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Awareness and perception of climate change and variability among indigenous people living around Nigerian national parks

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ABSTRACT

This study evaluated the awareness and perception of indigenous people living around Nigerian national parks on climate change and variability. It examined the way indigenous people living around Old Oyo (OONP), Kainji Lake (KLNP), Cross River (CRNP) and Okomu (ONP) National parks perceive~~d~~ climate change, their adaptive strategies to climate change, and their perceived hindrances to adaptation. Questionnaire was administered ~~on~~ to 531 respondents from villages selected through multi-stage random sampling. Data obtained were analyzed using descriptive statistics such as frequency, percentage, mean, etc. Linear regression analysis was used to determine the relationship between the respondent's demographic characteristics and their level of perception of climate change. Majority of the respondents were male; OONP (57.7%), KLNP (75.5%), CRNP (73.7%) and ONP (63.6%). In terms of age, majority of the respondents in CRNP, KLNP and ONP fall within the age class of 21-30 (35.8%, 36.8%, 36. 4% respectively). Most of the respondents (66.4%), 52.6%, 48.1%, 60.0% in OONP, CRNP, KLNP and ONP respectively strongly agreed that the climate is changing due to diverse human activities. The result shows that age, qualifications and gender has significant relationship ($p<0.05$) with the respondents awareness and perception of climate change respectively. This abstract did not fully address the objectives as stated. What are the identified adaptation strategies and hindrances to adaptation? They should be included at this point. There is need to develop policies on combating climate change and also to improve the adaptive capacity of the local people to cope with climate change.

Keywords: Awareness, climate change, variability, indigenous people, adaptation, national parks

INTRODUCTION

Observational evidence indicates that climate change in the twentieth century has already affected a diverse set of physical and biological systems (McCarthy,2001; Ben Mohamed *et al*. 2002; Jalloh *et al.* 2013; Karfakis *et al*. 2011). Changing climate is expected to continue in the 21st century in response to the continued increasing trend in global greenhouse gas (GHG) emissions (Intergovernmental Panel on Climate Change (IPCC), 2007), stimulating three main responses: technical and livelihood adaptations by affected communities, mitigation actions that sequester GHGs or reduce fossil fuels dependence, and formal international dialogue on the scope and correction of this now rapidly emerging

threat to human existence. Climate change scenarios for Africa include higher temperatures across the continent estimated to be increasing by 0.2°C per decade and more erratic precipitation with slight increase in ecozones of eastern Africa and moist forest ecozones of West Africa and sustainable declines in the productivity in the Sahel and the ecozones of southern, Central and North Africa (Stige*et al*,. 2006).The earth system is an integral component of human enterprise (Leiserowitz*et al.* 2004). This ever-changing system provides a multitude of valuable services to humankind, including a livable climate, provision of clear air and water, and the production of food and fiber (Leiserowitz *et al.* 2004).

Climate change can result in grave consequences for human well-being, development, and security through increased exposure to severe weather conditions such as floods and droughts that will directly aggravate the risks of disease and poor-health, inadequate drinking water and food scarcity, loss of livelihoods, migration, violence, and conflict (UNDP, 2007). Vulnerable and marginalized groups including the poorest populations in low and middle income countries will face a disproportionate impact of climate change and this will threaten the effectiveness and success of development and poverty-reduction efforts (The World Bank, 2006). Additionally, resource scarcity may intensify existing inequalities and result in greater fissures between communities and a rise in violence and conflict. Conversely, existing inequalities can also exacerbate individual's vulnerability to the negative effects of climate change (IPCC, 2007). Climate change is an environmental, social and economic challenge on a global scale (Scholze *et al*., 2006; Mendelsohn *et al*., 2006). Climate change can be exacerbated by human induced actions such as: the widespread use of land, the broad scale deforestation, the major technological and socioeconomic shifts with reduced reliance on organic fuel, and the accelerated uptake of fossil fuels (Millennium Ecosystem Assessment, 2005).The most devastating adverse impacts of climate change in Nigeria and other subtropical countries includes frequent drought, increased environmental damage, increased infestation of crops by pests and diseases, depletion of household assets, increased rural urban migration, increased biodiversity loss, depletion of wildlife and other natural resource base, changes in the vegetation type, decline in forest resources, decline in soil quality (soil moisture and nutrients), increased health risks and the spread of infectious diseases, changing livelihood systems, etc. (Abaje and Giwa, 2007).

Indigenous Peoples who are vital and active parts of many ecosystems may help to enhance the resilience of these ecosystems. Their livelihoods depend on natural resources that are directly affected by climate change, and they often inhabit economically and politically marginal areas in diverse, but fragile ecosystems. In addition, they interpret and react to climate change impacts in creative ways, drawing on traditional knowledge as well as new technologies to find solutions, which may help society at large to cope with the impending changes (Jan and Anja, 2007). In Nigeria, just as in many developing countries in the Subtropical region the agricultural sector is more vulnerable to climate change; farmers, livestock keepers, people in poor health, those who are malnourished, people with low economic power, women and children including women headed households, those with low level of education, and those with low technological know-how are more exposed to the risk of climate change (Barber, 2003).Doss and Morris (2001) opined that the perspectives of the indigenous people, the way they think and behave in relation to climate change, as well as their values and aspirations have a significant role to play in addressing climate change. Despite

this, Indigenous and other Traditional Peoples are only rarely considered in academic, policy and public discourses on climate change, despite the fact that they are greatly impacted by impending changes of climate (Berkes and Jolly, 2001).

It is of great importance to investigate local peoples' awareness and perceptions regarding climate change. This is because evidence from research suggests a strong relationship between awareness and perceptions of climate change and the adaptation to its impacts (Adger *et al*. 2009; Debela *et al.* 2015). How people perceive the impacts strongly affects how they deal with climate-induced risks and opportunities, and the precise nature of their behavioral responses to this perception will shape adaptation options, the process involved and adaptation outcomes (Adger *et al*. 2009). Perceptions not only shape knowledge but knowledge also shapes perception. Peoples' perceptions about climate change, therefore, strongly affects how they deal with climate induced risks and uncertainties, and undertake specific measures through coping strategies to mitigate the adverse impact of climate change on agriculture (Raghuvanshi *et al.* 2016).This study was carried out to determine socio-economic characteristics of the respondents, assess the level of awareness of local community about impacts of climate change, determine problems associated with adapting to effects of climate change and identify specific practices used to combat climate change in the area.

METHODOLOGY

The study was conducted in four out of seven national parks in Nigeria, namely, Old Oyo, Kainji Lake, Okomu and Cross River National Parks.

Kainji Lake National Park (KLNP) was established in 1979 by the merger of the two former gme rserves–Borgu Game Reserve (located between Niger and Kwara States) and the Zugurma Game Reserve (located in Niger State), the two reserves were gazetted in 1962 and 1971 respectively as Game Reserves by the then Northern Regional Government. It was therefore known to be the first National Park and the second largest of all the seven National Parks in Nigeria with land area of 5,340.83sq.km. The Park lies between latitude $9^0\ 40^1$–$10^0\ 30^1$ N and longitude $3^0\ 30^1$–$5^0\ 50^1$E (UNEP-WCMC, 2003) and it has a savanna vegetation. Night temperature can be as low as 7^0C near Oli River. The drainage system in Borgu sector of Kainji Lake National Park is maintained by the Oli, Menai and Doro Rivers while the Manyara and NuwaZurugi Rivers maintains the Zurguma sector. The major vegetation type of Kainji Lake National Park as classified by Keay (1959) is Northern Guinea Savanna ecotype. Afolayan (1977) and Milligan (1978) both identified seven vegetation sub-types in Kainji Lake National Park.

Old Oyo National Park is located in the northern part of Oyo state, southwestern Nigeria. It has a total land area of 2,512sq.km and derives its name from the ruins of Oyo Ile, the ancient political capital of the Yoruba empire. The Park lies between latitudes 8°101 and 9°051N and longitudes 3°00' and 4°02'E. The Head ofice is 300km from Lagos, 60km from Ibadan, 160km from Ilorin, 600km from Abuja, 600km from Kaduna and 910km from Kano (Nigeria National Park Service, 2010). Most of the park is low and plain, rising from 300m to 500m above the sea level at its highest. Notable hills in the Park include Yemoso, Gbogun and Kosomonu. The southern part is drained by Owu, Owe and Ogun Rivers, while the northern sector is drained by Tessi

River. The park experiences two seasons in a year, the wet and dry season. The rainy season begins in April through September while the dry season begins from October to March. The park is rich in fauna and flora resources, significant among which are Buffon Kob, Buffalo, Bushbuck and a wide variety of Birdlife. Ethno-historical sites includes the ruins of the city wall, the great 'Agbaku' cave, Python cave, Detune wall, the Oyo-Ile Reservoir.

Cross River National Park is located in the rainforest ecological zone in the extreme south eastern corner of Nigeria on the border with the Republic of Cameroun. The park occupies a total land area of about 4000sqkm of tropical rainforest ecosystem which thins out progressively to montane savannah vegetation at the edge of Obudu Plateau in Okwangwo. The southern Oban sector has an area of 3000sq.km while the northern Okwangwo division near Obudu covers an area of 1000sq.km. The park lies within longitudes 5°05' and 6°29'N and latitiudes 8°15' and 9°30'E (Nigeria Park Services, 2010). The Park is home to many species of plants and animals, some of which are; Gorilla, Drill, Chimpanzee, Forest elephant, Leopard and Butterflies. Flora species include *Anceistocladus korupensis, Prumus africana, Irvingia gabonensis*etc.

Okomu National Park is located in Ovia South west Local Government area of Edo State. It is the last surviving protected rainforest ecosystem in Southwest, Nigeria. It is about 45km west of Benin City and lies between latitudes 6°25'N and longitudes 5°9' and 5°23'E. It is bounded in the west by the Okomu River and in the northeast and south by a series of straight cut lines. With an area of 202.24sq.km, it is the smallest of Nigeria's National Parks. Okomu National Park was originally gazetted as a Wildlife Sanctuary in 1986, and was upgraded to a fully-fledged National Park in 1999. The Park is endowed with wildlife population which includes the Dwarf Crocodile (*Osteolaemus tetraspis)*, White throated Monkey (*Cercopithecus erythrogaster)*, Forest Elephant (*Loxodonta Africana cyclotis)*, Forest Buffalo (*Syncerus caffer*) etc. It is also very rich in Birdlife with above 200 species recorded in the Park. (Nigeria Park Services, 2010)

Sampling Design and Data Collection

The sample frame of the study consists of villages located within 5km from the boundary of each of the National Parks. The Parks were divided into sectors based on the protection and administrative units of the park. Sectors were further divided into ranges which are small units for protection and conservation activities. Within the villages are the support zone villages of the Parks that were selected for the study. Thirty percent (30%) of the villages from the sample frame was purposely selected and from list of the selected villages, 20% of the respondents in ach village was randomly selected to ensure effective comparison, variation and representativeness of the respondents in the villages. In all, a total of 531 respondents were selected from the 26 villages as presented in Table 1.

Data Analysis

Data were obtained through the use of set of questionnaire administered to respondents in each village. The questionnaire comprised the socio- demographic characteristics of the respondents, awareness and perception about climate change. The explanatory and dependent variables are operationalized in Table 2. The data collected were analyzed and presented descriptively using Statistical Package for Social Sciences version 21 (International Business Machines Corporation, 2012). One way Analysis of variance was used to determine the respondents' awareness, while logistic regression was used to identify the socio-demographic predictors of perception about climate change.

Table 1: Sampling unit selection design

National Park	Village sampling Frame	30% Sampling Size Villages	Estimated Population Size	20% sampling size /village	Total sample per Park	Total Respondent data Collected
Cross River	19	6	600	20	120	95
Okomu	12	4	640	32	128	110
Old Oyo	38	12	1200	20	240	220
Kainji Lake	13	4	581	29	116	106
Total	**82**	**26**	**3021**	**101**	**604**	**531**

Table 2: Operationalization of variables

Explanatory variables	Description	Operationalization
Gender	Whether the respondent is a male or female	1 for male, 0 female
Age	Actual age of respondent in years	
Education	Education attainment of respondent	1 for non-formal, 0 otherwise
Occupation	The occupation of the respondent	1 for farming, 0 otherwise
Marital Status	The marital status of the respondent	1 for single, 0 otherwise
Length of residency	Actual years respondent has lived in the community	Length of residency
Raised in the Village	Whether the respondent grew up in the village	1 for raised in the village, 0 otherwise
Native status	Whether the respondent is an indigene of the community or not	1 for yes, 0 otherwise
Dependent variables	Description	Operationalization
Awareness of climate change	Whether a respondent is aware or not aware of climate change	1 for aware, 0 otherwise
Perception about climate change	Perception of respondent about climate change	1 for high , 0 otherwise
Native status	Whether the respondent is an indigene of the community or not	1 for yes, 0 otherwise

RESULTS

Respondents' demographic characteristics are in Table 3. It reveals that more male participated in the study than female. In OONP, 57.7 %of the respondents were male, 73.70% in CRNP, 75.7 % in KLNP and 63.3% in ONP were male. Most of the respondents in CRNP, KLNP and ONP were in the age group 21 – 30 with 35.8%, 36.8% and 36.4% respectively, while in OONP most of the respondents were in the age group 31 - 40(32.3 %). The respondents were mostly married in CRNP (78.9%), ONP (77.3 %), KLNP (75.5%) and OONP (76.4%).

Majority of the respondents in CRNP and ONP were Christians (89.5 % and 65.5 % respectively), while in KLNP and OONP majority of the respondents were Muslims (84.9 % and 64.5 % respectively). In terms of educational qualification all the parks have higher percentages of respondents without formal education. CRNP recorded 61.8 % of respondent without formal education, 10.5 % had primary education and12.6% had secondary education. In ONP 57.3% of respondents had no formal education, 13.6 % had primary education, 17.3% secondary education. In KLNP, 58.5% of respondents had no formal education, 11.3% had primary education and 7.6 % had secondary education, while 61.8 % had no formal education in OONP, 19.55% had primary education and 9.1 % had secondary education (Table 3). The Primary occupation of the villagers living around the national parks is farming. Majority of the respondents were farmers in all the Parks CRNP (61.8 %), ONP (73.6%), KLNP (67.9 %) and OONP (80.0 %). The result of the respondents' awareness about climate change is presented in Figure 1. The result shows that majority of the respondents (81.23%) were aware of climate change, while 18.77% of the respondents claimed not to be aware of any climate change. In terms of sources of awareness information about climate change, majority of the respondents received awareness information about climate change mainly from the local radio station (80.41%).

Table 3: Demographic characteristics of respondents

Variable		OONP 220 (%)	CRNP 95 (%)	KLNP 106 (%)	ONP 110 (%)
Sex	Male	127 (57.7)	70 (73.7)	80 (75.5)	70 (63.6)
	Female	93 (42.3)	25 (26.3)	26 (24.5)	40 (36.4)
Age	Below20	3 (1.4)	19 (20.0)	12 (11.3)	23 (20.9)
	21-30	34 (15.5)	34 (35.8)	39 (36.8)	40 (36.4)
	31-40	71 (32.3)	33 (34.7)	34 (32.1)	30 (27.3)
	41-50	81 (36.8)	7 (7.4)	14 (13.2)	14 (12.7)
	51-60	24 (10.9)	2 (2.1)	7 (6.6)	2 (1.8)
	61 Above	7 (3.2)	0 (0)	0 (0)	1 (0.9)
Marital Status	Single	52 (23.67)	20 (21.06)	26 (24.53)	25 (22.7)
	Married	168 (76.36)	75 (78.94)	80 (75.47)	85(77.3)
Religion	Christianity	77 (35.0)	85 (89.5)	14 (13.2)	72 (65.5)
	Muslim	142 (64.5)	8 (8.4)	90 (84.9)	20 (18.2)
	Traditional	1 (0.5)	2 (2.1)	2 (1.9)	18 (16.4)
Occupation	Farmers	176 (80.0)	65 (61.75)	72 (67.92)	81 (73.64)
	Traders	7 (3.18)	5 (4.75)	11 (10.38)	4 (3.64)
	Civil Servant	13 (5.91)	8 (7.60)	5 (4.72)	9 (8.18)
	Students	10 (4.55)	7 (6.65)	5 (4.72)	5 (4.55)
	Loggers	5 (2.27)	10 (9.50)	4 (3.77)	11 (10.0)
	Grazers	9 (4.09)	-	9 (8.49)	-
Educational Qualification					
	Non formal	136 (61.82)	53 (55.79)	62 (58.49)	63 (57.27)
	Primary	43 (19.55)	10 (10.53)	12 (11.32)	15 (13.64)
	Secondary	20 (9.09)	12 (12.63)	8 (7.55)	19 (17.27)
	OND/NCE	16 (7.27)	8 (8.42)	15 (15.09)	4 (3.64)
	HND/BSC	4 (1.82)	11 (11.58)	8 (7.55)	7 (6.36)
	Masters	1 ()	1 (1.05)	0 (0)	2 (1.82)
Indigene of the village	Yes	107 (48.6)	50 (52.6)	70 (66.0)	58 (52.7)
	No	113 (51.4)	45 (47.4)	36 (34.0)	52 (47.3)
R**aised in the village?**	Yes	100 (45.5)	49 (51.6)	74 (69.8)	48 (43.6)
	No	120 (54.5)	46 (48.4)	32 (30.2)	62 (56.4)
When did you move to this area?					
	1-5	42 (19.1)	21 (22.1)	5 (4.7)	10 (9.1)
	6-10	53 (24.1)	11 (11.6)	3 (2.8)	22 (20.0)
	11-15	34 (15.5)	20 (21.1)	12 (11.3)	32 (29.1)
	16-20	32 (14.5)	0 (0)	9 (8.5)	10 (9.1)
	21-25	27 (12.3)	2 (2.1)	24 (22.6)	6 (5.5)
	26 ABOVE	32 (14.5)	41 (43.2)	53 (50.0)	30 (27.3)
How many times have you moved?					
	Never	107 (48.6)	60 (63.2)	70 (66.0)	42 (38.2)
	Once	97 (44.1)	14 (14.7)	13(12.3)	40(36.4)
	Twice	11 (5.0)	4 (4.2)	7 (6.6)	25(22.7)
	Thrice	5(2.27)	3 (3.2)	5 (4.7)	2 (1.8)
	Four times	0 (0)	5 (5.3)	4 (3.8)	1 (0.9)
	Five times above	0 (0)	9 (9.5)	7 (6.6)	0 (0)

Other sources of information on climate change were television (3.77%) and association/interaction (through farmers' cooperative society, relative/family members and extension agents; 5.65%), while 10.71% had no source of information.

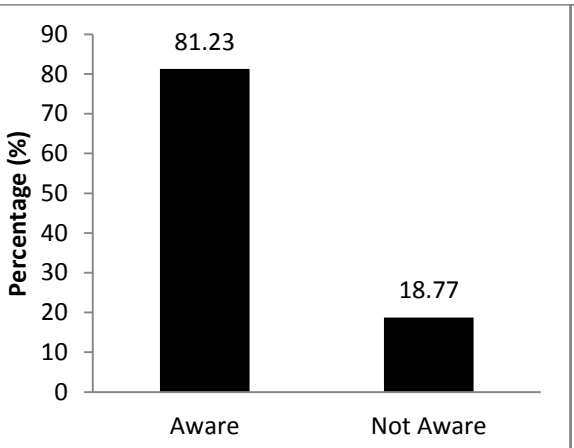

Fig. 1. Respondents awareness about climate change

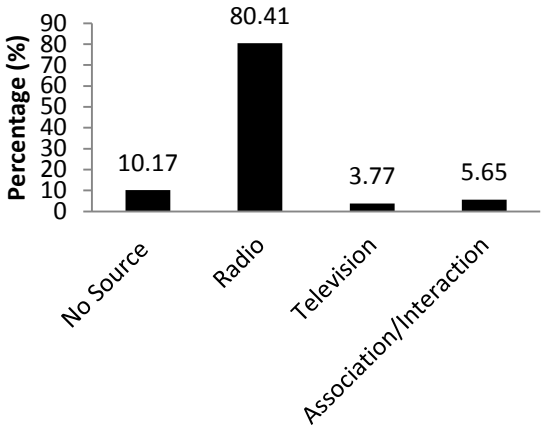

Fig. 2. Respondents' sources of awareness about climate change

Considering the issues of environmental change, majority (67.0%) of the respondents strongly agreed that the environment has been changing over the years due human activities such as farming, deforestation, bush burning, and overgrazing. In analyzing the effect of climate change, 58.4% of the respondents agreed that the climate change has led to decline of forest resources and that forest fruits are no longer as abundant as before (51.5%). Some of the respondents (36.7%) expressed fear that rainfall is decreasing every year with varied rainfall anomalies and due to these the environment is becoming dry every year, while others believed that yearly rains are not supporting crop production as before. The result also shows that many of the respondents (36.2) believed that climate change has led to various forms of crops infestations there by reducing the quality and quantity of crops produced, which are very significant factors that increase cost of food crops. There have also been problems of flooding which has been a serious problem associated with climate change and also threatened the livelihood of the inhabitants of the study area as indicated by 46.7 % of the respondents (Table 4). The results also showed the migration history of the area and the respondents, 51.4% of the respondents in OONP were not indigenes of the area but migrated into the area. This is also similar to what is found in the other parks were 47.4%, 34.0 and 47.3% of the respondents were migrants in CRNP, KLNP and ONP respectively (Table 4). Analysis of variance was carried out to find out if there exist a positive correlation between the respondents' awareness about climate change and the location (Table 5). The results shows that there was no significant relationship at $p< 0.01$

Table 4: Respondent's perception of climate change and the environment

S/ No	Climate Change Issues	Strongly Disagreed %	Disagreed %	Agreed %	Strongly Agreed %	Mean	Standard Deviation
1.	The Environment in this village is changing due to human activities	3.4	4.7	24.9	67.0	3.56	0.74
2.	Climate change has led to decline of forest resources	1.3	2.4	37.9	58.4	3.53	0.62
3.	Forest fruits are no longer abundant	0.4	6.5	41.5	51.5	3.29	0.85
4.	Rainfall is decreasing every year	12.4	17.3	33.5	36.7	2.95	1.02
5.	Small streams and rivers dry up nowadays	1.3	2.4	37.9	58.4	3.53	0.62
6.	The weather is becoming dry every year.	6.8	29.4	23.5	40.3	2.97	0.98
7.	The yearly rains are not supporting crop production as before	7.7	25.6	28.6	38.0	2.98	0.97
8.	There is high occurrence of infestation and diseases on crop	11.9	20.9	31.1	36.2	2.92	1.02
9.	The cost of food crops are increasing because of climate change.	3.6	8.1	31.5	56.9	3.42	0.79
10.	Climate change has led to rural-urban migration	8.7	29.4	28.2	33.7	2.87	0.98
11.	Climate change has led to change of livelihood system	6.6	25.0	31.5	36.9	2.99	0.94
12.	There have been increase incidences of floods during the rainy season	11.1	13.4	28.8	46.7	3.11	1.02
13.	There have been increase incidences of droughts during the rainy season	36.7	33.5	17.3	12.4	2.95	1.02
14.	The Climate is changing	1.3	2.4	37.9	54.4	3.53	0.62
15.	Temperature is rising.	0.8	2.6	39.2	57.4	3.53	0.59

Table 5: Analysis of variance on respondents' awareness about climate change

	Sum of Squares	**df**	**Mean Square**	***f value***	***P value***
Between Groups	.168	4	.042	1.159	.328
Within Groups	19.079	526	.036		
Total	19.247	530			

The results of the model explaining respondents' perception about climate change is presented in Table 6. The likelihood ratio test indicated that the logistic regression model is significant with Chi-square statistics of 12.392 for support for perception about climate change. This shows that some of the socio-demographic variables of the respondents were significantly related to their perception about climate change. In addition, the model predictions are correct at 67% which showed that the explanatory variables can be used to specify the dependent variables (i.e. perception about climate change) in discrete term (0,1) with a high degree of accuracy. Age, Religion and educational qualification are statistically significant with perception about climate change ($p<0.01$) However, occupation and native status of the respondents were not statistically related to the respondents' perception about climate change. The final

model fit indicated that 67% of the variation in the perception about climate change is explained by the logistic model indicating a strong relationship between the predictors and the predictions.

Table 6: Socio-demographic predictors of respondents' perception about climate in the study area

	B	SE	Wald	Sig.	Exp(B)
Sex	.407	.209	3.795	.051	1.502
Age	1.021	.298	11.716	.001	2.776
Religion	-.752	.213	12.427	.000	.471
Occupation	.384	.297	1.669	.196	1.468
Education	-.734	.217	11.449	.001	.480
Native status	-.155	.200	.600	.438	.856
Nationality	-.301	.270	1.242	.265	.740
Constant	.636	.351	3.290	.070	1.890
Correct Prediction (%)	68.2%				
	Final Model Fit				
-2 Log Likelihood	636.076				
Nagelkerke R Square	0.94				

*P<0.01

DISCUSSION

The result shows that majority of the respondents were male. Ogunjinmi and Braimoh (2018) in Old Oyo National Park, Nigeria reported that 64% of the participants in their study were male. Also, majority of the respondents were between the age range of 21-30 years and 31-40 years, these are the productive years of the respondents. The result also shows that majority of the respondents in Old Oyo National Park and Kainji lake National Park were Muslims while majority of the respondents in Cross River National Park and Okomu National Park were Christians. The educational qualification of the respondents also shows that majority of the respondents in the Park had no formal education. This is in agreement with Ogunjinmi*et al.* (2012) which recorded that 56.6% of the respondents found around seven national parks in Nigeria had no formal education. Saidu (2006) also reported that 44.0% of the local people interviewed in the support zones communities of Kainji Lake National Park, Nigeria lacked formal education. Majority of the respondents in the study areas were predominantly farmers. This finding is consistent with Saidu (2006), Osunsina, (2010) and Ogunjinmi*et al*. (2012).

The study also revealed that majority of the respondents were indigenes of their villages in Cross River National Park, Kainji Lake National Park and Okomu National Park while majority of the respondents from Old Oyo National Park were migrant from other places. Only Old Oyo National Park has high number of respondents who are not indigene of the area. This is in agreement with the study conducted by Osunsina, (2010) in four Nigeria National Parks which also reveals high level of respondents that are not indigene of the villages around Old Oyo National Park. Majority of the respondents were aware of climate change in the study areas. This corroborated the findings of Ado et al (2018) which shows that 84.4% of the respondents were fully aware of the climate change problem. Similar studies by Shukla *et al.* (2016), and Mandleni and Amin (2011) both found that 85% of respondents were aware of climate change. Only few (18.77%) of the respondents claimed not to be aware of climate change.This is in line with Ado *et al* (2018), who reported that only 15.6% of

farmers were unaware of climate change in the Niger Republic and Ajayi (2014), who indicated that 13.89% of farmers were unaware of climate change in the Niger Delta region of Nigeria. Acquah and Onumah (2011) also found that only 15.3% of interviewed farmers were unaware of climate variability in Dunkwa, Ghana.

Dissemination of information about climate change is an important factor which creates and enhances awareness among the people. Most of the respondents (80.41%) indicated radio as their source of information about climate change. Transistor radio is the most common source of information in the rural areas due to its handy nature which makes it easier and comfortable to carry about and because the information is broadcast in the local language. This agrees with the findings of Ado *et al.* (2018) which reported that respondents received information about climate change mainly from the local radio station (81.4%). Also, transistor radio does not require electricity supply unlike other source of information such as television and internet which requires electricity supply. Other reasons attributable to lack of other sources of information such as newspaper and phone may be due to higher level of poverty and illiteracy, as over 55% of the respondents in the study areas have no formal education. Similar prevalent economic condition and educational characteristics made by Ado et al. (2018) recommended that information concerning climate change and associated impacts should mainly be disseminated in local languages through radios

The finding of the study also shows that most of the respondents were aware of changes in climate conditions in recent years and its effect on their livelihood. This corroborated the findings of Ishaya and Abaje (2008), Adebayo and Oruonye (2012a; 2012b) and (Egbe *et al.*, 2014). Most of the respondents also indicated increasing flood in their area, stating that there has been increase in flood occurrence in the last 10 years. This is in line with the findings of Oruonye (2012a; 2012b) and Oruonye and Adebayo (2013) which shows increasing cases of flood disaster in different part of Nigeria. The respondent's assessment of increasing temperature and serious heat agreed with experts report on temperature trend in other parts of northern Nigeria. This is line with the study conducted by Adebayo, 2010; Umar, 2011) which indicated extremely high temperature in different parts of the country. High temperature has also been linked with increase in insect pest infestation and diseases ravaging crops. The army worm infestation ravaging cereal crops since 2016 in Nigeria is a good example of insect pest infestation.

The study also shows that the respondents depend on the natural resources in their environment (such as fruits, vegetables and other non-timber forest products from the parks); which are threatened by problem of climate change. The study also shows that many of the respondents have adopted various methods for adapting to climate change such as planting improved variety of crops, cultivating different crops, shortening growing season, changing the extent of land and changing to irrigation or FADAMA farming. The result shows that 4 of the tested variables; age, sex, religion and educational qualification were found to be major factors through which variations on the level of perception of climate change in the study area can be explained or predicted. For instance, respondents' age would contribute to their perception about climate change since the climate variables such as rainfall, heat and humidity they have experienced years past is now changing. The level of

education also goes a long way to affect the perception of the respondents, since the more educated the respondents the more enlightened they would be. This is in consistent with the findings of Ado et al. (2018) which reveals that education has a significant and positive effect on respondents' awareness, perception and adaptation to climate change impacts. Juana *et al.* (2013) also reported that adaptation to climate change impacts can be considered from the perspectives of awareness and perception. This is consistent with the findings of Abid *et al.* (2015) and Deressa *et al.* (2011), also reported that an increase in the level of schooling increases the probability of adapting to climate change impacts.

CONCLUSION AND RECOMMENDATIONS

From the results, the perception of the respondents towards climate change is partly determined by the demographic characteristics and what the respondents' have perceived for a very long time. In the study areas, majority of the respondents acknowledged that they are aware of climate change and that there have been changes in the environment and that the temperature is rising. The findings of this study showed that the respondents' perceived threat of climate change is more on food supply, fuel wood availability and health than on businesses and instigating disaster. The adaptation strategies are on planting different varieties of crops, cultivating different crops and changing to irrigation/ FADAMA farming. Communities in the study areas should embark on an extensive tree planting because of the rate of deforestation and harvesting of fuel wood. There should be a heightened public education on environmental conservation and awareness on the impacts, implications and effect of climate change. It is important that government make issues of climate change adaptation top of its political agenda. Policies of reducing poverty and ensuring food security should be included in climate change strategies.

REFERENCES

Abaje, I.B, Giwa P.N. 2007. Urban Flooding and Environmental Safety: A Case Study of Kafanchan Town in Kaduna State. A Paper Presented at the Golden Jubilee (50th Anniversary) and 49thAnnual Conference of the Association of Nigerian Geographers (ANG) scheduled for 15th- 19th October 2007 at the Department of Geography, University of Abuja, Gwagwalada-Abuja.

Abid, M., Scheffran, J., Schneider, U., and Ashfaq, M. 2015. Farmers' perceptions of and adaptation strategies to climate change and their determinants: The case of Punjab province, Pakistan. *Earth System Dynamics*, 6, 225 --.

Acquah, H. D. G., and Onumah, E. E. 2011.Farmers perception and adaptation to climate change: An estimation of willingness to pay. *Agris on-line Papers in Economics and Informatics, 3*, 31.

Adebayo, A.A., 2010. Climate: Resource and resilience to agriculture. 8th Inaugural Lecture of Federal University of Technology, Yola, Adamawa State, Nigeria.

Adebayo, A.A. and E.D. Oruonye, 2012a. An investigation of local farmers assessment of climate change in Northern Taraba State, Nigeria. Proceedings of the Conference of the Nigerian Meteorological Society (NMetS), Held at the University of Benin, Benin City, Edo State, Nigeria, 5h – 9th November, 2012. pp: 75.

Adebayo, A.A. and E.D. Oruonye, 2012b. An assessment of the level of farmers. Awareness and adaptation to climate change in Northern Taraba State, Nigeria. Proceedings of Climate Change and ICT Conference Held at Osun State University Okuku campus,

OsunState,Nigeria 27th – 28th November, 2012. pp: 13-22

Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., 2009. Are there social limits to adaptation to climate change? *Climatic Change, 93,* 335–354.

Ado A. M., Leshan, J., Savadogo, P., Bo, L.andShah, A. A. 2018. Farmers' awareness and perception of climate change impacts: case study of Aguie district in Niger. *Environment Development and Sustainability.* Volume missing Pp 2-16. Https://doi.org/10.1007/s10668-018-0173-4

Afolayan, T.A. 1977. Effects of fire on the vegetation and soils in Kainji Lake National Park, Nigeria. Invited MAB-3 project paper presented at the International Rangeland Congress, Colorado, USA.

Ajayi, J. 2014. Awareness of climate change and implications for attaining the Millennium DevelopmentGoals (MDGs) in Niger Delta Region of Nigeria. *Agris on-line Papers in Economics and Informatics,*6, 3.

Ansari, M.A, Joshi, S. & Raghuvanshi, R, 2018.Understanding farmers perceptions about climate change: a study in a North Indian State *Advances in Agriculture and Environmental Science* 1(2), 85−89. DOI: 10.30881/aaeoa.00015

Barber H, Jennifer S, Ann EB, William GA 2003. Neighborhood Social Change and perceptions of Environmental Degradation. *Population and Environment.* 25, 7-108.

Ben Mohamed, A., van Duivenbooden, N., &Abdoussallam, S. 2002. Impact of climate change on agriculturalproduction in the Sahel—part 1. Methodological approach and case study for millet in Niger.*Climatic Change,* 54, 327–348.

Berkes F and Jolly D 2001.Adapting to climate change: socio-ecological resilience in a Canadian Western Arctic Community. *Conservation Ecology*. 5 (2), 18 -.

Debela, N., Mohammed, C., Bridle, K., Corkrey, R., & McNeil, D. 2015.Perception of climate change andits impact by smallholders in pastoral/agropastoral systems of Borana, South Ethiopia.*SpringerPlus,*4, 1–12.

Deressa, T. T., Hassan, R. M., & Ringler, C. 2011.Perception of and adaptation to climate change by farmers in the Nile basin of Ethiopia. *The Journal of Agricultural Science,* 149, 23 --.

Doss C, Morris M 2001. How does gender affect the adoption of agricultural innovations? The case of improved maize technology in Ghana.*Agricultural. Economics.* 25, 27–39.

Egbe, C.A., M.A. Yaro, A.E. Okon and F.E. Bison, 2014. Rural people's perception to climate variability/change in cross River State Nigeria. *Journal of Sustainable Development,* 7(2), 25 – 36.

International Business Machines Corporation, 2012. IBM SPSS Statistics for Windows, Version 21.0.2012, IBM Corporation, Armonk, NY.

Intergovernmental Panel on Climate Change (IPCC). 2007: Retrieved October 24, 2008, from http://www.ipcc.ch/ipccreports/ar4-syr.htm.

Ishaya, S. and I.B. Abaje, 2008.Indigenous people's perception on climate change and adaptation strategies in Jemma LGA of Kaduna state.*Journal of*

Geography and Regional Planning, 1(18), 138-143.

Intergovernmental Panel on Climate Change, 2007: Climate Change 2007: the physical science basis. contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Meehl, G.A.; Stocker, T. F.; Collins, W. D.; Friedlingstein, P.; Gaye, T.; Gregory, J. M.; Kitoh, A.; Knutti, R.; Murphy, J. M.; Noda, A.; Raper, S. C. B.; Watterson, I. G.; Weaver, A. J.; Zhao, Z. C. Cambridge University Press, pp. 747-846.

Jalloh, A., Nelson, G. C., Thomas, T. S., Zougmoré, R. B., & Roy-Macauley, H. 2013.*West African agriculture and climate change: A comprehensive analysis, Chapter 9*. Washington: IFPRI Research Monograph,International Food Policy Research Institute (IFPRI). https ://doi.org/10.2499/97808 96292 048.

Jan S and Anja B. 2007. Indigenous Peoples and Climate Change.University of Oxford and Missouri Botanical Garden.

Juana, J. S., Kahaka, Z., &Okurut, F. N. 2013. Farmers' perceptions and adaptations to climate change insub-Sahara Africa: A synthesis of empirical studies and implications for public policy in African agriculture. *Journal of Agricultural Science, 5*, 121 ---.

Karfakis, P., Knowles, M., Smulders, M., &Capaldo, J. 2011. Effects of global warming on vulnerabilityto food insecurity in rural Nicaragua.ESA-FAO WP series, pp. 11–18.

Keay, R.W.J. 1959.An outline of Nigerian vegetation.3rd edition.Federal Ministry of Information, Lagos (1960).An example of the northern Guinea zone vegetation in Nigeria. Inform. Bull, Dept. For. Res. Nigeria.

Leiserowitz, A.A.; Kates, R.W. and Parris, T.M. 2004. Sustainability values, attitudes, and Behaviors: A review of multi-national and global trends. Environment and Development Group, Centre for International Development (CID), Harvard University.CID Working Paper No 113, December 2004. 57pp.

Mandleni, B., &Anim, F. 2011.Perceptions of cattle and sheep farmers on climate change and adaptationin the Eastern Cape Province of South Africa. *Journal of Human Ecology*, 34, 107–112.

McCarthy, J. J. 2001. *Climate change 2001: Impacts, adaptation, and vulnerability: Contribution of workinggroup II to the third assessment report of the intergovernmental panel on climate change*. Cambridge: Cambridge University Press.

Mendelshon R, Dinar A, Williams L 2006. The distributional impact of impact of climate change on rich and poor countries.*Environment and Development Economics* 11, 159-178.

Millennium Ecosystem Assessment (2005).A Toolkit for Understanding and Action. Island Press Washington DC. Pp28*https://www.millenniumassessment.org/documents/document.356.aspx.pdf*

Milligan K. R. 1978. An ecological basis for the management of Kainji Lake National Park, Ph.D. Thesis University of Ibadan.

Nigeria National Park Service 2010. .Evolution of parks in Nigeria.www.nigeriaparkservice.org/okomu/default.aspx.retrieved June 2017.

Ogunjinmi A. A. and Braimoh C. O. 2018. Assessment of community awareness and participation in ecotourism in Old Oyo National Park, Nigeria Environ. Socio.-econ. Stud.**,** 6(3): 1-12**.** DOI: 10.2478/environ-2018-0017

Ogunjinmi, A.A., Onadeko, S.A. and Adewumi, A.A. 2012. An Empirical Study of the Effects of Personal Factors on Environmental Attitudes of Local Communities around Nigeria's Protected Areas. *The Journal of Transdisciplinary Environmental Studies,*11(1), 40-53.

Osunsina I.O.O. 2010. Anthropomorphic dimensions of Biodiversity Conservation in Nigeria. National Parks.Ph.D Thesis, University of Agriculture Abeokuta. Nigeria. 363pp

Oruonye, E.D., 2012a. Socio-economic impact assessment of flash flood in Jalingo metropolis, Taraba State, Nigeria.*International Journal of Environmental Sciences*, 1(3), 135 – 140.

Oruonye, E.D., 2012b. The challenges of urban flood disaster management in Nigeria: A case study of Jalingo metropolis, Taraba State Nigeria. *Recent Scientific Journal*, 3(1), 37 -42.

Oruonye, E.D. and A.A. Adebayo, 2013.An assessment of the effects of the 2012 flooding in Taraba State. Proceedings of the 5th annual conference of the Nigerian Association of Hydrological Sciences (NAHS), held at University of Nigeria Nsukka, October 21-24, 2013. Pp.13–20. https://www.researchgate.net/ppblication/282861831_An_Assessment_of_the_effects_of_the_2012_Floods_in_Taraba_State [accessed Apr 30 2019].

Raghuvanshi R., Ansari M.A. & Joshi S. 2016. Farmers' awareness about climate change and adaptation practices: A review. *Journal of Agriculture Science and Technology*. 2016;3(3), 41–51.

Saidu, A.B. 2006. Conservation of wildlife resources in relation to sustainable rural development in neighbouring communities of Kainji Lake National Park.M.Tech. Thesis, Federal University of Technology, Yola, Nigeria. 95 pp

Scholze M, Knorr W, Arnel NW, Prentice IC 2006. A climate-change risk analysis for world ecosystems. *Proceedings of the National Academy of Sciences*, 103 (35), 116-120.

Shukla, G., Kumar, A., Pala, N. A., &Chakravarty, S. 2016. Farmers' perception and awareness of climatechange: a case study from Kanchandzonga Biosphere Reserve, India. *Environment, Development and Sustainability*, 18, 1167–1176.

Stige, L.C., Ottersen, G., Brander, K., Chan, K.-S.andStenseth, N.C. 2006: Cod and climate: effect of the North Atlantic Oscillation on recruitment in the North Atlantic. *Marine EcologicalProgramme Series*, 325, 227–241.

Umar, A.T., 2011. Climate change in Nigeria: Evidence from meteorological parameters: in Climate change and sustainable development: proceedings of the 52nd Annual Conference of the Association of Nigerian Geographers, 14th-18th February, 2011. Iliya, M.A. Abdulrahim, M.A. Dankani, I.M. Opponkumi, A. Eds. pp. 501 -515

United Nations Development Program 2007. Human Development Report 2007/2008 Fighting climate change: Human solidarity in a divided world. Retrieved October 24, 2008 from http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf.