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Estimating the Non-use Value: The Contingent Valuation Approach on Rural Households in Hadejia-Nguru Wetlands, Northern Nigeria

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ABSTRACT

Wetlands are unique ecosystem of the earth that provides variety of goods and services to the society. The Hadejia-Nguru wetlands (HNW), being the first site to be identified as wetland of international importance (RAMSAR site) in Nigeria, is however facing serious anthropogenic threats. Lack of information on economic value of the wetlands, especially the non-use values has contributed tremendously to its continuous exploitation and degradation. The objective of this study is to estimate the non-use values of the wetland and determine the factors influencing respondents' willingness to pay for its conservation. The study employed dichotomous choice contingent valuation method (DC-CVM) on 405 systematically sampled households of some upstream communities near the wetland between the months of August to October, 2016. The study results showed that 78.8% of the respondents were willing to pay through donation for the conservation of the wetland. The mean WTP value was estimated at N2, 290.31 ≈ $ 7.51 per household, and the aggregate non-use value estimated was ₦ 29,366,540,335.11 ($=96,283,738.8) yearly. From the logit regression model, gender, age, income, household size, institutional trust, bid amount and attitudes were the significant predictors of WTP for non-use value. The study finding explicitly reveals the importance attached to the wetland by the local people and their willingness to make investment for its conservation and restoration. This outcome has significant policy implications for balancing development and conservation efforts and thus, recommends the incorporation of local communities in decision making for sustainable wetland management.

Keywords: Non-use, DC-CVM, Hadejia-Nguru, WTP, Wetlands

Mathematics Subject Classification: 62J10, 62H86

Journal of Economic Literature (JEL) Classification : Q51, Q57, D12

1. INTRODUCTION

Wetlands are regarded as highly productive ecosystems, that provides several goods and services to the local people living near them, as well as other communities that are away from the wetland areas (Barbier, Acreman, and Knowler 1997). While there is rising appreciation for the need to conserve wetland throughout the world, they continue to be lost at an unprecedented rate (Kerry Turner et al., 2000).

Wetlands are facing continuous pressure from man-made activities which includes; conversion for intensive agriculture, residential and industrial uses; and pollution from agricultural production, industry and households. Other factors that are negatively affecting the sustainable wetlands management include poverty and economic inequality, pressure from population growth, immigration and mass tourism. Schuyt and Brander, (2004) in their opinion, state that information failure is one of the main causes of wetland degradation. Absence of information about the economic value of these wetlands have serious policy implications as it is though, assume to be public good that is free for all. The policy makers often have insufficient information on the economic values of wetlands, hence conservation of the wetlands does not appear to be a serious alternative to other development decisions (Birol and Cox 2007).

It is not easy in difficult financial times for government decision makers to spend taxpayers' money on environmental activities, especially if there is no broad support from the public. As such, wetland valuation is a way to estimate ecosystem benefits to people and allows financial experts to carry out a Cost-Benefit activity which might be in favour of environmental investment (Lambert 2003). Economic valuations provide a means for measuring and comparing the various benefits from wetlands and the costs associated with their conservation. Valuations can assist policy-makers and stakeholders to make informed decisions involving wetland resource allocation when faced with competing land uses (Chaikumbung, Doucouliagos, and Scarborough 2016). Therefore, a method to establish economic values for use and non-use values of wetland resources is a major requirement in justifying wetland conservation. As such, CVM has been used successfully to value the economic benefits of wetlands, for both use and non-use values (Oglethorpe and Miliadou 2001; Wattage and Mardle 2008).

There are few studies on the Hadejia-Nguru wetlands despite being the pioneer Ramsar site in Nigeria, and no study was reported to have examined the non-use value of the wetlands. Hence the objective of this study is to examine the households' willingness to pay for conservation of the wetland, and estimate the aggregate non-use values of the wetland resources. This study would make contribution in two ways; first, it will add to the scant literature on application of CVM technique in estimating the non-use value of environmental resource, especially the wetlands in developing countries and Nigeria in particular. From the studies conducted to date, only Barbier, et al (1993b) had ever conducted valuation studies (Partial valuation) of Hadejia-Nguru wetlands using the market based approach. No empirical evidence was ever reported to have employed the non-market valuation techniques particularly the CVM on wetland in Nigeria. To date only few studies such as

Adamu, Yacob, Radam, and Hashim, (2015) who employed CVM technique for natural resource valuation in Nigeria. The second contribution of this paper to the wetland valuation literature is that, it does not only examine the non-use value of the wetland as whole but also was able to distinguished the various non-use value types (Option, Existence/Intrinsic and bequest) and the mean WTP for each of the component. Thus, this study would opened a new window of research in the area of wetland valuation, which will form important component of total economic value was as well as input for cost benefit analysis.

2. THE NON-USE VALUE AND CONTINGENT VALUATION

A heuristic concept that describes the different components of economic value of environmental resources provided to people is the term called the total economic value (TEV) (Christie et al. 2012). This concept was brought into limelight in the 80s by Peterson and Sorg, (1987), in an article titled "Towards the measurement of total economic value". The concept later became popular among scholars and was placed among the most extensively used frameworks for determining and categorizing the various benefits provided by the ecosystems (Barbier, Acreman, and Knowler 1997).

To explain the concept of total economic value within the context of wetlands, there is the need to expatiate the various components that made up the TEV. These includes the use value (UV) and the non-use value (NU). The use value encompasses both the extractive and non-extractive values of wetland resources, used either directly or indirectly by the society. It is the consumer surplus obtained from direct use of the wetland resources. ie.benefits achieved from the real use of the wetland and its resources (Togridou, Hovardas, and Pantis 2006). It is further subdivided into direct use (DU) and indirect use values (IU), where the direct use values involve the actual use of the resource in a consumptive way. Conversely, the indirect use value referred to the non-extractive use of the wetland resources (Jones-Walters and Mulder 2009).

Non-use value of the wetlands however, refers to the value or welfare gains to individuals that arise from the environmental changes derived from the non-use satisfaction. This is further subdivided into three major components as; the existence or intrinsic value (EV), the option value (OV), and the bequest value (BV). The existence/Intrinsic value referred to the value attached to environmental assets for their existence, which is borne out of the desire for its right to survival and continuous existence. The option value referred to the notion or believes that the resources might be used in future. The bequest value is based on the believe that natural resources should be taking care of or preserved for our future descendants also to see (Lee and Han 2002)(Christie et al. 2008).

Although the non-use values of wetlands are intangible and are not measured easily and as such, not commonly traded under market condition, the under-valuation of wetland resources consequently became very possible by policy makers, and as such, they would not consider it in development decisions. Therefore, economic valuation of wetlands resources that ignores the non-use values

results in poor policy for wetland management, and subsequently leading to wetland destruction. However, if the non-use values of the wetlands are taken into account in valuation studies, they help to prevent misleading information to policy makers, as they tend to focus on conservation rather than exploitation (Ghosh and Mondal 2013). Therefore, the total non-use value can be expressed as the sum of existence value, the option value and the bequest value as follows: NUV= (EV + OV + BV).

The contingent valuation method (CVM) is the most widely applied technique to estimate non-use values of wetlands, as it provides a framework that is capable of measuring the different forms of non-use values (Ghosh and Mondal 2013). Many studies suggest that the CVM has the potential for application to a wider range of wetland goods and services than any other non-use valuation methods and the non-use values obtained by the CVM cannot be quantified properly in any other ways (Bateman et al., 2002). Moreover, the CVM is the only method which is capable of estimating non-use values by directly asking respondents to state their WTP or WTA for hypothetical changes in wetland quality (Brander, Brouwer, and Wagtendonk 2013).

According to Venkatachalam (2004), the emergence of contingent valuation Method could be traced to Ciriacy-Wantrup (1946), in his attempt to estimate the side effects of soil erosion. Since then, the attention of CVM has shifted from valuing the damages to the environment to focusing on the environmental protection valuation. CVM technique is widely employed as a useful tool for policy formulation in the area of biodiversity conservation and protected area management (Baral, Stern, and Bhattarai 2008). Even though, contingent valuation technique is not the perfect tool for environmental valuation and also not the best substitute for the revealed preferences technique as it does not provide the needed solution to environmental problems, it however give individual the opportunity to make purchase of public goods hypothetically due to the absence of actual market scenario (Pettorelli et al. 2012). The contingent valuation willingness to pay for the non-marketed goods was developed from the theory of rational choice and utility maximization (Reynisdottir, Song, and Agrusa 2008).

3. METHODOLOGY

3.1. Study Area

The Hadejia-Nguru wetland is the first Nigeria's wetland to be recognize as a Ramsar site, designated in October, 2000. The wetlands area is an extensive area of floodplain located in the north-eastern sudano-sahelian zone of Nigeria, covering an area of approximately 3,500 square kilometres. In recent time, the extent of flooding areas has ranged from 70000 to 90000 hectares (Barbier 1993b). The Hadejia-Nguru wetlands recharge the Komadugu-Yobe Basin underground aquifer and support great number of wildlife species of, different diversity especially the Afrotropical and Palaearctic migratory water birds.

It was estimated that about one and half million (1.5 million) people lives in the Wetlands with the major ethnic groups comprising of the Kanuri, Hausa, Fulani, and Bade. The partial valuation

conducted in the wetland has placed the economic benefits of the main agricultural outputs in the at approximately N6 billion (US$75 million). In addition, heads of cattle grazing around the wetland was estimated to be over 250,000, which support the cattle trading with over N400 million (US$5 million) annual turnover. For the fish stock, annually over 6,000 metric tons of fish catch was estimated, with over N480 million (US$6 million) market value (Barbier 1993a).

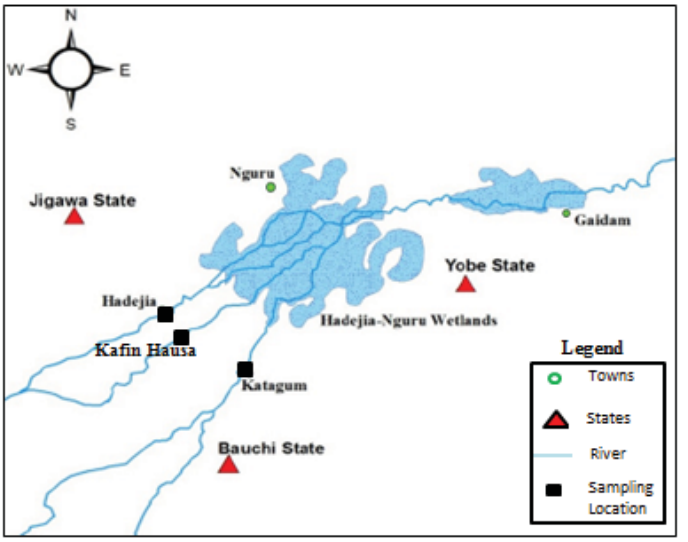

Figure 1. Map showing the study Area

3.2. Sampling Method and Data Collection

According to Lee and Han, (2002), to obtain good result from CVM study, it basically depends on the nature of survey technique employed. This study employed a multi-stage sampling technique where communities were initially stratified based on their proximity to the wetland. Secondly, from the stratified communities, three (3) communities each from one stratum were randomly selected and the samples were drawn them by systematic random technique, where every third household was selected. The NOAA (National Oceanic and Atmospheric Administration) panel have endorses the use of a face-to-face in-person interview in contingent valuation studies as a more reliable and superior technique for data collection when compared with other survey methods like the mail survey and self-administered (Arrow et al. 1993). Therefore, this study employed the direct face to face interview method for the data collection.

The study employed three (3) enumerators for data collection who were taught about the survey protocols and procedures for conducting the face-to-face interview as well as the content of the questionnaire. Earlier, in February 2016, pilot survey of 30 respondents was conducted using open-ended elicitation open-ended elicitation method. From the result of the pilot survey, the various bids price used in the main survey were obtained. For the final survey, a total of 425 households were

interviewed between the months of August to October 2016, in which 405 valid responses were obtained. The objective of the study was stated to the respondents and they were assured that the research is purposely for academic use only, and all information gathered will be treated with confidentially. This assurance that information provided by the respondents will not influence government decision on enacting price such as access fee to the wetland was aimed at minimizing the likelihood of strategic bias (Mmopelwa, Kgathi, and Molefhe 2007). The data analysis for the study was conducted with the aid of statistical software NLOGIT Version 4.0..

3.3. Dichotomous Choice Contingent Valuation Method

Contingent valuation method is regarded as the most popular approach for estimating the economic values of non-market goods (Hanemann, 1994; Lee & Han, 2002). This research employed a dichotomous choice contingent valuation method (DC-CVM) to measure households' WTP. The dichotomous choice (DC) approach was first introduced by Bishop and Heberlein, (1979), in their study to measure the economic value of goose hunting. DC approach provides the respondents with only two answer choice of either 'Yes' or 'No' (Bhatt, Shah, and Abdullah 2014). This is commonly described as a single "take it, or leave it" (TIOLI) to the bid amount option presented to the respondents (Mohd Rusli et al. 2009). The DC-CVM question format is easier than the open-ended since respondents are more acquainted with market transactions that are discrete in nature (Hanemann, 1994). Thus, the DC-CVM format is normally considered as a superior method of elicitation (Lockwood and Tracy 1995). Although the general limitation of CVM technique lies on individuals' WTP under a hypothetical market situations (Lee and Han 2002), this imaginary situation in the DC-CVM may result in overestimating the WTP value giving by the respondents. The current study employed an especially designed CVM instrument with a payment vehicle that is known to the respondents in order to minimise the hypothetical bias.

3.4 Model Specification and Procedures

Estimating the demand function provides the mean WTP of the respondents. This is based on the theory of utility maximization. In this study, the respondents have a choice of either to accept or to reject the amount proposed for donation as bid price so as to maximize their utility based on the following condition.

$$U_{jk}(1, Y - A; S) + \varepsilon_1 \geq V_{jk}(0, Y; S) + \varepsilon_0 \quad (1)$$

Where u is the indirect utility function, Y is the mean annual income, A is the donation amount of offered, S, denote the socio-demographic information of the respondents and other psychometric variables influencing 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:

$$\Delta U = U_{jk}(1, Y - A; S) - v(0, Y; S) + (\varepsilon_1 - \varepsilon_0) \quad (2)$$

The probability (P_i) that the households will accept a specified amount (Y) can be expressed in the following logit model based Cameron (1988) method (Lee and Mjelde 2007; Wang and Jia 2012).

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

Where α is the intercept, β represents the coefficient of the bid price of variable A, 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.

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

$$\text{Mean WTP} = \frac{\beta + \beta_1 AGE + \beta_2 GEN + \beta_3 EDU + \beta_4 TRUST + \beta_5 HHSIZE + \beta_6 INC + \beta_7 ATD}{\beta_0} \quad (5)$$

Where; β =estimated constant, β_0 = coefficient of the bid price, $\beta_1 \ldots \beta_7$ = coefficients of the parameters, AGE= age, GEN=gender, EDU=years of education, TRUST= Institutional trust, HHSIZE=households' size, INC=income, ATD=environmental attitude.

4. RESULT AND DISCUSSION

4.1 Socio-demographic Characteristics

The socio-demographic profile of the respondents (Table 1) indicates that 91.9% were men while women constitute only 8.1%. The respondents' age distribution shows that those whose age range from 18 to 30 years were 28.4%, those within the range of 31-40 years were 36.5%, while those whose age range from 41 to 50 were 21.0%. However, only 14.1% of them have age ranging from 51 years and above. The study outcome has shown that the marital status of the respondents indicated that those who were married 87.9% while those who responded as single were 12.1%.

The educational level of the respondents has shown that 25.23% of them either did not attend school at all, or had only non-formal education. Those who attained only primary level of education were 56.7%, while those who reported to have attained secondary level of education were 30.4%. Out of the total households surveyed, 21.5% reported to have had education to tertiary level. For respondents' primary occupation, those who engaged in farming were 36.3% (majority), 6.2% were in to fishing, while livestock rearing were 5.2%. Those who reported to be into Public/ Private Service constitute 19.8%, while those engaged in businesses were 23.0 and Artisan constitute the remaining 9.6%. The respondents' income distribution indicated that those earning between 15,000-30,000 Naira monthly were 39.5%, those with income range of 31,000- 45,000 were 35.8% and those with income ranging from 46,000-60,000 were 17.0%. The highest income earners (61,000 and above) were 7.7%.

The household size distribution of the respondents have shown that household with a size between 1-3 were 27.4%, those with size between 4-6 were 41.2% whereas those whose household has a size range of 7-9 were 18.8%. However, those who stated to have household size above 10 people per household constitute 12.6% of the total responses. Membership or otherwise of a pro-environmental association have shown that those who belongs to pro-environmental association were only 26.9% of the total respondents, whereas those who doesn't belongs to any environmental organization constitute the majority (75.1%).

Table 1. Socio-demographic characteristics of the Non-users (n=405)

Variables	Category	Percentage
Gender	Male	91.9
	Female	8.1
Age	18-30 yrs	28.4
	31-40 yrs	36.5
	41-50 yrs	21.0
	51 and above yrs	14.1
Marital Status	Married	87.9
	Non-Married	12.1
Education	Non-formal	25.2
	Primary school	23.0
	Secondary School	30.4
	Tertiary	21.5
Household income	₦ 15,000-30,000	39.5
	₦ 31,000- 45,000	35.8
	₦ 46,000-60,000	17.0
	₦ 61,000 and above	7.7
Primary Occupation	Farming	36.3
	Fishing	6.2
	Livestock Rearing	5.2
	Public/ Private Service	19.8
	Business	23.0
	Artisan ship	9.6
Household Size	1-3	27.4
	4-6	41.2
	7-9	18.8
	10 and above	12.6
Membership of NGO	Yes	26.9
	No	75.1

1 $= ₦ 305

4.2 The Non-use Willingness to Pay Responses

The summary statistics of the willingness to pay responses to each of the bid price presented offered is presented in Table 2. The result shows that responses 319 (78.8%) were willing to pay by choosing "Yes" to the bids prices offered, whereas the remaining 86 (21.2%) responded by choosing "No"

option (Protest Bidders). The initial bid price (₦ 1200) had a 'Yes' response for the bid as 75 (18.5%), while the 'No' response was 10 (2.5%).For the second bid price (₦ 1400), share of those who said 'Yes' was 69 (17.0%), while the 'No' response was 13 (3.2%).

The third bid price was ₦ 1600, and the positive response (YES) to the bid was 65 (16.0%) and those who had responded negatively (No) were 16 (4.0%). For the fourth bid price (₦ 1800), it has a total 'Yes' response of 61 (15.1%), whereas, those who were not willing to pay the bid price ('No' response) were 21 (5.2%). However, for the highest bid price offered to the respondents (₦ 2000). The positive response obtained (Yes) was only 49 (12.1%), while the remaining 26 (6.4%) selected the "No" option to the bid. This outcome indicated that increase in bid price, reduces the chance of its selection, which is in line with economic theory (theory of demand).

Table 2. Summary of Non-users' Willingness to Pay for Conservation

	YES		NO		Total	
Bid price	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
₦ 1200.00	75	18.5	10	2.5	85	21.0
₦ 1400.00	69	17.0	13	3.2	82	20.2
₦ 1600.00	65	16.0	16	4.0	81	20.0
₦ 1800.00	61	15.1	21	5.2	82	20.2
₦ 2000.00	49	12.1	26	6.4	75	18.5
Total	319	78.8	86	21.2	405	100

1$= ₦ 305

4.3 Reasons for Willingness to Pay

Bequest and existence values were the frequently stated reasons given by the non-users for their willingness to pay, with about 43.2% saying they were willing to pay for conservation in order to sustain the resources for future generation (bequest value). About 30.6% gave their reason as 'for the conservation of natural resources (existence value). Other reasons given include; 'for its sustainability, so that I can visit again' (Option value), 'to limit number of visitors from overcrowding the wetland' (Visitation control), and 'Is not expensive, I can afford it for my recreational pleasure' (Actual use). But for those who were not willing to pay any bid amount, the major reasons given were that 'It is government responsibility to conserve the reserve', others gave their reasons as not been interested in resource conservation, or they already pay through tax, and those who don't believe the money will be used for conservation.

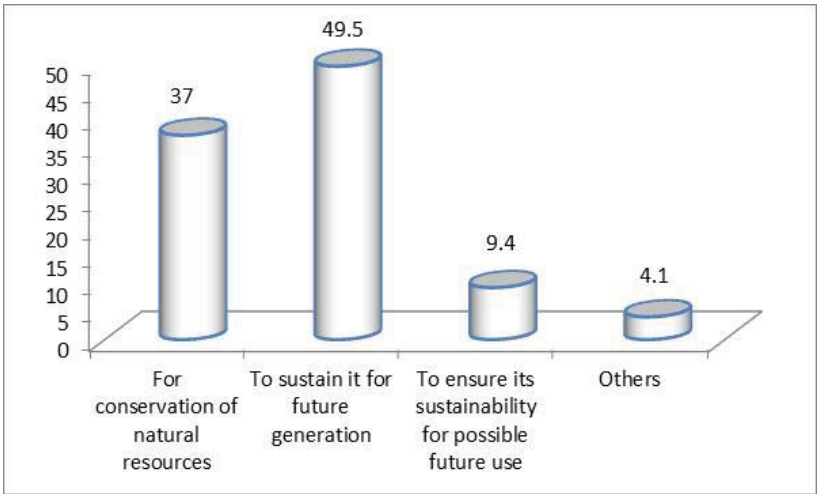

Figure 2. Reasons for willingness to pay

4.4 The Binary Logistic Model and WTP Estimation

The binary Logistic regression model was employed to examine the influence of environmental attitude measure and the socio-demographic characteristics of the respondents on their willingness to pay. Among the variables influencing households' willingness to pay that were common in many literatures and were employed in this study includes; income, age, gender, years of education, environmental attitude, environmental awareness, institutional trust, household size and the bid price.

The result of the logistic regression obtained (Table 3) was consistent with many empirical findings. The households' level of income (INC) was found to be significant variable in the model. It has a positive coefficients value of .0002, and statistically significance at 1% level of confidence. The result shows that households with a higher level of income have higher likelihood to pay for conservation of the wetland than those with low level of income. This outcome is in conformity with the results of many CVM studies that reported positive influence of income and willingness to pay. These studies include that of Wang and Jia, (2012), Bhandari and Heshmati, (2010) and Bal and Mohanty (2014).

Another important variable in the model was the respondents' age (AGE). The coefficient of the age was positive (.2375) and statistically significant at 5% confidence level. It shows that the respondents with higher age are more likely to pay for conservation than those with lower age bracket. This outcome is in agreement with the result of Bhandari and Heshmati, (2010), Bal and Mohanty (2014) and Lee and Mjelde, (2007), whereas in disagreement with the outcome of the study by Montes, Benayas, and Martı, (2007) and Reynisdottir et al., (2008).

The respondents' gender (GEN) was also found to be significant at 5% confidence level in the model, with a positive signs on its coefficients. Gender has the the highest coefficient value (2.1395). This

outcome revealed the relationship of gender with willingness to pay, also indicating a higher likelihood of men to pay for conservation than the female respondents. Although, differences in WTP based to gender were justified by few studies, nevertheless those study results remain inconclusive (Reynisdottir, Song, and Agrusa 2008). Thus, this result support the outcomes of studies by Wang and Jia, (2012) and Hejazi, Shamsudin and Rahim, (2014) that reported influence of gender on WTP.

Years of education (EDU) is another important variable that is statistically significant at 5% confidence level, with a positive coefficient value of .2278. The result showed that increase in years of education increases the probability of willingness to pay. The positive relationship between education and the willingness to pay of the households in this study is conformity with many studies in the literatures that reported the influence of education in predicting willingness to pay (Baral, Stern, and Bhattarai 2008).

The respondents' attitude towards the environment (ATD) was also incorporated in the model, and statistically significance at 1% confidence level. Its coefficient value was .6172, which shows the propensity of attitudes on the probability of WTP. Therefore, pro-environmental attitude increases the probability of willingness to pay for conservation. This outcome is in agreement with many studies such as Kotchen & Reiling, (2000) who found positive significant influence of pro-environmental attitude and willingness to pay for non-use value.

Peoples' trust on government in form of institutional trust (TRUST) was also employed in the model. The variable was measured as dichotomous option (Yes or No), and was statistically significant at 5% confidence level, with coefficient value of 2.0950. The result indicates the influence of respondents' trust on government on their willingness to pay for conserving the wetland. This outcome is no doubt that without the trust on the authorities, people will be less likely to make donation into propose wetland conservation trust fund. Similar result was also reported by Wang and Jia, (2012).

Household size (HH_SIZE) was found to significantly influence households' willingness to pay in the model. Although, it was statistically significant at 5% like other variables in the model, however, has a negative sign on its coefficient (-.8463). This negative sign shows an inverse relationship between household size with willingness to pay. This result shows that the higher the household size, the lower the probability of willingness to pay. Although, role of household size in predicting WTP were reported by a few studies, however, there was mixed findings. Nevertheless, this finding is in agreement with that of Surendran and Sekar, (2010), who reported negative relationship between households' size with WTP.

As expected for the bid price (BID), it also has a negative coefficient. The negative sign indicates a negative relationship between the bid price and the willingness to pay. The bid has a negative coefficient value -.0109 and was significant at 1% confidence level. This result is in line with the economic theory and support numerous CVM literatures that emphasis that increase in bids price

while using CVM-WTP format, reduces the likelihood of willingness to pay (Mohd Rusli, Alias, Khairil, & Ahmad, 2009; Reynisdottir et al., 2008).

The overall model fitness based on model chi-square was significant at the .01 level according to the. The percentage of correct prediction was (97.28%). The McFadden's pseudo R^2 was .8768 (87.68%). These goodness of fit based on these parameters reported were above the minimum acceptable level. Creating a model with parameters that predicts WTP for environmental good with coefficients values carrying the expected signs proves that the study has measured the anticipated outcome (Carson, Flores, & Meade, 2001).

Table 3 Result of the Logistic Regression Model

Variable	Coefficient	Standard Error	b/St.Err	P-Value
Constant	-27.2875390	5.44651439	-5.010	.0000
INC	.00022239	.604852D-04	3.677	.0002
AGE	.23754983	.10539589	2.254	.0242
GEN	2.13945941	.98371363	2.175	.0296
EDU	.22774969	.09164778	2.485	.0130
ATD	.61720984	.11884088	5.194	.0000
TRUST	2.09500805	.84975571	2.465	.0137
HHSIZE	-.84634174	.33808124	-2.503	.0123
BID	-.01089512	.00242556	-4.492	.0000

Number of Observations	**405**
Log likelihood function	**-25.80885**
McFadden Pseudo R-squared	**.8767512**
Percentage Correct Prediction	**97.28**

In order to estimate the willingness to pay value, previous studies usually employ the mean method of estimate instead of the median estimate of WTP (Kotchen and Reiling 2000). According to Gurluk, (2006), if the choice of the estimate is based on efficiency criteria, estimating the mean WTP is the most appropriate measure for WTP rather than median WTP. Thus, this study estimated the mean WTP following the Hanemann, (1994) procedure based on equation (5) as;

$$\text{Mean WTP} = \frac{\beta + \beta_1 AGE + \beta_2 GEN + \beta_3 EDU + \beta_4 TRUST + \beta_5 HHSIZE + \beta_6 INC + \beta_7 ATD}{\beta_0} \quad (5)$$

The mean WTP value obtained was ₦2,290.31 ≈ $ 7.51. This it is the average amount of money that individual households will be willing to donate into the hypothetically propose wetland conservation trust fund for the conservation of Hadejia-Nguru wetland.

4.5 Differences in WTP Amount Based on Socio-Demographic Characteristics

The difference in mean WTP amount was examined based on certain socio-demographic characteristics of the respondents. One-way ANOVA test was employed to examine the significant difference in mean WTP amount that each category of the users is willing to pay for conservation of Hadejia-Nguru wetland, as shown in Table 4.

Based on the educational level of the respondents, the result shows that there is significant difference in WTP amount (p <0.001) for the four different educational level, F (3,401) = 48.010, p = 0.000. Post hoc analysis (Tukey HSD test) revealed that there is significant difference between all the four categories p<0.005 and the descriptive statistics shows the that those who do not had any formal education have mean WTP amount as ₦ 1836.25, while those who attended only primary school have ₦ 2076.82 as their mean WTP value. For secondary school, the mean value was ₦ 2410.61, while those who attained tertiary education have mean WTP amount as ₦ 2925.99. It can be concluded that mean willingness to pay amount significantly increases with increase in level of education, conforming to the regression result that shows increase in educational experience increases the willingness to pay.

For the occupation of the respondents also, the ANOVA result shows that there was significant difference in WTP amount for the six different occupations reported, F (5,399) = 21.86, p = 0.000. Post hoc analysis indicated that there is significant difference in mean WTP between the respondents based various their various occupations. Farmers were willing to pay ₦ 2382.56 as mean WTP, while Fishermen were willing to pay ₦ 1695.40 and those engaged in business had their mean WTP as ₦ 2031.33. For those who depends on livestock rearing, they were willing to pay ₦ 1929.29 and those who were artisans, have mean WTP amount as ₦ 2278.84. Among the respondents, those who were into public service or privately employed have the highest mean WTP amount (₦ 2775.42) among all the respondents.

In addition, the result on the of respondents' age shows that there was a statistically significant difference in WTP amount for the four different age category [F (3,401) = 51.41, p = 0.000]. The Post hoc result show that there is differences between the various age groups as those whose age ranges from 18–30 years were willing to pay ₦ 1785.51 as their mean WTP amount, whereas those who were within the range of 31-40 years have meant WTP amount as ₦ 2475.01. Those within the age category 41-50 years were willing to pay ₦ 2660.25 and those whose age ranges from 51 years and above have meant amount as ₦ 2668.68. Thus, it indicates that older people are willing to pay higher

amount than younger ones. This result further confirms the outcome of the logistic regression result where increase in age increases the willingness to pay.

Another important variable is households' income. The mean WTP amount was found to be significantly different for the four different income group, [F (3,401) = 85.451, p = 0.000]. The post hoc analysis further revealed that the respondents whose monthly earning range from 15,000-30,000 have mean WTP amount as ₦ 1837.63, whereas those who earn from 31,000 to 45,000 were willing to pay ₦ 2552.84 per month. However, the category that earn between 46,000-60,000 have mean WTP amount ₦ 2891.51, while those who earn from ₦ 61,000 and above per month were willing to pay ₦ 3267.62 as their mean WTP amount. The result indicated that as the income level increase, the mean WTP amount also increases, which also validates the result of the regression model that shows the propensity of income to willingness to pay, thus it can be concluded here that increase in income level increases the mean WTP amount.

Table 4 Differences in Mean WTP Amount based on Socio-demographic Characteristics

	Variables	Mean WTP	(df)	*F*	p
	Education				
1.	Non-formal education	1836.25	(3,401)	48.010	0.000
2.	Primary	2076.82			
3.	Secondary	2410.61			
4	Tertiary	2925.99			
	Occupation				
1	Farming	2382.56	(5,399)	21.86	0.000
2	Fishing	1695.40			
3	Business	2031.33			
4	Livestock Rearing	1929.29			
5	Artisanship	2278.84			
6	Private/ Public Service	2775.42			
	Age				
1	18-30 yrs	1785.51	(3,401)	51.408	0.000
2	31-40 yrs	2475.01			
3	41-50 yrs	2660.25			
4	51 and above yrs	2668.68			
	Income				
1	15,000-30,000	1837.63	(3,401)	85.451	0.000
2	31,000-45,000	2552.84			
3	46,000-60,000	2891.51			
4	61,000 and above	3267.62			

4.6 Distinguishing the Different Non-Use Value Type Based on WTP Amount

This study was able to distinguish between mean WTP amounts based on the type of non-use values (Table 5). One-way analysis of variance was carried out to explore the differences in willingness to pay amount and the result shows that there is significant difference in WTP amount (p <0.001) between the four different value type identified by the study, F (3,315) = 11.610, p = 0.000. The Post hoc analysis (Tukey HSD test) result shows that there is significant difference between the most mentioned reasons for willingness to pay (Bequest), which has the highest mean WTP amount (₦ 2705.35). The amount willing to pay by the respondents for existence/intrinsic value was ₦ 2509.88, option value has mean WTP amount as ₦ 2342.42, whereas other reasons for willingness to pay which include, 'not expensive, 'because I can afford it' etc was valued at 2137.80. Based on the mean willingness to pay amount of the different type of value, it can be concluded that the household in the study area attached some importance to the wetland mainly for bequest and existence purpose, option value was also considered by some few among the respondents.

Table 5 ANOVA Result Showing Differences in Mean WTP Amount Based on Value Type

Reason for WTP	Value Type	N	Mean	Std. Deviation	(df)	F	P
To sustain it for future generation	Bequest	157	2705.35	400.48	(3,315)	11.610	.000
For conservation of natural resources	existence/ intrinsic	117	2509.88	522.84			
To ensure its sustainability for possible future use	option value	31	2342.42	466.28			
Others	Other reasons	14	2137.80	602.79			

4.7 The Aggregate Non-use Value of the Hadejia-Nguru Wetland

The total non-use values of the Hadejia-Nguru wetland was determined following Carson and Hanemann, (2005) suggestion that the WTP amount should be multiplied by the number of people in the population in order to produce an estimate of aggregate value. Based on the non-users' population estimated at 12,822,081 people in this study, the aggregate non-use value of Hadejia-Nguru wetland was computed at ₦ 29,366,540,335.11 ($=96,283,738.8) yearly.

5. CONCLUSION

This study presents a compelling business case for wetland conservation in the Hadejia-Nguru wetlands, as it provides recent information to better our understanding of the wetland value

specifically, the non-users. The results of this present study provide information about wetland values that would guide policy makers on social return on investment.

Hadejia-Nguru wetland is a very important and significant environmental asset in Nigeria that supports the livelihoods of millions of the local people. This paper estimated the non-use value of conservation of the Hadejia-Nguru Wetlands using DC-CVM. The study result suggest that people living in upstream areas near the wetland, even though, they don't depends on the wetland, however, they were willing to donate money for the conservation of the wetland. An important conclusion of this study is that 78.8% of those who resides in communities outside the periphery of the wetland (non-users) were willing to donate money for the conservation. The results of the study showed that the household were willing to donate average amount of ₦ 2,290.31 ≈ $ 7.51 yearly into the hypothetically proposed wetland conservation trust fund. The total annual aggregate non-use value of the wetland was estimated at ₦ 29,366,540,335.11 (US$ 96,283,738.8). This estimated non-use benefit indicated that the non-users' had placed a considerable value on the wetland resources, despite the fact that they enjoy no direct benefit from its existance. Yet, they attached economic value on the wetland by revealing their willingness to donate money for its conservation.

Economic valuation is a key indicator that revealed the importance of wetland in tangible way to people and the to the wetland managers, willingness to pay results can be used as a useful indicator for identifying the relative importance of goods and services people valued. Thus, economic values estimated in this study would provide a fundamental metric for directly comparing the benefits and costs of wetland decisions with other economic initiatives.

Among the variables used in the model were age, income, education, gender, households' size, institutional trust, respondents' attitude, and bid price. All of which were found to significantly influence the willingness to pay response of the households. The importance of non-use value elicited by the survey respondents was derived mainly for bequest and existence purposes. This indicates that people in the study area are very much concerned about the environmental conditions of the wetland as a legacy that could be left for the future generations.

The study finding would inform the policy makers on the significance of conserving the wetlands, as it clearly highlight the importance of the non-use values attached to the wetland and the willingness of the local people to make investment for its conservation. This outcome have shown that there is the potential for generating huge amount of money through donation which could be channelled for conservation and other better wetland management programs. By doing this, sustainability of the wetland would be ensured, as source of fund for conservation would be guaranteed. The study therefore recommended that the conservation of the wetlands should be considered as an integral system that would ensure the involvement of the local communities in decision making related to the wetland management.

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