



Are People Willing to Pay for Improved Water Supply?  
Evidence from Metro Manila and Camarines Sur

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# **Are People Willing to Pay for Improved Water Supply? Evidence from Metro Manila and Camarines Sur**

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## **Abstract**

We compare the results of two contingent valuation studies undertaken in Metro Manila and Camarines Sur that estimate households' willingness to pay (WTP) for the improved management of four watersheds supplying water to Metro Manila and of Mt. Isarog Natural Park. Estimated using the logit models, WTPs are P29/household/month for Metro Manila and P55/household/month for Camarines Sur. In both areas, the respondents' main reason for their WTP is the desire to secure the reliability of water supply, both for present and future uses. In contrast, those not willing to pay believe that the management of these resources is the government's responsibility. In both areas, the respondents prefer the water user fee to be added to their monthly water bills.

## **1. Introduction**

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. 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, studies were conducted by researchers from the University of the Philippines Los Baños to look into people's attitudes towards and evaluate their willingness to pay for watershed conservation. These studies represent 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 Study Areas*

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.

On the other hand, Mt. Isarog is a solitary volcanic cone type mountain located at 13° 40' N and 123° 21' E in Southeastern Luzon, Philippines. It is the largest and tallest mountain the Camarines Sur with an area of 10,112 ha and at a height of 1966 meters above sea level (masl). It was proclaimed a national park by virtue of Proclamation No. 293 on July 20, 1938 and is now known as the Mt. Isarog Natural Park (MINP) by virtue of Proclamation No. 214 dated June 20, 2002.

MINP is also an important watershed, providing water to 15 municipalities and a city, and irrigates 67,400 ha of agricultural land. The Metro Naga Water District (MNWD) and Pili Water District (PIWAD) tap the abundant potable water coming from the park. The Partido Development Authority and other municipal waterworks also source water from MINP.

The Department of Environment and Natural Resources (DENR) has jurisdiction over Mt. Isarog. The continued financing of management activities, however, is constrained by the limited budget of DENR and LGUs and the short term project funding from NGOs. Thus far, the management of MINP largely depended on funds from these NGOs.

There is a felt need to ensure the continuous financing of management interventions in these watersheds. If these interventions will not be undertaken or sustained, the ecological balance, hydrological services and economic security of people dependent on the park can be adversely affected. Clearly, funds from the usual government and non-government sources are not enough, and may not last. Hence, revenues need to be generated from other sources, and one possibility is to put prices on the goods and services that these watersheds produce, and collect these prices.

### *Objectives of the Paper*

This paper compares the results of two contingent valuation studies undertaken in Metro Manila and Camarines Sur to estimate households' willingness to pay for the improved management of four watersheds supplying water to Metro Manila and the improved management of the Mt. Isarog Natural Park, a protected area. Among other things, the studies aimed to: evaluate the respondents' level of awareness about the importance of watersheds in ensuring a sustainable water supply; determine the water users' willingness to pay (WTP) and the amount they are willing to pay for the protection and conservation of the watersheds; and identify the factors that affect the water users' WTP.

## **2. Methodology**

### *Preliminary Activities*

Two focus group discussions (FGDs) for each of the study sites were conducted before the contingent valuation (CV) survey took place. The first FGD was with government agencies and water distributors, while water users attended the second FGD. The enumerators involved in the study underwent training, the topics and activities of which were based on Whittington (2002). Several pre-tests were conducted to hone the skills of the enumerators, generate the bid amounts, and refine the questionnaire.

The National Statistics Office (NSO) generated the sample for the Metro Manila study, which covered 13 municipalities/cities, 168 barangays, and 2,240 respondents.<sup>For</sup> <sup>MINP,</sup> the number of respondents in the survey and their distribution among the city and towns were determined using stratified systematic sampling. The target number of respondents of 1,500 was proportionately allocated between MNWD and PIWAD based on the number of barangays and households per barangay.

### *The Interview Schedule*

The interview schedule was first developed for the Metro Manila study, and was later adopted and modified for the Mt. Isarog study. The interview schedule had four parts. The first part asks about background information on the household's water source, use and expenditures, and awareness about watersheds. The second part presents a brief description of the current water supply situation in the area, discusses the role of forests and watersheds in sustainable water supply, describes the hypothetical trust fund that will be created, and asks the CV question. The third part assesses the preferred institutional arrangements, while the last part is about the socio-economic background of the respondent.

The contingent valuation (CV) question was asked using the dichotomous choice referendum format. This format simplifies the respondent's task because he or she will only decide on one price, and provides incentive for the respondent to reveal his or her true preference (Bateman et al. 2002). Each respondent was asked whether he or she would vote for a legislation that would create a trust fund for the protection and

conservation of the watershed/s if his or her household would have to pay the bid amount per month.

Two scenarios were used: the first did not mention that other users of watershed services would be made to pay, while the second mentioned that they would be made to pay. It was emphasized that a council composed of various stakeholders would manage the trust fund. The council would decide which activities would be supported by the fund, all of which should be directly related to watershed management. The questionnaire was translated to Filipino to facilitate its use.

#### *Development of the CV Model*

The binomial logit model was used to determine the respondents' WTP 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:

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

where:  $WTP = 1$  is equivalent to the "yes" response,  
 $X_1, X_2, \dots, X_m$  are independent variables, and  
 $A$  is the bid amount.

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

$$mean = \gamma / \hat{\beta}_n \quad (2)$$

where:  $\gamma$  is the estimated constant plus the coefficient estimates of the other variables multiplied by their respective mean values;  
 $\hat{\beta}_n$  is the estimated coefficient of the bid amount variable.

### **3. Results**

#### *Awareness about Watersheds and Forests*

Among other things, the studies sought to evaluate the levels of awareness about forests and watersheds. Out of the total number of 2,232 respondents from Metro Manila, only 16 percent knew what a watershed was (Table 1). This lack of awareness was slightly higher among those served by MWSI than MWCI (86% and 81%,

respectively). On the other hand, 91 percent of respondents knew about the role of forests in ensuring a sustainable water supply.

For Mt. Isarog, there were fewer respondents who were aware what watersheds are (32 percent for MNWD and 35 percent for PIWAD). However, almost all respondents for Mt. Isarog were aware of the role of forests in water supply. Furthermore, 94 percent of all respondents were familiar with Mt. Isarog, and 96 percent of those who knew about watersheds (474 out of 495 respondents) were also aware that Mt. Isarog is a watershed.

#### *Equations and Mean WTP Estimates*

Table 2 shows the equations generated for Metro Manila and Mt. Isarog the mean WTP estimates for the general models (i.e., those that considered all respondents) and the models by water distributor/district.

In general, the mean WTPs of Metro Manila respondents are lower than those of Mt. Isarog respondents. The mean WTP for Metro Manila's general model, was ₱29.11/mo. Furthermore, the mean WTP of MWSI water users was about twice that of MWCI's (i.e. ₱37.98/mo and ₱19.31/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.

For Mt. Isarog's general model, the mean WTP was ₱ 55.14/mo. This was the amount that respondents on the average were willing to pay on top of their current monthly water bill as their contribution for the management of Mt. Isarog. Furthermore, the mean WTP of MNWD respondents was about P5 higher than the mean WTP of PIWAD respondents. This may be because of the higher mean income of MNWD respondents (P12,485/mo) compared to that of PIWAD respondents (P8,870/mo). Also, the water tariff of MNWD is lower than that of PIWAD (e.g. P87.50 for the first 10 m<sup>3</sup> for MNWD against P189.00 for the first 10 m<sup>3</sup> for PIWAD).

#### *Factors Affecting WTP*

The significant variables of the models for Metro Manila and Mt. Isarog (at 10% significance level) are given in Tables 3 and 4, respectively. For both the Metro Manila and Mt. Isarog, bid amount (BA) was consistently significant, the negative sign of which is consistent with expectations.

Age was a significant variable for the three Mt. Isarog models. Age had a negative relationship with the probability of a "yes" response, which means that younger respondents were more likely to say "yes" to the WTP question. This may be because younger respondents were more financially stable and had a higher level of awareness about the environment. Furthermore, since the CV question was not significant, this implies that knowledge about other users being made to pay for other watershed services does not affect WTP.

Mt. Isarog's general model shows that 12 enumerators are significant. This means that these enumerators could have shown some bias in eliciting WTP. The large number of enumerators involved in the study could explain this. Bateman *et al.* (2002)

note that interviewer effects or biases have been observed in many studies. However, they find that the magnitude of the effects, while variable, is relatively minor.

#### *Reasons Why Respondents are Willing or Not Willing to Pay*

Fifty-eight percent (58%) and 54% of the respondents from Metro Manila and Mt. Isarog, respectively, indicated a WTP for watershed conservation. The most common reason was they wanted reliable water supply (Table 5). On the other hand, those who were not willing to pay reasoned that watershed conservation is the government's responsibility, they could not afford to pay, and they found the water tariff to be already high.

#### *Respondents' Preferred Collection Mechanism*

About half of the respondents for the Metro Manila and Mt. Isarog studies preferred that the water user fee be added to the monthly water bill. The respondents explained that this would be convenient as it would require them to only make one payment. However, they also emphasized that the water user fee should be highlighted in their bills so that their payments would be used as intended.

Conversely, some respondents said they would prefer another agency to collect their payments, mainly because they did not trust the concessionaires. Some respondents would like their payments to be voluntary or channeled through their barangay.

Most of the respondents would like the water user fee 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. Some respondents opted for a flat rate system, where they would pay the same amount regardless of the volume of water consumed.

## **4. Conclusions**

1. The respondents in the two studies generally have a low level of awareness about watersheds, but have a high level of awareness about the role of forests in securing water supply. This points to the need for a campaign to inform the people about the importance of watersheds.
2. In general, residents from Metro Manila and four towns and one city in Camarines Sur are willing to pay for the improved management of the watersheds.
3. The estimated mean willingness to pay for Metro Manila and Mt. Isarog amount to P29/household/month and P55/household/month. These amounts may be insignificant to some water users, but substantial to others.

For Metro Manila, the important factors affecting WTP are: bid amount, connection to water distributor, additional water expenses, and occupation.

For Mt. Isarog, the important factors that affected the respondents' willingness to pay were bid amount, monthly income, and age.

4. 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. The respondents are willing to pay mainly because they want a reliable water supply for both present and future generations. They also want the watersheds to continue producing other environmental services. Some 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. 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.

## **5. Recommendations**

1. Information, education and communication (IEC) activities should be heightened to inform people about the importance of watersheds.
2. A water user fee should be implemented in both study areas to capture the willingness of its residents to pay for the improved management of the 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. 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.
6. The willingness to pay of these other groups, e.g. industrial, commercial, and agricultural sectors, should be investigated.

Table 1. Awareness about forests, watersheds (for both study sites) and Mt. Isarog (for Camarines Sur only).

Item	Response	Metro Manila			Camarines Sur		
		MWCI	MWSI	Total	MNWD	PIWAD	Total
Watersheds	Aware	19	14	16	32	35	33
	Not aware	81	86	84	68	65	67
	Total	100	100	100	100	100	100
Forests	Aware	87	94	91	99	99	99
	Not aware	13	6	9	1	1	1
	Total	100	100	100	100	100	100
Mt. Isarog	Familiar				94	94	94
	Not familiar				6	6	6
	Aware as watershed				9	100	96
	Not aware				6	0	4

Table 2. Equations and mean WTP estimates for Metro Manila and Mt. Isarog.

MODEL	EQUATION		MEAN WTP (P/MO)
	$\gamma$	$\hat{\beta}_n$	
<b>Metro Manila</b>			
A (General Model)	0.341710610	- 0.0117403	29.11
B (MWSI)	0.464655000	- 0.0122318	37.98
C (MWCI)	0.219609228	- 0.0113695	19.31
<b>Mt. Isarog</b>			
A (General Model)	1.553421279	-0.0281712	55.14
B (MNWD)	1.529540000	- 0.0276070	55.40
C (PIWAD)	1.221877720	- 0.0242380	50.41

Table 3. Significant factors affecting WTP, Metro Manila.

VARIABLE	MODEL A	MODEL B	MODEL C
BA	-0.0117403 (0.000)	-0.0122318 (0.000)	-0.0113695 (0.000)
WDist	-0.2052112 (0.025)		
WExp	0.0002374 (0.027)		
WDCon		-0.3723940 (0.023)	
Occ1	0.1735257 (0.088)		
Occ3	0.3637454 (0.004)	0.3877312 (0.023)	
Inc			0.0000007 (0.098)
Age		-0.0108988 (0.027)	
O1		-17.5141000 (0.000)	
O2		-17.6247600 (0.000)	
O3		-17.5257200 (0.000)	

Table 4. Significant factors affecting WTP, Mt. Isarog.

<b>VARIABLE</b>	<b>MODEL A</b>	<b>MODEL B</b>	<b>MODEL C</b>
Naga	-0.3268227 (0.016)	-0.4058900 (0.016)	n.a.
E1	n.s.	n.s.	1.7546250 (0.003)
E2	0.9010936 (0.008)	n.s.	1.2927870 (0.022)
E3	-0.7978899 (0.004)	n.s.	n.s.
E4	2.2791010 (0.000)	2.5008680 (0.000)	n.s.
E5	-1.3305810 (0.000)	n.s.	n.s.
E6	n.s.	n.s.	1.1230360 (0.036)
E7	n.s.	n.s.	1.3073920 (0.041)
E8	-1.2528480 (0.000)	n.s.	n.s.
E9	n.s.	n.s.	1.4292180 (0.019)
E10	-1.2999700 (0.000)	n.s.	n.s.
E11	1.6947930 (0.000)	2.1462940 (0.000)	1.9963010 (0.007)
E12	n.s.	n.s.	1.4373540 (0.006)
E13	-0.9447335 (0.000)	n.s.	n.s.
E15	-1.2241450 (0.000)	-1.3256600 (0.000)	1.1456930 (0.024)
E16	-1.1852900 (0.000)	n.s.	n.s.
E17	-0.7829708 (0.004)	n.s.	n.s.
E18	-0.8466305 (0.002)	n.s.	n.s.
Know WS	0.3155369 (0.026)	0.4360620 (0.006)	n.s.
Bid amount	-0.0281712 (0.000)	-0.0276100 (0.000)	-0.0242400 (0.000)

VARIABLE	MODEL A	MODEL B	MODEL C
Age	-0.0163812 (0.001)	-0.0150600 (0.006)	-0.0302600 (0.005)
Occ1	2.2754130 (0.009)	2.1655360 (0.016)	n.s.
Occ2	2.3290080 (0.008)	2.2999500 (0.010)	n.s.
Occ3	2.3971100 (0.007)	2.2414030 (0.014)	n.s.
Occ4	2.3997160 (0.007)	2.2620750 (0.014)	n.s.
Occ5	2.4653000 (0.008)	2.2842760 (0.018)	n.s.
Occ6	2.2233920 (0.012)	2.0205360 (0.033)	n.s.
Monthly income	0.0000308 (0.000)	0.0000276 (0.001)	0.0000509 (0.005)
Water consumption	n.s.	-0.0220400 (0.032)	n.s.
Water expenditure	n.s.	0.0020610 (0.031)	n.s.
Single	n.s.	n.s.	15.1193400 (0.000)
Married	n.s.	n.s.	15.2818400 (0.000)
Widow/er	n.s.	n.s.	16.1285400 (0.000)

n.s. – not significant at 10% significance level

n.a. – not applicable

**Definition of significant variables:**

$E_n$  -Enumerator number; the 12 enumerators involved in the survey were included in the model using dummy variables, e.g.  $E_1$ ,  $E_2$ , etc.

Know WS - Knowledge or awareness about watersheds based on respondents' answers (yes or no) to a question asking if they knew what a watershed is; follow-up questions were asked to elicit extent of awareness

Age- Age of the respondent, in years

Bid amount - Bid amount presented to the respondent, ₱/month

Monthly income- Monthly income, ₱/month

Occ – Occupation: Occ1 – unemployed; Occ2– self-employed;

Occ3– government employee; Occ4– private employee;

Occ5– retired/pensioner; Occ6 – Farmer; Occ7 - Fisherman

Water consumption – volume of water consumed, m<sup>3</sup>/mo

Water expenditure – average monthly water bill, ₱/month

Civil status – Single, Married, Widow/er, Separated

Table 5. Reasons why respondents were willing or not willing to pay.

Willingness To Pay/Reasons*	Metro Manila			Mt. Isarog		
	MWSI	MWCI	All	MNWD	PIWAD	All
	%	%	%	%	%	%
<b>WILLING TO PAY</b>	<b>57</b>	<b>59</b>	<b>58</b>	<b>55</b>	<b>52</b>	<b>54</b>
Want reliable water supply	41	44	43	96	92	95
Responsibility as consumer				79	80	79
Continue to produce environmental services	17	15	16	82	92	84
Reliable water supply for the future generation	13	13	13	88	95	90
Believes in the council	3	3	3	66	75	68
Others	3	3	3			
<b>NOT WILLING TO PAY</b>	<b>43</b>	<b>41</b>	<b>42</b>	<b>45</b>	<b>48</b>	<b>46</b>
Cannot afford to pay	8	9	9	71	62	69
Water tariff is already too high	4	3	4	60	71	62
Government's responsibility	9	9	9	85	90	86
Don't care about reliable water supply	0.1	0	.05			
Don't believe additional payment will improve watershed management	1	1	1			
Don't understand the question	0	0	0			
Lack of trust in the council				51	81	56
Don't believe in additional payment will improve watershed management				16	71	26
Not connected to a water distributor				46	86	53
Others	3	3	3			

\*With multiple answers

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