

## Extension Services Strategies in Adaptation to Climate Change in Oyo State, Nigeria.

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### Abstract

The paper examined the extension service strategies in adaptation to climate change in Oyo State Nigeria. A multistage sampling technique was used in selecting 96 respondents. Descriptive statistics was used in analyzed the data collected for the study. Results show that impacts of climate change experienced by the respondents are shortage of water for human and live stock, Shortage of pasture for grazing animals and Reduction in household income result to high rate of school dropout. While respondents adopted enterprise choice, conservation agricultural practices and early warning system as the adaptation strategies to climate change in the study area. The perceived roles of extension agents in capacity building on climate change adaptation strategies are: use of demonstration methods in teaching farmers on the strategies to adapt to climate change, use of farmer to farmer extension strategies, and dissemination of innovation. The study find that low level of funding, change in government policy, difficult challenge in mobility and lack of access to information are the constraints that hindered adoption of adaptation strategies to climate change in the study area. There should be stability in government in order to influence continuity of any planned programme for the sustainability of agriculture especially at this period that climate change is threaten settlement, live and agriculture.

**Key words:** Extension, Strategies, Adaptation, Climate change, Oyo State.

### 1 Introduction

Nigeria agriculture faces varying climate change impacts which mainly worsen production condition and adversely affects its economies (Ministry of Environment of the Federal Republic of Nigeria (MOEFRN, 2003 Garforth, 2005). It is obvious that climate change is reality that calls for immediate action for mitigation and also to assist the affected economy sector (Agriculture) to be able to adjust naturally and human application systems that may be new and results in changing environment. (Adaptation) Climate change is one of the most serious environment threats facing mankind worldwide. It affects agriculture in several ways, including its direct impact on food production. (Garforth, 2005). It can also be seen as change in climate which is attributed directly or indirectly to human activities that alter the composition of the global atmosphere and which are in addition to natural variability observed over comparable periods of time (IPCC, 2007).

Climate change has become a global issue in recent times manifesting in variations of different climate parameters including cloud cover, precipitation, temperature ranges, sea levels and vapour pressure (MOEFRN, 2003 Folke ,et al, 2005). The variations in climate parameters affect different sectors of the economy such as agriculture, health, water resources, energy etc. (Nicholas and Nnaji, 2011). Agriculture is therefore the main culprit of climate change, producing significant effects through the production and release of Green house Gases (GHGs) (Nicholas and Nnaji, 2011). Clearing of forests for agricultural production replaces forests with crops thereby reducing the rate at which carbon (iv) oxide gas trapping and absorbing Occurs (UNEP, 2007). There is no doubt therefore that the earth is getting warmer and human beings are mainly to be blamed (spore, 2008). In Sub-Saharan Africa, there is growing interests on the likely impacts of climate change on agriculture, economic growth and sustainable development. Incidence of climate change include changes in soil moisture, soil quality, crop resilience, timing of growing seasons, yield of crops, animals production, atmospheric temperatures, weed insurgence, flooding, unprecedented droughts, sea level rises, and many more (Spore, 2008, Nicholas and Nnaji 2011).

IPCC, (2007) Nicholas and Nnaji (2011) projected an-increases in rainfall in the humid regions of Southern Nigeria, which are accompanied by increases in cloudiness and rainfall intensity particularly during severe storms. Similarly, the savannah areas of northern Nigeria were projected to experience less rainfall, which coupled with temperature increases, reduces soil moisture availability. Changes in climate are severely effecting agricultural production in many African Countries (UNEP, 2007, Nicholas and Nnaji 2011). Increased temperature and accompanying decrease in water availability reduce the length of growing seasons and yield potential of crops and hence affects the areas suitable for agriculture (Thornton et al, 2006, Nicholas and Nnaji 2011). Also an increase in temperature is conducive for a proliferation of pests and diseases, which detrimental to crop production. (MOEFRN, 2003. Cury and Shannon, 2004).

Extension officers are well aware of the climate change problem; they perceive climate change as change of

weather patterns over a long period of time and the disruption of the annual weather pattern. And also perceived that the natural environment is changing as bushes had been depleted when farmer clear bushes for farming, forest cleared for settlements, charcoal production, building materials and the rate of depletion is not equal to rate of replacement (Cotching, 2009). Climate change thus worsening the working conditions for extension services in several ways due to frequent crop failure, that farmers become more impoverished and frequent droughts also discourage farmers to invest more into farming (Kiteme, 2009). In order to sustain the agricultural sector that plays pivotal roles in human existence in terms of the provision of food, fibre, fuel and income, strategies for change need to be urgently initiated to cope with the changing climate. Agricultural extension has key roles to play in initiating this change. This is because adaptations to climate change impacts require changes in knowledge, attitudes, resilience capacities, and skills of the people and agricultural extension (Osman-Elasha, 2007). However, extension services uses various measures to advice farmers on adapting to climate change by packaging climate adaptation information into advice on the order of production challenged that are of immediate importance to the farmers' (Osman – Elasha, 2007, Kiteme, 2009).

Leeuwis, (2006) Nicholas and Nnaji (2011) reported that agricultural extension is a series of embedded communicative interventions that are meant, among other things, to develop or induce innovations which suppose to resolve problematic situations experienced by the farmers'. It has been observed that agricultural extension are involved in public information and education programmes that could assist farmers' in mitigating the effects of climate change (MOEFRN, 2003, Nicholas and Nnaji 2011).). It is therefore pertinent to ascertain impacts of climate change on agriculture in the study area, identifying adaptation strategies introduced by extension agents, ascertain the role of extension agents in adoption of strategies introduced in cushioning the impacts of climate change and examine the constraints that hindered effective adoption of adaptation strategies to climate change in the study area. It was hypothesized that there was no significant relationship between impact of climate change and adaptation strategies introduced by the extension agents.

## 2 Materials and Methods

The study was carried out in Oyo State, Nigeria. The study area lies within latitude  $7^{\circ} 3' N$  and  $9^{\circ} 12' N$  and longitude  $2^{\circ} 47' E$  and  $4^{\circ} 23' E$ . The area share boundaries' with Osun State in the west, Ogun State in the South and Kwara State in the North. The study area has thirty three Local Government Areas (LGAs) and made up of four agricultural zones namely: Ibadan/Ibarapa, Oyo, Ogbomoso and Shaki. Thus two agricultural zones Ibadan/Ibarapa and Shaki were randomly selected for the study. From each agricultural zone four extension blocks were randomly chosen (a Local Government Area is a block) for Ibadan /Ibarapa (Ibadan east, Iddo, Oluyole and Ona Ara, while Atisbo, Olorunsogo, OOrelope and Shaki west were selected from Shaki agricultural zone. Three extension cells were randomly selected from each extension block making a total of 24 extension cells for the study, from each extension cell two communities were randomly selected making 48 communities selected for the study. Two full term farmers' with many years of farming experience (more than 20 years) were randomly chosen so as to get most useful information from them, on their experience of impact of climate change on farming practices production and effectiveness of adaptation strategies introduced by extension agents. This make the total number of respondents for this study to be 96. The selected farmers' were interviewed with a set of well structured interview schedule in their various communities. The impacts of climate change on agriculture was measured by using a four point likert type scale name very great impact, great impact, little impact and no impact with nominal values of 4, 3, 2 and 1 respectively, the ranking of the impact was done on the basis of their mean value. To examine the effectiveness of adaptation strategies introduced by extension agents any response option with score  $\geq 50\%$  was regarded as effective, while items with scores  $< 50\%$  was regarded as not effective. The roles of agricultural extension agents was measured on a five point likert type scale of strongly agree, agree undecided, disagree and strongly disagree with nominal value of 5, 4, 3, 2 and 1 respectively. The ranking of the roles was done on the basis of their mean value. The data thus collected were analyzed by using frequency counts, percentages, mean scores multiple regression and chi -square.

## 3.0 Results and Discussion

### 3.1 Impacts of climate changes

Table 1 shows that impacts of climate change experienced by farmers in the study area were prolonged droughts with mean score of (3.0), change of rainy seasons not following pattern as before with mean score of (3.26) more variability of short rains as compared to the long rains with mean score of (3.24), high temperature level with mean score of (2.77) Increased soil acidity with mean score of (1.67) Increased rainfall failures with mean score of (2.86) reduced rainfall amounts with mean score of (3.33) delayed in onset of rains with mean score of (3.44) decrease foliage grassed and some species have disappeared with mean score of (3.43), changing in natural environment with mean score of (2.86) depleted of bushes and forests, with mean score of (2.10) decreased in natural water sources with water level going down with mean score of (3.60). This implies that farmers'

experienced impact of climate change, These results agree with finding of Ozor and Nnaji (2011) who reported that farmers' experienced in impacts of climate change was significant in agricultural production.

### **3.2 Adaptation strategies to climate change**

Table 2 shows the most significant and effective strategies adopted by the respondents in coping with climate change impacts in the study area. These include enterprise choice (100%) Conservation agricultural practices (95.8%) early warning systems (92.7%) use of crops residues (91.7%) passing new farming techniques to the farmers and making the farmers willing to adopt (90.6%) water harvesting holes (88.5%) initiation of activities that counteract climate change impact (afforestation). (87.6%) promoting new crop varieties that droughts resistance (86.5%). This implies that most of the adaptation strategies adopted by the respondents were effective for cushioning the impacts of climate change in the study area. This results conform with (Maddison, 2006 Ozor and Nnaji, 2011) who reported that one of the many adaptations strategies to climate change involves the use of resistant varieties such as early maturing varieties or drought resistant ones. Also the use of crop residues as organic manure was adopted by farmers not only to increase the fertility of the soil in the most sustainable way but to increase the moisture content of the soil.

### **3.3 Perceived roles of extension agents in building capacity on climate change adaptation strategies**

Results in table 3 show that farmers' perceived roles of the extension agents were use of demonstration methods in teaching farmers' with mean value of (4.25), use of farmer to farmer extension strategies to promote awareness and adoption of best practices in climate change impacts management with mean value of (4.18), dissemination of innovations on best practices and building resilience capacities of vulnerable farmers in climate impacts management with mean value of (4.16), providing feed back to government and interested agencies with situation reports on various causes of climate change. This implies that extension agents roles were identified, as effective and significant in mitigating the impacts of climate change. The result conforms with Biermann, (2007) Ozor (2009) Ozor and Nnaji (2011) who stated that the demands for extension service brace up to the development by re-training its personnel to acquire the capability (knowledge and skills) in managing the risks of climate change especially in rural areas where greater part of agricultural activities take place.

### **3.4 Constraints to adoption of adaptation strategies on climate change**

Table 4 shows that 97.9% of the respondents indicated low level of funding as the constraints to the adoption of adaptation strategies introduce by extension agents. They further emphasized that most of the strategies cannot be practiced if one does not financially buoyant and government is not assisting them in any way and even they plead to extension officer before they visit them because they were not mobile. This findings agree with kite me, (2009) who stated that as a result of shortage of funding extension officers demand lunch and fuel from the farmers. 92.7% of the respondents indicated change in government policies as the constraints to adoption of strategies to climate change. This implies that as government is changing, policy on climate change adaptation strategies is changing, because new government will not like to continue with what past government started, This conform with kite me, (2009) who reported that poor transport facilities, lack of cars, poor road infrastructure, large areas to cover, inadequate staff, lack of enough facilitation, congested schedule, low extension staff farmer ratio, staff are over worked are the constraints that hindered farmers and extension personnel from adoption and adequate dissemination of information on strategies to ameliorate impacts of climate change.

### **3.5 Conclusion and Recommendation**

The major findings of this study are that respondents indicated impact of climate change they experienced in their farming activities and further revealed those strategies adopted in coping with impact of climate change as a result of the discharged roles of extension services on adaptation strategies to climate change impacts, while there are some constraints that hindered the respondents from adoption of climate change adaptation strategies. There is need for more public enlighten on climate change adaptation strategies by ministry of environment to supplement the roles of extension personnel on climate change adaptation strategies. There should be control and limitation to human activities that alter the composition of the global atmosphere

**Table3.1: Distribution of respondents by impacts of climate change.**

<b>Impacts of climate change</b>	<b>WMS</b>	<b>STD</b>
Prolonged droughts	3.00	1.27
Change of rainy seasons not following pattern as before	3.26	1.35
More Variability of short rains as compared to the long rains	3.24	1.31
High temperature levels	2.77	1.27
Increased acidity	1.67	1.42
Increased rainfall failures	2.86	1.21
Reduced rainfall amounts	3.33	1.09
Delayed onset of rains	3.44	1.12
Decrease foliage: grasses have dried up and some special have disappeared	3.43	1.10
Changing in natural environment	2.86	1.21
Depleted of bushes and forests	2.10	1.29
Increase and decreased in natural water sources with water levels going down	3.60	1.19
Many rivers has become seasonal	3.00	1.27
Scarcity of wild fruit due to deforestation and clearing of bushes	3.47	1.38
Crop failures	2.14	1.17
Decrease in agricultural production	3.39	1.42
Increase in food shortage	3.65	1.37
Prolonging famines	1.98	1.49
Shortage of pasture for grazing animals	3.76	1.39
Shortage of water for human and livestock	3.94	1.20
Men migrate to urban in search for jobs	3.60	1.11
Reduction in household income result to high rate of school drop outs	3.74	1.29

Data analysis 2012

**Table3.2: Distribution of respondents by adaptation strategies adapted to climate change.**

<b>Adaptation strategies*</b>	<b>F</b>	<b>%</b>
Enterprise choice	96	100.0
Initiation of activities that counteract climate change impact (afforestation)	84	87.5
Setting up of conservation efforts	76	79.2
Passing new farming techniques to the farmers and making the farmer willing to adopt	87	90.6
Market intelligence	69	71.9
Post harvest management	78	81.3
New crop varieties	83	86.5
Early warning systems	89	92.7
Conservation agricultural practices	92	95.8
Forage conservation	67	69.8
Use of crop residues	88	91.7
Urban farming	58	60.4
Range improvement	62	64.6
Zero grazing	56	58.3
Livestock breeds	72	75.0
Breeding	62	64.6
Improve sanitation	53	55.2
Water harvest management	79	82.3
Food preservation	64	66.7
Dry land cultivation	52	54.2
Soil and water management	77	80.2
Water harvesting holes	85	88.5

Field survey 2012

\*Multiple responses

**Table3.3: Mean distribution of respondents by perceived roles of extension agents in building capacity on climate change adaptation strategies.**

ROLES OF EXTENSION AGENTS	WMS
Use of demonstration methods in teaching farmers the strategies used to adapt to impacts of climate change	4.25
Setting up of emergency management unit by extension agencies that will attend to victims of impacts of climate change	2.95
Re-training of extension agents to acquire the new knowledge and skills (capacity) in climate risk management	4.07
Dissemination of innovations on best practices and building resilience capacities of vulnerable farmers in climate change impacts management	4.16
Use of farmer to farmer extension strategies to promote awareness and adoption of best practices in climate change impacts management	4.18
Organizing seminars, work shops and field days to sensitize farmers and the public on climate change impacts management	3.77
Use of information communication technologies (ICTs) such as the internet, radio, television, leaflet, sms, media vans, posters, flip charts, etc to create awareness on the climate change issues	3.13
Use of farmer field schools (FFS) to promote faster learning by farmer on the strategies used to mitigate and adapt to the impacts of climate change	2.98
Providing feedback to Government and interested agencies on various causes of climate change, its impacts and the local knowledge and practices of the rural people.	4.05
Use of law enforcement against persons that indulge in practices that contribute to climate change such as bush burning.	3.23

Data analysis 2012WMS-WeightedMeanScore **Table 3.4: Distribution of respondents by constraints to adoption of adaptation strategies to climate change.**

Constraints*	F	%
Low level of funding	94	97.9
Change in Government policy	89	92.7
Difficult challenge in mobility and access to information	87	90.6
Gaps in legislation	86	89.6
Inadequate office space and equipments	84	87.5
Inadequate and aging of extension staff	79	82.3
Gaps in resources and structures	78	81.3
Inadequate transport facilities	76	79.2
Educational qualification of the extension agents	59	61.5

Source filed survey 201 2

\*Multiple responses

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