Assessment of the Economic Value of Selected Wetlands in Southwest, Nigeria

[1]Odine A. T., [1]Shittu A. M., [1]Ayinde I. A. and [2]Olubanjo O. O.

[1]Department of Agric. Econs. and Farm Mgt., Federal University of Agriculture, Abeokuta
[2]Department of Agric Econs, Olabisi Onabanjo University, Yewa Campus, Ayetoro.

Corresponding author; Email:

Abstract

This study assessed the economic value of the Eleyele, Eriti, and Lagos Lagoon wetlands in Oyo, Ogun and Lagos States (Nigeria) respectively. The study was based on primary data collected on livelihood activities of 160 wetland users that were drawn in a multistage sampling process. The data were obtained by administration of questionnaire that was designed to elicit information on the respondents' socio-economic characteristics and livelihood activities around the wetlands. The wetland users' willingness to pay (WTP) for utilization of the wetlands was also assessed by Contingent Valuation method based on an iterative bidding game process. The data were analysed by descriptive and budgetary techniques as well as Tobit regression analysis. The study revealed that the most prevalent economic activities around the wetlands include crop farming and fishing. Most (71.8%) of the operators of these livelihood activities were males, majority (58.8%) of which had no more than primary school education. Budgetary analysis showed that the Net Factor Income (NFI) per ha per year, which is the economic value of the wetland when used for crop farming, was ₦349,024 for Eleyele wetland, ₦239,694 for Eriti wetland, ₦263,699 and ₦175,633 for Badagry and Epe wetlands respectively. In terms of fishing, the economic value per year of Eleyele wetland's water body was estimated to be ₦32, 341,920 while that of Epe wetland was ₦1, 486,974,024. Eriti. The average WTP was ₦8,050.42, and was significantly ($p<0.05$) higher among fisherfolks (₦11,967.57/year) and crop farmers (₦8,370.40). The Tobit regression analysis result showed that the WTP for wetland utilisation is significantly ($p<0.05$) higher among female-folks than their male counterparts and those in the urban area vis-a- vis their rural counterparts. The study therefore concludes that wetlands are not wastelands but of economic importance to various users and thus recommends that the government should put in place measures to reduce wetland destruction as this leads to significant income losses to members of farm households.

Keywords: Wetlands, economic value, willingness to pay, southwest Nigeria

Introduction

Wetlands, according to Carter (1981) are land transitional between terrestrial and aquatic systems where the water level is usually at or near the surface or the land is covered by shallow

water. They cover 6% of the world's land surface and contain about 12% of the global carbon pool, playing an important role in the global carbon cycle [International Panel on Climate Change (IPCC), 1996]. They constitute some of the most important and threatened ecosystems in the world (IPCC, 1996). Wetlands in Nigeria cover an extensive area (13,000 km^2) and support a wide range of economic activities that sustain significant proportion of communities around it [Nigeria Environmental Study/Action Team (NEST), 1991].

Wetlands are important especially for the biological, hydrological, economic, socio-cultural and aesthetic roles they play in the environment. Terer *et al* (2004) observed that in the world over, rivers, lakes, seas, oceans and the plants and animals associated with them are important to every culture on earth and form an explicit or implicit part of the religious and cultural heritage of almost all human cultures. Their rich physical and biological resources are exploited for food, water, medicinal plants, fuel wood, materials for building and handcrafts (Terer *et al,* 2004).

Interactions among wetland characteristics, structure and processes result in the performance of functions, which are not of economic nature but provide a flow of goods and services which are valued by society. Wetlands provide populations with numerous goods and services that have a significant economic value, not only to the local population living in its periphery, but also to communities living outside the wetland area. Examples of valuable wetland goods are fish, reeds and papyrus, birds and wild animals and fresh water. The staple diet of 3 billion people, half the world's population, is rice, which grows in wetlands in many parts of the world (Schuyt and Brander, 2004). In addition, wetlands provide a nursery habitat for many commercially important fish species that are harvested outside the wetland. Tejuoso, (2006) reported that each wetland is composed of a number of physical, biological and chemical components such as soils, water, plants and animal species, and nutrients which yields benefits, which are of direct use value to humans. Many wetlands are being directly exploited to support human livelihoods. Processes among and within these wetland components allow the wetland to perform certain functions such as flood control, shoreline stabilization, water purification, and general products such as wildlife, fisheries and forest resources. In addition, there are ecosystem scale attributes such as biological diversity and cultural uniqueness/heritage that have value, either because they induce certain uses, or because they are valued themselves.

Ecosystems have limited resilience and have a carrying capacity, which is the maximum stress that it is capable of absorbing without changing into a vastly different state. Secondly, biodiversity provides the ecosystem with its functional properties and resilience (Hulme, 2005). Thus, due to its carrying capacity and biodiversity, ecosystems change and evolve continually.
One of the world's most important natural resource is consumed in an unsustainable manner to the extent that their continuous existence may not be guaranteed for the future generations (Barbier *et al.*, 1997). The situation is not different in Nigeria as one of its most important wetland, the Hadejia-Nguru Wetlands in Jigawa and Yobe states respectively, have shrunk by as much as two-thirds in the past 30-40 years because of diversions from dams, irrigation developments and drought. Fisheries, farming and wildlife are all impacted by these hydrological changes (Idris, 2008). As people increasingly reclaim wetlands or distort the

ecosystem balance, coupled with population increase, such problems are bound to worsen because the people may not be aware of the effect of their activities on the agro-ecological value of the wetland. Nevertheless, wetlands can be sustainably exploited if the dynamics of the local institutions that influence accumulation and consumption of livelihood assets are well understood and harnessed appropriately, because conversion of wetlands is influenced by households' asset position and shocks which, under an appropriate and sustainable management regime, can generate a flow of useful functions such as nutrient purification, ground water buffering and biodiversity (Gren *et al.,* 1994*)*. The life support systems that are inherent within the wetland ecosystems can provide a wide range of valuable functions to society if they are used in a sustainable manner, for example, by incorporating the primary users in the management of the wetlands within the context of societal livelihoods and local institutions (Folke, 1991).

People increasingly reclaim wetlands for construction purposes (houses, industries roads) and also to sustain livelihood, thus, the wetland resource is degrading at a very fast rate. The inability to place a monetary value on wetland has been identified as one of the reasons why both public and government do not value the wetland . Hence, there is a need to quantify the value of wetlands in order to come up with strategies for income generation, food security and environmental sustainability. Against the above background, the study is assesses the economic value of Eleyele, Eriti and Lagos Lagoon wetlands respectively in Oyo, Ogun and Lagos States located in Southwest Nigeria.

The specific objectives are to:

- describe the prevalence of the various types of livelihood activities around the selected wetlands ;
- describe and compare socioeconomic characteristics of the wetland users;
- determine the wetland users' willingness to pay for sustainable utilisation of the selected wetlands and the determinants; and
- estimate the economic value of each of the selected wetlands for agricultural uses.

Materials and Methodology

The study was carried out in communities around and/or within Eleyele, Eriti, and Lagos Lagoon wetlands in Oyo, Ogun and Lagos States, in the Southwest rainforest zones of Nigeria. The Eleyele wetland is located in Ido Local Government Area (LGA) of Oyo State. The city lies between latitudes 07°22'30" N and 07°25'50" and longitudes 003°2'00" E to 003°55'50" E, at an altitude of approximately 1500 m above sea level. The climate of the area is influenced by Tropical Maritime and Tropical Continental air masses. The mean annual rainfall is 1413 mm, while the mean annual temperature ranges from 22.5^{o}C to 31.4^{o}C. The Eleyele wetland passes through Awatan, Apete, Ijokodo, Olopomewa and Eleyele.

Eriti wetland is located in Obafemi Owode LGA of Ogun State. It lies between latitude 7.73^{0} and longitude 5.79^{0} with an elevation of 459 m, with temperature ranging between 24°C to 30^{0}C during the dry and raining seasons respectively. Eriti vegetation is mainly Guinea and derived

savanna. Eriti is mainly a farm community and it is popularly known as the home of vegetables, as the farmers there cultivate more of leafy and fruit vegetables.

Lagos Lagoon wetland stretches from Epe LGA to Badagry LGA in Lagos state. The Lagos lagoon is fed by several rivers, the most important of which are, the Yewa, Ogun, Ona/Ibu, Oshun, Shasha and Oni.

This study was based on primary data collected by personal administration of a questionnaire /interview schedule from individuals that have their livelihood activities around the wetlands in the study areas. The questionnaire included questions on various socio-economic parameters such as age, gender, educational status, occupation, farm size, land ownership, organizational participation, involvement in farm activities, participation in decision making, access and rights on wetland resources, livelihood patterns, as well as production costs and returns.
The study respondents were selected by multi-stage sampling technique. The main goal of the selection was to ensure that communities where various types of wetland related livelihood activities – farming, fishing, sand mining, wetland resource collection, etc are represented in the sample.

The data collected were analysed by a combination of descriptive statistics, budgetary techniques, Contingent valuation method (CVM), Sensitivity Analysis and Tobit regression model.

Descriptive statistics
Descriptive statistics such as mean, frequencies and percentages, crosstabs, tables were used to describe the socio-economic characteristics of the respondents. It was also used to explain the livelihood pattern of the respondents.

Budgetary analysis
Budgetary techniques were used to estimate the costs and returns as well as the Net Wetland Income (NWI) associated with various livelihood activities found around the wetlands. The NWI, which is a measure of the economic value associated with wetland uses, is defined as follows:

$$NWI = GFI - NWTC \quad (1)$$

where,

GFI = is the Gross Farm Income, which is the total value of farm outputs including those sold, consumed at home and/or given out;

TNWC = is the Total Non-Water Cost of production, including the cost of all the variable and fixed inputs employed in production except that of the wetland water, land and associated resources.

Contingent valuation method (CVM)

Contingent valuation method was used to determine willingness to pay for preserving the wetland. Respondents were presented with various conservation plans in order to elicit their willingness to pay for conservation. The CVM was achieved using the following steps:

1. The respondents were asked questions on their socio-economic characteristics and livelihood activities around the wetland.
2. The respondents were thereafter, educated on various use pattern that destroy the wetlands, and the need to put in place appropriate strategies/measures to ensure sustainable use of the wetland. They were then presented the following hypothetical wetland preservation plans:
   i. Establishment of a waste reclining plant and general waste management measure.
   ii. Timely removal of all water weeds which posed problems, most especially for the fishermen and sand miners.
   iii. Improving the aesthetic quality of the wetland;
3. The respondents were then asked, by iterative bidding process, the maximum percentage of their wetland related income they were willing to pay to continue to use the wetland. The actual value of each respondent's willingness to pay (WTP) for sustainable wetland utilisation was computed as follows:

   WTP (₦) = %WTP x Gross Wetland Income (2)

Sensitivity analysis

In order to reduce the biases associated with CVM , such as payment vehicle and hypothetical bias, a sensitivity analysis was carried out by enquiring about the wetland users desired improvement as well as their preferred payment vehicle. They were then educated about the fact that fund expended to achieve the desired change will not be available for satisfying other needs and therefore, the decision to pay should be considered carefully.

Tobit Regression Model

The relationship between the respondents expressed WTP for a continuous utilisation of the wetland and its hypothesised determinants were analysed within the framework of a Tobit regression model. The model is specified as follows:

$WTP_i^* = X_i \beta + \varepsilon_i$ (3)

where,

$\varepsilon_i \sim N(0, \sigma^2)$.

β is the vector parameters being estimated

WTP^* is a latent variable that is observed for a reported WTP values greater than 0 and censored otherwise.

The observed WTP_i is defined by:

$WTP_i = WTP^*$, if $WTP^* > 0$

$WTP_i = 0$, if $WTP^* \leq 0$

X_i = is a vector of hypothesised explanatory variables, including

X_1 = the main livelihood activity of the respondent, decomposed into four dummy variables:
- X_{11} for farming; it takes the value 1 if the reference person is a farmer and 0 otherwise. This was dropped during estimation, with farmers used as the reference group.
- X_{12} for fishing ; it takes the value 1 if the reference person is a fisher and 0 otherwise
- X_{13} for natural resource collection; it takes the value 1 if the person is a natural resource collector and 0 if otherwise. Natural resource collectors are people who collect sand, leaves, firewood etc around the wetland resourceX_{14} for service rendering; it takes the value 1 if the reference person is rendering services and 0 if other wise

X_2 = Gender of the respondents (1 if female and 0 if male)
X_3 = Age of respondents (years)
X_4 = Wetland Income (Naira)
X_5 = Income from non-wetland livelihood activities (Naira)
X_6 = Education of respondents in years
X_7 = Distance of respondents' resident from the wetland in kilometers
X_8 = Frequency of visit to wetland site (no of times per week)
X_9 = Locality of the wetland which consist of three dummies including
- X_{91} for rural; it takes the value 1 if the wetland is in a rural area, and 0 if otherwise
- X_{92} for suburban; it takes the value 1 if the wetland is located in a suburban area, and 0 if otherwiseX_{93} for urban; it takes the value 1 if the wetland is in an urban area, and 0 if otherwise

The model was estimated by the Tobit regression procedure in SHAZAM econometric software (Windows Professional Edition), with the default lower limit of zero imposed in estimation.

Results and Discussion

The wetland communities considered in this study were classified into three: rural, sub-urban and urban communities bearing in mind the fact that uses to which wetlands may be put could vary from one type of locality to another depending on population density. The classification follows official definitions in Nigeria, which requires that a community be considered as urban if its population is at least 20,000 and/or if it is located within a State or Local Government headquarter town/city (Shittu, 2008). Areas considered rural were, however, those with a population of less than 3000 people (Okali, *et al.*, 2001; Lanjouw and Lanjouw, 2001), while those considered as sub-urban were those located in urban fringes (peri-urban communities) with population typically between 3,000 and 20,000.

Personal Characteristics of Respondents

Table 1 summarises the personal characteristics of individuals involved in the pursuit of livelihood activities around the selected wetlands by locality type. As shown on the table, majority (92.4%) of these individuals were married, with an average age of 45years. The youth

(30years or younger) constituted less than a fifth (17.4%) of those pursuing livelihood activities around the wetlands, just as the women-folks (28.2%) were out-numbered by their male counterparts (71.8%).

In terms of formal education, results on Table 1 show that the people pursing livelihood activities around the wetlands were predominantly primary school (43.5%) or secondary school (29.0%) leavers. Only a few (11.2%) were educated up to the tertiary school level. Most (66.4%) of the livelihood operators had crop farming as their main occupation, with 14.5% having artisanal fishing as their main occupation. The prevalence of fisher-folks was higher on rural wetlands (21.9%) than what obtains in other wetland localities.

A typical wetland livelihood operator's household was made up of six (6) members with households in the rural area having five (5) members while their counterparts in the urban area had household size of 7. This, however, is contrary to *a-priori* expectations, but may be a result of rural-urban migration, with some members of the rural households having migrated to urban centres.

Table 1 also shows that the respondents live very close to the wetland (i.e. within 1km radius of the wetland). This implies that they both reside and have livelihood pursuit around the wetland. Also, they incur little or no transport cost in order to access the wetland. In addition, the respondents have spent about 20 years around the wetland. Since they are long time settlers, this is likely to affect the value they place on the wetland, given their likely emotional attachment to it. The value they place on the wetland may be very high.

Livelihood Activities around the Wetlands

One of the key objectives of this study was to identify the various types and mix of livelihood activities that are taking place around wetlands in the study area. Table 2 summarises the distribution of livelihood operators found around the selected wetlands by the mix of livelihood activities they were engaged in and locality types. As shown on Table 2, the main types of livelihood activities identified around the wetlands were crop farming (mostly fruit and/or leafy vegetable production), fishing, natural resource collection (sand mining, water collection, leaf collection, snail collection etc) and services (trading, hotel and bar services, transportation, boat making and mending) .

The most prevalent single enterprise wetland related livelihood pursuit was farming (69.5%), with most of the other types of enterprises embarked upon in conjunction with crop farming or jointly with other types of livelihood pursuit. Fishing was predominantly combined with farming and/or natural resource collections, with only a few (2.3%) having fishing as their only activity. Resource collection was common only in the rural area, though involving a negligible proportion (1.4%) of the wetland operators. This is possible because the rural people are closer to nature while service-rendering is more in the urban areas (14.7%) than the rural area (1.4%). One feature of the livelihood of the people who live in wetland areas is that their livelihood is essentially wetland related and based around the cultivation of crops such as vegetables, rice,

cassava, fruity vegetables and harvesting of aquatic resources such as fish. People living in wetland areas undertake a wide range of activities as part of their livelihood strategies. For instance, some of the respondents combine farming and fishing (7.6%), farming and resource collection (4.6%), with some of them involved in all the activities. These findings agree with those of Groot *et al* (2006) and Bikangaga (2007), which had noted that, with dramatic seasonal changes in water levels, livelihood strategies in wetland areas tends to change according to periods of floods and periods of less water.

Willingness to Pay For, and Economic Value of Wetlands

The main theme of this study was to estimate the economic value of the respective wetlands in Southwest Nigeria. The wetlands were valued using the Net Factor Income (NFI) and WTP methods. The results are summarised on Table 3.

As shown on Table 3, economic value of Eleyele wetland was estimated to be ₦349,024.28/ha/year for crop farming and ₦269, 516.11/fisherman/year for fishing. Epe wetland was worth ₦75,633.42/ha/year and ₦303,588.00/fisherman/year for crop farming and fishing respectively. Income from the collection of natural resources such as sand, leaves, snail etc as well as income from service rendering around the wetland was estimated to be N23,3218/person/year and ₦192,312/person/year for Epe wetland while that of Eriti was ₦48,804/person/year for each of the activity.

Contingent valuation was used in this study to determine willingness to pay for preservation of wetland. It is expected that livelihood pursuers in wetland areas should be willing to pay for wetland preservation because, in doing so they are sustaining their livelihood indirectly as preservation prevents the wetland land resource from degrading thereby preventing its users from losing their means of livelihood. The mean willingness to pay for wetland preservation per year was ₦3102.13 for wetland users in Eleyele, ₦6,620.84 for users in Epe, while that of wetland users in Badagry and Eriti were ₦8372.69 and ₦10252.98 respectively. WTP was higher among fishermen (₦11,967.57/year) and crop farmers (₦8370.40/year) than their natural resource collectors (₦3025.30) and service rendering (₦3556.66/year) counterparts. The mean WTP for preservation of a wetland in southwest Nigeria was ₦8050.42.

Factors Affecting Willingness to Pay For Wetland Preservation

Table 4 shows the estimated Tobit regression model which was used to determine factors that influence how much respondents in the study area were willing to pay for wetland utilization of the wetland. Education (years) has an influence on how much individuals having livelihood pursuit around wetlands are willing to pay for its preservation as the coefficient of education is significant at $P<0.05$ but negative. This means that the higher the educational level, the lower the willingness to pay. This may be because individuals with high education may find less-reliance on seeking livelihood around the wetland in relation to white –collared jobs elsewhere. The coefficient of income from other activities like civil service, transport services, tailoring, etc. was significant at $P<0.01$ and positive. This means that those involved in other activities other than wetland activities are willing to pay more. This implies that the value they attach to the

wetland goes beyond the use value and probably involves other values, such as option and existence value. Fisher men are willing to pay more than crop farmers. This could be as a result of the fact that they earn their income directly exploring the wetland and further improvements may lead to increase in income thereby sustaining their livelihood.

The coefficient for urban dummy was significant at $P<0.05$ and positive. This implies that operating around urban wetlands has an influence on how much they pay for wetland preservation. People in the urban areas are willing to pay more for wetland preservation than their rural area counterpart. It could be because there are other activities around the urban wetlands such as hotel services, boat making, trading which served as a source of income other than agriculture. But the willingness to pay of those in the sub-urban area was less than that of their rural counterparts as the coefficient was significant and negative.

Conclusion and Recommendations

First, the study revealed that wetlands are actually not wastelands but serves as a source of income for people that have livelihood activities such as farmers, fishers, resource collectors and those rendering services around it. If properly put to use, wetlands will help to an extent to solve the problem of food insecurity and poverty as it serves as a source of food and income.
Second, the main activity around any typical wetland is crop farming and majority of the people having livelihood around wetlands have little or no formal education. The implication of this is that livelihood pursuers may be dependent on their old practices since, they lack the ability to learn new methods that will enable them optimize the use of the wetland and maximize profit.
The study therefore concludes that wetlands are of economic importance to various user and efforts should be made to preserve the wetlands so as to sustain the livelihood of the users.
The findings of this study has revealed that there is need to educate people more about the value of wetlands and also the need to preserve them for livelihood sustainability. Based on these, the study therefore recommends the following:

- Individuals, government and NGOs should put in place measures to reduce wetland destruction, as it leads to significant income losses to members of farm households.
- Efforts should be made to create awareness about the true value of wetlands, the services they provide to people, as well as their importance for the maintenance of biological diversity.
- Farmers should be encouraged to cultivate more of fruity vegetable around wetlands as these will optimize the use of land and also maximize profit.

References

Barbier, E.B, Acreman, M., Knowler, D. (1997): "Economic valuation of wetlands: A guide for policy makers and planners" Ramsar Convention Bureau, Gland, Switzerland.

Bikangaga, S., Picchi, M.P., Focardi, S. ,and Rossi, C. (2007): "Perceived benefits of littoral wetlands in Uganda: a focus on the Nabugabo wetlands" *Wetlands Ecological Management 15:529–535*

Carter, V. (1981): Remote Sensing for Wetland Mapping and Inventory*. Water International. Vol. 6, No. 4.*

Folke C (1991): "Socio-economic dependence on the life-supporting environment. In: Folke C, Kabeger T (eds) Linking the natural environment and the economy: essays from the eco-ecogroup. Kluwer, Dordrecht, pp 77–94

Gren, I.M, Folke C., Turner K, and Bateman I. (1994): "Primary and secondary values of wetland ecosystems". *Journal of Environmental Resource Economics 4:55–74*

Hulme, P. E (2005): "Adapting to climate change: is there scope for ecological management in the face of a global threat?" *journal of Applied Ecolology 42: 784–794*

Idris, M. (2008): "Damming Nigeria's wetlands People: Communities Work Together to Restore Lives and Livelihoods" World Rivers Review: Legacy Issue

IPCC(1996): "Technologies, policies, and measures for miligating climate change." Intergovernmental Panel on Climate Change Technical Report 1.

Lanjouw, J. and Lanjouw, P. 2001. Rural Non-farm Employment: A Survey. Journal of *Agricultural Economics 26: 1 – 23.*

Nigerian Environmental Study/ Action Team (1991) ''Nigeria's Threatened Environment: A National Profile''.

Okali, D., Okpara, E. and Olawoye, J. 2001. Rural-Urban Interactions and Livelihood Strategies: The case of Aba and its region, southeastern Nigeria. Working Paper Series on Rural-Urban Interactions and Livelihood Strategies, Human Settlements Programme, IIED, October.

Schuyt, K. and Brander L. (2004): "The Economic value of the World's wetland" Living waters publication . 8-23

Shittu, A.M. (2008): "Off-farm Labour Drift and Production Efficiency of Farm Households in Ogun and Oyo States, Nigeria". Ph.D. Thesis, Department of Agricultural Economics and Farm management, University of Agriculture, Abeokuta, Nigeria.

Tejuoso, Olufemi Johnson (2006): "Wetland uses/dynamics for agricultural purposes and its health implications in lower Ogun river basin, Lagos, Nigeria" A technical report summated to International Development Research Centre (IDRC) (Ecosystem Approach To Human Health Team) pp 20-22

Terer T., Ndiritu G. and Gichuki N. (2004): "Socio-economic values and traditional strategies of managing wetland resources in Lower Tana River, Kenya" *Journal of Hydrobiologia 527: 3–14.*

Table 1: Distribution of wetland livelihood operators by personal characteristics and locality type

Description	Locality type			**All**
	Rural	**Sub-urban**	**Urban**	**Respondents**
Mean Age (years)	43	47	48	45
Mean household size	5	6	7	6
Mean distance from home to wetland (km)	0.8	0.3	0.9	0.8
Mean years spent around wetland	20	22	21	20
Gender				
Female	29(39.7%)	3(12.5%)	5(14.7%)	37(28.2%)
Male	44(60.3%)	21(87.5%)	29(85.3%)	94(71.8%)
Marital status				
Married	66(90.4%)	24(100.0%)	31(91.2%)	121(92.4%)
Single	2(2.7%)	0(0.0%)	2(5.9%)	4(3.1%)
Widow(er)	5(6.8%)	0(0.0%)	1(2.9%)	6(4.6%)
Education level				
None	14(19.2%)	3(12.5%)	3(8.8%)	20(15.3%)
Primary	31(42.2%)	14(58.4%)	12(35.3%)	57(43.5%)
Secondary	18(24.6%)	6(25.0%)	14(41.2%)	38(29.0%)
Tertiary	10(13.7%)	1(4.2%)	5(14.7%)	16(11.2%)

Source: Data from field survey 2010

Table 2: Distribution of livelihood enterprise operators by mix of livelihood activities and locality

Activities	Locality			**Total**
	Rural	**Sub-urban**	**Urban**	
Farming	48(65.8%)	20(83.3%)	23(67.6%)	91(69.5%)
Fishing	1(1.4%)	2(8.3%)	0(0.0%)	3(2.3%)
Resource collection	1(1.4%)	0(0.0%)	0(0.0%)	1(0.8%)
Service rendering	1(1.4%)	0(0.0%)	5(14.7%)	6(4.6%)
Farming and fishing	7(9.6%)	1(4.2%)	2(5.9%)	10(7.6%)
Farming and resource collection	6(8.2%)	0(0.0%)	0(0.0%)	6(4.6%)
Farming and services rendering	3(4.1%)	0(0.0%)	1(2.9%)	4(3.1%)
Farming, fishing and resource collection	1(1.4%)	1(4.2%)	0(0.0%)	2(1.5%)
Farming, fishing and service rendering	3(4.1%)	0(0.0%)	0(0.0%)	3(2.3%)
Fishing, resource collection and services rendering	1(1.4%)	0(0.0%)	1(2.9%)	2(1.5%)
All activities	1(1.4%)	0(0.0%)	2(5.9%)	3(2.3%)

Source: Data from field survey 2010

Table 3: Economic value and willingness to pay for of wetland

	Net Wetland Income				**Mean WTP (₦/Operator /year)**
	Eleyele	**Epe**	**Eriti**	**Badagry**	
Enterprise					
Crop farming (N/Ha/Year)	349,024.28	75, 633.42	239, 694.26	2636, 98.82	8370.40
Fishing (N/fisherman/Year)	269,516.11	303,588.00	-	-	11967.57
Resource collection (N/person/Year	-	233,218	48,804	-	3025.30
Service rendering (N/	**-**	192,312	48,804	-	3556.66
Mean WTP by location (₦/year)	3,102.13	6,620.84	10,252.98	8, 372.69	
Overall Average WTP (N/person/year)					**8,050.42**

Source: Data from field survey 2010

Table 4: Estimated Tobit regressions for willingness to pay for wetland utilization

Explanatory variable	Estimated coefficient	T-Ratio	Marginal effect
Constant	18.637	3.9761	
Age	-0.10743	-1.5181	-0.80121E-1
Female	1.7305	0.82860	1.29061
Education	-0.54198**	-1.9773	-0.40421
income(Wetland)	-0.20137E-04	-1.5906	-1.50182E-05
Income(other s)	0.30246E-04***	2.8766	2.25557E-05
Frequency of visit	0.30019	1.0658	0.22388
Distance	0.25463	0.43231	0.18990
Fishing	12.065***	2.8209	8.99808
Resource collection	2.5643	0.38089	1.91245
Services	-2.9141	-0.78375	-2.17334
Urban	4.2698**	2.0263	3.18442
Sub-urban	-6.2940**	-2.5180	-4.69407
Log –Likelihood Function	-807.42358		
Predicted F(I)	0.7458		
Squared correlation	0.41047		

Note: ***, ** ***and*** * ***indicate the associated coefficient was significant at 1%, 5% and 10% level respectively***

Source: Data from field survey 2010.