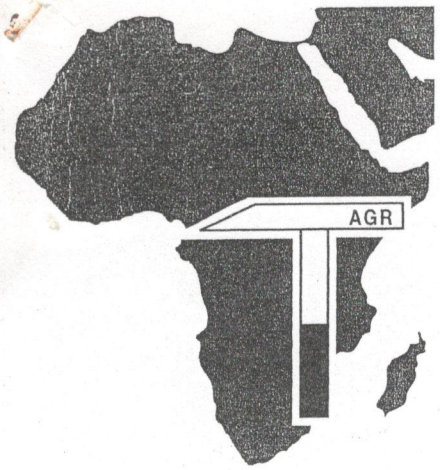

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NIGERIA:
COASTAL ENVIRONMENT AND WETLANDS

GUEST EDITORS: O. MARTINS, O. A. OLUFEMI and I. A. AKPOBORIE

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Assessment of the economic and environmental value of selected wetlands in Southwest, Nigeria

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Abstract - This study assessed the economic and environmental value of 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, livelihood activities around the wetlands, associated wetland income and their willingness to pay (WTP) for wetland utilisation. The WTP was assessed by contingent valuation method based on an interactive bidding game process. The data were analysed by descriptive and budgetary techniques as well as Tobit regression method. The study found that the most prevalent economic activities around the wetlands include farming (90.1%) and/or fishing (17.5%). 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 N349, 024 for Eleyele wetland, N239, 694 for Eriti wetland, N263, 699 for Badagry wetland and N175, 633 and Epe wetland. In terms of fishing, the economic value per year of Eleyele wetland's water body was estimated to be N32, 341, 920 while that of Epe wetland was N1, 486, 974, 024. The mean WTP for the wetland utilisation was N8, 050.42 /operator/year. The figure was significantly ($p<0.05$) higher among fisher folks (N11, 967.57 /operator/year) than crop farmers (N8, 370.40 /operator/year). Tobit regression analysis 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 communities.

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 covered by shallow water. In the Ramsar Convention, wetlands are broadly defined to include lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs, and salt pans (Ramsar, 2010). These 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). In Nigeria, wetlands cover about 13,000 km^2 of the landscape (Fig. 1), and support a wide range of economic activities that sustain significant proportion of communities around them [Nigeria Environmental Study/Action Team (NEST), 1991].

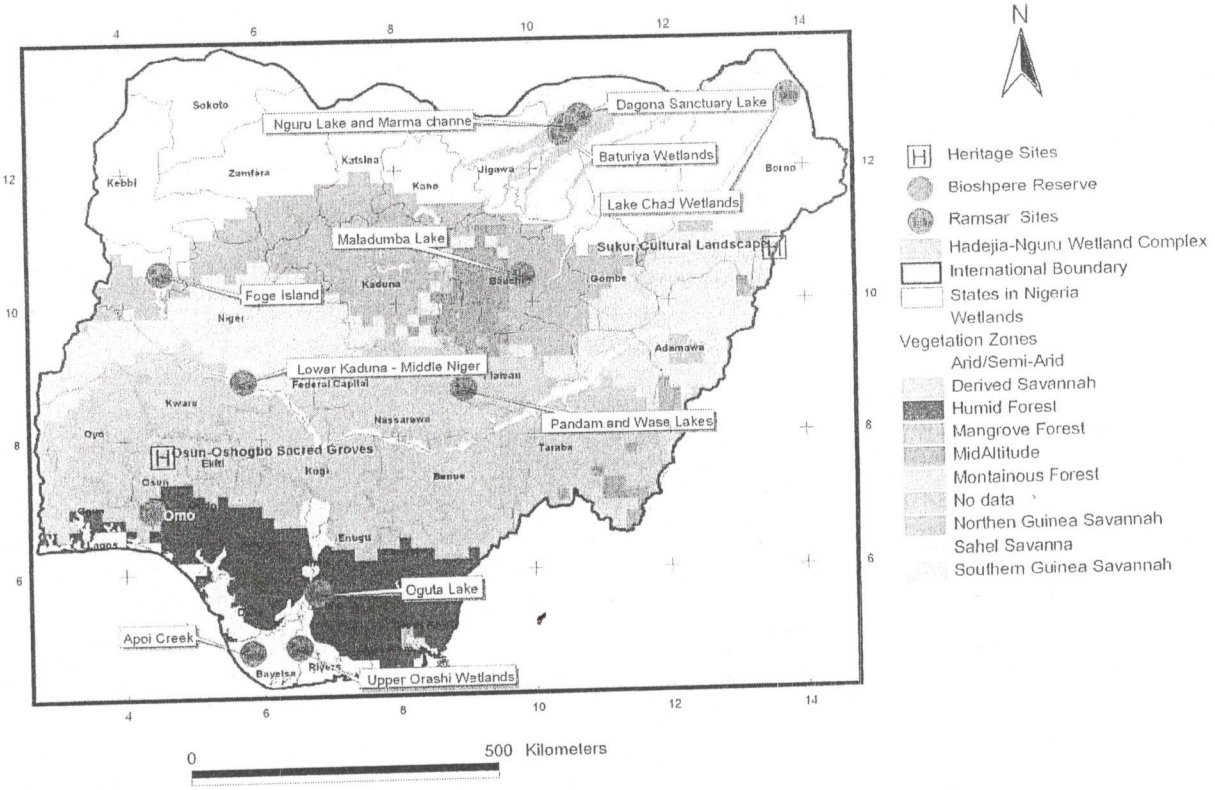

Figure 1. Map of Nigeria showing some of her important wetlands (source: Nigerian Conservation Foundation, 2008)

Wetlands are important especially for the biological, hydrological, economic, socio-cultural and aesthetic roles they play in the environment. 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 (Terer *et al.,* 2004). 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 (Bikangaga, 2007). 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.

The role of wetlands in climate change mitigation has also been stressed. As pointed out in MEA (2005), while sea level rise and increases in storm surges associated with climate change will result in the erosion of shores and habitat, increased salinity of estuaries and freshwater aquifers, altered tidal ranges in rivers and bays, changes in sediment and nutrient transport, and increased coastal flooding; wetlands, such as mangroves and floodplains, can play a critical role in the physical buffering of climate change impacts. Several studies have also shown that protection of coastal wetlands do not only help in shoreline stabilization and climate change mitigations, they also result in increases in the abundance and size of fish within the reserve (Gjertsen, 2005), and some studies have also documented an export of biomass outside the reserve (Alcala, 1988; Roberts and Polunin, 1993) resulting in substantial improvement in human wellbeing (Gjertsen, 2004). In addition, wetlands are very important in the regulation of global climate change through sequestering and releasing a major proportion of fixed carbon in the biosphere, and thereby, reducing green house gas accumulation and global warming (MEA, 2005; IUCN, 2008).

Despite its crucial ecosystem services, however, massive destruction of Wetland ecosystems is taking place all over the world, with as much as about 50% of the World Wetlands already lost (O'Connell, 2003; RAMSAR, 2009) to the extent that their continuous existence may not be guaranteed for the future generations (Barbier *et al.*, 1997). Most of these loses are due to human activities, including large scale diversion of water for irrigation, burning and exploitation of peat land, extensive drainage of marshes and pollution of lakes and rivers (RAMSAR, 2009). 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 of its size in the past 30-40 years because of diversions from dams, irrigation developments and drought. A study by Adenekan (2009) also put wetland losses in four coastal local government areas of Lagos state at between 38% and 100%.

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. Household asset position and shock has been found to be one of the factors that influence wetland conversion. However, if the dynamics of the local institutions that influence accumulation and consumption of livelihood assets are well understood and harnessed appropriately, the wetland can be exploited in a way that will enable it perform its various functions such as nutrient purification, ground water buffering and biodiversity continuously (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 the public and governments do not attach much value to wetlands (Turpie *et al.* 2010). 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, this study was

undertaken to assess the economic value of selected wetlands in Southwest Nigeria. These include Eleyele, Eriti and Lagos Lagoon wetlands in Oyo, Ogun and Lagos States respectively. The specific objectives are to:

- describe socioeconomic characteristics of the wetland users;
- describe the prevalence of the various types of livelihood activities around the selected wetlands, and the associated contributions to household income;
- determine the economic value of the selected wetlands for agricultural and fishing activities; and
- estimate the wetland users' willingness to pay for sustainable utilisation of the selected wetlands and the determinants.

MATERIALS AND METHODS

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°C to 31.4°C. The Eleyele wetland passes through Awotan, 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 30^0C during the dry and raining seasons respectively. Eriti vegetation is mainly Guinea and derived savannah. Eriti is mainly a farm community and is popularly known as the home of vegetables, as leafy and fruit vegetables are the major crops cultivated by the farmers. 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, and 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.

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 patterns 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:
   - Establishment of a waste reclining plant and general waste management measure.
   - Timely removal of all water weeds which posed problems, especially for the fishermen and sand miners.
   - 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:

- $X_{1,1}$ 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.
- $X_{1,2}$ for fishing ; it takes the value 1 if the reference person is a fisher and 0 otherwise
- $X_{1,3}$ 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 resource
- $X_{1,4}$ 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 kilometres

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

- $X_{9,1}$ for rural; it takes the value 1 if the wetland is in a rural area, and 0 if otherwise
- $X_{9,2}$ 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).

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

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, the net factor income (NFI) from livelihood pursuit around Eleyele wetland, which is an indicator of its economic value, was N349, 024.28/ha/year in respect of

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 wetland.

Enterprise	Net Wetland Income				Mean WTP (₦/Operator /year)
	Eleyele	**Epe**	**Eriti**	**Badagry**	
Crop farming (N/Ha/Year)	349,024.28	75, 633.42	239, 694.26	236, 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/person/year)	-	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

crop farming and ₦269, 516.11/fisherman/year in respect of fishing. Similar figures in respect of Epe wetland was ₦75,633.42/ha/year from crop farming and ₦303,588.00/fisherman/year from fishing, while NFI from crop production in Eriti and Lagos Lagoon wetlands are respectively ₦239, 694.26 and ₦236, 98.82. 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 N233,218/person/year and ₦192,312/person/year respectively for Epe wetland and ₦48,804/person/year each in Eriti wetland.

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 among people pursuing livelihood activities around the selected wetlands was ₦3, 102.13/person/year for wetland users in Eleyele, ₦6, 620.84/person/year for users in Epe, while that of wetland users in Badagry and Eriti were ₦8, 372.69/person/year and ₦10, 252.98 /person/year respectively. In general, the WTP was higher among fishermen (₦11, 967.57/person/year) and crop farmers (₦8, 370.40 /person/year) than what obtains among an average person engaged in natural resource collection around the wetlands (₦3, 025.30 /person/year) and those rendering service (₦3, 556.66 /person/year). The mean WTP for preservation of wetlands among people pursuing livelihood activities around the wetlands in the study area was ₦8, 050.42/person/year.

Factors affecting willingness to pay for wetland preservation

Table 4 shows the estimated Tobit regression model which was used to determine factors that

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.

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 lack the necessary knowledge required for sustainable use and management of the wetland resource which will enable them to maximize profit.

The study therefore concludes that wetlands are of economic importance to various users and efforts should be made to preserve the wetlands so as to sustain the livelihood of the users.

The findings of this study have revealed that there is need to make people become more aware of 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.

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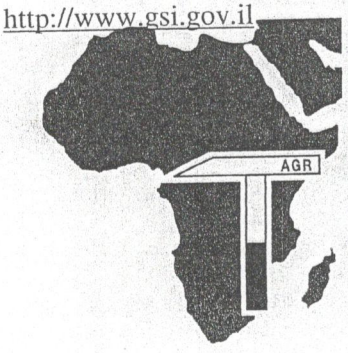

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