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Estimation of Willingness to Pay for Conservation of Nyando Wetlands, Kenya: A Contingent Valuation Approach

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Abstract: Wetland resources of Nyando support important economic and ecological activities. However, it is faced with multiple pressures from different anthropogenic activities within the wetlands and upstream. This is bound to intensify as population pressure increases. Using the Contingent Valuation survey method, bidding game, the economic benefits [Willingness To Pay (WTP)] and its determinants, by use of the Tobit model, to conserve Nyando Wetlands were measured through a purposive sampling technique. The results show that nearly all the local people were aware of the economic benefits from the wetland with about 96% agreeing that the benefits were being degraded. About 83% were willing to pay to the payment vehicle, Conservation Trust Fund. The aggregated WTP for the wetland conservation was about KES 38 Million (US$ 0.4 Million) per year. Tobit model revealed that sex of household head; age; household size; and education were the determinants of WTP. The study suggests policies towards gender empowerment, family planning and awareness creation to conserve the wetland.

Key words: Bidding game, contingent valuation, Tobit model, payment vehicle, Nyando

1. Introduction

Wetlands goods and services satisfy various objectives of different users: food security and cash income (fishing, hunting and agricultural production), health (drinking water and hygiene), recreation and culture

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(spiritual enrichment, cognitive development and aesthetic experience (McCartney *et al.*, 2004) and generate a huge variety of plant, animal and mineral products used and valued by people all over the world (Ramsar, 2011). Their socio-economic importance has attracted significant portions of human populations who survive by exploiting their resources, through different resource utilization activities, often driven by economic and financial motives (Kirsten, 2005).

Reliance on natural resource exploitation for livelihood, always pose a great danger to the resources, more so if their value is not known or appreciated by the stakeholders. The Nyando Wetland is undergoing threats such as pollution from industrial waste water, burning of papyrus, overgrazing, reclamation for agriculture, over-fishing, over-exploitation of macrophytes, soil erosion and siltation, among others (Raburu, 2003, Kipkemboi *et. al.*, 2009). These threats are worse during the dry spell because the community rush to reclaim land for agriculture and overgraze (Obiero *et. al*., 2012). Despite these threats, Nyando wetlands still provide a substantial flow of ecosystem goods and services which forms the backbone of the wetland community livelihood (Maithya *et. al.*, 2011 and Thenya, 2006). The value of this flow has however not been established as it is assumed to be public good that is free for all. As a result, management decisions have not adequately considered the economic importance these goods and services provide to the local community and the national economy. For this reason, they have not been given their due importance in policy development and hence inadequate attention in their conservation and management. The inability of the government and the community to realize the potential revenue opportunities associated with the Nyando Wetlands have make it possible to trade off the wetlands for other profitable development projects.

Using an economic approach, total wetland value is defined as the summation of benefits people gain from using wetlands and the benefits nonusers gain simply from the knowledge that wetland resources continue to exist in their natural state (Leitch *et. al.*, 1988). To aid and improve wise use and management of wetland resources, economic valuation is considered as a powerful tool for measuring and comparing the various benefits of wetlands (Edward *et al.*, 1997). The value of the benefits is the price of that product in the open market and the worth of those benefits to the potential buyers. Therefore the economic value of the wetland services/commodity is measured by people's WTP for those benefits (Ramachandra *et al.*, 2005). Attempts have been made in the past to put a monetary measure on the values of wetlands (Barbier, 1993; Batie *et al.*, 1982; Dixon, 1989; and Turner, 1991). Various methods have been used to value wetlands resources such as Contingent Valuation Method (CVM), Travel Cost Method (TCM) and Replacement Costs among others (Perman *et al.*, 1997; Okurut *et al.*, 1999; and United Republic of Tanzania, 2003). Globally, economic value of wetlands and their associated ecosystem services has been estimated at US$14 trillion annually (Millennium Ecosystem Assessment, 2005). Some wetlands have been valued across the globe. However, the valuation has

been based on specific goods and services. For example, agriculture, fishing and firewood provision of Hadejia-Nguru Wetland in Nigeriawas valued at approximately US$34-54/ha (Barbier *et al.,* 1997), agriculture in Nakivubo Wetland in Uganda was estimated at US$500/ha (Emerton *et al., 1*999), grazing in Zambezi Basin wetlands ranged in value from US$16/ha in the Barotse Wetland to US$97/ha in the Caprivi Wetland (Turpie *et al., 1*999), harvestable resources in the Olifants River catchment in South Africa was estimated at US$1-14/ha/year(Palmer *et al., 2*002), and grazingin wetlands of southern Africa was US$257-343/ha among others. In Kenya, three ecosystem valuation studies have been done. These studies are wildlife viewing in Lake Nakuru National Park estimated at US$ 7.5 -15M (Navrud and Mungata, 1994) using Contingent Valuation Method (CVM) and Travel Cost Method (TCM), Tana Delta (Emerton, 1994) and Yala Wetlands estimated at US$ 120.4M (Ikiara *et. al.*, 2010) by use of both CVM and market price.

Models used to find the determinants of WTP for environmental goods and services are Ordinary Least Square (OLS), Tobit, Logit and probit (Mutuli, 2002). Ramanathan et al., (2009) used OLS regression analysis and found that income was the most important element which determines the WTP and Sumana (2007) used OLS found out that income and education level were the major determinants of WTP. (Mwakubo *et. al.*, 2009) used Tobit model and found that farm size and ownership, education level and household size all influence households' likelihood to actively engage in wetland resource exploitation and willingness to pay for its conservation. Adepoju *et. al.*, (2009) used Logit analysis and found out that age, income and education level were also found to increase the tendencies to adopt and pay for improved water source. This study used Tobit model to estimate the probabilities with the assumption that more than one decision is interconnected. Tobit imposes the presumption of censoring (Greene, 2000, Sigelman and Zeng, 1999).

How can we measure the public's WTP for Nyando Wetlands conservation? One of the methods most widely used by academics and policy makers for valuation of resources, environmental goods and services is Contingent Valuation Method (CVM) (Whittington 2002, Wang et al., 2006). Therefore, the main purpose of this survey was to study the public's WTP for the Nyando Wetlands conservation and investigate factors that determine households WTP. The assessment was carried out through utilization of the CVM. The study site was Nyando wetlands in Kenya where no estimation of this kind has previously been conducted.

2. Materials and Methods

Study Area

The study was conducted within the Nyando Wetlands due to its ecological and socio-economic importance and the pressures it faces from wetland resource utilization. The Nyando wetland is one of the largest and

economically important deltaic wetland ecosystems fringing the Lake Victoria, located at $0^0$11'-$0^0$19' S / $34^0$47'-$34^0$57'E and covering about 10,000 ha (Wandinga and Makopa, 2001). It was formed during the Miocene period (about 20 million years ago) as a result of vertical up warping of the African surface and the resultant sagging of the great ridge center (Bugenyi, 2001) and has within it some of the most severe problems of agricultural stagnation, environmental degradation and deepening poverty found anywhere in Kenya. The Nyando wetland was reclaimed for agricultural production during the 1940's. The land remained under intensive agricultural activities for 15-20 years before the prolonged rains of 1963 (Uhuru rains) that caused floods due to overflow of Nyando River. The Nyando River drains into the Winam Gulf of Lake Victoria and is a major contributor of sediment, nitrogen and phosphorus to Lake Victoria. There are three Agro ecological Zones (Lower midland zone 3, 4, and 5). The mean annual temperature ranges between 20-30^o C while the mean annual rainfall range between 1,000 and 1,800mm (Government of Kenya, 2005). The rainfall is bi-modal with long rains (March to June) and short rains (October to November) (Government of Kenya, 2005).

About 750 000 people reside within the Nyando basin, most of whom live in Nyando District in Nyanza Province and Nandi and Kericho districts in Rift Valley Province. At the administrative location level, the locations of Nyando District include both those with the lowest poverty rate in the sugar belt of Muhoroni Division (36 percent) and those with the highest poverty rate in Upper Nyakach Division (80 percent) for the entire basin (Central Bureau of Statistics, 2003).

Land-use and property rights vary across the basin. The upper part of the basin is comprised of gazetted forests, commercial tea production and small-scale agriculture on steep hillsides that were degazetted as forests during the last 40 years. Mid-altitude areas are a mixture of smallholder farms (with maize, beans and some coffee, bananas, sweet potatoes and dairy) and large-scale commercial farms (mostly sugar cane). The flood-prone lakeshore area is mostly used for subsistence production of maize, beans and sorghum, combined with commercial production of sugar cane and irrigated rice. There are clear differences in land use between long-settled areas and resettlement areas. The irrigated areas are owned by smallholder farmers and the moribund National Irrigation Board.

The wetlands in the study site include lake shores, river banks and swamps with nearly all of the current agricultural land formerly being wetlands. A cross-section survey research design was used in which information relating to awareness of the economic benefits of wetland goods and services and WTP bids for wetland conservation was collected from a cross section of the population involved in the different resource utilization activities. This research design was considered because it permits the collection of various wetland value attributes at a given point in time.

Survey Design

Purposive sampling technique was used to select divisions and locations with intensity of harvesting wetland products within the districts in Nyando wetlands; Kisumu East, Nyando and Nyakach districts. 11 locations with equivalent number of enumerators were selected. The purposive sampling was employed in this survey with the understanding that Nyando wetland communities were not homogenous in terms of wetland utilization, conservation challenges, socio-economic values attached and development concerns and threats. One of the criticisms of the CVM is that respondents who are unfamiliar with the good to be valued will have difficulty forming a monetary valuation for it. This gives rise to population choice bias (Bateman *et. al.*, 2002). The choice of the 11 locations was meant to overcome this problem.

In each location, line transect sampling was then employed to determine the movement path during data collection. Line transect is a sampling technique by which scientists record data regarding communities in an ecosystem. This method of sampling involves only a small section of large natural area, yet produces an accurate representative sampling of the biotic and abiotic parts of that community. The path started from the wetland to riparian areas with each targeted households separated by five homesteads along the transect path. Household heads were sought as respondents because they make decisions on resource allocations in the households. The household heads manage the household and their characteristics make them do so in specific ways. Line transect sampling is reliable, versatile, and easy to implement method to analyze an area containing various objects of interest. Mugenda (2008) sample size formula was used at 97% standard deviation; the sample size of 270 was obtained. Due to cost implications, it was not possible to attain sample size at 99% standard deviation. A total of 277 questionnaires were administered to household heads but 3 of them had no meaningful data hence were discarded. The sample size distribution per location was made proportionately according to the number of households. This was to give each household in all the location an equal opportunity to be interviewed.

Data Collection and Survey Instrument

Structured questionnaires, Focus Group Discussions and Key Informant Interviews were used to gather primary data. Personal interviews have the ability to control which sampling units are interviewed and have recorded higher response rate of 70 per cent or higher (Bateman *et. al.*, 2002) than other methods but is the most expensive method to collect data, particularly if respondents are spread over a larger geographical range. Preceding the contingent valuation section, the questionnaire elicited information on household demographics and economic activities engagement by the community. Thereafter, the household heads were asked about their awareness of economic benefits of the wetland, degradation facing the wetland and their WTP Following

standard practice in CVM analyses, the respondents were asked to screen protest zeros; individuals giving a zero WTP were asked if this was because they did not value the proposed conservation's easements, or because they objected to the payment vehicle or some other aspect of the question (McFadden, 1994). The choices of answers included, among others; affordability, lack of information and government's role in conservation.

According to Hesselink (2008), in order to get a much better picture of the social and technical complexities in realizing the plan or start a joint fact finding and planning process, focus groups is one of the best methods. Focus group are a means of interviewing - in a very free way - a specific stakeholder group and was used as an auxiliary to CVM to explore Nyando Wetlands community's knowledge, perception and understanding of importance of wetland conservation. With this over view in mind, 3 discussions were held at different dates and venues around the fringing wetland with a total of 41 participants. The choice of site was deliberate focusing on unique consumptive resources. The aim of the discussions was to collect quantitative economic data and qualitative data about the consumptive wetland products extracted their prices, and seasonal variability of different kinds of products and services.

Key informant interviews was held to collect information of a generally applicable nature, like seasonality, markets and prices, as well as to collect sufficient information to be able to make preliminary estimates of wetland resources harvesting and associated economic values, in order to assist with survey design.

In eliciting WTP, this study used iterative bidding game as an elicitation mechanism to elicit WTP with a Conservation Trust Fund as the payment vehicle. Brouwer *et. al.*, (1997) in their meta-analysis of contingent valuation wetland studies inferred that the behavioral motivation of respondents to be both consumers and citizens is based on the payment vehicle. The use of voluntary trust fund as a payment vehicle in this study was more likely to induce a positive consumer response than the use of tax which might be viewed from a citizen perspective. The limitation of the bidding game is normally the starting point bias as this study started at Ksh 1,000. The follow-up question was conditional on the respondent's response to the bid value offered in the initial question: the amount offered was lowered if the response was 'no.' This process was continued by reducing the bid value offered on each occasion, if the respondent's response was 'no,' until the lowest bid value in the bid list was reached. The bid vector contained 10 different bid values: Ksh 1000, 800, 600, 400, 300, 200, 100, 50, 30 and 10 per month. Finally, the respondents who refused all the bid values offered in the survey were asked to present the maximum amount that they would be WTP for conserving the Nyando wetlands. Cooper (1994) suggests that this open-ended question offered at the end of the elicitation process improves the precision of the WTP estimates. However, Alberine *et.al.* (1997) point out that this whole approach mimics consumers' behavior in regular markets. The Contingent valuation scenario was that despite of the goods and services communities derive from the wetland, degradation was still eminent. To curb the

problem, conservation, wise use and rehabilitation measures were to be implemented by Non Governmental Organization (NGO) through a monthly contributory Conservation Trust Fund. The limitation of such a scenario might be that little attention to the economic theory of household decision making could have been considered.

Data Analysis

Data was processed by use of SPSS, STATA and Ms Excel. Descriptive statistics such as measures of central tendencies and cross-tabulations, among others, were carried out to explore the characteristics of sampled households. Tobit analysis was carried out to establish the determinants of willingness to pay for the conservation of Nyando wetlands. This was done to give understanding of the level of households' WTP. The general model was specified as follows;

$Y = f(X_i \ldots X_n)$ ……1

Where;

Y = Maximum WTP for conservation in Ksh

$X_i \ldots X_n$ = Determinants of WTP such as household size, age of household head, education of household head, flood crisis, gender of household head, farm size, household income, access cost to the market, and so on. Tobit model was used to analyze the function.

Therefore, in this model the WTP elicited through CVM is the dependent variable and independent variables are those that might explain WTP in the explicit equation in the linear form. This is given by:

The Maximum WTP (Y) = $a0 + a1X_1 + a2X_2 + \ldots\ldots\ldots anX_n + U$ ……2

Where; a0 = intercept

a_i's = Coefficients of the independent variables.

U = Error term

Censored data is modeled by specifying a Tobit model. The Tobit model assumes normally distributed errors and uses all of the information, including info on censoring and provides consistent estimates. The equation for the structural Tobit model is the same as the equation applied in the multiple regression analysis:

$y_i = \beta_i x_i + \varepsilon$ ……3

Where,

$\varepsilon i \sim N(0, \sigma^2)$

β =is the vector parameters being estimated

x_i = is a vector of hypothesized explanatory variables

y_i =WTP which is a latent variable that is observed for a reported WTP values greater than 0 and censored to zero if equal or greater than 5.3 (Ksh 200) of the natural logs.

Therefore;

$$y_i = \begin{cases} y^* \text{if } y^* > 0 \\ 0 \text{ if } y^* \geq 5.3 \end{cases} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Correlation matrix was used to determine the relationship and the significance between dependent and independent variables. Variance Inflation Factor (VIF) was performed to determine levels of multicollinearity. The skewness statistics was performed on the dependent variable to determine the direction of skewness in order to find the data censoring position. Tobit Regression was then conducted in which the most extreme outliers were censored to zero (Daunfeldt *et.al.*, 2009).

3. Results

The results show that 99.6% of wetlands inhabitants were aware of the wetlands benefits with 95.6% enjoying the benefits. About 96.4% of the inhabitants agreed that the wetland was being degraded. About 82.6% of the respondents were willing to pay to the payment vehicle, Conservation Trust Fund. The maximum amount that most respondents (19%) were willing to contribute per month was KES 50 followed by 17% for KES 100 per month. WTP for majority of the community for specific consumptive resources were in the lower quartile. However, for those who were not willing to pay, majority of the respondents (37.5%) said that government should be solely responsible for protecting and conserving the wetland (**Fig. 1 and Table 1**).

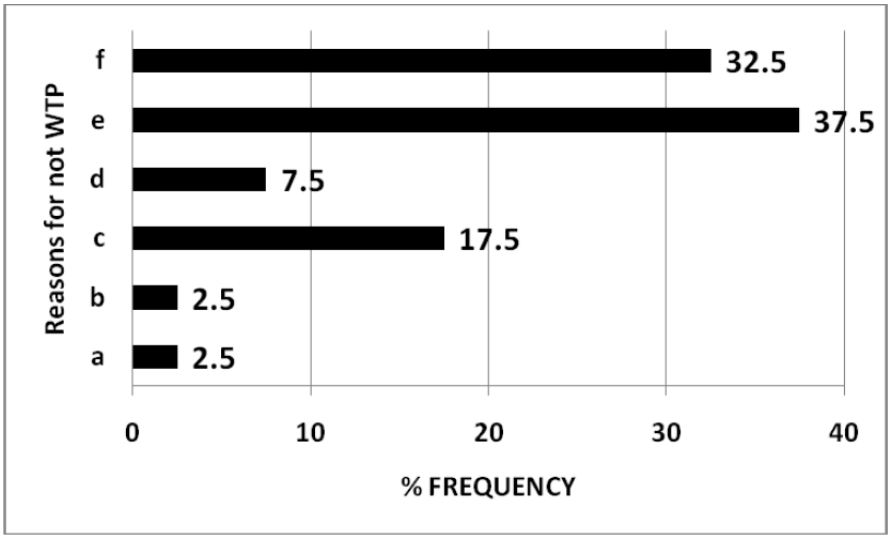

Fig. 1 Reasons for not WTP

Table 1. Key for the descriptions for Fig. 1 of reasons for not WTP

Key	Description
a	I did not have enough information to enable me place a value for conserving the wetland
b	I did not want to place a value for conserving the wetland
c	I disagree with paying money into a fund
d	The wetland is worth nothing to me so I did not want to pay anything
e	The government should be solely responsible for protecting and conserving the wetland
f	I could not afford to pay anything

The household heads who answered (a), (b), or (f) were classified as legitimate zero bidders who did not value the proposed conservation's Trust Fund. On the other hand, the households who answered (c), (d) or (e) were classified as protest zero bidders who objected to the payments vehicle or some other aspect of the question.

Standard deviation of WTP was greater than the mean WTP. This indicated skewness hence rendering mean WTP irrelevant due to its susceptibility to the influence of outliers. The skewness statistics were all positive indicating a greater number of smaller WTP values. To curb the problem of skewness, median was taken as better measure of central tendency in this study. The median WTP was KES 168.87 $\pm$248.54 per household per month. One-way ANOVA showed statistically significant difference of the median WTP between locations ($F=4.069$, $P=0.000$). The households were willing, therefore, to devote about 3.8% of their income per month to wetlands conservation payment vehicle. The aggregated WTP for the wetland conservation was about KES 38 Million (US$ 0.4 Million) or KES 1590 / Ha / year (US$ 16.7/Ha/year).

The correlation between WTP and age, household size, education level and household income were significantly different from zero ($p<0.05$). Multicollinearity test gave a mean Variance Inflation Factor (VIF) of 1.12; an indication of negligible collinearity among the independent variables given a benchmark of VIF 10. The variance of the error term was constant given the heteroskasdicity test by Breusch-Pagan / Cook-Weisberg test for heteroskedasticity showed chi^2 (1) =1.61 and Prob > chi^2= 0.2042. This indicated that heteroskedasticity was probably not a problem (or at least that if it was, then it was not a multiplicative function of the predicted values). Given the positive skewness, the WTP value was assumed to be normally distributed, but censored above Ksh 200 as values about the amount were taken outliers. To perform Tobit regression analysis, the continuous variables such as Maximum WTP, household size and farm size were

transformed to natural logarithm to linearize their relationship. Table 2 gives the result of the censored Tobit regression.

Table 2: Tobit Regression summary of determinants of WTP

InWTPmax	**Coef**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
Sex	-0.632114**	.2452431	-2.57	0.037	-1.11497	-0.14925
Age	-0.815835**	.3399313	-2.40	0.047	-1.48514	-0.14654
InHHSize	-.0.829530*	.2821517	-2.94	0.022	-1.38506	-0.27400
InFarmsize	.0523241	.1883486	0.28	0.788	-0.31853	0.42317
Duration of stay	-0.8013043	.3587421	-2.23	0.061	-1.50764	-0.09496
Education level	1.042552**	.3959569	2.63	0.034	0.26294	1.82216
Monthly Income	0.3650071	.2832979	1.29	0.240	-0.19279	0.92281
Constant	7.110371*	1.866664	3.81	0.007	3.43505	10.7857
Sigma	2.137479	.1071311	19.95	0.000	1.92657	2.34843
n	216					
LR chi^2 (7)	17.16					
Prob> chi^2	0.0163					
Log likelihood	-523.3843					
Pseudo R^2	0.0161					

*Indicates significant level at 1% and ** at 5%

Taking Alpha at 0.05, the Tobit regression results showed that four out of seven predictors were statistically significant determinants of WTP for wetland conservation in the study area; sex of the household head, age of the household head, household size and education level of the household head. The statistically significant coefficient of sigma shows that the bias estimation may be at the clustered zero response WTP rather than as a result of selection bias associated with censoring. The likelihood ratio (χ^2=17.16, df (7), p=0.0163) showed that the model as a whole fitted significantly better than an empty model (i.e., a model with no predictors).

The coefficient of education variable is 1.04 implies that a one year spent in education level, the WTP increases by 1.04 points. The coefficient of household size was -.0.829530 indicating that one unit increase in household size reduces WTP by about 0.83 points. The coefficient of household head age was -0.815835 indicating that one year increase in age reduces the WTP by about 0.8 points. Sex, age and household size have negative coefficients indicating inverse relationship with WTP. The sex variable had a coefficient of -0.632114 indicating that women were 0.63 points more like to pay for the conservation than men.

4. Discussion

Communities living in Nyando wetlands derive a number of products from natural wetlands for their livelihoods, mainly in the form of emergent macrophytes biomass, fishery and seasonal agriculture. Despite pro-conservation attitudes of the Nyando wetlands residents, resource use is driven by motivation to meet household subsistence needs. A good percentage of Nyando Wetlands dwellers were aware of its benefits hence reduced biases in formulating a value for wetland (Anderson and Bishop, 1986). The socio-economic characteristics implied that women are more dependent on wetland products than men (Kipkemboi *et. al*., 2007); rural women are more directly involved in household food provision and interact with the environment on a daily basis. The average age found in the study connotes experience and an accumulation of wealth (Nyang, 1999), better access to land (Taruvinga, 2010), and reduced percentage of true score variance in survey measures (Frank, 1986). On the other hand, household size of 6 persons implies household labour time endowment in the wetland. Household size coupled with close proximity of the households to wetland creates unsustainable conditions for wetland conservation (Kyarisiima *et. al.,* 2008). In addition, the farm sizes depicted that the households were smallholders hence could be both more efficient and more environmentally friendly (Willis, 1997). Similarly, the level of education was low hence might have impact on their willingness to pay to conserve the wetland. Education, which is a proxy for information flow, may overcome many characteristics of wetland resource users that act as obstacles to sustainable utilization of wetlands such as unreceptiveness to new ideas, fear of change and lack of incentives. Education leads to better resource allocation and is a form of human capital (Idachaba, 1994).

In estimating the WTP, the positive skewness statistics of the values could have been as a result of the difference existing between the proposed bid amount and the individual's true reservation price for the scheme. This was consistent with the traditional theory of consumer behaviour, which states that at higher prices, less would be demanded than at lower prices. Conversely, certainty about the implementation of the scheme in the community had an effect on the individual's decision to state a positive WTP. The more certain the individual was, the greater the probability as explained by the theory of choice under uncertainty. The median WTP of KES 168.87 $\pm$248.54 per household per month or aggregated WTP of about KES 38 Million (US$ 0.4 Million) or KES 1590 / Ha / year (US$ 16.7/Ha/year) showed that there is a significant contribution to the maintenance of the Nyando Wetlands payment vehicle. The wetland is very vital for local people not only for their subsistence but also as a heritage for them. Therefore the government should provide a proper management program in order to consider the threats endangering wetland and alleviate the effect of them on it. Awareness campaigns on economic value of the wetland are essential, therefore, as a way of demonstrating the wetlands

contribution to the local and national economy. Such sensitization will empower local communities with knowledge and awareness particularly on the roles of wetlands so as to influence a positive shift of attitudes toward these ecosystems.

The Tobit model showed that sex, age and household size have negative coefficients indicating inverse relationship with WTP. For sex, this might be because women are primary users and managers of forests in rural communities in developing countries (Agrawal, 2001). On the other hand,the relationship between age and harvesting of wetland goods can be described as an inverted U, increasing with age and later on declines. Older people may not be able to contribute much due to many reasons like lesser control over family‘s budget, dependence on children after their retirements, more expenditure on health, and strong preference for alternative use of wetlands like agriculture and so on. In addition, old age people might have short future planning horizons as a result of which they might be less willing to pay for the conservation of resources that give benefits after some time (Bekabil *et. al.,* 2009). The younger generation may be willing to pay for the conservation scheme because of higher anticipation of better settlement in future. There is need therefore to empower youths in the wetlands, especially involving them in decision making processes. Similarly, assuming income is constant, an increase in household size reduces the ability of households to meet the subsistence needs, especially where land pressure is high and may subsequently lead to higher amount of natural resources harvested. Thus, if a family has more members, it needs extra income to support extra subsistence requirements, hence lower WTP to conserve the wetlands. The finding is consistent with the findings of Bamire *et. al.*, (2002) who reported that increased household may suggest increased consumption level which has the possibility of enhancing land intensification and exposing the land area to further degradation, if adequate measures for land improvement are not made. Population growth could also be slowed by taking action in related areas of population policy, reproductive health and family planning services, and improved educational and employment opportunities for women. Measures to improve access to family planning and raise the status of women can contribute to a reduction in the total fertility rate per woman. However, the coefficient of education variable was positive implying increase in WTP with increase in numbers of years spent in education hence the educated have stronger preference to wetland conservation. For the effective conservation of Nyando Wetlands, awareness campaigns on economic value of the wetland are essential.

5. Conclusion

Nyando wetlands community derives economic value from wetlands goods and services. Any change of use of a wetland must allow these traditional uses to continue without loss or hindrance of any other user. Their protection and sustainable management is critical to the survival and welfare of Nyando wetland community

whose livelihoods are strongly aligned to the fragile wetland ecosystems. Therefore the government should provide a proper management program in order to consider the threats endangering wetland and alleviate the effect of them on it.

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