when it comes to creating the correct regulatory environment.

There are often significant transactions costs involved in the design and maintenance of financial mechanisms; costs which should be recognized when assessing a particular strategy (http://www.forest-trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf). These transactions costs include: research to identify and trace the flow of ecosystem services; monitoring and enforcement; conflict management; and, making necessary changes in the legal and regulatory frameworks.

Some lessons and rules of thumb are worth considering when looking at (?) the implementation of financing mechanisms in watershed management (http://www.forest-trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf). These include:

- Transfer payments from downstream water users to upstream stakeholders are the most common approach and the largest current source of financing.
- Self-organized, private deals are likely to occur when the water services provided are related to private goods. Ironically, the contracts of MWCI and MWSI state that they will get raw water for free (personal communication with NWRB Executive Director, March 11, 2004).
- In practice, political or budgetary considerations, rather than strict economic benefit evaluations, have usually set the price paid for water-related ecosystem services.
- A strong legal and regulatory framework is needed to reduce the transactions costs of establishing and maintaining a financial mechanism.
- Stakeholder's participation and negotiation and institution building are critical in all strategies.

3.2.3 The Proposed Water User Fee

The proposed user fee was developed bearing in mind the guidelines cited by UNEP. For example, UNEP (2002) emphasized that the choice and development of an appropriate economic instrument (EI) such as this is

determined by the prevailing political, social, institutional and environmental circumstances.

Some of the important questions that need to be answered when implementing an EI on a resource are: 1) What is the damaged resource? 2) What is the anticipated severity of the damage? 3) What does the government hope to accomplish?

The reconnaissance survey conducted by the research team revealed that La Mesa, Angat and Ipo watersheds all suffer from differing levels of damage and destruction. Ipo watershed, for instance, has been subjected to slash and burn farming which have exposed the area's soil surface to erosion. La Mesa, Ipo and Angat have illegal occupancy problems. The problems in La Mesa and Angat are not as severe as those in Ipo, but if no measures are taken, the problems can only get worse.

The resources available for the management of Angat, Ipo and Umiray are limited, and the watershed management agencies cannot therefore hire an adequate number of forest guards to monitor and protect them. In the La Mesa watershed, the Bantay Kalikasan has implemented rules and regulations to curb illegal activities, but it has not been completely successful in relocating a number of culpable families. Considering these problems, and the important role of these watersheds in supplying water to Metro Manila, it is clear that revenue collected through the proposed water user fee should be channeled towards forest protection.

Another concern in the implementation of an EI, is identifying the main stakeholders and their interests. In this particular study, the important stakeholders of the four watersheds included: the National Power Corporation, which has been vested by law (Executive Order No. 224 dated July 16, 1987) with the complete jurisdiction, control and regulation of Angat Watershed; the Department of Environment and Natural Resources, which is the caretaker of Ipo and Umiray watersheds; Bantay Kalikasan (ABS-CBN Foundation), which is the resource manager of the La Mesa Watershed; the Manila Water Company, Inc. and Maynilad Water Services, Inc., water distributors for the east zone and west zone of Metro Manila, respectively; other government agencies such as the National Water Resources Board, National Irrigation Administration, Local Water Utilities Administration and the Metropolitan Waterworks and Sewerage System; private industries; farmers; and, finally, local households.

The National Water Resources Board (NWRB) through Executive Order No. 124-A, has been mandated to coordinate and integrate all activities involving the development and management of water resources. Ideally, all water users should pay water fees to the NWRB because it has a legal mandate to collect and impose fees and charges (as per Presidential Decree Nos. 424, 1067, and 1206). But as the NWRB Executive Director noted, government agencies that use water

such as NPC, NIA, etc. are exempted from paying fees (personal communication, March 11, 2004). Even the major water distributors do not allocate any part of their income for watershed protection and conservation. Hence, all resources used in the development and protection of La Mesa, Angat, Ipo, and Umiray come from the budget allocations of the watersheds' management agencies. More often than not, these allocations are not enough to undertake the necessary protection measures such as reforestation/tree planting, hiring forest guards, installing look-out-towers, putting up soil conservation structures, purchasing communication and transportation equipment and information, education and communication (IEC) activities.

The structure and strength of the relevant public sector institutions have a bearing on EI implementation. The interviews undertaken for this study revealed that many of the respondents did not trust the government as far as the collection and management of the water user fee was concerned. This was due to the belief that public sector institutions are corrupt and characterized by poor governance. Therefore, it is clear that fund management and collection should not be given to government institutions.

3.2.4 Legal Framework of the Water User Fee

The Philippine Constitution lays down the fundamental justification for the adoption of economic instruments as a tool for the sustainable development of the country's natural resources (Section 1, Article II). The Philippine Strategy for Sustainable Development, specifies how such tools should be implemented in compliance with Agenda 21. This strategy underlines the importance of the proper pricing of natural resources. This is in order to stop the gross underpricing of natural resources that has led to their wasteful over utilization.

This use of EIs as a sustainable development tool is further supported by the following related initiatives:

- The Philippine Strategy for Improved Watershed Resources Management, which has focused on watershed resource pricing;
- The Philippine Environment and Natural Resources Medium-Term Development Plan (1999-2004), which lays down strategies for the adoption of economic instruments for sustainable natural resources management;
- The Medium-Term Philippine Development Plan (2001-2004), which has adopted a general strategy to pursue economic pricing of water to ensure the sustainability of raw water supply; and
- The Institutionalization of natural resource accounting through Executive Order 406 issued on March 21, 1997.

- The DENR also issued Administrative Order No. 96-40 dated December 19, 1996. Known as the Revised Implementing Rules and Regulations of Republic Act 7942 (An Act Instituting a New System of Mineral Resource Exploration, Development, Utilization and Conservation), this Order institutionalized the Contingent Liability and Rehabilitation Fund. This fund ensures the sustainable rehabilitation of any areas adversely affected by a mining operation or activity. It also ensures just and timely compensation for damages caused by such operations.
- Other national agencies like the National Water Resources Board and the Laguna Lake Development Authority impose and collect fees and charges for the use of underground water and lake water. Article 83 of Presidential Decree No. 1067 (Water Code of the Philippines) authorizes the Board to collect reasonable fees or charges for the development of water resources from water appropriators. In addition, Section 7 of the Implementing Rules and Regulations of the Water Code of the Philippines authorizes the Board to revise its water charges or impose special water rates as the need arises (Villenas 2000). During the project presentation to the NWRB Executive Director on March 11, 2004, the NWRB officials recognized the importance of the proposed water user fee. This was fortuitous since the Board were in the process of revising their fees and charges. The research team asked the NWRB Executive Director to factor the water user fee into the proposed new rates. The new rates will take effect through a NWRB Board Resolution.
- Section 3 of Executive Order No. 27 empowers the Laguna Lake Development Authority to collect fees for the use of the lake water and its tributaries. The authority can do this for all beneficial purposes including fisheries, recreation, municipal, industrial, agricultural, navigation, irrigation and waste disposal purposes (Oledan 2000).
- Republic Act No. 7586, otherwise known as the National Integrated Protected Areas System Act of 1992, provides the legal basis for the collection of an entrance fee and a facilities user fee from users of protected areas. Section 60 of the law creates the Integrated Protected Areas Fund (IPAF) for the purpose of financing projects of the Integrated Protected Areas System (Castillo 2000).
- Republic Act 7160, also known as the Local Government Code of the Philippines, authorizes local government units to charge fees from the utilization of natural resources found within their political jurisdictions.

- If the water user fee is institutionalized, it will not be the first time that users have had to pay for watershed services. At present, the National Power Corporation is charging customers one-fourth of one centavo per kwh for the management of its watershed reservations. The Energy Regulatory Commission approved the charging of this fee on April 2, 2003 (Philippine Daily Inquirer, April 12, 2003).

From these examples, it is clear that the legal framework for the implementation of economic instruments already exists. However, in the water sector, the institutionalization of such instruments has been slow because of problems among water users and agencies. In particular, the high incidence of poverty and unemployment in Metro Manila makes the issue of equity a key barrier to the implementation of a water user fee.

The main equity issue facing the charge proposed in this study is: should households consuming less water pay the same amount as those consuming more water? To address this concern, an increasing block tariff scheme (IBT) is recommended. IBTs are the tariff structures most commonly implemented in developing countries (Boland and Whittington 2000). Under an IBT structure (based on a volumetric component), a water user is charged a relatively low per unit price up to a specified amount that defines the end of the first block. Users then pay a higher per unit price for additional consumption until the end of the second block is reached. Consumption within subsequent blocks is charged at progressively higher rates. This process continues until the 'top block' is reached. The increasing block pricing structure is felt to be equitable because low-income households pay lower rates for water than households consuming more (Maddock and Castano 1991 as cited by Pashardes and Hajispyrou 2002).

3.2.5 Water User Fee Collection and Administration Mechanism

As has been shown, the respondents' preferred fee collection mechanism was through the monthly water bill. It is therefore proposed that an item labeled 'water user fee' should be added to current water bills to ensure that the amount collected will be earmarked for the intended watershed management purposes.

Given that the fee will be collected by the water distributors, the next questions to be addressed are: Who will administer the fund? And where will it be remitted? Important precedents that will help answer these questions have been set in the management of other similar funds.

In the case of the Integrated Protected Areas Fund (IPAF), all income generated from the use of resources within a protected area is remitted to the National Treasury under a special account or an IPAF sub-account. This income is divided into two: 75% for the concerned protected area and 25% to be remitted to the control of IPAF. Each protected area's 75% share has to be requested by its Management Board. Requests must be backed up by an approved Work and

Financial Plan and are subject to all accounting and auditing rules and regulations. Not surprisingly, difficulties are encountered in this process due to processing delays. These delays can take months.

For Community-Based Forest Management (CBFM), a CBFM Special Account has been created in a qualified Philippine Government Bank. This is under the name of the CBFM Special Account and has been created by virtue of DENR Administrative Order No. 98-44. The sources of the CBFM fund include:

- The government's portion of all Production Sharing Agreements. These have been made with the CBFM people's organizations (POs) in relation to the harvest and management of forest resources.
- Interest and other charges imposed by the government on POs that borrow money from the CBFM Fund.
- Contributions, donations, endowments and grants from any source; other revenues derived from the management of the CBFM projects; and, such other funds as DENR may later identify or provide to the CBFMSA.

The disbursement of the CBFM fund is used solely to support the implementation of the CBFM Strategy. The management, allocation and disbursement of the CBFMSA is determined and decided by the CBFMSA Governing Board.

Money for both the CBFM fund and IPAF is remitted to the National Treasury and deposited under a special account. Unfortunately, it is generally considered that any money that goes to the central treasury is "lost", whereas money that stays within the sector for which it was collected is not (Stern 2003). This study's interviews also showed that respondents did not trust the government as fund manager. Therefore, the Research Team recommends that the proposed water user fee should be retained within the water sector. In fact, the DENR Secretary herself is in favor of retaining 75% of the IPAF fund within the appropriate protected areas (personal communication, March 1, 2004).

The Research Team therefore proposes that a Multisectoral Council should be created to manage the water user fee. Under this proposal, collected fees will form a fund for the implementation of various management, conservation and protection projects and activities in the four watersheds. The Council will be composed of representatives from the following groups: water users, water distributors, government agencies, local government units and non-government organizations. It will formulate policies, guidelines and criteria for funding projects and will ensure that they are effectively and efficiently implemented. A Technical Secretariat will serve as the technical staff of the Council. Specifically, this body will review the technical feasibility of all proposed projects and activities and shall recommend which should be funded. It will keep a repository

of records and documents and information pertinent to the different watershed programs. It will also continuously monitor and periodically evaluate project implementation to ensure effectiveness and efficiency (Figure 3.3).

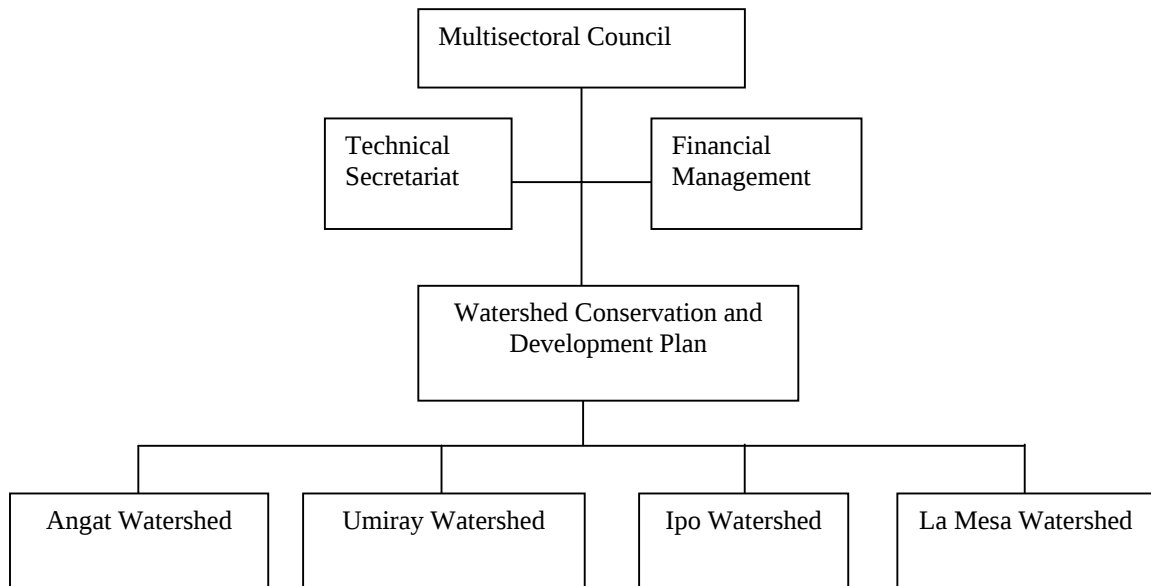


Figure 3.4 Proposed Institutional Framework

With regard to fund management, the team proposes the creation of an office that will be in charge of: 1) allocating and disbursing the funds for projects and activities approved by the Council; 2) monitoring the financial operation of all supported projects; and 3) preparing periodic financial reports to the Council. All financial transactions will be subject to internal and external accounting and auditing rules and regulations.

As shown in Figure 3.4, the water user fee will go directly from the water distributors, which are in charge of collecting the fund, to the Multisectoral Council. In contrast, the CBFM Fund and IPAF are remitted to the national treasury before a certain percentage (75% for IPAF) is released to the PAMB.

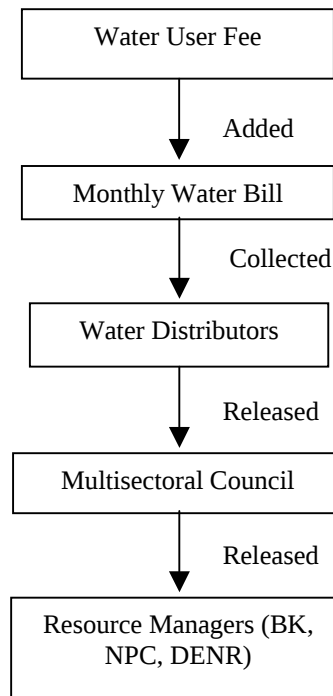


Figure 3.5 Proposed flow of water user

4.0 CONCLUSIONS

Based on the results of this study, the following conclusions are made:

1. Metro Manila residents have a low level of awareness about watersheds, but have a high level of awareness about the role of forests in securing water supply. The most well known among the four watersheds that supply the metropolis is La Mesa. This can be explained by its proximity to Metro Manila and its wide media exposure. This points to the need for a campaign to inform the people about the importance of all four watersheds.
2. In general, Metro Manila residents are willing to pay for the improved management of the four watersheds. Fifty-eight percent (58%) of the 2,232 respondents expressed a willingness to pay the various bid amounts proposed in the study. This number does not include many respondents who said they were willing to pay for improved watershed management, but only if the government would not be involved in the collection and administration of the fund. This shows that there is a widespread distrust of the government.
3. The estimated mean willingness to pay amounts to P29/household/month, which is about 10% of the average monthly water bill of P300, and about 2% of the average monthly income of the respondents. This amount may be insignificant to some water users, but substantial to others.
4. The important factors affecting WTP are: bid amount, connection to water distributor, type of water distributor serving the household, volume of water consumed, water availability, additional water expenses, age, income, and house ownership. People's knowledge about other user groups being made to pay for watershed services is not a significant factor. This means that it should be possible to collect the water user fee starting with just one user group, in this case domestic water users.
5. Metro Manila residents are willing to pay because they want a reliable water supply for both present and future generations. They also want the watersheds to continue producing other environmental services. This points to a bequest value for watershed services, however this was not specifically investigated in this study. Residents are not willing to pay because: they cannot afford to pay; the water tariff is already too high; and, they feel that watershed management is the responsibility of the government. This last reason highlights the need for households to be informed that watershed protection, and environmental protection in general, is not the sole responsibility of the government.

6. Based on WTP estimates, the potential revenues from a water user fee should be able to finance about half of the estimated annual management costs of the four watersheds. If it is collected, this revenue will provide much-needed funds to the agencies managing the four watersheds. However, fees will still need to be collected from other user groups.
7. The economic instrument that is most appropriate for households in Metro Manila is the water user fee. The legal framework for such a fee already exists. This is primarily because the National Water Resources Board is already authorized to impose and collect reasonable fees or charges for water resources development. However, a lot remains to be done to bring about the institutionalization of such a fee. A recent development in the country is the issuance of Executive Order 318 by President Gloria M. Arroyo. This calls for the proper valuation and pricing of forest resources. Specifically, EO 318 mentions the need to properly value and price water for domestic, industrial, irrigation and power generation uses. This order strengthens the legal basis for collecting the water user fee.
8. Residents would prefer a water user fee to be added to their water bills since they will then only have to pay one agency. Such an approach is also cost effective because a collection mechanism already exists through the concessionaires. However, recent disclosures about MWSI's unauthorized collection of the foreign currency differential adjustment and the accelerated extraordinary price adjustment may make people have second thoughts about channeling their payments for improved watershed management through the concessionaires.

5.0 RECOMMENDATIONS

The following recommendations are made:

1. Information, education and communication (IEC) activities should be heightened to inform people about the importance of watersheds. The survey results show that television and radio are effective ways of communicating the importance of watersheds and forests. Bantay Kalikasan was able to generate a lot of support for the La Mesa Watershed largely because of its effective use of the mass media.
2. A water user fee should be implemented in Metro Manila to capture the willingness of its residents to pay for the improved management of the four watersheds. The mean WTP values derived in this study can be used as the basis for this raw water pricing policy. The price that water users will eventually pay should be sensitive to the income differences among households. It should follow the block pricing policy that is implemented by water distributors.
3. Public hearings and consultations with stakeholders need to be held before prices and the payment mechanism are finalized. As in most other cases where a previously free good has become a costed item, there will be a lot of debate and disagreement about the merits of this move. However, since the national leadership has already provided guidelines regarding water pricing, the relevant agencies should not lose this chance to implement it.
4. If the water user fee is added to the water bill, it should be clearly highlighted and demarcated. It should also be remitted by the concessionaires to a special account. A multi-sectoral council should be created to manage this account. There should also be transparency and accountability as to where the funds go to convince the water users that their contributions are not wasted.
5. An alternative mechanism to that used by the Community Based Forest Management Special Account and the Integrated Protected Areas Fund should be employed. Money for these two funds is remitted to the National Treasury. This set-up has resulted in difficulties and delays when funds are released.
6. Strong internal and external auditing is important to safeguard the water users' contributions. While many respondents are willing to pay, they are wary that the funds will not be used for the intended purposes.

7. The share of the protection fund distributed to each watershed area should be based on that watershed's contribution to water supply and its need for rehabilitation and protection.
8. This study only focused on the willingness to pay for improved watershed management of households in Metro Manila. It did not consider other user groups. The willingness to pay of these other groups, e.g. industrial, commercial, and agricultural sectors, should be investigated.

REFERENCES

- Alikpala, Ramon B. Personal Communication. March 11, 2004.
- Bateman, I. J. et al. 2002. Economic Valuation with Stated Preference Techniques, A Manual. United Kingdom: Edward Elgar Publishing Limited. 458 pp.
- Boland, J. and D. Whittington. 2000. The Political Economy of Water Tariff Design in Developing Countries: Increasing Block Tariff versus Uniform Price with Rebate *in* The Political Economy of Water Pricing Reforms, A. Dinar, Editor. Oxford University Press.
- Castillo, I. A. 2002. Collection and Disbursement of Integrated Protected Areas Fund. Paper presented during the National Stakeholders Workshop on Institutionalization of Economic Instruments in Managing Philippine Natural Resources, Pasig City, Philippines.
- Champ, P.A., K.J. Boyle and T.C. Brown. 2003. A Primer on Non-market Valuation. The Economics of Non-Market Goods and Resources. The Netherlands: Kluwer Academic Publishers. 576 pp.
- David, C. and A. B. Inocencio. 2001. Urban Water Pricing: Metro Manila and Metro Cebu *in* Enhancing and Sustaining Stakeholders' Participation in Watershed Management. General Technical Report Series 9. The Committee on Natural Resources, Philippine House of Representatives and the Forestry Development Center, University of the Philippines Los Baños.
- DENR Administrative Order No. 98-44. 1998. Guidelines on the Establishment and Management of the CBFM Special Account.
- DENR Administrative Order No. 96-40. 1996. Revised Implementing Rules and Regulations of Republic Act No. 7942, Otherwise Known as the "Philippine Mining Act of 1995".

- Ebarvia, M.C.M. 2003. Pricing for Groundwater Use of Industries in Metro Manila, Philippines. EEPSEA Research Report. <http://203.116.43.77/publications/research1/ACF4D.html>.
- Executive Order No. 318. 2004. Promoting sustainable forest management in the Philippines.
- Executive Order No. 927. 1983. Further defining certain functions and powers of the Laguna Lake Development Authority.
- Forest Trends, World Resources Institute and The Katoomba Group. Undated. Developing Markets for Water Services from Forests: Issues and Lessons for Innovators. http://www.forest-trends.org/resources/pdf/Developing_Markets_for_Water_Services.pdf.
- Francisco, H. A. 2002. Watershed-Based Water Management Strategy: The Missing Link to Sustainable Water Services. Paper presented during the Policy Forum on Water Resource Management, Philippine Institute for Development Studies.
- Francisco H. A. 2002. Why Watershed-Based Water Management Makes Sense. Policy Notes 2002-09. Philippine Institute for Development Studies.
- Garn, H.A. Pricing and Demand Management: A Theme Paper on Managing Water Resources to Meet Megacity Needs. Unpublished Report. World Bank.
- Haab, T. C. and K. E. McConnell. 2002. Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation. United Kingdom: Edward Elgar Publishing Limited. 326 pp.
- http://www.adb.org/Documents/Events/2002/Third_Water_Forum/Maynilad.pdf
- <http://www.etpi.com.ph/aboutus/img/map.gif>
- http://www.forest-trends.org/resources/pdf/Developing_Market_for_Water_Services.pdf
- [http://www.iadb.org/int/jpn/English/support_files/Philippines Urban Water Case Study.pdf](http://www.iadb.org/int/jpn/English/support_files/Philippines_Urban_Water_Case_Study.pdf)
- Jakobsson, K. M. and A. K. Dragun. 1996. Contingent Valuation and Endangered Species: Methodological Issues and Application. UK and USA: Edward Elgar Publishing Limited. pp. 77-115.
- Javier, J. A. 2001. The Philippine Strategy for Improved Watershed Resources Management *in* Enhancing and Sustaining Stakeholders' Participation in Watershed Management. General Technical Report Series 9. The Committee on Natural Resources, Philippine House of Representatives and the Forestry Development Center, University of the Philippines Los Baños.

- Mendoza, Marlo. Personal communication. August 1, 2002.
- National Statistical Coordination Board. 2002. Philippine Statistical Yearbook.
- National Statistics Office. 2003. National Capital Region: Close to 10 Million Persons. 2003 Press Release No. 12.
- Oledan, M. T. 2000. Legal Basis of Charging Water User Fees: The LLDA Experience. Paper presented during the National Forum on the Legal Basis of Collecting Water User Fees for Philippine Watersheds, Pasig City, Philippines.
- Pashardes, P. And S. Hajispyrou. 2002. Consumer Demand and Welfare Under Increasing Block Pricing. Discussion Paper 2002-07, Department of Economics, University of Cyprus. <http://www.econ.ucy.ac.cy>
- Perrot-Maitre, D. And P. Davis. 2001. Case Studies of Markets and Innovative Financial Mechanisms for Water Services from Forests.
- Philippine Daily Inquirer. April 12, 2003. ERC Clears P0.0025/kwh hike for Napocor's watershed reservation.
- Philippine Daily Inquirer. March 20, 2004. Maynilad 'Bailout' Rapped. Palace Defends Deal, Says No Politics Involved.
- Presidential Decree 1067. 1976. Water Code of the Philippines.
- RAND Corporation. 2003. New York City Depends on Natural Water Filtration.
- Republic Act No. 7586. 1992. National Integrated Protected Areas System Act of 1992.
- Republic Act 7942. 1995. An Act Instituting a New System of Mineral Resource Exploration, Development, Utilization, and Conservation.
- Santos, E.C. 2003. Manila Water Supply Regulation. 3rd World Water Forum. Osaka, Japan.
- Sterner, T. 2003. Policy Instruments for Environmental and Natural Resource Management. Washington D. C.: Resources for the Future Press.
- Tabios, G. III Q. and C. C. David. 2002. Competing Uses of Water: Cases of Angat Reservoir, Laguna Lake and Groundwater Systems of Batangas City and Cebu City. Paper presented at the Water Resources Management Policy Forum, Philippines Institute for Developmental Studies, National Economic and Development Authority, Makati City.
- Tunstall, S., C. Green and J. Lord. 1988. The Evaluation of Environmental Goods by the Contingent Valuation Method. Flood Hazard Research Centre. Middlesex Polytechnic, Middlesex .

UNEP. 2002. Opportunities, Prospects, and Challenges for the Use of Economic Instruments in Environmental Policy Making. Draft report prepared by the International Working Group on Economic Instruments, UNEP.

Villenas, L. 2000. NWRB Regulatory Functions. Paper presented during the National Forum on the Legal Basis of Collecting Water User Fees for Philippine Watersheds, Pasig City, Philippines.

Whittington, D. 2002. Guidance Notes on Managing and Training Enumerators for Contingent Valuation Surveys in Developing Countries. (Draft Version)

www.islandwebs.net

APPENDIX A

DESCRIPTION OF THE STUDY AREAS

The Watersheds

The study focused on the four watersheds that supply water to Metro Manila, namely Angat, Ipo, Umiray and La Mesa. (Figure 1).

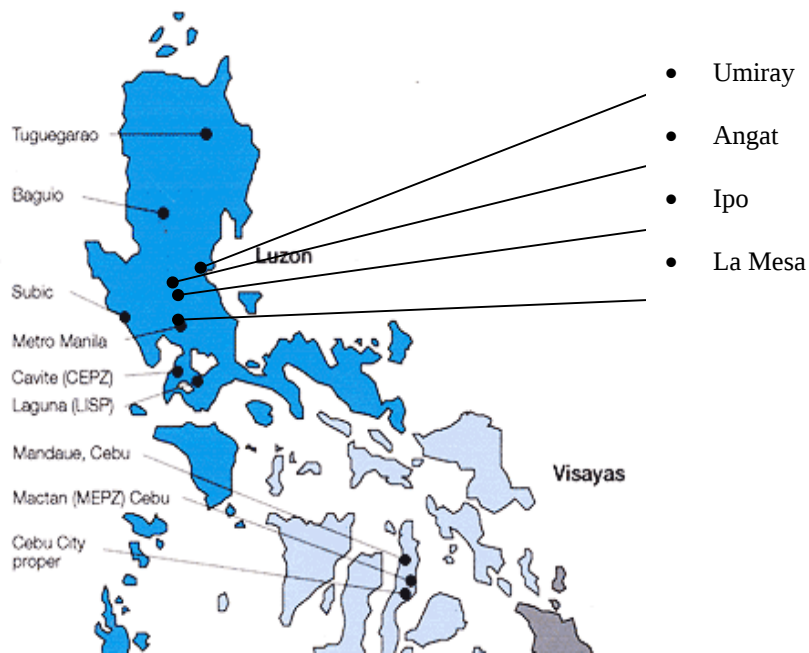


Figure 1. Map of the Philippines showing the relative location of the four watersheds

Angat watershed lies 58 km northeast of Metro Manila in the town of Norzagaray, Province of Bulacan. The Angat River basin is divided into two, the upper and lower basins. The lower basin has a total drainage area of 936 km² while the upper basin, which traverses down to the Angat dam, has an area of 568 km² ([http://www.iadb.org/int/jpn/English/support_files/Philippines Urban Water Case Study.pdf](http://www.iadb.org/int/jpn/English/support_files/Philippines_Urban_Water_Case_Study.pdf)). The area under the jurisdiction of the National Power Corporation is about 62,000 ha (personal communication, For. Mendel Garcia, February 13, 2004).



Figure 2. Angat watershed

(maximum rate capacity of 246MW), but it is also the lead agency in the management and protection of the entire Angat watershed. The dam irrigates about 30,000 ha of farmlands in the Provinces of Bulacan and nearby Pampanga through the management of the National Irrigation Administration.

Ipo watershed is situated in Sitio Ipo, Barangay San Mateo, Norzagaray, Bulacan, about 42 km

In 1967, a dam was built to serve as a water reservoir for irrigation and domestic use and power generation. The multi-purpose reservoir has a capacity of 640×10^6 m³ and regulates an average annual inflow of $1,894 \times 10^6$ m³. The reservoir supplies about 97% (about 4,000 MLD or 27-31 m³/s) of the raw water requirement of Metro Manila. The National Power Corporation (NPC) is not only responsible for the generation of hydroelectric



Source: www.mwss.gov.ph

Figure 3. Ipo watershed

north of Metro Manila. It is located downstream of the Angat watershed. In the 1920's, a dam was constructed with water being fed from the Angat basin. The Ipo dam is being used as a reservoir for the La Mesa dam. The Ipo watershed contributes $6.5 \text{ m}^3/\text{s}$ to the water supply.

The Umiray River Basin has an area of 538 km^2 . The Umiray River originates from the Sierra Madre Range and flows in a south-north direction to drain into the Pacific Ocean (Figure 4). The eastern



Figure 4. Umiray watershed

part is under the jurisdiction of Barangay Umiray, General Nakar, province of Quezon, while the western part falls under the jurisdiction of Barangay Umiray (Malamig) in Dingalan, Aurora. NWRB granted MWSS the right to abstract a total of $17.58 \text{ m}^3/\text{s}$ from the Umiray River for domestic use. The water is diverted through a 13-km long main diversion tunnel at a rate of $9 \text{ m}^3/\text{s}$ or 780 MLD (ADB 1996). The project is under MWSS, but the management of the watershed is under the Department of Environment and Natural Resources.



Source: www.mwss.gov.ph

Figure 5. The La Mesa reservoir

The La Mesa Watershed is situated 20 km north of Manila and spans the boundaries of Kalookan City, San Jose Del Monte, Bulacan and Rodriguez, Rizal.) It covers an area of 2,700 ha, with 2,050 ha of land and 650 ha of reservoir (Figure 3.5).

A reservoir was established in 1929 mainly to serve the water requirement of Metro Manila. Currently, the watershed contributes only 6% of the total water requirement of Metro Manila. At the southern end of the watershed, a filtration plant was established to handle the water generated from its reservoir, including water diverted from Angat and Ipo (about $33.5 - 37 \text{ m}^3/\text{s}$) to the Balara and La Mesa filtration plants.

entered into a Memorandum of Agreement. The foundation envisions a “conservation and education-interpretation” concept in managing La Mesa. With an initial planting program of 50 ha, the foundation has launched an ambitious conservation program (La Mesa Watershed Resource Management Framework Plan 2001).

The 25-year contract provides that MWSS shall be responsible for continued security, squatter relocation and wall construction, while the ABS-CBN Foundation shall handle reforestation, education, interpretation and visitor aspects, as well as the associated marketing and fund raising.

Only La Mesa has a perimeter fence. It is also the watershed with the greatest private sector involvement, e.g. tree planting, sponsorship of areas for reforestation, and other activities.

Metro Manila

The National Capital Region, more popularly known as Metropolitan Manila, covers 12 cities and five municipalities: the cities of Manila, Mandaluyong, Marikina, Pasig, Quezon, Caloocan, Valenzuela, Las Piñas, Makati, Muntinlupa, Parañaque and Pasay; and the municipalities of San Juan, Malabon, Navotas, Pateros and Taguig (Figure 3.6). Metro Manila is the second most populous region of the country (2000 Census of Population and Housing) and the most urbanized region of the country.

Metro Manila is located in west coast of Luzon, bounded by the province of Bulacan in the north, provinces of Laguna and Cavite in the south, Rizal province in the east and by the Manila Bay in the west. It has a total land area of 636 km².



Figure 6. Map of Metro Manila

The Water Concessionaires

The operational and investment functions of the Metropolitan Waterworks and Sewerage System (MWSS) were privatized on August 1, 1997 through an international bidding (MWSS 2004). MWSS retained the ownership of the facilities. Through a public-private partnership, it entered into a concession agreement with the Manila Water Company, Inc. (MWCI) and the Maynilad Water Services, Inc. (MWSI). Under the agreement, MWCI and MWSI are tasked to operate, maintain, rehabilitate, modernize and expand the water and sewerage systems and service delivery. On the other hand, it is the duty of MWSS to help the concessionaires meet their targets and obligations on time.

The privatization aimed to improve services (water availability for 24 hours, water pressure of about 16 psi, and water quality that meets the Philippine National Standards for Drinking Water), expand water, sewerage and sanitation services coverage, promote customer satisfaction, and eliminate the financial burden on the government (Santos 2003).

MWCI operates in the East Zone, which covers parts of Quezon City and Manila, Marikina, Mandaluyong, Makati, Pasig, San Juan, Taguig, all in Metro Manila, as well as Antipolo City and the municipalities of Angono, Baras, Binangonan, Cainta, Cardona, Jala-jala, Morong, Pililla, Rodriguez, San Mateo, Tanay, Taytay and Teresa in the province of Rizal.

MWCI is a Filipino firm that is owned by the Ayala family. Their partner is International Water Ltd. (IWL), which was formed by the US-based Bechtel Overseas Corp. and the UK firm Northeast Water. MWCI submitted a bid of P2.32/m³.

On the other hand, MWSI operates in the West Zone, which covers parts of Quezon City, Manila and Makati, Malabon, Navotas, Muntinlupa, Caloocan, Pasay, Parañaque, Las Piñas and Valenzuela, all in Metro Manila, and Imus, Bacoor, Kawit, Noveleta, Rosario and Cavite City in the province of Cavite.

MWSI is a Filipino firm owned by the Lopez family, in partnership with the French firm Lyonnaise Des Eaux. MWSI submitted a bid of P4.97/m³.

A serious problem suffered by both companies is the high proportion of non-revenue water (NRW), a problem that existed even before privatization. Non-revenue water is the term used for water that is unaccounted for, largely because of illegal connections, leaks and meter errors. Prior to privatization, MWSS's NRW was 61%. As of 2001, the NRWs of MWCI and MWSI are 48% and 66%, respectively. MWSI has reported losses from 1997 to 2001.

On December 9, 2002, MWSI filed a Notice of Early Termination, citing MWSS's Breaches of the Concession Agreement as Amended. The government did not approve MWSI's petition for rate increases, from which the company intended to generate funds to repay its loans (Philippine Daily Inquirer 2004). The government reached an agreement with Benpres Holdings, majority owner of MWSI, on March 18, 2004 where Benpres would write off its holdings in Maynilad and its joint venture with the France's Suez Group. This means that MWSI's unpaid concession fees of P8 billion would be converted into equity.

APPENDIX B

IMPROVED MANAGEMENT OF THE ANGAT, IPO, UMIRAY AND LA MESA WATERSHEDS IN LUZON, THE PHILIPPINES: A CONTINGENT VALUATION STUDY

QUESTIONNAIRE FOR HOUSEHOLDS

Good morning/afternoon/evening! I am from the University of the Philippines Los Baños, and I am part of a research team conducting a study to estimate the value of the improved management of the watersheds supplying water to Metro Manila. I would like to assure you that the information that you will reveal in this interview will be used solely for purposes of research, and that your identity as well as your answers will be treated with confidentiality. In answering my questions, please remember that there are no correct or wrong answers. We are just after your honest opinion.

Basic Information:

Name of Respondent: _____

Barangay: _____

Municipality/City: _____

Date of Interview: _____ **Interviewer:** _____

Time Interview Started: _____ **Time Interview Ended:** _____

Part I. Background Information

A. Water Source, Use and Expenditures

1. Please rank the following needs based on the difficulty you have in availing or buying them (1 is the most difficult to avail or buy)

_____ Food
_____ Clothing
_____ House/Shelter
_____ Water
_____ Electricity
_____ Education
_____ Others, pls specify _____

2. To which water distributor are you connected?

_____ Manila Water Company Inc
_____ Maynilad Water Services
_____ Others, please specify
_____ Not connected to any water distributor

3. What is your average water consumption/month? _____ cubic meters

4. How much do you pay for water/month on the average? ₱ _____

5. What is/are your other source/s of water?

Type	Ownership		Volume (m ³)	Frequency
	Own	Communal		
Deep Well				
Water Pump				
Water Vendor				
Others, Pls. Specify _____ _____				

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

7. In a day, what is the availability of water in your household? ____ hrs.

8. How would you rate the quality of water in your household? (Please check one)

_____ Highly acceptable (water can be drunk straight from the faucet)
_____ Moderately acceptable (water can be used for cooking, cleaning but not for drinking)
_____ Acceptable (water can be used for cleaning but not for cooking or drinking)

9. What are the major uses of water in your household? Please rank the following choices with 1 as the highest.

_____ Drinking
_____ Cooking
_____ Bathing
_____ Cleaning
_____ Laundry
_____ Others, pls specify _____

10. What do you think are the causes of water supply problems?

_____ Busted pipes
_____ Illegal connections
_____ Insufficient raw water during the dry season

_____ Deforestation
_____ Others, pls specify _____

11. What are the negative effects of the unstable water supply to your household?
- _____ Health problems
- _____ Higher expenditures for water (buying or boiling water)
- _____ Delays in doing household chores
- _____ Personal hygiene is affected
- _____ Others, pls specify _____
12. What do you think is the primary source of raw water being distributed by Maynilad/Manila Water? _____

B. Awareness about Watersheds

1. Do you know what a watershed is?
- _____ Yes (Proceed to #2, 3, 4, 5, 6)
- _____ No (Proceed to #2, except column 3, then to #7)
2. Please indicate on the following table whether or not you are familiar with the following watersheds/areas. If yes, please check your source/s of information.

WATERSHED/ AREA	FAMILIAR?		AWARE THAT THIS IS A WATERSHED?		SOURCE OF INFORMATION *					
	YES	NO	YES	NO	NP	RD	TV	R/F	WD	OTHERS
La Mesa										
Angat										
Umiray										
Ipo										

* NP – Newspaper; RD – Radio; TV- Television; R/F- Relatives/Friends; WD- Water Distributor

3. Which of the following statements do you think is/are true about watersheds?
- _____ Watersheds are the primary source of raw water.
- _____ Watersheds provide other goods like timber, rattan, and animal and plant products.
- _____ Watersheds provide other services like hydroelectric power, biodiversity conservation, recreation, and carbon sequestration.
- _____ A good forest cover enhances the way watersheds provide various goods and services.

- | | | | | | | | | | | |
|---------------|---|--|---|---|---|---|---|---|---|----------------|
| 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Not Important | | | | | | | | | | Very Important |

- ☐ absorb water and make this available for future use
☐ minimize floods during the rainy season
☐ improve water quality
☐ others, pls specify _____

- _____ they don't directly affect my household
 _____ I don't believe in their role in improving water supply
 _____ others, pls specify _____

- _____ Yes (Proceed to #8) _____ No

- _____ absorb water and make this available for future use
 _____ minimize floods during the rainy season
 _____ improve water quality
 _____ others, pls specify

A. Presentation of the Water Supply Situation

The domestic water supply of Metro Manila comes from the Angat, Ipo, Umiray and La Mesa Watersheds. The National Power Corporation has jurisdiction over the Angat, the Department of Environment and Natural Resources over Ipo and Umiray Watersheds, while the ABS-CBN Foundation, through its Bantay Kalikasan program, has been given the task of managing the La Mesa watershed.

Water distribution in Metro Manila used to be the job of the Manila Water and Sewerage System, a government agency. Recently, distribution has been privatized and is now being handled by the Manila Water Company (for the east zone) and the Maynilad Water Services (for the west zone).

The interviewer will show and discuss newspaper headlines about the water supply problems of Metro Manila in recent years.

Perhaps you are aware that water tariffs recently increased. You may also have heard about the problems the water distributors have encountered, for example, that one of them is losing money.

1. On a scale of 1-10, where 1 is not happy and 10 is very happy, how do you feel about the increase in water tariff?

1	2	3	4	5	6	7	8	9	10
Not Happy								Very Happy	

2. **For those who answered 6-10:** If you are happy about the increase in water tariff, it is because (you can choose more than one answer):

☐ I am sure this will result in a better water service
☐ I found the previous tariff too low
☐ I found the increase insignificant because my income is high enough
☐ Other reasons, please specify _____

3. **For those who answered 1-5:** If you are unhappy about the increase in water tariff, it is because (you can choose more than one answer):

☐ In general, I don't want a price increase
☐ I think the water company is passing on its inefficiency to consumers like me
☐ An increase in water tariff in the past did not result in improved water service
☐ There was no corresponding increase in my income, and the increase has reduced the amount of money left for my other needs
☐ Other reasons, please specify _____

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

The interviewer will describe the role of forests and watersheds in sustainable water supply and show pictures of degraded and well-managed watersheds.

The interviewer will demonstrate this using a plastic bottle cut into half with the smaller hole as the outlet, a container of water, and a piece of towel enough to cover the hole of the plastic bottle. Initially, only a small amount will be poured, which the towel will absorb. As more water is added, some of it will be drained or retained on the surface, representing a "flood."

A watershed is like a kitchen sink. You've seen how the kitchen sink catches water from the faucet and drains this into an outlet. The watershed works in a similar manner. It also catches water, though from the rain and not from the faucet, and drains the water through a network of rivers and streams in the area, until it reaches a common outlet.

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

However, the amount of water that can be stored in the watershed is largely affected by its land uses. It is widely accepted that maintaining a good forest cover increases the capacity of the watershed to store water and regulate its flow. But as you may already know, our country is fast losing its forest cover. Deforestation and poor land use practices are common and these have damaged the hydrologic condition of many of our watersheds. As a consequence, floods during the rainy season and droughts during the dry season are common.

C. *The Trust Fund*

Background of the Trust Fund

At present, the money paid by water users to the water distributors is mainly for treating and distributing water to the users. Very little, if any, is used for watershed management. The agencies responsible for managing and protecting the watersheds lack the financial resources necessary to effectively carry out their tasks. If these agencies have additional funds, they can:

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

The CV Question

Studies similar to this one have been conducted to estimate people's willingness to pay for the improvement of an environmental good. The respondents were presented hypothetical situations, and the payments were also hypothetical, as they will be for you. (In other words, the new situation described did not actually exist yet, and the respondents did not have to pay anything on the spot). The results of these studies show that some people tend not to reveal their true willingness to pay. Or they simply choose not to cooperate.

Why would a respondent not reveal his or her willingness to pay or refuse to cooperate? I guess the most obvious answer is that the respondents are afraid that they might actually be made to pay.

But I would like to request you to think carefully about whether you really care for reliable water supply or not. Also remember that this study was not commissioned by the water distributors but came about because of the research team's desire to find out how water users feel about protecting the basic resource that produces water. There are really no right or wrong answers to the questions that I will pose.

Suppose a trust fund for the improved management of the four watersheds will be created. The trust fund will be managed by a council composed of various stakeholders - water users like you, water distributors (Maynilad and Manila Water), government (Department of Environment and Natural Resources/National Water Resources Board, Manila Water and Sewerage System), Local Water Utilities Administration, local government units, non-government organizations, and the academe. This council will decide the activities that will be supported by the fund, all of which should directly be related to watershed management. Under no circumstance will the fund be used for any other purpose.

Prior to the establishment of this trust fund, the government will consult the water users through a referendum. The result of the referendum will determine whether the trust fund for the management of the watershed will be established or not.

(NOTE TO THE ENUMERATOR: Before proceeding to the next question, make sure the respondent fully understood the concept of trust fund)

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

1. If you will participate in a referendum, will you vote for a legislation that will create the trust fund if its passage will require all water users to contribute ₱____ / household/month to this trust fund?
☐ Yes (Proceed to #2, #2a & #4)
☐ No (Proceed to #3)

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

1. If you will participate in a referendum, will you vote for a legislation that will create the trust fund if its passage will require all water users to contribute ₱____ / household/month to this trust fund.? I would like to inform you that the legislation will also make other groups benefiting from the watershed, e.g. hydroelectric power consumers, industries, recreationists pay a corresponding amount?
☐ Yes (Proceed to #2, #2a & #4)
☐ No (Proceed to #3)

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

2. How sure are you of your answer in #1? On a scale of 1-10, where 1 is not sure and 10 is very sure, choose and encircle your answer.

1	2	3	4	5	6	7	8	9	10
Not sure									Very Sure

- 2a. If your answer in #2 is not 10, please explain why you have some doubts about your willingness to pay.

Proceed to #4

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

_____ Yes => If yes, how much? P_____

_____ No (Proceed to #5)

_____ Yes, but with condition (please see table below)

Check	Reason	Suggestions
	I do not trust the council that will administer the fund	
	I do not believe in the referendum process	
	Others, please specify	

4. Please indicate the reason/s why you are willing to contribute to the fund (Check and rank).

_____ I want more reliable water supply.

_____ I want the watersheds to continue producing other environmental services like flood control, biodiversity conservation, recreation and carbon sequestration.

_____ I would like the future generations to have reliable water supply, too.

_____ I believe that the council will do a good job in administering the fund.

_____ Other reasons, please explain _____

5. If you are not willing to contribute any amount to the fund, please identify your reason/s (Check and rank).

☐ I cannot afford to pay any additional amount to what I am currently paying.
☐ I think the water tariff I am paying at present is already too high.
☐ I think it should be the government that should finance the watershed management activities
☐ I do not care about the reliability of water supply.
☐ I do not believe that paying will result in improved watershed management.
☐ I do not believe that improved watershed management will result in more reliable water supply.
☐ I do not fully understand the question.
☐ Other reasons, please identify _____

Part III. Assessment of Institutional Arrangements

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

☐ Amount to be added to water bill as trust fund, which is to be managed by the council
☐ A separate agency/office will collect the fee
☐ Other means, pls specify _____

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

☐ Volume of water used
☐ Income
☐ Number of members in the household
☐ Flat rate
☐ Others, pls specify _____

Part IV. Socio-economic Information

1. Age: _____
2. Gender: _____ Male _____ Female
3. Civil Status: _____ Single _____ Married _____ Widow/er
4. Educational attainment:
 - _____ No formal schooling
 - _____ Elementary level (indicate grade)
 - _____ Elementary graduate
 - _____ High school level (indicate year)
 - _____ High school graduate
 - _____ Vocational
 - _____ College level (indicate year)
 - _____ College graduate (indicate course)
 - _____ Master's degree units (indicate field)
 - _____ Master's degree holder (indicate field)
 - _____ PhD/MD/DDM/DVM/LIB units (please encircle)
 - _____ PhD/MD/DDM/DVM/LIB graduate (please encircle)
 - _____ Others, please specify _____
5. Occupation
 - _____ Unemployed
 - _____ Self-employed
 - _____ Government employee
 - _____ Private sector employee
 - _____ Others, please specify _____
6. Household Size:
 - _____ Adults (15 years and above)
 - _____ Children (14 yrs and below)

7. How many in your family, including yourself, is/are gainfully employed? _____

What is the annual income of each member of the household who is/are gainfully employed?
Please be assured that the information you will reveal is for research purposes only.

Household Member	Income			
	Main		Other Source	
	Type*	Amount (₱)	Type*	Amount (₱)

* Employee, Business, etc.

8. Ownership of House:

_____ Owned

_____ Rented

_____ Living with relative

Thank you very much for your cooperation and help.