DIRECT USE VALUE AND HOUSEHOLDS' PREFERENCES FOR WETLAND MANAGEMENT OF AGUSAN MARSH WILDLIFE SANCTUARY (AMWS) IN AGUSAN DEL SUR, PHILIPPINES

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ABSTRACT

This paper aimed to estimate the direct use value and analyze the households' preferences for wetland management of Agusan Marsh Wildlife Sanctuary (AMWS). Primary and secondary data was used to estimate the direct use value of AMWS using the market price method. Total direct use value of AMWS is PHP 91,612,719.50 from fisheries, agriculture, transport, and tourism sectors. Agriculture accounted for 97% of its total value. Choice experiment method was used to determine the preferences for AMWS wetland management using the Logit models. Results showed that all attributes except the number of migratory birds were significant. Of most importance was biodiversity followed by research and education uses and re-training of fishermen, farmers and loggers. Each household is willing to pay PHP27.71, PhP24.13, and PhP .44 for biodiversity, research and education uses and re-training of fishermen, farmers and loggers, respectively. Consequently, the implied willingness to pay (WTP) for an ideal improved management scenario is PhP95.84/household/year, when aggregated it amounts to PHP 12,174,503.67 for the entire Province.

Keywords: non-use value, choice experiment, attributes, logit models

1   INTRODUCTION

Wetlands play a major role in the ecosystem dynamics. It provides services that include economic, social and ecological contribution to man. Given its importance, information on its economic value is needed to efficiently use the resource and effectively undertake conservation measures. Economic valuation is the attempt to assign quantitative values togoods and services provided by environmental resources, whether market prices are available or not (Barbier et al. 1997). In the Philippines, there are resources that are both important for the country and its ASEAN neighbors such as the Agusan Marsh Wildlife Sanctuary (AMWS) in Agusan. It is a protected area, declared a Ramsar site in 1999 and included in the 1997 United Nations list of protected areas falling under category IV and one of the "Important Bird Areas" in the world. Conservation of this resource is needed to bolster economic development of the region through tourism and natural-based manufacturing. This paper is an attempt to help policy makers in the wise use of AMWS by providing data on its economic value to aid in the crafting of a sound management plan. It is important for policy-makers to take into consideration the value or the people's preferences on the wetland attributes for the improvement/management of the resource since the local people will be

directly affected. However, there is lack of information on the total economic value (both use and non-use) of the Sanctuary.

The study aimed to: 1) estimate the direct use value of AMWS in terms of fisheries, agriculture, transportation and tourism; 2) analyze the awareness and attitudes of the people of Agusan towards related environmental issues; 3) estimate people's willingness-to-pay for wetland management attributes; 4) rank marshland management attributes according to importance, and 5) formulate policy recommendations based on the results of the study.

2   REVIEW OF RELATED LITERATURE

Choice Modelling as an approach to estimate non-use value has been explored by Morrison et al*. (1998) for the Macquarie Marshes; Hanley et al. (1998) for forest landscape in United Kingdom; Carlsson, Frykblom and Liljenstolpe (2002) for wetlands in Staffanstorp, Sweden.; Othman, Bennett and Blamey (2004) for Matang Mangrove wetlands in Perak State, Malaysia; Birol, Karousakis and Koundouri (2006) for Cheimaditida wetland in Greece; and Das, Birol and Bhattacharya (2008) to estimate residents' willingness to pay (WTP) for solid management (SWM) services improvements in India where data were analysed using logit models. Similarly, Do and Bennett (2010) used the method to determine the WTP of people living inside or outside the Mekong River Delta for an improved wetland biodiversity conservation. Lastly, Selassie and Kountouris (2010) estimated the local fishermen's WTP for higher *Tilapia* and better environmental conditions on Lake Awassa. On the other hand, valuation studies made in the Philippines mostly used Contingent Valuation (CV); Whittington and Lauria (1992) in Davao City and Subade (2005) for the quantification of non-use values of Tubbataha Reefs National Park. Meanwhile, North and Griffin (1993) used hedonic property valuation method and Samonte-Tan et al. (2007) used market price method Bohol Marine Triangle (BMT). Application of Choice Experiment Method for economic valuation in the Philippines is quite new. Yorobe et al. (2010) used the method to derive the marginal willingness-to-pay (WTP) for the maize seed attributes. Meanwhile, Bacalso (2007) used Choice Experiment to evaluate the choice decisions of fishers in Danajon, Bohol.

3.0   METHODOLOGY

3.1   Study Area
Agusan del Sur is one of the provinces of Region XIII or CARAGA Region, founded June 17, 1967 (Figure 7). It has 14 municipalities; 8,966.0 square kilometres land area; 559,294 population (2000 census), population growth rate of 1.79% and a population density of 62 persons/sq. km. It is home to five tribal groups: *Aeta, Mamanwa, Bagobo, Higaonon*, and *Manobo*. Agriculture, cultivating crops such as rice, corn, banana, palm oil and coconut is basically its economy. Mining operations are also present and it has many ecologically important resources like Agusan Marsh Wildlife Sanctuary (AMWS). The Sanctuary is a vast complex of freshwater marshes and watercourses with numerous small shallow lakes and river tributaries, and floating communities. It qualifies for the Ramsar list under Old Criteria 1c on hydrological role in a river basin and genetic and ecological diversity.

3.2   Study I – Market Price Method
Production based-method specifically producer surplus was used to derive estimates for fisheries, agriculture, transport while expenditure-based method (expenditures by tourist and visitors on the use of the wetland for recreational or educational purposes) was used to

derive the estimates for tourism. Primary and secondary data were utilized in the study.

- *Fisheries* - average harvest per day and the cost incurred in the fishing activity for 2008.
- *Agriculture* - average yield of rice and corn for 2008 from farmers and production costs.
- *Transport* - number of passengers per trip based on the 2008 record and cost of operation
- *Tourism* - visitors' spending based on the rates implemented by the Municipality of Bunawan for entrance fees, pump boats and other necessities during the visit. Fares and other expenses of tourists from their homes going to AMWS are excluded.

3.3   Study 2 – Choice Experiment Method

Types and Methods of Data Collection. Wetland management attributes and its level were generated through a Focus Group Discussion (FGD) with Local Government Unit (LGU) representatives from all the municipalities within Agusan Marsh and other stakeholders were present. Aside from the CE data, other primary data were also obtained such as the socio-economic characteristics of the respondents and their opinions on environmental issues.

Selection of Respondents and Data Collection. 400 respondents were randomly selected. Hensher et al. (2005) suggested a minimum sample size of 50 decision makers for choosing each alternative option. CE survey was administered from April to July 2009 in the municipalities of Bayugan, San Francisco, Bunawan and Trento, using face-to-face interview. Respondents were approached in their houses with the survey starting with the researcher describing in brief the importance of AMWSand showing the choice sets with a visual illustration of the attributes and its level and explaining further how it was obtained. Hypothetical management scenarios were explained and respondents were reminded of their budget constraints when choosing an option.

Stages of the Choice Experiment Method
Definition of attributes and levels and the Choice Set. The initial step in a Choice Experiment is to define the good to be valued in terms of its attributes and the levels it take (Birol et al. 2005). In this study, it is the wetland management scenario. Wetland attributes, its definition and its levels obtained from FGD were included in the CE questionnaire. Attributes selected were biodiversity, retraining of farmers, research and education, and number of birds. Similar to the attributes generated from the FGD in a valuation of non-use value of Cheimaditida wetland in Greece (Birol et al. 2006), wetland area in Staffanstorp, Southern Sweden (Carlsson et al. 2003) and in Mekong Delta, Vietnam (Do & Bennet 2005). A fifth attribute consisted of monetary levels that residents of Agusan del Sur are capable of contributing which is necessary in computing WTP (Table 1).

Development of the experimental design. Experimental design is concerned with the creation of choice sets and/or the generation of different combinations of attributes and attribute levels into a profile of alternatives in an efficient way (Alpizar et al. 2001). Thirty two (32) pairwise combinations generated thru SPSS were randomly blocked into four (4) different versions (Adamowicz et. al. 1995; Shen 2005; Das et. al. 2008), each with eight choicesets. In this study, it is assumed that in the "opt out" scenario government intervention is minimal and the people do not mind what the government would do to the marshland. It was presented in printed visual aids containing illustrations of the marshland management attributes and their levels, which were translated to Cebuano/Bisaya, the main dialect in the area.

Table 1: Marshland management attributes and levels used in the choice experiment

ATTRIBUTES	DEFINITION	LEVEL
Biodiversity	The number of different species of plants, animals, their population levels, the number of different habitats & their size.	High:10% increase from current level Low:10% decrease from current level
Re-training of farmers, fishermen and loggers	Re-training of farmers, fishermen and loggers to environmentally friendly practices for agriculture, fisheries and forestry to preserve the area for the next generation.	Number of farmers, fishermen and loggers for re-training to environmentally friendly practices :25, 50, 75,100
Research and education uses	The educational, research and cultural information that may be derived from the wetland's existence, including scientists, students, and school children'svisits to learn about culture, ecology and nature.	High: 10% increase from current level research and education use Low:10% decrease from current level
Number of migratory birds	This feature of AMWS has attracted domestic & international interest and gives source of inspiration to nature-lovers and a feeling/sense of calmness and serenity and oneness with nature.	High: 10% increase from the current number of migratory birds Low:10% decrease from current level
Annual Contribution to AMWS Fund	A yearly payment to go to the AMWS Fund to help finance conservation projects and activities.	Four levels of contribution: Php 5.00; Php 20.00; Php 50.00; Php 100.00

Questionnaire design. Socio-economic profile of the respondents; attitude and perceptions of respondents' to selected issues and topics on environmental management; and the CE choice sets, comprised the questionnaire. Respondents were asked to choose their preferred option from each choice set (Figure 2).

Attribute	Management Scenario A	Attribute	Management Scenario B	Scenario C
Biodiversity	Low : Decrease by 10%	Biodiversity	Low : Decrease by 10%	Neither management scenario A nor management scenario B: It is up to the government how it would manage Agusan Marsh
Re-training of farmers, fishermen & loggers	75	Re-training of farmers, fishermen & loggers	100	
Research & education uses	High	Research & education uses	Low	
Number of migratory birds	Low	Number of migratory birds	High	
Yearly contribution to Agusan Marsh Wildlife Sanctuary Fund	PHP 20.00	Yearly contribution to Agusan Marsh Wildlife Sanctuary Fund	PHP. 20.00	
Please check	A ☐		B ☐	C ☐

Figure 2: Sample choice set

Descriptive analysis. Socio-economic profile of the respondents included age, gender, household size, number of children in the household, education, employment, and income

were analyzed using descriptive statistics such as frequency, percentage and mean. The same method was used to analyze whether they had heard or visited the marshland, attendance to seminars and participation to organizations. Attitudes of the respondents towards environmental issues were measured on a Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Econometric analysis. Data obtained through choice experiment (CE) survey were converted and entered in the utility function using codes. Data for each attribute depended on its level. The attributes: biodiversity, research and education, and number of migratory birds were qualitative attributes in this study which required words rather than numbers attached as descriptors. Each attribute had two levels: high and low. For analytical purposes, a numeric value was assigned, in this case, 1 and -1 describing the likely effect of any management activity. Attributes having two levels (high and low) entered the utility function as binary variables that were effects coded (Louviere et al. 2000). For high levels of each attributes, the code was 1 and entered in the function as 1. Low levels were entered as -1. The two other attributes, levels for re-training of farmers, fishermen and loggers to environmentally friendly practices and yearly contribution to AMWSFund were entered in cardinal-linear form (Birol et al. 2005). Hence, the levels entered as 25, 50, 75 and 100 for re-training and 5, 20, 50 and 100 for yearly contribution (Table 1).

Attributes for Scenario C or the neither management option were coded with zero values for each attributes (Birol et al. 2009). Based on the meager yearly budget of the IPAS office in Bunawan, it was assumed that activities, in relation to the identified attributes that would result to major improvements, have not been done. These data were analyzed using a software for Logit Model (McFadden 1974; Greene 1997; Maddala 1999 in Birol et al. 2009).

Based from the conditional logit model, the conditional indirect utility function used the equation below:

$$V_{ij} = \beta + \beta_1\, RT + \beta_2\, BD + \beta_3\, RE + \beta_4\, NB + \beta_5 YC \tag{1}$$

where:

Vij = indirect utility for respondent i associated with any wetland management
   alternative j
β = alternative specific constant (ASC)
$\beta 1$ = coefficient on retraining of farmers, fishermen and loggers
$\beta 2$ = coefficient on biodiversity
$\beta 3$ = coefficient on research and education uses
$\beta 4$ = coefficient on number of birds
$\beta 5$ = coefficient on yearly contribution
RT = number of trainees (farmers, fishermen and loggers)
BD = level of biodiversity
RE = level of research and education uses
NB = level of change in number of migratory bird species
YC = amount of yearly contribution to AMWS Fund

4   RESULTS AND DISCUSSION

Study I - Direct use value of Agusan Marsh Wildlife Sanctuary
Result of the direct use value of AMWS in terms of agriculture, fisheries, transport, and tourism sectors is presented in Table 2. Total direct use value of AMWS was estimated at PHP 91,612,719.50 per annum. The figure represents only partial estimation of its use value because there are other functions and services which when valuated would result to higher estimates. These may include, among others, flood protection, nutrient retention, pollution clean-up and ecosystem support.

Agriculture accounted the largest contribution at 97% and tourism sector with the lowest contribution at 0.1%. Low contribution of tourism sector can be attributed to very few, if any, promotional campaign of the area both on a national and international level. But this sector has huge potential for an increase in contribution to value of AMWS in the future with proper promotional campaign strategies by the Department of Tourism and Local Government Units of Agusan del Sur.

Study II - Preferences for Wetland Management
Socio-Economic Profile of Respondents. Majority of the respondents were female (59%) aged 38 years old, married (80%) with high school education (43%), and with income range PHP 1,001 to PHP 5,000. Average household size was 5 with average of 3 children per household. In terms of the attitude of respondents towards AMWS, 82.5% of the respondents had knowledge about it; only 2.5% of the respondents said to have learned about AMWS in the school and majority (79.25%) of them have not visited the area. Also, majority of the respondents have not participated trainings or seminars on environmental protection while 26.25% of the respondents considered local government units' information campaign on solid waste management as their trainings on environment protection.

Table 2: Direct use value of Agusan Marsh Wildlife Sanctuary

SECTORS	ANNUAL NET REVENUE (Php)	CONTRIBUTION (%)
Agriculture	88,674,004.94	97.0
Fisheries	2,007,406.56	2.0
Transport	796,460.00	0.9
Tourism	134,848.00	0.1
Total	**91,612,719.5**	

Respondents' Awareness of Environmental Issues/Concerns. Results showed that in terms of waste segregation, 96.75% of the respondents agreed that it was important but admitted it was difficult to practice. On issues and concerns affecting AMWS, 93.75% of the respondents agreed that it should be protected for organism dwelling in the area but 19 or 4.75% disagreed and 1.5% of the respondents simply had no opinion on the matter. On matters of cutting trees inside AMWS, 315 or 78.75% disagreed citing that the place was a reserve area and such activity might cause more frequent and long days of flood in the province. However, 59 or 14.75% of the respondents agreed to give people additional income and provide additional land for agricultural purposes. Lastly, on issues about seminars on environment, managing environment as sole government responsibility and willingness of people to participate in activities to protect environment, 383 or 95.74% agreed that government and non-government organizations (NGO) should conduct the activities while 69.5 % disagreed that management of the environment was the sole responsibility of the government, and 90.25% agreed to help in activities to help protect the environment.

Analysis of Households' Preferences for Wetland Management. A multinomial model has an alternative specific constant (ASC) which captures any systematic variations in choice observations that are associated with an alternative that are not explained by the attribute variation (Othman et al. 2004). In this study, wetland scenarios used generic options (no labels) instead of a labelled option thus, ASCs were equal to 1 when either Scenario A or B was chosen and equal to 0 when Scenario C was chosen (Louviere et al. 2000 and Birol et al. 2005). Use of generic option instead of labelled option may reduce the risk of strategic behaviour (Alpizar et al. 2001). A negative sign on the ASC implies that respondents are likely to be responsive to changes in the choice sets and they make choices closer to rational choice theory and observed behaviour in reality (Kontoleon 2003 in Birol et al. 2005).

The basic assumption in any choice experiment model is that the observable utility function would follow a strictly additive form. As such, the choice of a marshland management scenario is a function of its attribute and the alternative specific constant (Birol et al. 2006). The econometric models in the study made use of 3,200 data from 400 respondents. Estimates were derived using the conditional logit model (CLM). CLM results are presented in Table 3. The overall fit of the model, as measured by McFadden's ρ2 was 0.01343. The value is low by conventional standards used to describe probabilistic choice models (Ben-Akiva&Lehrman 1985 in Birol et al. 2005; Das et al. 2008). The value of ρ^2 of extremely good fit was between 0.2 and 0.4. The low ρ^2 indicates a bad model fit (Hensher et. al. 2005). Nevertheless, coefficients of three wetland management attributes (biodiversity and re-training of farmers, fishermen and loggers, and research and education uses) are significant at less than 10% and signs are expected *as priori*. Meaning, biodiversity and re-training of farmers, fishermen and loggers, and research and education uses are important factors in the design of wetland management scenario, and *ceteris paribus* higher levels of any of these three attributes increases the probability that a management scenario is selected. In other words, respondents prefer wetland management scenario that results in higher levels of biodiversity and research and education uses and higher number of farmers, fishermen and loggers for re-training.

In terms of utility, β_1 (re-training of farmers, fishermen and loggers) shows a change in utility in moving from no re-training of farmers, fishermen and loggers to having re-training; β_2 (biodiversity) shows a change in utility in moving from the original level of biodiversity to a 1% improvement of biodiversity; β_3 indicates an increase in utility from a move away from the original level of research and education to an improved level; and β_5 indicates the utility of a PHP 1.00 reduction in the contribution to AMWS fund. However, β_4 (number of migratory birds) is insignificant implying that respondents are indifferent to this attribute. Possible reason for this could be that the presence of migratory birds is a normal occurrence in the area, and perceived to be beyond man's control. Nevertheless, positive and significant coefficients of biodiversity; re-training of farmers, fishermen and loggers; and research and education uses indicate that respondents have positive and significant non-use values for both environmental and social attributes of AMWS.

The sign of the payment coefficient indicates that the effect on utility of choosing a choice set with higher payment level is negative. Positive and significant ASC implies that people are more likely to choose one of the wetland management alternatives presented to them, rather than the status quo. Consequently, a positive utility impact occurs in any move away from the status quo.

Importance of biodiversity in the management of AMWS can be attributed to the knowledge and concern of the people for the preservation of the different kinds of flora and fauna, especially that there are Manobos living in the inner parts of the area as reflected in the awareness part of the study.

Table 3. Results of the conditional logit model (CLM) for Agusan Marsh Wildlife Sanctuary AMWS) wetland management attributes, Choice experiment, Philippines, 2009

ATTRIBUTES	Original Sample		Reduced Sample		
	Conditional Logit Model		CL Model	RPL Model	
	COEFFICIENT	STANDARD ERROR	Coefficient Std (s.e.)	Coefficient Std (s.e.)	Coefficient Std. (s.e.)
ASC	0.2862***	0.0774	1.8167* ** (0.1051)	1.8167* ** (0.1051)	
Re-training of farmers, fishermen and loggers	0.0020**	0.0009	0.0023** (0.0001)	0.0023** (0.0001)	1.5 x 10^{-6} (.0008)
Biodiversity	0.0669**	0.0275	0.0714** (0.0312)	0.0714** (0.0312)	.0003 (.0304)
Research and Education	0.0512*	0.0269	.0621* (0.030)	.0621* (0.030)	0027 (.0294)
Number of Migratory Birds	0.0271	0.0296	0.0458 (0.0356)	0.0458 (0.0356)	.0010 (.0348)
Yearly Contribution	-0.0047***	0.0007	-0.0051*** (0.0008)	-0.0051*** (0.0008)	
ρ2	0.01343		0.17745	0.17745	
Log-likelihood	-3,468.35		-2,226.639	-2,226.634	
Sample size	3,200		2,464	2,464	

*** Significant at 1%   ** Significant at 5%   * Significant at 10%

Meanwhile, importance of re-training of farmers, fishermen and loggers could be attributed to economic needs of the people at the same time wanting to protect AMWS. Farming, fishing and logging are the common livelihoods that support the daily needs of the people of Agusan del Sur. Hence, farmers and fishermen should know the current appropriate technology that will improve their practices and would enhance yield. Also, farmers, fishermen and loggers should be trained on other environment friendly activities that would alleviate poverty and protect the environment. Caraga region is the poorest in the entire country with poverty incidence ranging from 23.9% to 66.7% (NSCB 2006). Logging has always been the region's problem despite current regulations on the matter. The intention to help people in these sectors are expressed when 14.75% of the respondents agreed to cut trees inside AMWS citing provision of additional income and additional land for agricultural purposes. It was observed that a number of respondents chose a wetland management scenario where number of people for retraining was highest.

Research and education uses was also considered as important attribute for an improve management of AMWS. According to IPAS personnel, few researches had been in the area and many existing flora and fauna have yet to be named. Moreover, theManobos' lifestyle and practices had been constantly mixed with modern way of life. Respondents recognized this attribute's importance to better understand the dynamics of the area and preserve the people's culture. A place's culture needs to be preserved so future generations could appreciate their roots, and do the same for generations further ahead.

The conditional logit model assumes the independence of irrelevant alternatives (IIA) property, which states that, relative probabilities of two options being chosen are unaffected by the introduction or removal of other alternatives. If this property is violated, CLM estimates are biased and other models should be used. To test if CLM is a sufficient model for the data, Hausman and McFadden test (1984 in Birol et al. 2006) was conducted.

The test revealed that a fair conclusion, whether to accept or reject at 99% level that IIA property holds, cannot be made since the third option was unable to generate needed

information, meaning no value was given (Table 4). Do and Bennett (2007), and Maligalig (2008) obtained similar results which concluded that CLM may be an inappropriate model.

Table 4. Test of independence of irrelevant alternatives (IIA), Choice experiment,
Philippines, 2009

ALTERNATIVE DROPPED	X^2	DEGREES OF FREEDOM	PROBABILITY
Management scenario A	38.9009	6	.000001
Management scenario B	38.3094	6	.000001
Neither management scenario A or B*	-	-	-

* could not carry Hausman & McFadden
test for IIA

Another model, random parameter logit (RPL) was used to analyze the data due to the uncertainty in the IIA test result. Results revealed that the estimates of the sample resulted in insignificant derived standard deviations indicating that the data do not support any choice specific unconditional unobserved heterogeneity. In addition, the log likelihood is the same as that of the CLM. Further estimation of the data using RPL with an improvement in the distribution simulations from 500 to 1,000 draws (Adamowicz et al. 1995) was also conducted but it did not improve the function. The log likelihoods values of the two models are almost the same, hence, the Swait Louviere Log Likelihood ratio test cannot reject the null hypothesis that the RPL and CLM model estimates are equal (Birol et al. 2005). Consequently, it can be concluded that CLM is sufficient for the analysis of the data set.

Estimation with reduced sample size. In the study, approximately 83 or 21.5% of the respondents always choose the current scenario or "opt out", regardless of attribute levels, hence considered as protesters. They are respondents who object to the valuation process, who can give bias estimates of WTP (Halstead et al. 1992 in Dziegielewska & Mendelsohn 2007). Recognizing the importance of this problem, many authors adjust for protest responses (Boyle et al. 1993; Jorgensen et al. 1999; Whittington et al. 1992) by excluding all data from respondents who consistently chose the status quo and re-estimate the model (Adomowicz et al. 1995). Reasons cited for such behaviour includes doubt on handling of fund, no extra money to contribute and belief that it is the government's role to finance activities for the environment. Such behaviour is reflected in the awareness survey wherein 28% of the respondents agreed that taking care of the environment is a sole responsibility of the government.

Results in the re-estimation of the model using a reduced sample of 308 are qualitatively similar to the full sample CE in terms of significant attributes but with higher coefficients (Table 3). The signs of the coefficients are the same but with a higher value of ASC. More importantly, CLM has a better fit with a $\rho2= 0.18$, nearer to extremely good fit value of ρ^2 between 0.2 and 0.4 (Ben-Akiva & Lehrman 1985 in Birol et al. 2005). Therefore, excluding the protesters improves the model. Subjecting the data to an IIA test still gave an indefinite conclusion hence, RPLM was carried out to test for heterogeneity of preference among respondents. However, similar results were obtained, thus, the use of the RPL model does not show any improvement and it can still be concluded that the CLM is sufficient for the analysis even with a reduced data set.

Estimation of Willingness to Pay. Table 5 shows the marginal willingness to pay (WTP) value for each of the wetland management attribute of AMWS at 95% confidence interval.

The values are calculated using the Wald Procedure using a software. Results are all positive marginal value implying that respondents would be better off with an increase in the level of the attribute.

Table 5. Marginal willingness to pay for Agusan Marsh Wildlife Sanctuary (AMWS) and implied rankingof wetland management attributes, Choice experiment, Philippines, 2009

ATTRIBUTES	CLM (n = 400)		CLM (n= 308)	
	WTP	Rank	WTP	Rank
Re-training of farmers, fishermen and loggers	0.42	3	.44	3
Biodiversity	28.25	1	27.71	1
Research and Education	21.63	2	24.13	2
Number of Migratory Birds	*--		*--	

The estimates indicate that respondents were willing to pay PHP 0.42 for an extra or additional trainee for environmentally friendly practices or employment and Php .44 using the reduced sample. Furthermore, respondents were willing to pay PHP 28.85 for a one percent improvement in the level of biodiversity but using the reduced sample respondents the willingness to pay was 5 centavos lower. Similarly, respondents were willing to pay PHP 21.63 for one percent improvement in research and education uses, but using a reduced sample, respondents were willing to pay PHP 2.50 higher. On the other hand, number of birds had insignificant WTP in both number of samples. This implies that respondents are not willing to pay for this attribute.

The three attributes (biodiversity and re-training of farmers, fishermen and loggers, and research and education uses) are considered important factors in the design of wetland management scenario. Consequently, the implied WTP for an ideal improved management scenario with a one percent improvement in the level of biodiversity, research and education uses and highest number of trainees (i.e., 100 persons) was PHP 91.88/household/year, assuming linear, additively separable indirect utility functions. Using the reduced sample, each household was willing to pay PHP 4.00 higher for this improved management scenario or PHP 95.84/household/year. Aggregating, this amount could be multiplied to the number of households in the province. Since only 2000 census data were available, the population was projected until 2008 using the 1995-2000 growth rate of 1.79 (Agusan del Sur Quickstat 2009). As such, the ideal improved AMWS scenario would be worth PHP 12,174,503.67.

Implied Ranking of Wetland Attributes. When the payment attribute is assigned as a normalising variable, biodiversity is the most important wetland management attribute of AMWS (Table 5). This is followed by research and education uses, then finally, re-training of farmers, fishermen and logger for both the original and reduced sample.

5 CONCLUSIONS

Agusan Marsh Wildlife Sanctuary provides direct use values to the local people. Direct use value per annum from agriculture, fisheries, transport, and tourism sectors is valued at PHP 91,612,719.50. This figure is a rough and partial estimate considering difficulty in obtaining all the relevant data, specific only to AMWS. The figure would have been higher if the values of other direct uses had been estimated; nevertheless, it partially reflected direct use values of AMWS. However, with this partial estimation alone, there is sufficient evidence to support that AMWS provide direct use values to the local people. Also, this value would reflect the extent of potential losses of the local community if AMWS will not be properly managed.

In choosing wetland management scenario, respondents take into consideration the

attributes of the wetland management scenario. Of foremost importance is biodiversity, specifically at high levels followed by the high level of research and education uses, then finally higher number of farmers, fishermen and loggers for environmentally friendly practices. But number of migratory birds is not considered as an important wetland management attribute. Nevertheless, results indicate that respondents have positive and significant non-use values for both environmental and social attributes of AMWS. Attributes such a biodiversity and research and education uses capture non-use of AMWS.

Moreover, people of Agusan del Sur value an improved AMWS management plan at almost PHP 12,174,503.67 annually suggesting that the people is willing to help in the protection and conservation of AMWS. Aggregating, the total economic value of AMWS both from the direct use value and the WTP of the households is PHP 103,787,223.17 per annum. The value is a partial estimate and could have been higher if other wetland attributes and services are included in the estimation. Nevertheless, it already reflects that the people of Agusan del Sur derive both use and non-use values from AMWS.

6   POLICY IMPLICATIONS AND RECOMMENDATIONS

The net benefit generated from AMWS through economic valuation can be used as basis for understanding and developing appropriate economic instruments for sustaining the use of the resource. Of most important direct use is agriculture. As such, information, policies and programs on improving the sustainability of agriculture while maintaining conservation measures, such as crop rotation and using of varieties and breeds that are well-adapted to the conditions in the locality, should be prioritized. Also, it is important that sources of reliable data should be taken into consideration to be able to estimate a conclusive value: 1) fisheries, establish a system in every lake that would record fish catch, sold and consumed daily from fishermen and concessionaires; 2) tourism, establish protocol agreed and jointly enforced by the six municipalities that cover AMWS; and 3) political boundaries down to the barangay level must be established and collection of agriculture data during monitoring should be included. A joint effort on massive information campaign should also be done. Programs like establishment of ban on collection of birds and animals for pet and domestication, and restricted areas of any type of activity during breeding seasons of birds and other animals should be undertaken.

In terms of research and education, major programs like establishment of an AMWS Research Center and incorporation of local knowledge/information about it in school curriculum starting in Caraga should be explored. In terms ofre-training of farmers, fishermen and loggers for environment-friendly practices, measures such as enhancing eco-tourism and provision of alternative livelihood that could lessen the stress put on by extractive uses to AMWS should be enforced jointly by all six municipalities. The study also revealed that number of migratory birds is an insignificant attribute in an improved wetland management implying that it is not considered an important attribute. However, on a management perspective it is very important because it is one of the tourist attractions in the area and birds are considered as bio-indicators of global patterns in biodiversity conservation (Sucaldito & Nuneza 2007). Thus, a public disclosure could be done stressing its importance on local radio stations. Moreover, the generated WTP somehow give insight to policy-makers on the possibility of exploring public source of fund through donations to an AMWS fund to augment its resources and possibly tapped volunteers from the local community to help in monitoring considering its huge area.

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