

Economic valuation for improve conservation of Yankari game reserve, Bauchi Nigeria

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Abstract- Biodiversity conservation can be seen as avoiding and eliminating any steps that can seriously disturb Yankari game reserve biodiversity ecosystem. Eco-conservation is regarded as an ideal tool for attaining both economic and conservation sustainability. The objective of this study is to determine the adjoining community willingness to pay for improve conservation of Yankari game reserve using a dichotomous choice contingent valuation method (DC-CVM) on 422 respondents from adjoining communities of Yankari game reserve. The result of the study showed that the mean willingness to pay for improve conservation of the reserve by people of the adjoining communities of the reserve is N2, 376.42. The findings of this study would provide a guide for the government, policy makers, management of the game reserve and relevant authorities towards achieving improved and sustainable conservation of Yankari game and also take into account the benefits associated with resources conservation and the need for both the public and private organisations to actively and financially participate for future generation to benefit.

Index Terms- Biodiversity, Conservation, Contingent valuation, Eco-conservation, Willingness-to-pay

I. INTRODUCTION

Globally, the rate at which varieties of species of plants and animals were lost supersedes its natural lost (Chanie&Tefaye, 2015; Meduna, Ogunjinmu and Onadeko, 2009). The daily increase of human activities is destructing natural resources which necessitate the establishment of conserve and protected environmental resources globally (Grigoroudis, Petridis&Arabatzis, 2014). Biodiversity conservation can be seen as avoiding and disregarding any steps that can disturb Yankari Game Reserve ecosystem. The rapidly growing ecological resources of the present day society which lead to habitat destruction and fragmentation, extinction of species and the general decline or loss of biodiversity (Frikvist, Erika, 2015; Larby& Patricia, 2009).

Reserves and resources parks establishments are aim at ensuring that varieties of plants species are conserved and protected (Jia, Fu, Feng, Hou, Liu & Wang, 2014; An, Li, Guan, Zhou, Wang, Deng & Jiang, 2007). The main aim of ecosystem conservation is to maintain and protects ecological process which is proved to have continuously contributed

significantly in the productive capacity of the protected ecosystem resources, biodiversity genetically materials, protection of culture and rural area development as a whole (Newing, 2010).

II. REVIEW OF LITERATURE

Biodiversity Conservation and Protected area

Conservation is an activity of guarding and protecting of plant and animal species and their habitats (Condamine, Rolland & Morlon, 2013). Conservation is the ethical use and protection of valuable resources, such as plants, minerals, animal, water bodies, land and other resources. It is focused on maintaining the natural sphere in order to safeguard the sources of resources (Soule, Tegene&Wiebe, 2000; Soule & Wilcox1980).

Conservation of environmental resources serves as ecosystem maintenance system such as the sequestential of carbon, recreational and educational services, erosion and flooding mitigation and control (Jia, Fu, Feng, Hou, Liu & Wang, 2014). Such areas are to serve as avenues of poverty reduction and job creation and sustainable community and conservation development (Rogerson&Sim, 2012). Therefore, conservation of natural environment resources is a wealth of life which is found on earth plants, animals, microorganisms and the system that exist in (Olaleru, &Egonmwan, 2014).

Protected area are referred to as the cornerstone for ecosystem and biodiversity conservation because of its significant in biodiversity conservation and the services it rendered in ecosystem services it offers to our societies (Htun, Mizoue and Yoshida, 2012). Those services rendered necessitated the need for the creation or establishment of protected areas so that the vital resources of the environment will be protected and sustained (Barber, et al., 2012).

Establishment of Nigeria protected areas is traced back to the 17th century and the first protected area to be conserve was the Forest reserves by Mr. Thompson in 1896 at the Colony and protectorate of Lagos (Adekunle, 2007). In 1916, the Forestry Law was reviewed to outspread the jurisdiction of the Forest Department to the Northern protectorate (Hyman, 1993). Conservation of these areas came as a result of the government interest to sustain the natural resources in them for present and future generations to benefit. All the conserved areas have a compact character with biogeographically important attributes. The concepts of conserving wildlife in Nigeria forest game

reserves came up in the early 1930s, with the suggestion that game reserves should be established in savanna areas of (Ejidike&Ajayi, 2013; Joppa, Loarie&Pimm, 2008; Terborgh, 2002; Afolayan and Ajayi, 1980). Anadu in (1987), suggested that established forest reserves, game reserves, national parks and other protected areas will positively result in protecting natural resources utilization for sustainable human benefits. The conservation policy of natural resources in game reserves, national parks and other protected was as a result of government interest in preventing extinction of most flora and fauna in the wild (Olaniyi, 2016; Olakunle, Omotayo&Odewumi, 2011; Anderson, 2004; Aduradola, 2004). Globalization, industrialization, rapid population boost and urbanization have altered food production patterns and consumption rate in ways that extremely affect ecosystems resources (Barau, Buba, Maikeri, Tukur, Gabuin, Kabir&Danba, 2015; FAO, 2010). Management and conservation of natural resources especially the ones that replenish themselves under optimum conditions necessitate attention to ensure their sustainability. Therefore, the desires for wildlife conservation came into reality through the demarcation of Yankari game reserve (1280 km²) in Bauchi State in 1956 and opening it off to the public in 1962 as premier game reserve in Nigeria (Usman&Adefalu, 2010; Ejidike&Ajayi 2013).

The conservation impact and effect on any particular settlement results from a complex set of interacting conditions, some having to do with geography and location, some with the dwelling, and still others with the social and economic characteristics of the people living there (Hewitt, 2014 & 1983; Drabek&McEntire 2003; Quarantelli, 1987 & 1995; Bates and Peacock, 1987). According to Cannon: there are no really generalized opportunities and risks in nature, but instead there are sets of unequal access to opportunities and unequal exposures to risks which the roots of local disaster vulnerability are increasingly recognized to be the pre-existing patterns of community settlement and development (Lobenstine 2014; Diaz & Pulwarty, 2012; Bennett, 2009; Pielke, 2005; Anderson, 1994; Pulwarty and Riebsame, 1997; Pielke and Pielke, 1997), including 'the on-going social order, its everyday relations to the habitat and the larger historical circumstances' (Hewitt, 2005 & 1983). The impact of a natural event on any given community, for example, is not random, but determined by everyday patterns of social interaction and organisation, particularly the resulting stratification paradigms which determine access to resources (Bandopadhyay, 2014; Oliver-Smith, 2009 & 1986; Maskrey, 1993 & 1989; Few, 2003; Bolin and Stanford, 1998) are consequences of the socio-economic system.

Economic valuation technique for non-market goods and services

Environmental Valuation Technique is just a branch of environmental economics, which is aimed at allocating values for non-market goods and services which have no market prices. Environmental valuation is considered as a difficult task, most economics have frequently been compelled for attempting to put a "price tag" on environmental resources. However, organisations responsible for natural resources protection and

management most often make difficult decision that involve trade-off in allocating resources. These kind of decision are economic decisions, are based to either be directly or indirectly on the general public values (Samdin, et al., 2008; Bateman *et al.*, 2006).

The principal challenge associated with the application of standard economic technique to the provision of environmental goods, whether directly through public provision or indirectly through regulations, is the issue of assigning monetary value on the resources. Due to the fact that these goods are not usually bought and sold in the market, the real prices and sales information is not obtain more often. As such, economist developed several methods to value non-marketed goods and services consistent with the valuation of marketed goods (Hanley and Splash, 1993).

The Contingent Valuation Method

Cooper 1993, describe applying dichotomous choice contingent valuation as a simple technique of data collection and having standard empirical models of estimating the economic values of natural environmental goods and services. WTP value of a hypothetical change of the environment resources can best be obtained through the questionnaire survey. Responses of WTP questionnaire survey can be used to estimate the net benefit of natural resources to the

According to Yacob et al., (2009) a single bounded DC-CVM is a 'take it or leave it (TIOLI) bid offer which is offered to respondents with only "Yes or No" option'. Therefore, for the purpose of this study, the single bounded DC-CVM 'take it or leave it (TIOLI) bid offer option' was used to elicit respondent willingness to pay for an improve conservation of Yankari Game reserve, Bauchi Nigeria.

CVM is a method that 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. It plays a significant role in the establishment of environmental policy (Adamuet *al.*, 2015). The CVM technique is applied in many fields including the protected areas (Ricoet *al.*, 2011), endangered species conservation (Kotchen and Reiling, 2000), ecosystem services (Turner et al., 1995), and also biodiversity conservation (Wang et al., 2012).

III. STUDY AREA

The areas for this study are the adjacent communities of Yankari game reserve. Due to the intense utilization of the land surrounding the reserve, it has become an island of well-developed savannah woodland. The surrounding communities' comprises small towns and peripheral villages originally founded by farmers and hunters. All adjoining communities of Yankari game reserve are been affected either positively or negatively by the conservation of the area because the section of the land is been protected from any type of developmental activity from an individual or that group of individuals.

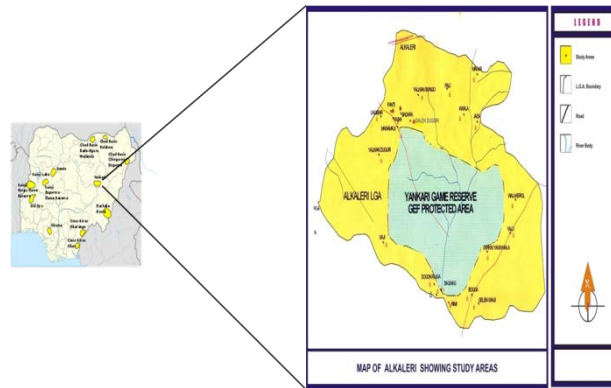


Figure 1 Study Area

Study Population

The populations of the study are the members of the adjoining communities who are above eighteen (18) years of age. And according to national bureau of statistics (NBS, 2010), Alkali local government at which Yankari game reserve is located and chosen for this study has a population of 328,284 and 54,714 households.

Sampling technique

The surrounding communities were stratified into four (4) based on their direction from the reserve boundary and also are stratified based on distance proximity to the reserve. However, this study utilized the mapping produce by Local Empowerment and Environmental Management Project (LEEMP) and Global Environmental Facility (GEF) (2008), out of which ten (10) communities were strategically selected using MS excel random number generator and the respondents were randomly selected from the selected communities.

Sampling size

For this study Yamane (1976) formulae of determining sample size was applied, and it is adjudged to be and deemed adequate for CVM analysis (Israel, 1992).

$$n = \frac{N}{1 + N(e)^2}$$

n- Sample size =?
N- Total number of population of the study =328,284
e- Level of precision =0.05
1 – Constant
Therefore; n = 328,284/ 1+328,284(0.05)²
=328,284/1+821.71
=399.51 =400

However, 40 (10%) additional questionnaires was added to the 400 sample drawn in order to curtail any problem regarding questionnaire rejection or poor return rate making the total number of the questionnaires to be 440 so as to compensate non-return questionnaires (Ismail, 1992).

Sampling Units

The study sampling units consist of the individuals or households, because it was found that estimates made based on individual sample of respondent yield greater value than household sampling unit (Kaffashi, 2016; Quiggin, 1998). But

many authors have argued that if the right decision makers are not interviewed there is high tendency that biased estimates of WTP/WTA could be obtained (Sandorf et al., 2016; Lindhjem and Navrud, 2009; Bateman and Munro, 2009). It is important in a research like this to identify the targeted sampling population whose response is to be elicited for valuation estimate in other to have a relevant policy making.

Questionnaire administration

The structured Questionnaire is the instrument applied in the data collection of this study using the direct face-to-face questionnaire interview method of both the dichotomous choice format.

A hypothetical scenario on the importance of Yankari game reserve and the need for its conservation, and the DC-CVM format was employed to elicit the respondent's willingness to donate towards the reserve improve conservation. The DC-CVM format of take it or leave it (TIOLI) bid offer consist of only Yes or No option to the respondents and it is adjudge to be the most easier to answer (Yacob et al., 2009). CVM was used to ascertain what the respondents would be willing to donate under the hypothetical market scenario (Adamu, et al., 2015 and Kim et al., 2012).

IV. RESULT AND DISCUSSION

Socio-demographic profile of the Respondents

The output result of the socio demographic characteristics of the respondents is presented in table 4.1 as the total retrieved questionnaires from the respondents was four hundred and twenty two (422) when male respondents constituting 321 (76.1%) while that of women is 101 (23.9%) respondents. These can be linked to the socio cultural and religious belief of Muslims of northern Nigeria that mostly prevent their wives and female associate from staying outdoors and taking part on social activities.

The age mean score of the respondents is 35 years and respondents age ranging from 18-25 years constitute of 107(25.4%), 119(28.3%) while those fall within the range of 26-35 years covered 103(24.4%), respondents fall within the range of 36-45 years, while 53(12.6%) and 40(9.5%) fall within the range of 46-55 years and 56 and above years respectively.

From the survey result, the marital status of the respondents indicates that married respondents constitute of

279(66.1%) while non-married (singles) are 143(33.9%). The respondent level of education indicates that 105(24.9%) attended a non-formal type of education, those with primary qualification were 83(19.7%), 187(44.3%) respondents that have secondary school qualification constituted majority of the research respondents. Those that attended colleges, polytechnics and university (tertiary education) constituted only 47(11.1%) of the respondents.

The result of the occupational status of the respondents shows that 95(22.5%) are being employed by government while those that are self-employed were 128(30.3%). 133(31.5%) of the respondents are farmers while unemployed and retirees constitute of 51(12.1%) and 15(3.6%) of the total survey respondents respectively.

Respondents membership to association indicates that 226(53.6%) belong to a particular association that relates to

conservation were as those that did not belong to any association constitute of 196(46.4%). From the survey, family size ranging from 1-4 people per house constitute of 187(44.3%), 57(13.5%) respondents fall within the family size range of 5-6, 71(16.8%) respondents fall within the family size range of 8-10s, while 107(25.4%) fall within the range of 11 and above.

The respondents gross monthly income indicates that 167(39.6%) earn between N10,000-N20,000 monthly, those that earn between N21,000-N30,000 were 129(30.6%) while those within the range of N31,000-N40,000 were 97(23.0%) respondents and N41,000-N50,000 were 23(5.5%) of the respondents. Respondents with the highest monthly income of N51,000 above constituted only 6(1.4%) of the survey respondents. The mean score of gross monthly income of the respondents from the result analysis is N25, 597.

Table1 Respondents Socio-demographic profile

| Element | Freq. | Percentage |
|----------------------------------|----------------|-------------------|
| | (n=442) | (%) |
| Gender | | |
| Male | 321 | 76 |
| Female | 101 | 23.9 |
| Age | | |
| 18-25 | 107 | 25.4 |
| 26-35 | 119 | 28.3 |
| 36-45 | 103 | 24.4 |
| 46-55 | 53 | 12.6 |
| 56 and above | 40 | 9.5 |
| Marital status | | |
| Non married | 143 | 33.9 |
| Married | 279 | 66.1 |
| Educational level | | |
| Non formal | 105 | 24.9 |
| Primary | 83 | 19.7 |
| Secondary | 187 | 44.3 |
| Tertiary | 47 | 11.1 |
| Occupation | | |
| Government employed | 92 | 22.5 |
| Self-employed | 128 | 30.3 |
| Farmers | 133 | 31.5 |
| Unemployed | 51 | 12.1 |
| Retiree | 13 | 3.6 |
| Membership of Association | | |
| Yes | 226 | 53.6 |
| No | 196 | 46.4 |
| Family size | | |
| 1-4 | 187 | 44.3 |
| 5-7 | 57 | 13.5 |
| 8-10 | 71 | 16.8 |
| 11 and above | 107 | 25.4 |
| Level of Income | | |
| N 10,000- N 20,000 | 167 | 39.6 |
| N 21,000- N 30,000 | 129 | 30.6 |
| N 31,000- N 40,000 | 97 | 23.0 |
| N 41,000- N 50,000 | 23 | 5.5 |
| N 51,000 and above | 6 | 1.6 |

Willingness to Pay Estimation

Among the total number of 440 respondents interviewed during the field survey, 422 were retrieved back fully answered from the respondents. 314(74.4%) respondents indicates that they are willing to pay by choosing “Yes” to various bids (500, 1000, 1500, 2000, 2500) amount offered to them and the remaining 108(25.6%) responded “No” that they are not willing to pay. The result summary of the respondent’s willingness to pay section is presented in table 4.14.

For the initial bid amount offered. 500, 87 responses were obtained and those that indicate “Yes” to the bid amount are 75(17.8%), while those that indicate “No” are only 12 (2.8%) showing their unwilling to pay the amount for improve conservation of Yankari game reserve. The second bid amount is 1000 and 85 questionnaires were returned and fully answered, out of which 71(16.9%) said “Yes” they are willing to pay and 14(3.3%) respondents said “No”. for the third bid amount of 1500, 84 answered questionnaires were retrieved out of which 62(16.7%) were willing to pay by saying “Yes”, whereas “No” respondents are 22(5.2%). The forth bid amount offered is 2000 and has a total response of 83 respondents with 57(13.5%) responding to the “Yes” option while the 26(6.2%) choosing “No” option. The last bid amount 2500 has 83 responses and 49(11.6%) are respondents willing to pay by choosing “Yes” to the bid amount and the remaining 34(8.1%) chose “No” to the

bid amount. The willingness to pay response here revealed that the more there is increase in bid amount, the lower the “Yes” response from the respondents which is in line with the economic theory of demand (Kimet al., 2007; Alberini et al., 2003; Cooper, 1993).

Similarly, existence value was the major reason that the respondents gave for their willingness to pay with about 139 (32.9%) saying that they are willing to pay for improved maintenance of the reserve and, 73(17.3%) respondents stated that they are willing to pay because the amount is minor, they can afford it. Other reasons offered for willingness to pay are, for sustainable management of the reserve, natural resource-s conservation and for future generation to benefit from it with 42(10.0%), 38(9.0%) and 26(6.0%) respondents accordingly.

However, from the “No” responses of 108(25.6%) that are not willing to pay for the improve conservation of the reserve, 48(11.4%) said It is government responsibility alone to conserve the reserve, while 33(7.4%) stated that they didn’t believe that their donation will be used judiciously is their reason for not willing to pay. I have made my contribution through tax is another reason that the respondent gave for not willing to pay with 15(3.6%) respondents. Having no interest in conservation of the reserve is the less response given for not willing to pay for improves conservation of the reserve with about 12(2.8%) respondents.

Table 2 Summary of WTP base on Bids

| Bid Amount | Yes | | No | | Total | |
|------------|-------|------|-------|-----|-------|------|
| | Freq. | (%) | Freq. | (%) | Freq. | (%) |
| N 500 | 75 | 17.8 | 12 | 2.8 | 87 | 20.6 |
| N 1000 | 71 | 16.8 | 14 | 3.3 | 85 | 20.1 |
| N 1500 | 62 | 14.7 | 22 | 5.2 | 84 | 19.9 |
| N 2000 | 57 | 13.5 | 26 | 6.2 | 83 | 19.7 |
| N 2500 | 49 | 11.6 | 34 | 8.1 | 83 | 19.7 |

Logistic Regression Models

Binary logit regression model is the statistical tool employed in this study to examine the relationship between the willingness to pay as the dependent variable and the socio-demographic variables of Age, Gender, Level of Education, monthly income, Membership to Association and Bid amount as independent variables.

Logit Regression Model

Based on the model result has been present in table 4.15 those six (6) independent variables are found to be significant at varying levels, and all the six (6) variables have a coefficient, marginal effect and significant level (P value). The coefficient of each variable is entailing two(2) vital information of sign and weight. In a situation where by the coefficient has a negative sign, it is entailing an inverse relationship between the said variable and the WTP. Coefficient weight on the other hand is the coefficient value that presents the level of strength of the variable in determining the WTP. All of the six (6) variables of

Age, years of Education, income, membership to Association and Bids have positive coefficient at varying weight.

Age is another relevant variable that is used in determining WTP in the model. The result of the finding shows that age has a positive coefficient with weight of .07937426 and found to be significant at 1% confidence level. The finding indicates that as the age of respondents increase, their WTP also increase. Therefore older people among the respondents have higher WTP than younger ones Scholarly view on positive and significant relationship between age and WTP as said by Bhandari and Heshmati, (2010); Barel et al., (2008), and Le and Mjelde, (2007). Other scholars such as Montes, Benayas and Marti, (2007) and Reynisdottir et al., (2008) have divergent views on that issue.

Next important variable with most effect on WTP in this study is the years education of the respondents, which is coded in dummy (0= non-formal education, 1= primary education, 2= secondary education and 3= tertiary (colleges, polytechnic and university). Educational level have a positive coefficient value with weight of .10712621 and statistically significant at 1%

confidence level. The position of coefficient shows that those with higher level of education are more willing to pay than those with low or lower level of education. The result output is signifying that educated people are believed to have more information and awareness on resource conservation than those with lower level of education. Therefore, influence of education on WTP is being reported by researchers such as Wang and Jia (2012) and Barel et al., (2008).

Another important variable in the WTP model is income of the respondents, which also have a positive coefficient of 860987D-04 and significant at 1% confidence level. It is calculated from the model that as the income of the respondents increase, their willingness to pay also increases. This implies that, respondents with higher income have higher possibility of WTP than those with low or lower income. This determination is in compliance with many literatures of determining WTP (Wang and Jia, 2012), Bhandiri and Heshmati, 2010; Reyinisdottir et al., 2008; Seongseop, Wong and Cho, 2007 and Togridon, 2006).

Membership of associations that are related to resource conservation is another variable with positive coefficient and it is also coded as dummy variable (1= Yes and 2= No. its coefficient weight is 1.23605962 and it is significant at 1% confidence level. This reveals that those respondents that belong to any association that relates to environmental conservation have more willingness

to pay than those that are not members to any. This result finding is in line with the findings of Baral et al., (2008) and Messick and Brewer (1983) where members of NGOs are high WTP.

In the study, Awareness of respondents is found to be positively significant with coefficient weight .03943391 and significant at 5% confidence level. This show a high elasticity of gender for willingness to pay, indicating that those respondents with positive or high level of awareness are more willing to pay for improve conservation of Yankari game reserve. The said result may be associated to factors low level of education of women and income. This outcome coincides with Findings of many studies with positive relativity positive awareness and willingness to pay (Brécard et al., 2009; Clark et al., 2003; Messick and Brewer, 1983).

However, the sixth variable is Bid amount. Bid amount carries a negative sign on its co efficient weight at -.00120365 as expected and significance at 1% confidence level. As explain earlier, a negative sign is an indication of inverse relationship between the variable and WTP. This implies that as the bid amount increases, the WTP is decreasing. Therefore in this situation the higher the increase in bid amount the lower the possibilities of the respondents' willingness to pay (Baral et al., 2008; Loomis, et al., 2000).

Table 3 Logit Regression Model

| Variable | Coefficient | Standard Error | Marginal effect | P-Value |
|-------------------------------|-------------|----------------|-----------------|---------|
| CONSTANT | -4.29789160 | .80355890 | -5.415 | .0000 |
| AGE | .07937426 | .01494674 | 4.140 | .0000 |
| BIDS | -.00120365 | .00022487 | 5.834 | .0000 |
| ASSO | 1.23605962 | .30444865 | 2.756 | .0000 |
| EDU_YRS | .10712621 | .02763805 | 2.253 | .0001 |
| INC | .860987D-04 | .162605D-04 | 7.353 | .0000 |
| AWR | .03943391 | .01319898 | 2.442 | .0028 |
| Number of observations | | 422 | | |
| Log likelihood function | | -152.615 | | |
| Mcfadden Pseudo R-squared | | .35837 | | |
| Percentage correct prediction | | 85.071 | | |

Note: ***Significance at 1%, **Significance at 5%, *Significance at 10%

Mean Willingness to Pay for Estimation

The single bounded dichotomous choice of contingent valuation method (DC-CVM) was employed for the purpose of this study, therefore the result outcome will be in dichotomous state of two (2), either the respondent is willing to pay by choosing “Yes” option for the offered bid or not willing to pay the offer bid by choosing “No” to the question. The mean willingness to pay is calculated using the logit regression result using the mean willingness to pay derived equation stated in the previous chapter. Nigerian naira (N) is the unit currency used for the monetary estimation.

The mean Willingness to pay for Improve Conservation of Yankari game reserve

The mean WTP amount estimated using the logit regression model was calculated using the equation formulae stated earlier. The mean Willingness to pay for the respondents for the improve conservation of Yankari game reserve is

estimated at about N2376.42. This amount indicates that the respondents are willing to pay higher than the highest bid amount so that the reserve will be conserve base on the reasons they stated in table 4.5 and Table 4.6. The WTP and mean WTP amount of the respondents based on the various socio demographic (Gender, Age, Educational level, membership of Association and Income) variables were also estimated.

V. CONCLUSION

The Existing Environmental resources conservation Laws and Legislations on Natural Resources Conservation in Nigeria, Federal Laws [*The Natural Resources Conservation Act 198, Federal Environmental Protection Agency Act (Chapter 131, Laws of the Federation, 1990, The Environmental Impact Assessment Act (no 86 of 1992), Endangered Species (Control of International Trade and Traffic) Act 11 of 1985, The National Parks Decree (Decree No 36 of 1991)*], Laws and Legislations

in the States and Traditional / Customary Conservation Practices in Nigeria.

Importance is given to protected areas such as game reserves and national parks, protecting endangered species from extinction and poaching. Human activities have greatly affected such areas and make them more vulnerable and the land degraded, but the reason for such threats is either because the government and the reserve management has been unable to provide development projects and control the threats affecting the reserve and lack of enough funding (Kaffashi et al. 2012).

The logit estimation models with the socio-demographic variables has shown that the probability of a “yes” response was significantly correlated (positively) with the communities respondents awareness, level of education, age, household income, membership to environmental related associations and negatively correlated with the donation bid price. Mitchell and Carson (1989) explained that the theoretical study on CVM requires regressing of the WTP bids amount against respondents socioeconomic variables using mean WTP estimation formulae as;

Mean WTP = $[\beta_0 + \sum \beta_2 X_2 \dots \beta_k X_k] / (\beta_1)$ Cameron, (1988). The result helps to estimate the mean willingness to pay (MWTP). The results obtained, revealed the MWTP contribute of the respondents for improve conservation of Yankari game reserve biodiversity.

These studies offers a valuable policy guide by revealing relative economic value in natural resources management context for proper and rigorous environmental policies towards incorporating and identify the class of stakeholder that can contribute economically, socially and environmentally for the sustainability of the reserve resources. The results can be helpful to other conservation areas in Nigeria and other developing countries with similar nature-based resources problems. Furthermore, these research finding can contribute to the increasing literature on application of contingent valuation method for natural resources conservation in developing countries.

The findings of this study therefore suggest that, the adjoining communities of Yankari game reserve are positively supporting and willing to donate towards the improve conservation of the reserve; therefore the reserve conservation program must involve the adjoining communities.

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