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Economic Valuation Of Wetland Resources: Evidence From Resource-Dependent Households In Northern Nigeria

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ABSTRACT
In an effort to evaluate the economic benefit of conservation, the respondents' willingness to pay for conservation was evaluated. Dichotomous-choice contingent valuation method (DC-CVM was employed on 393 households in communities surrounding the wetland. Binary Logistic regression was used in estimating the CVM model. The results of the analyses showed that75.8% of the the respondents were willing to pay for the conservation of Hadeji-Nguru wetland. The result from the CVM model revealed that gender, age, education level, gross monthly income, bids amount, membership of environmental organisation, pro-environmental attitude and knowledge about the importance of the wetland were significant determinants of the willingness to pay. The result also revealed that the mean willingness to pay amount was estimated at ₦ 2,324.08 ≈ USD 6.46 per household. The overall total use benefit of conservation of the wetland was estimated at ₦ 3,486,120,000 (USD 9,683,666.67). The outcome of this study presents a compelling business case for wetland conservation in the Hadejia-Nguru wetlands, as it provides vital information that would guide policy makers on social return on investment in conservation. Therefore, for long term sustainability of the wetlands being an important resource pool that supports millions of local population, institutional and management structures that would guarantee its sustenance and promote wise use need to be in place. Also, there is the need for policy option that would be acceptable to all stake holders especially the local people, where they will be adequately represented as important stakeholders in decision making process.

Keywords: *Economic value, CVM, Hadejia-Nguru Wetlands, WTP, Use value*

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INTRODUCTION

With increase in economic pressure, and the development of scientific evidences on the biological, physical, chemical, hydrological, and socioeconomic benefits of wetlands to the society, their importance as a valued resource is becoming known day by day (Barbier, Acreman, & Knowler, 1997)**.** In recent past, these wetlands were perhaps one of the most neglected and misunderstood ecosystems on earth and thus, considered as wasteland. Nonetheless, a paradigm shift in recent time has change the general perception about wetland from waste land to a valued resources owing to the growing awareness and understanding of the benefits associated with them (Thompson & Hollis, 1995). Worldwide, it has been admitted that wetlands are among the most productive ecosystems that offers human with consumable goods and services through the various functions they performed for enhanced health, safety, and overall societal welfare (Wang, Yao, & Ju, 2008).

Wetlands are regarded as the transitional type of ecosystem found in-between land area and water bodies. For example, the coastal wetlands are important zones where the land, the sea, and the freshwater body meet in a fascinating manner. This transitional characteristics of wetlands offers it with the ability to provides many vital

ecosystem functions that includes; shoreline protection, decomposition of organic matter, carbon sequestration, flood control, nutrient cycling, habitat for migratory birds, water quality improvement and shelter for animals (Ghosh & Mondal, 2013).

Nowadays, there is growing concern about the importance of wetland ecosystems and the wide variety of goods and services provided by them such as biodiversity or freshwater in human welfare (Schuyt, 2005). Most natural services, such as water purification and aesthetics, provided by wetlands cannot be valued in terms of market price (Lindemann-Matthies et al., 2010). This characteristic put them at high risk of underestimation of their actual value to human. As a result, when economic development such as industries, extensive agriculture, dam construction, and other forms of urban developments are more profitable, and the opportunity cost of losing the important services provided by wetlands has been overlooked or discounted, the markets force will tend to priorities wetland conversion at the detriment of wetland conservation (Kaffashi et al., 2012).

There have been many valuation studies of wetlands to estimates their economic value; however, the attention of majority of these studies were in developed countries. Few reported cases focus on wetlands in developing countries, and what is more worrisome is the dearth in literature about African wetlands that suffers underrepresentation in such valuation excises despites having important number of wetlands comparable to North America and Europe (Schuyt, 2005). In Nigeria for instance, the floodplains and wetlands are known to support millions of people due to their richness. For instance, the Hadejia-Nguru wetland as an important resource pool, support millions of local population. It is regarded as Nigeria's renowned wetland and is believed to have shrunk by more than two third of its original size within the last 30 to 40 years (Muslim, 2008). The shrinkage can be attributed to the various developmental projects that caused major hydrological changes such as the dam construction in the upstream, river diversion, irrigation scheme, farming and fishing and effect of climate change, notably the draught. More so, the nearby communities surrounding the wetlands have been suffering an untold hardship mainly due to mismanagement of these important ecosystems (Muslim, 2008). This severely affects the water resources status and hydrology of the wetland environment, with much adverse effect on the wetland resources and the anticipated ecosystem service benefits to the society in general (Nwankwoala, 2012).

Generally in Nigeria, little is known about the economic value of the country's wetlands' goods and services, in reality, the actual value of Nigeria's wetland resources is not known. The absence of valuation studies have made it almost impossible to appreciate the significance of conserving this vital resources in favour of other development activities that have the potential for higher turnover in the long run (Ambastha, Hussain, & Badola, 2007). For instance in Hadejia-Nguru wetland, no economic valuation study was conducted that captures the real value of the natural resources (especially the use value). Barbier, (1993) conducted partial valuation of the wetland using market price approach, and thus, concentrated only on market value of some extractive wetlands resources, whereas information regarding the non-market values and their estimates remain unattended. Recently, study by Adamu, Yacob, Radam, and Danladi, (2018) focusses on the non-use value of the wetland, however, the use value of the wetland is left unattended. This study therefore tried to bridge this literature gap by estimating the total use value of Hadejia-Nguru wetland, which can be an important component of total economic value (TEV) as well as input for cost/benefit analyses for future policy development of the wetland.

Types of Resources Value

The estimates of willingness to pay are basically grouped based on the notion of having either a use and non-use value (Lee & Han, 2002). The use value denotes the consumer surplus resulting from the use of the resources directly or rather the consumer surplus enjoyed from tangible use of the resources. This means that it is the utility enjoyed as a result of the direct use or extractive benefit enjoyed from the resources (Togridou, Hovardas, & Pantis, 2006). However, the non-use value refers to the benefits enjoy from the abstract or intangible value attached to the natural resources by the society. It is the utility enjoyed from the non-use satisfactions that resources has either existence value, option value, or bequest value (Surendran & Sekar, 2010).

The option value in this case referred to believe of possible future use of the resources. In economic term, it is therefore the willingness-to-pay for sustaining the resources for possible future use. The existence value is the willingness-to-pay for ensuring that the resources are conserved and continue to exist as natural assets, not to be destroyed. Existence value is the willingness-to-pay for natural resources to continue to exist on the notion that that the resources also have right to exist, not to be exploited. The bequest value is linked to the opinion that taking care or conserving the resource, by keeping it untouched for future descendants is also important. It is the willingness-to-pay for bestowing or bequeathing the natural resources to the future generation. Thus the utility derived from this believe that lead to people willingness to pay is called the bequest value (Togridou et al., 2006). The emphasis of this study therefore, is placed on the concept of the 'Use values' since the target respondents are the local people residing in communities around the wetland.

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The Contingent Valuation Method

The Contingent Valuation Method (CVM) is a technique offered by Ciriacy and Wantrup in 1947 who use it in valuing the side effects of soil erosion (Venkatachalam, 2004). This technique is so promising as public goods (In contrast to private goods) are not commonly traded in the market and therefore does not command a market price (Carson, Flores, & Meade, 2001). The method is based on the notions of willingness-to-pay/willingness-to-accept in order to get information from individuals for the purpose of estimating the value of non-marketed goods. The technique is extensively used as a policy tool especially in the management of protected areas and biodiversity conservation (Baral, Stern, & Bhattarai, 2008).

According to Ellingson and Seidl, (2007), CVM is among the few available valuation methods for determining the economic value where market information is absence. Though the technique is not a flawless substitute for obtaining revealed preferences information, thus it does not provide all the needed information for environmental monitoring. The CVM is a technique that offers a hypothetical opportunity to individuals for the purchase public goods or services where there is no existing information concerning the real market situation. The CVM willingness to pay for non-marketed goods is based on the theory of utility maximization and rational choice. The technique has the advantages of letting the researcher to develop a hypothetical market for the goods in question and subsequently make an informed economic decision (Pettorelli et al., 2012).

CVM is applied in various fields including the protected areas (Togridou et al., 2006), ecosystem services (Turner & Folke, 1995), conservation of endangered species (Kotchen & Reiling, 2000), as well as the biodiversity conservation (P.-W. Wang & Jia, 2012). Other areas where CVM is becoming a popular tools includes; improvement in water quality, human health, energy system, natural resources conservation and many other fields such as the outdoor recreation and ecotourism (Lockwood & Tracy, 1995). The technique provides individuals with the opportunity to purchase public goods under hypothetical situations, especially in the absence of real market or existing information concerning the real market scenario (Adamu, Yacob, Radam, & Hashim, 2015). Furthermore, the absence of 'real market' means that the actual monetary value or price anticipated by consumers or their preferences cannot be directly measure (Mohd Rusli, Alias, & Shuib, 2009). The choice of appropriate economic instruments such as the CVM in determining individual's willingness to pay is usually regarded as a perfect way of developing comprehensive management policies that would help to generate more funds for resource conservation and management (Adamu, Yacob, Radam, Fallah, & Danladi, 2017).

METHODOLOGY

Population and Sampling Procedure

The population of this study consist of the residence of communities surrounding the wetlands, whose activities and livelihood depends on the wetland. According to Kaugama and Ahmed, (2014), there are about 1.5 million inhabitants consisting of farmers, herders and fishermen who relied on Hedjia-Nguru wetland for their livelihood. These sets of wetland users mentioned are the key target population of this study. In order to determine sample size form this population, literature provide guide for determining sample size for valuation studies. Achieving correct sample size is one of the main steps in ensuring the accuracy of the CVM estimation. Calia and Strazzera, (2000) suggested that sample size for of 100 or less is regarded as small sample size, while medium sample size ranges between 250-450 and 1000 and above samples as large sample for CVM studies. In this study, the sample size was calculated using Krejcie and Morgan formula of determining sample size. Thus;

$$s = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

Based on the study population, (1.5 million people), the estimated sample size was 384. However, in order to take care of outliers and missing information, Israel, (1992) suggested increase of 10% of the sample size in order to take care of the outliers and to ensure that minimum sample size was maintained. Hence, 425 was taken as the sample size of the study.

For the sample size determined to be reach out from the entire population, the current study employed a multi-stage sampling technique. Multistage sampling entails two or more stages of random sampling based on the hierarchical structure of natural clusters within a geographically diverse population (Sedgwick, 2015). Stratified random sampling, with proportionate method, simple random sampling and systematic sampling methods were employed due to absence of sampling frame (complete list of the target respondents). With stratified random sampling, the populations were initially divided into mutually exclusive groups, each representing a proportion of the total population. Blamey et al., 1999) stated that the basis for creating the groups can be any characteristic common to the population (e.g. age, income, occupation, location, gender etc.). Thus, the basis for stratification was 'economic activities' of the communities. Three predominant economic activities of the inhabitants of the communities were identified as; farming, fishing and grazing. In the second stage of the sampling, simple random sampling technique was employed in selecting one community to represent each stratum, and proportionately, samples were allocated based on population of the selected communities. To maintain randomness within the sample, Hensher et al., (2005) suggested that a systematic random sample to be used within each stratum to get

the unit sample. Hence, in the last stage, unit samples were drawn from each of the selected communities using systematic random sampling technique where the enumerators randomly select first sample and subsequently approached every 3rd household in each of the selected community.

Study instrument

The instrument for this research was a questionnaire.The CVM questionnaire presents the respondents with a hypothetical case scenarios based on economic incentives. CVM fundamentally, establish what respondents would be willing to pay under a hypothetical market scenario (Lee & Mjelde, 2007). A dichotomous-choice contingent valuation method (DC-CVM) format was used to elicit the willingness of households to pay for conservation of Hadejia-Nguru wetlands. Dichotomous choice (DC) format is a single 'take it or leave it (TIOLI) method where bid price is presented to each respondent with only two options of either 'Yes' or 'No' (Mohd Rusli et al., 2009). It is easier to answer a DC questions than open-ended and it is regarded as a superior elicitation method (Hanemann, 1994; Lee & Mjelde, 2007). Thus, this study developed a DC-CVM questionnaire with follow-up questions in order to elicit valid and reliable information from the respondents.

Payment vehicle

Choosing a realistic payment vehicle is one of the important key steps in non-market valuation studies (Lee & Han, 2002). Payment vehicle refers to the method of payment of WTP amount by the respondents. Among the common payment vehicles commonly used in conservation includes; increase in utility bills, donations, entrance fee and income taxes. However, in the case of use value, the panel NOAA recommended the use of taxation as the most appropriate payment vehicle (Pascual et al., 2010). Hence income tax was used in this study as the reliable and relevant payment vehicle.

Model Specification and Procedures

The CVM-WTP estimates were done with the aid of NLOGIT Version 4.0 econometric software. The WTP of the respondents can be obtained by estimating the demand function, as demand is usually based on the utility maximization theory. For the purpose of conservation in Yankari game reserve, the tourists had the choice of accepting or rejecting the proposed entrance fee offered in order to maximise their utility under the following condition.

$$u(1,M-F;S)+\varepsilon_1 \geq u(0,M;S)+\varepsilon_0 \quad (1)$$

Where u is the indirect utility function, M is the average annual income, F is the entrance fee offer, S represents to the socio-demographic characteristics and other variables determining individuals' preference. ε_1 and ε_0 are identical independently distributed random variables with zero means. The utility difference (Δu) can best be described as follows:

$$u(1,M-F;S)+\varepsilon_1 \geq u(0,M;S)+\varepsilon_0 \quad (2)$$

The probability (P_i) that the tourists will accept a specified amount (F) as entrance fee can be expressed in the following logit model based Cameron (Mitchell & Carson, 1989) method (Lee & Mjelde, 2007; P.-W. Wang & Jia, 2012).

$$P_i = \frac{1}{1+exp\{-(\alpha-\beta.F+\gamma.x)\}} \quad (3)$$

Where α is a constant, β refers to the coefficient of the entrance fee variable F, x is the vector of other explanatory variables that influences the response and γ is the vector of the corresponding slope. And the mean WTP was estimated using the following equation.

$$Mean\ WTP = \frac{\beta_0+(\sum\beta_n X_n)}{-\beta_1} \quad (4)$$

Where; β_0 =estimated constant, β_n= parameter of the coefficients, X_n=the mean value of explanatory variables and β_1 =coefficient of the bid price. Thus, mean WTP in this study can be obtained by the following equation.

$$\text{Mean WTP} = \frac{(\beta+A\beta GE+\beta GEN+\beta HHSIZE+\beta INC+\beta NGO+\beta ATD+\beta KNW)}{\beta 0} \quad (5)$$

RESULT AND DISCUSSION

The descriptive analysis of the respondents' demographic characteristics is presented in Table 1. This background information provides an insight into the socio-cultural and demographic characteristics of the households living around the wetland. The result on gender distribution revealed that male respondents constitute 357 (90.8%), while females make up the remaining 36 (9.2%). This outcome can be attributed to the socio-cultural and ethno-religious nature of northern Nigeria, where men generally assume the position of the head of the family and make decision concerning the households, whereas women mostly stays at home and engage in domestic activities and rarely represents the households in any formal activity. The age distribution shows that the average age was approximately 37 years, and those within the age range of 18-30 years of age were majority (139)

representing 35.4%, while 124 (31.6%) ranged between 31 to 40 years of age. Those between 41 to 50 years constituted 81 (20.6%) whereas those from 51 years and above and were 49 (12.5%). The age distribution indicates that significant number of the respondents were within their youthful and productive ages that enable them to engage in all sorts of economic activities in the wetland.

The self-reported literacy attainment shows the respondents' level of education. Those with no formal education at all were 107 (27.2%), those who attended primary school only were 88 (22.4%), while those have secondary level of education were 134 (34.1%). Lastly, those who have attained tertiary level of education were 64 (16.3%). This outcome revealed that the low literacy level of the respondents was in accordance with what was given by the national bureau of statistics (NBS) for these communities as most of the people usually engage in economic activities as family occupation at the earlier stage of their life. The occupational status of the respondents revealed that most of them 117 (29.8%) engaged in farming as their primary occupation, while 84 (21.4%) reported be engaged in fishing. About 61 (15.5%) engaged in livestock rearing, whereas those who are either public or privately employed were 52 (13.2%). The respondents who engaged in business constituted 48 (12.2%) of the total responses, while those who engaged in artisanship as their primary occupation were 31 (7.9%).

About the household's monthly income, the average income was ₦ 34.650 (USD 96.25), and those who earn between ₦ 15,000 to ₦30,000 (USD 41.67 – 83.33) per month were 189 (48.1%), whereas those who earn between ₦ 31,000 to ₦ 45,000 (USD 86.11 – 125.00) were 136 (34.6%). The respondents whose households' monthly income ranges between ₦ 46,000 to ₦ 60,000 (USD 127.78 -166.67) were 55 (14.0%) and those who earn between ₦ 61,000 and above (≥US$ 169.44), were 12 (3.0%). Result on households' size shows that the average households' size was 5 persons per households, while based on categories, households' size ranging from 1 to 3 were 118 (30.3%), those ranging between 4 to 6 were 150 (38.2%), whereas those with a size ranging from 7 to 9 were 81 (20.6%). Lastly, the household categories with 10 persons and above were 44 (11.2%). On membership of environmental conservation organisation (NGO), from the households that were sampled, 133 (33.8%) were members in or more pro-environmental association such as the 'Wetland Development Initiative', while 260 (66.2%) of the respondent were not engaged in any pro-environmental organisation.

Table 1. Demographic Variables of the respondents

Variables		Frequency	Percent	Mean
Gender				
	Male	357	90.8	
	Female	36	9.2	
Age (years)				36.98
	18-30	139	35.4	
	31-40	124	31.6	
	41-50	81	20.6	
	51 and above	49	12.5	
Education				
	Non-formal	107	27.2	
	Primary	88	22.4	
	Secondary	134	34.1	
	Tertiary	64	16.3	
Household Income				34,65 (USD 95.25)
	₦15,000-30,000 (USD 41.67-83.33)	189	48.1	
	₦ 31,000- 45,000 (USD 86.11-125.00)	137	34.9	
	₦46,000-60,000 (USD 127.78-166.67)	55	14.0	
	₦ 61,000 and above (USD 169.44)	12	3.0	
Occupation				
	Farming	117	29.8	
	Fishing	84	21.4	
	Livestock Rearing	61	15.5	
	Public/Private Service	52	13.2	
	Business	48	12.2	
	Artisan ship	31	7.9	
Household Size				5.3 (2.8)
	1-3	118	30.3	
	4-6	150	38.2	
	7-9	81	20.6	
	10 and above	44	11.2	
Membership of NGO.				
	Yes	133	33.8	
	No	260	66.2	

Note: 1 USD = ₦ 360

The willingness to pay estimation

The respondents were presented with dichotomous choice binary options to select either 'Yes' or 'No' to one of the Five (5) bids prices offered to them. The WTP responses obtained indicated that 75.8% (298) respondents 'Yes' (were willing to pay for conservation) whereas the remaining 95 (24.2%) responded "No" (Protest Bidders). Table 2 shows the summary statistics of the distribution of responses to each of the bid price presented. The initial bid price (₦ 1200) had a total response 83 (22.1%), with 'Yes' response for the bid as 74 (18.8%), while the 'No' response was 9 (2.3%). For the second bid price (₦ 1400), the total responses obtained was 80 (20.4%), the 'Yes' response was 67 (17.0%), while the 'No' response was 13 (3.3%). The third bid price was ₦ 1600 and the total response obtained was 81 (20.6%), those who answered "Yes" were 62, (15.8%) and for 'No' were 19 (4.8%). The fourth bid price (₦ 1800), which has a total response of 76 (19.3%). 'Yes' response were 53 (13.5%), whereas, 'No' response were 23 (5.9%). The highest bid price offered to the respondents was ₦ 2000 and has a total response of 73 (18.6%), with 'Yes' response as 42 (10.7%) while 31 (7.6%) responded "No". This outcome indicated that increase in bid price, reduces the chance of its selection, which is in line with economic theory of demand.

Table 2 Summary of Households' Willingness to Pay for Conservation

	YES		NO		Total	
Bid price	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
1200.00	74	18.8	9	2.3	83	21.1
1400.00	67	17.0	13	3.3	80	20.4
1600.00	62	15.8	19	4.8	81	20.6
1800.00	53	13.5	23	5.9	76	19.3
2000.00	42	10.7	31	7.9	73	18.6
Total	298	75.8	95	24.2	393	100

Binary Logistic Regression Model

The binary Logistic regression model was employed to examine the influence of the independent variables on the dependent variable (willingness to pay). The independent variable comprised of the socio-demographic characteristics such as respondents' age, gender, income, level of education, membership of pro-environmental organisation. Other independent variables include the psychometric information which includes respondents' environmental attitude, and their level of knowledge about the wetland resources

Based on the result of the Model obtained (Table 3), eight of the explanatory variables were found to be significant with their expected priori signs. The coefficient and the significant level (P-value) for each variable provide vital information regarding its relationship with the WTP in the model. The importance of sign on the coefficient revealed its relationship with the dependent variable as negative sign means inverse relationship while positive sign indicates positive relationship. The weight of the coefficient value shows the strength of the variable in predicting willingness to pay in the model.

The result of the analysis is in consistent with many empirical findings, as respondents' age, (AGE) was found to be statistically significant at 5% confidence level with positive signed coefficient and weight value of 0.1188. The marginal effect revealed that the probability of household's willingness to pay will instantaneously increase by 0.002% as age increases by one unit (one year). This therefore indicates that increase in age, increases the probability of willingness to pay for conservation of the wetland. The propensity of age to willingness to pay was reported in many studies. Baral et al., (2008), Bhandari and Heshmati, (2010), and Lee and Mjelde, (2007) for example have found a significant positive relationship between age and WTP, while Montes, Benayas, and Martı, (2007) and Reynisdottir et al., (2008) have reported significant but negative relationship between age and WTP. More specifically, Ghosh and Mondal, (2013) have reported a significantly negative relationship between Age and willingness to pay for wetland conservation in Bangladesh, and concluded that respondents with lower age were more willing to pay for wetland conservation than the older ones.

The respondents' gender (GEN) coded as dummy variable (1=male and 0=female) in the model was found to be significant at 5% confidence level with a positive sign on the coefficient and a weight value of 1.4911. The marginal effect of gender indicates that the probability of willingness to pay by male respondents was 0.048 % more than that of their female counterpart. This result is in line with many findings that reported significant positive relationship between male gender and WTP (Hejazi, Shamsudin, & Rahim, 2014; Surendran & Sekar, 2010; Wang & Jia, 2012). This study outcome may be due to lower literacy level of the women who mostly stay

at home for domestic work and thus, might not know the benefit associated resource conservation, especially the wetland that is commonly seen as waste land.

Households' income (INC) is another positively significant variable in the model. It has a positive coefficient, with a weight value of 0.0935 and statistically significance at 5% confidence level. The marginal effect of this variable showed that for every unit increase in Households' income, there is 0.013% probability increase in WTP. This result shows the elasticity of income with willingness to pay for wetland conservation. The study findings is in conformity with that of Reynisdottir et al., (2008), Wang and Jia, (2012),Seongseop, Wong, and Cho, (2007), where higher income increases the probability of willingness to pay. More so, Ghosh and Mondal, (2013) who carried out wetland valuations in Bangladesh and Wattage and Mardle, (2008) in Sri Lanka also reported the importance of income as a significant predictor of willingness to pay for wetland conservation.

Households' size (HHSIZE) of the respondents was found to be statistically significant 5% confidence level with a positive coefficient having weight value of 0.3994. The marginal effect of this variable shows that increase in household size by one person, increases the probability of willingness to pay by 0.021%. This finding is in disagreement with Surendran and Sekar, (2010) who reported negative relationship between households' size with WTP. However, this study outcome may be true reflection of the respondents' view in the study area in the sense that most of the households in the surrounding communities of the wetland heavily rely on the wetland for their means of livelihood. Therefore, as their survival depends on it, any measure aimed at ensuring the sustainability of the wetland, being a source of livelihood especially by those with larger family size will be supported.

Membership of pro-conservation association (NGO) was also found to be a significant predictor of willingness to pay in the model. It has a positive coefficient with weight value 2.9180 and statistically significant at 5% confidence level. This high coefficient value makes it the variable that predicts WTP the most in the model. The marginal effect value indicated that membership of pro-environmental organization increases the probability of willingness to pay by 0.0047%. This is supported by the findings of (Nabin Baral, 2008) and Loomies et all, (2000), and in disagreement with the findings of Togridou, (2006) who reported that membership of NGO does not influence WTP.

Another important significant determinant of WTP in the model is environmental attitude (ATD). Attitude was statistically significant at 5% confidence level, with a positive coefficient value 0.0877. Marginal effect of attitude towards the environment indicated that for every unit increase in pro-environmental attitude, the probability of willingness to pay increase by 0.0461%. The importance of determining respondents' attitude towards the environment and subsequent incorporation of it as one of the predictors of willingness to pay is based on NOAA panel recommendation (Arrow et al., 1993), and have been reported in several studies. CVM literatures have revealed that attitudes towards the environment have been closely related to WTP (Chung, Kyle, Petrick, & Absher, 2011; Reynisdottir et al., 2008). This study therefore, supported the findings such as Kotchen & Reiling, (2000) who reported positive and significant relationship between pro-environmental attitude and willingness to pay. More so, Gelso and Peterson, (2005), reported a positive relationship between environmental attitude and use values. More relevant here is the study by Cooper, Poe, and Bateman, (2004), who specifically measured environmental attitude using modified NEP scale and incorporate such in a model that revealed significant relationship between environmental attitude and willingness to pay.

Respondents' knowledge about the wetland (KNWL) is another psychometric variable employed in the present study. It was found to be statistically significant at 5% confidence level with a positive coefficient value of 0.2883. The marginal effect revealed that increase in respondents' level of knowledge about the wetland, increases the probability of willingness to pay by 0.0064%. Knowledge like the attitude plays significant role in predicting WTP, as people who are very familiar with the resources and services provided by the wetland will be more likely to pay for its conservation. This findings is in agreement with that of Kotchen and Reiling, (2000) who reported significant influence of prior knowledge on willingness to pay.

The last variable in the model is the bid price (BID). It has the priori expected sign (negative) on its coefficient, which indicates an inverse relationship between the BID price and the WTP. It has a coefficient value -0.0055, and statistically significance at 1% confidence level. The marginal effect of bid price revealed that a unit increase in bid price decreases the probability of willingness to pay by -.0009%. The result shows that as the bid amount increases, the willingness to pay reduces. Loomis, et al.,(2000) elucidated that an increase in the bid price, lowers the probability of willingness to pay.

In conclusion, for CVM result to be considered reliable, higher proportion of the variation in the willingness to pay should be explained by variation in the expected explanatory variables (Ghosh & Mondal, 2013). Mitchell and Carson, (1989) stated that the easiest way to test for the reliability of willingness to pay values is to achieve an acceptable McFadden R^2 value. Thus, the value obtained by this study was $R^2 = 0.69$ (69% variation in WTP when regressing it against the theoretically predicted explanatory variables). Therefore, the model estimated in the present study can be deemed as reliable. Another useful criterion for ensuring CVM model fitness is the categorisation of the respondent based on those who are willing to pay for the bid offered and those

who rejected it. In this study, the percentage of correct prediction of the model was 92.62%, suggesting that 92.62% of the respondents truly answered the "Yes" or "No" when asked about their willingness to pay.

Table 3. Result of the Logistic Regression Model

Variable	Coefficient	Std. Error	Marginal effect	p-value
Constant	-12.1481051	2.96445502	-.20414	.0000
AGE	.11878146	.04740919	.00200	.0122
GEN	1.49112461	.69760749	.04820	.0326
HHSIZE	.39944150	.17288929	.00671	.0209
INC	.09358403	.03770676	.00157	.0131
NGO	2.91799937	1.03265969	.04209	.0047
ATTD	.08773716	.04398152	.00147	.0461
KNWL	.28833013	.10583687	.00485	.0064
BID	-.00550276	.00108163	-.00009	.0000
No. of observation		393		
Log likelihood function		-67.14381		
McFadden Pseudo R-squared		.6910869		
Percentage correct prediction		92.62%		

Estimation of Mean WTP

In order to estimate the willingness to pay value, mean WTP or the median estimate of WTP is employed depending on the circumstance (Kotchen & Reiling, 2000). According to Gurluk, (2006), if the choice of the estimate is based on efficiency criteria, then the mean is the most appropriate measure for WTP, whereas if the objective is to assess whether there are differences in the factors affecting welfare measures, then median method is used (Barrio & Loureiro, 2010). Thus, this study estimated the mean WTP based Hanemann, (1994) method, based on the following equation;

$$\text{WTP} = \frac{(\beta + A\beta GE + \beta GEN + \beta HHSIZE + \beta INC + \beta NGO + \beta ATD + \beta KNW)}{\beta 0} = \text{N2,324.08} \approx \text{USD 6.46}$$

The mean WTP value estimated was N 2,324.08 (USD 6.46) and is the amount that the households are willing to pay as tax for the conservation of Hadejia-Nguru wetland.

Differences in Mean WTP based on Socio-demographic characteristics of the users

The difference in mean WTP amount was determined based on certain demographic variables. Table 4 presents the results of a one-way ANOVA conducted to compare differences in mean WTP. The result based on occupation shows there is significant difference in WTP amount for the six different occupation reported, F (5,387) = 19.558, p = 0.000. Post hoc result indicated that Farmers are willing to pay ₦ 2587.53 as mean WTP, while Fishermen were willing to pay ₦ 2440.69 and those engaged in business had their mean WTP as ₦ 1805.91. For those who depend on livestock rearing, they were willing to pay ₦ 2293.86 and artisans have mean WTP value as ₦ 1,742.17 (Lowest). The category of the respondents that are into public service or privately employed have the highest mean WTP amount (₦ 2,843.06) among all the respondents.

Furthermore, the result on the category of respondents' age shows that there was a statistically significant difference in WTP amount (p <0.001) for the four different age group [F (3,389) = 192.62, p = 0.000]. Post hoc test revealed that those whose age ranges from 18–30 years were willing to pay ₦ 1539.50 (Lowest) as their mean WTP amount, whereas those who were within the range of 31-40 years have meant WTP amount as ₦ 2423.93. Those within the age category 41-50 years were willing to pay ₦ 2890.69 and those whose age ranges from 51 years and above have meant amount as ₦ 3360.40. Thus, older people have higher mean WTP, while younger respondents have lower mean WTP. This result further confirms the outcome of the logistic regression result where increase in age increases the willingness to pay.

The differences in mean WTP based income level was also examined and the result was statistically significant for the four different income group, F (3,389) = 138.604, p = 0.000. Post hoc analysis further revealed that the respondents whose monthly earning range between 15,000-30,000 have mean WTP amount as ₦ 1736.10, whereas those who earn between 31,000-45,000 were willing to pay ₦ 2683.79 per month. However, the category that earn between 46,000-60,000 have mean WTP amount ₦ 3148.65, while those whose income was from ₦

61,000 and above per month were willing to pay ₦ 3698.77 as their mean WTP amount. The result indicated that the lowest income earners have lowest mean WTP amount while highest income earners have high WTP.

Table 0. ANOVA Result of Mean WTP based on Socio-demographic Characteristics

	Variables	Mean WTP		(df)	*F*	p
		(₦)	(USD)			
	Occupation					
1	Farming	2587.53	7.19	(5,387)	19.558	0.000
2	Fishing	2440.69	6.78			
3	Business	1805.91	5.02			
4	Livestock Rearing	2293.86	6.37			
5	Artisanship	1742.17	4.84			
6	Private/ Public Service	2843.06	7.90			
	Age					
1	18-30 yrs	1539.50	4.28	(3,389)	192.162	0.000
2	31-40 yrs	2423.93	6.73			
3	41-50 yrs	2890.69	8.03			
4	51 and above yrs	3360.40	9.33			
	Income					
1	₦ 15,000-30,000	1736.10	4.82	(3,389)	138.604	0.000
2	₦ 31,000-45,000	2683.79	7.45			
3	₦ 46,000-60,000	3148.65	8.75			
4	₦ 61,000 and above	3698.77	10.27			

1USD= ₦ 360

Total Use Value of Hadejia-Nguru Wetland

As Carson and Hanemann, (2005) emphasised that the WTP distribution should be multiplied by the number of people in the population in order to produce an estimate of aggregate value. The total use value of the Hadejia-Nguru wetland was determined by taking the product of the estimated population that depend on the wetland for their livelihood (about I.5 million) according Kaugama and Ahmed, (2014). Therefore, by computing the mean WTP (₦ 2324.08) with the population, the total use benefit that could be derived from the wetland conservation stands at ₦ 3,486,120,000 (USD 9,683,666.67). This is an estimated annual economic benefit that could be achieved if conservation policy is implemented for the wetlands in form of Wetland Conservation Fund.

CONCLUSION AND POLICY IMPLICATIONS

The Ramsar guidelines for managing wetlands suggest common agreement among the stakeholders in maintaining the wetlands ecosystem, by permitting wise use of the resources. The outcome from this study suggested that Hadejia-Nguru wetlands have great economic value to the resources users, as they indicate their willingness to pay for its conservation. The mean WTP value estimated have shown high value attached to the wetland by the respondents. The result further demonstrates that the various resource users have indicated their willingness to pay different amount based on their age, occupation and income level. This therefore suggests the need to create different wetland management policies for different resources users.

From economic point of view, the conservation of wetland areas requires that the variety of social, economic and ecological goods and services provided by these wetlands must be seen as an asset, with the overall conservation of the area as an investment. The economic basis of a decision for or against the preservation of these vital resources involves the consideration of all costs and benefits related to it. Economic valuation in form of willingness to pay outcomes is the main indicator that revealed the importance of wetland in tangible way to the society and creates awareness to policy makers by showcasing the relative importance of wetland resources goods and services that the society valued. Thus, economic benefit estimated offered a fundamental metric for direct comparison of the costs as well as benefits associated with wetland conservation with other competing economic uses.

Valuation study of this nature can provide useful information that would guide the wetland managers and policy makers on the need to introduce conservation tax to the various wetland users, which would help in realising significant revenue for conservation of the wetland. In addition, the willingness to pay amount revealed by the respondents provide a clue for the potentials of huge revenue if policy on wetland conservation trust fund is formulated. It is therefore, suggested that wetland managers and policy makers should examine the potentials of

exploring revenue option from this source, in order to compliment the budgetary shortfalls from government for overall effective wetland management. In conclusion, for long term sustainability of Hadejia-Nguru wetlands, institutional and management structures that would ensure its sustenance and promote wise use need to be in place. Considering the economic linkages between local peoples' dependence on the common resource pool and the consequent wetland degradation, an institutional framework in the form of well-defined property rights of locals can help to mediate upon. This would prevent consequence of the 'Tragedy of the Commons' in the absence of property rights, and poorly defined rights to access.

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