WILLINGNESS TO PAY FOR CONSERVING LAYAWAN WATERSHED TOWARDS SUSTAINABLE DOMESTIC WATER SUPPLY IN OROQUIETA CITY, PHILIPPINES

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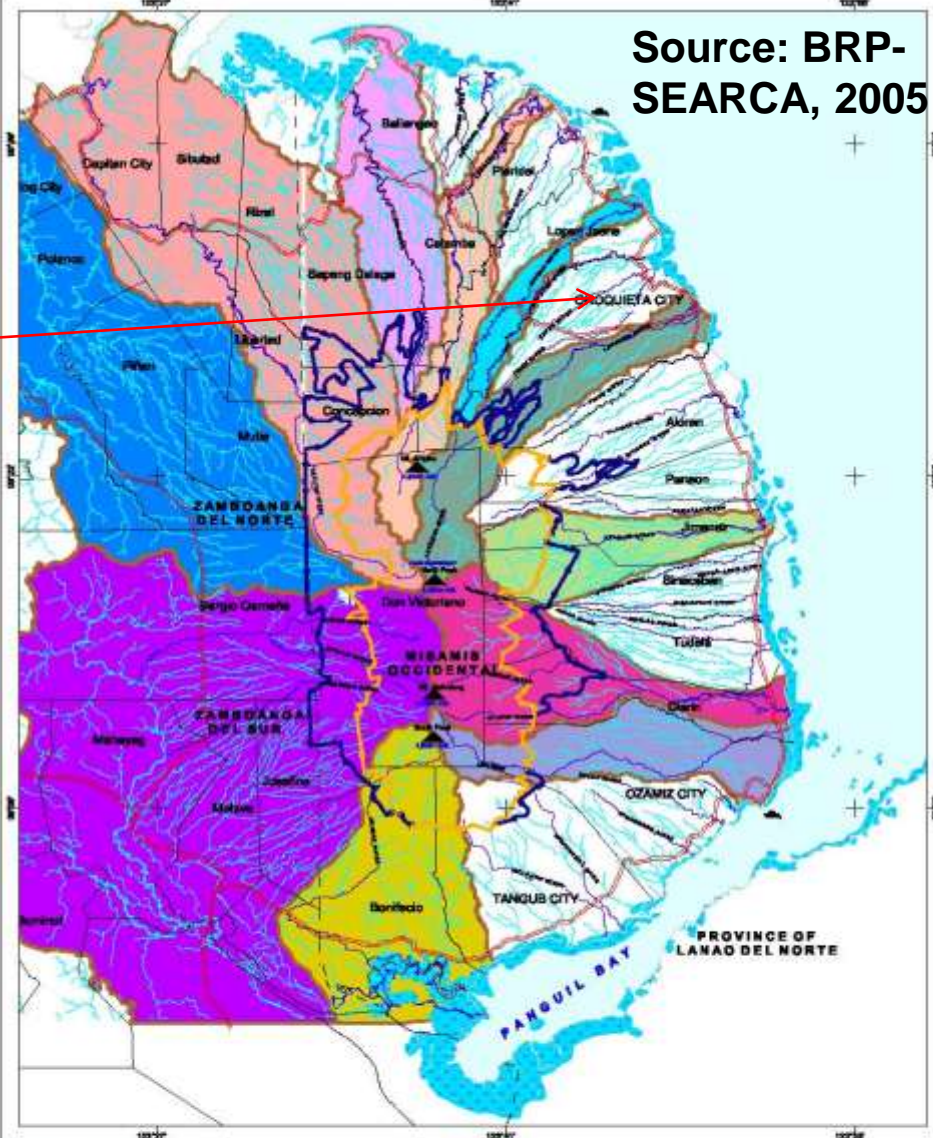
BRIEF OUTLINE OF PRESENTATION

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INTRODUCTION

Estimates of willingness to pay provide a measure of value for the benefits people get from the domestic water supply of Layawan watershed in Oroquieta City. Determining these estimates provide insight into the potential for generating community-sourced funding for community-based conservation projects in the upland to augment present level of watershed protection.

The Layawan watershed consists of the Layawan subwatershed, the Manimatay subwatershed, and the Panobigon subwatershed. It is mainly drained by the Layawan River that stretches 4,775m from the headwater to the convergence point, 4,200 m through the Manimatay stream, and another 1,450 for the Panobigon stream (Hansel, et al., 2006).

N

1971 Park boundary (RA 6266)
Municipal boundary
Provincial boundary

5   0   5   10

Kilometers

Statement of the Problem

What is the willingness to pay of the water users for the domestic water supply from the Layawan watershed at Oroquieta City? What are the factors that significantly affect this willingness to pay? Is there a potential to generate community-sourced funds to support community-based conservation activities in the Layawan watershed?

Objectives of the Study

The main objective of the study is to estimate the benefits and costs of conserving the Layawan watershed by determining the willingness to pay of the beneficiaries to fund conservation activities that will ensure the protection and sustainability of the water supply in Oroquieta City.

Specific Objectives

- The study aimed to assess if the nature of the payment scheme (mandatory or voluntary) and the provision of a money back guarantee as a provision point mechanism significantly affect WTP.

- The research also assessed the consistency of relationships observed between the WTP and independent variables with relevant economic theories.
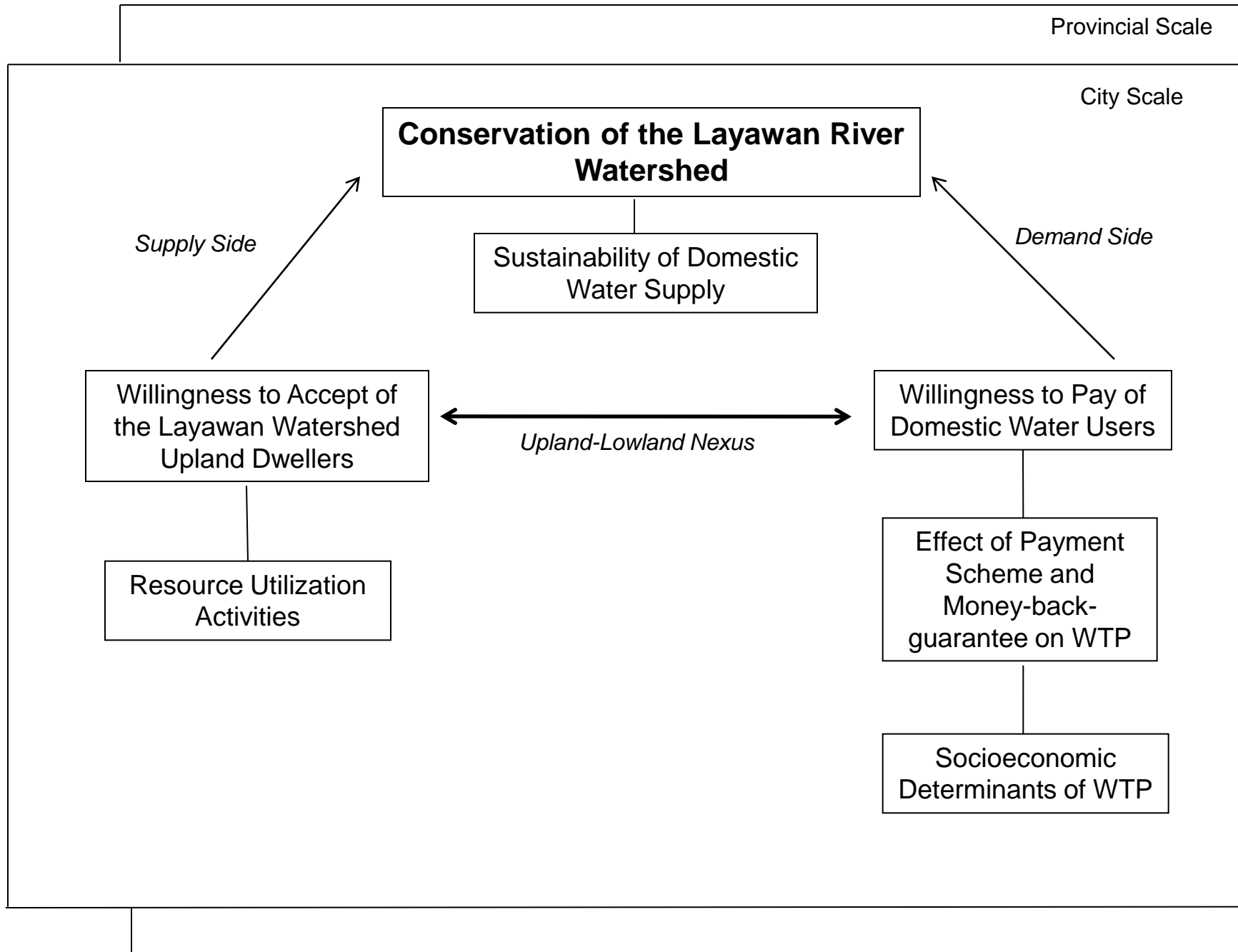
Study Framework

METHODOLOGY

- Secondary data collection, courtesy calls, Focus Group Discussion, Pretesting of questionnaire

- WTP survey in the Oroquieta City lowland by means of personal interviews with 278 household heads using closed ended iterative bidding format

- Subsamples for mandatory and voluntary schemes

- Monthly water bill as the payment vehicle for the implementation of the hypothetical program for the next five years

METHODOLOGY

- Analysis for WTP survey:
  - Frequency and percentage for respondents' profile
  - Non-parametric approach using the Kaplan-Meier limit estimator
  - Parametric approach using Heckman's two-stage analysis
  - Protest and certainty adjustments were done
- For WTA in the Upland: KII among Subanen elders and upland residents.
- Descriptive analysis for the KII results for WTA determination

Summary of Findings

Sample Profile

-There are more females than males at 69.42% and 30.58%, respectively.

-Majority are married at 74.82%, while 25.18% are either single, separated or widowed.

-The respondents are nearly equally distributed across the classes for productive age. The average age is 49.

-The average household size is 5.

-Majority are Catholics but there is a good diversity of religious affiliations.

-Majority of the respondents have earned degrees or units in the college level. This was followed by those who either attended or completed secondary education. The third are those who either attended or completed elementary education.

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Summary of Findings

Sample Profile

-Majority gave donations to other causes in the previous year (84.44%). Only 15.56% did not.

-74.1% does not have experience in being a member of an environmental organization. About 25.9% have experience in being a member or are currently members. These organizations include Bantay Lasang, Bantay Dagat, and church and school-based clusters that focus on solid waste management and regular community cleanups.

-The average monthly water bill per household is P300 (USD* 6.98)

-The average income is P10,074 (USD 234.28).

*USD 1 equivalent to P43.

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Summary of Findings

Environmental Perception and Awareness

- The three highest ranked general problems of the country are economy, poverty and corruption. The environment only ranked 6th. This means that the environment is not a priority concern for the Oroquieta populace.

- The three highest ranked environmental problems are solid waste, deforestation and climate change.

- Respondents are aware of the continued deforestation of Mt. Malindang. Majority (97.08%) believe that threats to the watershed are real. 70.86% believe that present collective management strategies are insufficient and further interventions are necessary.

Summary of Findings

Willingness to Pay

	YES		NO	
	Frequency	Percentage	Frequency	Percentage
Mandatory	108	75	36	25
Voluntary	99	73.88	35	26.12

Bid Values and Frequencies (Mandatory)

BID (in Php)	FREQUENCY	PERCENTAGE
P 0.00 (USD 0)	36	25
P 5.00 (USD 0.12)	54	37.5
P 10.00 (USD 0.23)	43	29.86
P 15.00 (0.34)	11	7.64
Total	144	100

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Summary of Findings

Bid Values and Frequencies (Voluntary)

BID (in Php)	FREQUENCY	PERCENTAGE
P 0.00 (USD 0)	35	26.12
P 5.00 (USD 0.12)	83	61.94
P 10.00 (USD 0.23)	2	1.49
P 15.00 (0.34)	14	10.45
Total	134	100

Some 25% of the mandatory subsample and 26.12% of the voluntary subsample gave 0 WTP value. Among the reasons cited for this are fear of corruption (23.75%), dislike of water bill increase (22.5%), insufficient income or inability to pay (20%), concern that the poor will be affected (18.75%) and others (15%).

Summary of Findings

Non-Parametric Estimation (Using Kaplan-Meier Product Limit Estimator)
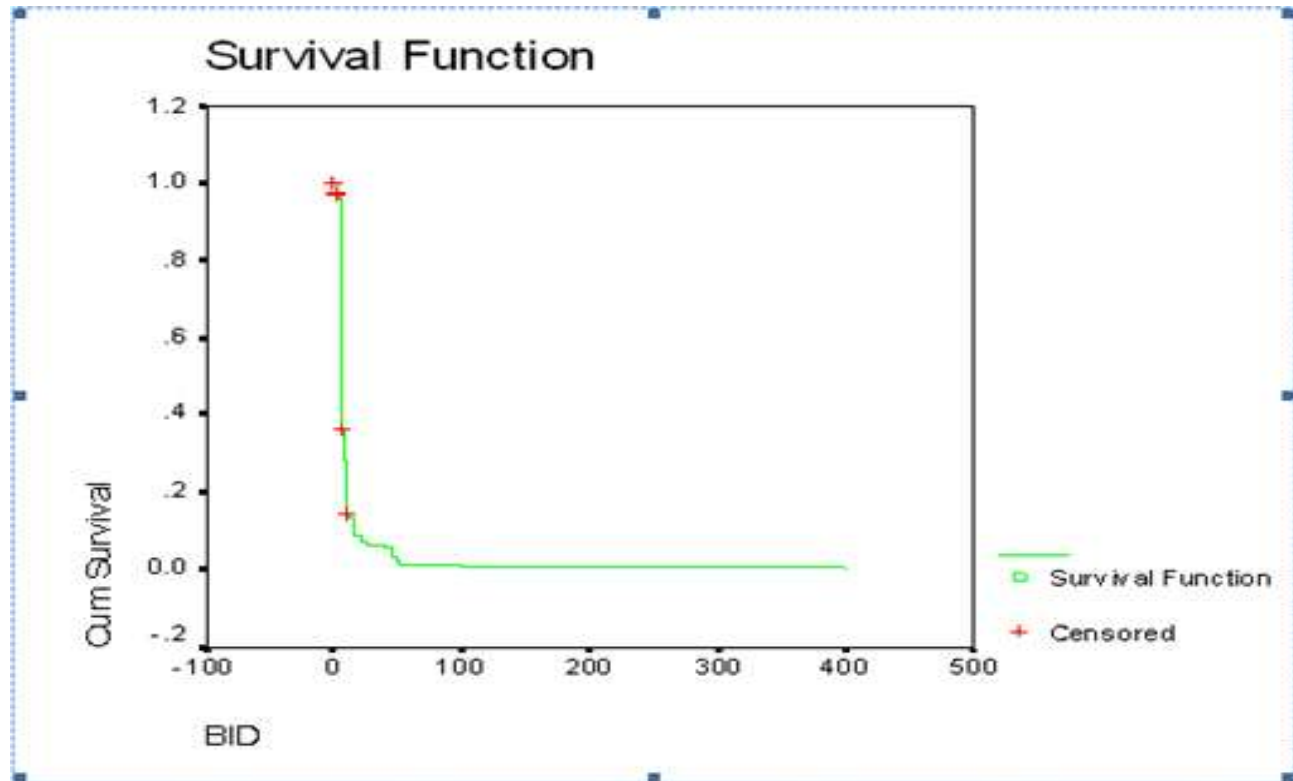
The survival function for the unadjusted pooled data. The red ticks show losses of survival.

Summary of Findings

Estimates from Non-Parametric Analysis

	WTP (in Php)		Standard Error		95% Confidence Interval	
	Mean	Median	Mean	Median	Mean	Median
Mandatory	10 (USD 0.23)	7.00 (USD 0.16)	1.25	-	7.52-12.41	-
Voluntary	13 (USD 0.30)	5.00 (USD 0.12)	4.39	0.10	4.62-21.82	4.80-5.20
Pooled	12 (USD 0.28)	5.00 (USD 0.12)	2.24	0.11	7.15-15.94	4.78-5.22

Mean of the voluntary scheme is higher than the mean of the mandatory scheme. But the median of the mandatory scheme is higher than that of the voluntary scheme. Since values overlap at the 95% confidence interval, there is no significant difference between the estimates of the two subsamples.
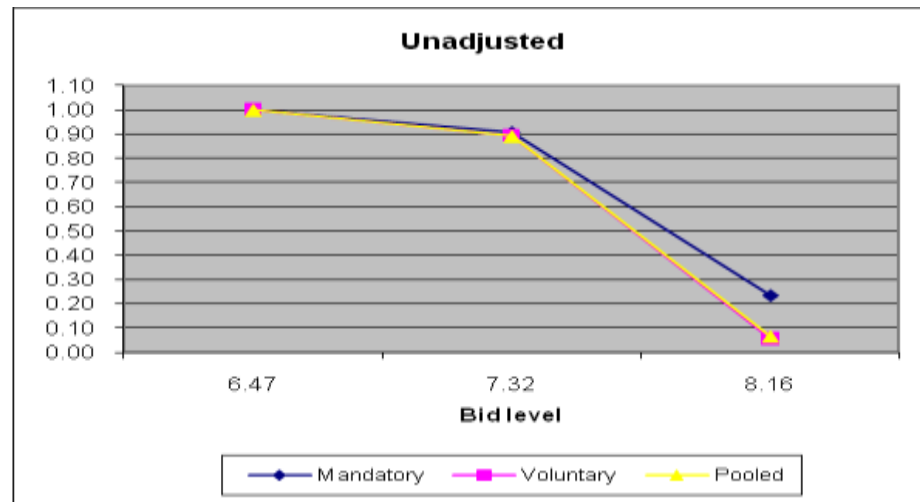
Summary of Findings

Protest and certainty adjustments were done. Results for protest adjustment showed that mean values became lower at P9 (USD 0.21) for mandatory, P12 (USD 0.28) for voluntary and P11 (USD 0.26) for pooled. Median is uniform at P5 (USD 0.12) for the three sets. Certainty adjustment yielded higher values at P10 (USD 0.23), P14 (USD 0.32) and P12 (USD 0.28) for the mandatory, voluntary and pooled sets, respectively.

Summary of Findings
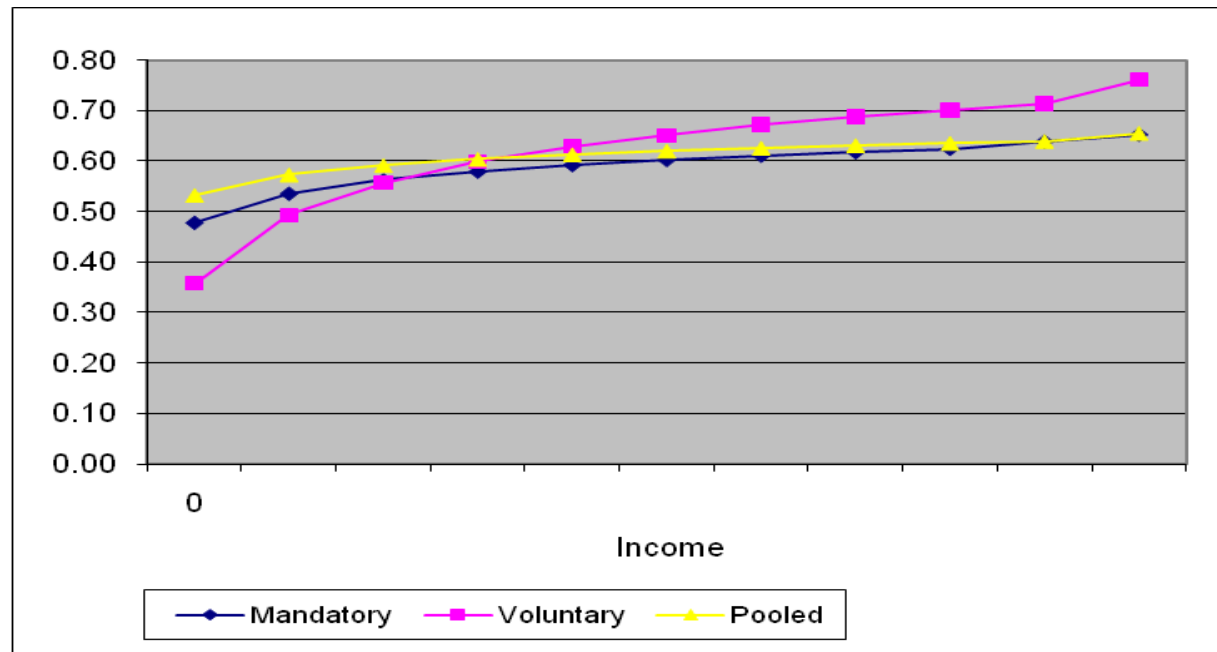## Parametric Estimation (Heckman's)

Bid level and WTP

A negative coefficient is observed for the bid level in its relation to the WTP.

Summary of Findings

Parametric Estimation (Heckman's)

Income and WTP

Income is positively related to WTP (1% level), consistent with the economic theory that as income increases, demand for a good also increases.

Summary of Findings
Parametric Estimation (Heckman's)

The Inverse Mill's Ratio (IMR) values from the two-stage analysis are -0.17, -0.33 and -0.35 for the mandatory, voluntary and pooled sets, respectively. These are negative and insignificant indicating that latent characteristics of households do not influence bid outcomes. Latent characteristics refer to the unobserved characteristics of households.

Summary of Findings
Parametric Estimation (Heckman's)

Other variables that are significantly related to WTP are education (5%, positive), religion (10%, Catholics are more likely willing to pay), civil status (10%, married respondents are more likely willing to pay), agreement to payment vehicle (1%, positive), membership to an environmental organization (5%, positive), experience in making donations (5%, negative), age (1%, negative), environmental awareness (1%, positive), knowledge of watershed importance (1%, positive) and knowledge that MMRNP is the only remaining representative natural forest in the Zamboanga peninsula (5%, negative). MBG is not significant.

WTP Mean Estimates

	Unadjusted Set		
	Mandatory	Voluntary	Pooled
Mean (in Php)	4.00 (USD 0.09) (L. B. 2.16) (U. B. 6.41) (s. e. 1.07)	6.00 (USD 0.14) (L. B. 5.28) (U. B. 7.68) (s. e. 0.60)	7.00 (USD 0.16) (L. B. 6.47) (U. B. 8.16) (s. e. 0.43)

Overlapping ranges mean values are not significantly different in 3 sets.

Extrapolation to Population (Discounted at 6%)

Aggregated to the household population and discounted at a rate of 6% for 5 years, it was found that potential collection can reach P 235,690 (USD 5,481.16), P 353,535 (USD 8,221.74) and P 412,458 (USD 9,592.05) for mandatory, voluntary and pooled schemes respectively.

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Indicative Willingness to Accept

- Farmers cultivate 3 has. of land on average.

- For reforestation and forest patrolling, indicative WTA is P150-235/day (USD 3.48-5.47).

Costs

- P 4M (USD 93,023.25) government allocation per year.

- P 1.36M (USD 31,627.91) goes to actual conservation activities

- P 600,000 (USD 13,953.48)for protected area patrolling
- P 200,000 (USD 4651.16) for biodiversity monitoring
- P 100,000 (USD 2,325.58) for training
- P 360,000 (USD 8,372.1) for hiring of forest guards
- P 100,000 (USD 2,325.58) for implementation of livelihood projects

The Upland Development Project is a key project with the following costing per hectare:

- Reforestation at P 15,490 (USD 360.23);
- Agroforestry establishment at P 32,183 (USD 748.44); and
- Nursery establishment at P 50,000 (USD 1,162.8)

A nursery of the above worth can contain 120,000 seedlings and reforest an area of 40 hectares.

(Source: Protected Area Management Bureau, Malindang Office)

Beliefs and Traditions of the Subanens

- The Subanens at Oroquieta City received the ancestral domain title in 2009.

- The Subanens believe that the forest is the dwelling place of divine spirits and spirits of the deceased.

- Because of these beliefs, all parts of the forest in the core protection are closed to timber extraction, and forest product harvesting among other activities that disturb the ecosystem. However, violations have remained prevalent.

- Interviewees attested to decrease in sighting of wildlife and soil fertility, more frequent occurrences of floods and warming of climate.

- Interviewees expressed willingness to participate in community-based programs for watershed protection.

CONCLUSION

- The residents of Oroquieta City have a positive willingness to accept for the conservation of Layawan Watershed.

- There is a potential to generate community-sourced funds for watershed conservation activities in the upland.

- Payment schemes and provision of money back guarantee (i. e. mandatory and voluntary) do not significantly affect WTP.

- A number of variables significantly affect WTP (e. g. bid level, income).

RECOMMENDATIONS

- Premium on water bill should follow mandatory scheme to ensure that the stakeholders of the resource, without exemption or decline of will, shall pay.

- A study in a similar context but using per cubic meter of water consumed as the basis for charging should be conducted.

- Other cities and municipalities who benefit from the water supply of the MMRNP should be explored as additional sources of conservation fund.

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Thank you

for listening.