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Full Length Research Paper

Climate Change and Coping Strategies among Peasant Farmers in Akwa Ibom State, Nigeria

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Abstract

The study investigated peasant farmer's adaptation strategies to climate change in Akwa Ibom State. A multi-stage random sampling was used to select 120 respondents for the study. Interview schedule was used to collect data from the 120 farmers randomly selected. The study revealed that 40% of the respondents were within the age range of 31 to 40 years. Thirty seven percent (37%) of the respondents had formal education while 47% of the respondents had I to 3 persons in their respective households. Years of experience in farming of most respondents were between 1 and 10 years. The result further revealed that about 79% of the respondents had 0.6 – 1.0 hectare of form while 68% of the respondents had contact with extension agents/officers once a month. The result showed that all the explanatory variables included in the model were significant determinants of adaptation measures to climatic condition. It was therefore recommended that the state government should encourage increased frequency of extension contact to significantly increased farmers' awareness to changing climatic conditions as well as adaptation strategies.

Keywords: *Climate Change, Adaptation Strategy, Akwa Ibom State.*

Introduction

Evidence from records of measuring instruments, historical texts, prehistoric artefacts and geological surveys indicate that one important attribute of climate, (be it local or global) is that it changes. Climate change refers to the variation in the global or regional climates over time. It describes changes in the variability or average state of the atmosphere over time scales ranging from a decade to millions of years (Ayoade, 2003). Climate is therefore dynamic and in constant turmoil and as such is expected that its characteristics can vary over a great range of time and space scales. Thus, the physical environment plays a crucial role in agricultural productions about what crop to grow, in what mixture, the location, timing of operations, the tillage and storage techniques suitable under varying climatic conditions. Climatic conditions influence the growth, development and functioning of crops as well as the production capacity of soil, livestock farmers and fish farmers among others.

Agriculture remains the primary determinants of Nigerian economic development as its generates primary food and raw materials to support other composite sectors of the nation's economy. Reports have shown that agricultural production and productivity remain below thresholds in the country leading to food and fibre insufficiency and nutrition related negativities (Nwachukwu and Nnawdozie, 2011). The performance of this sector is however dependent primarily on the vagaries of weather. Therefore climate change will have greater negative impacts on peasant farmers most as they have the lowest capacity to adapt to changes in climatic conditions. Adaptation is identified as one of the policy options to reduce the negativities from change in climatic conditions as well as other changing socio-economic conditions such as volatile short-term changes in local and international markets (Kandlinkar and Risbey, 2000). Common adaptation methods in agriculture include; use of new crop varieties and livestock species that are more suited to drier condition, irrigation, crop diversification, mixed crop livestock farming systems and changing planting dates (Nhemachema and Hassan, 2007). Due to the changing climatic conditions, the rural area has witnessed several severe wind and rainstorms, increased rainfall amount and intensity, no clear "August break" as before, reduced length and less severe harmattan period and increasing warm and occasionally hot condition. This study therefore aims at examining the socio-economic characteristics of farmers, identifying farmers' adaptation measures to climate change, and estimating the determinants of adaptation strategies to changing climatic conditions in Akwa Ibom State.

Methodology

This study was conducted in Akwa Ibom State, Nigeria. A multi-stage sampling procedure was used. Three out of the six agricultural extension zones in Akwa Ibom State were purposively selected within a zone two extension blocks were randomly selected from each of the three agricultural zones. The next stage was using simple random sampling techniques to select four cells each from the six extension blocks. Thus five farmers were randomly selected from each of the selected extension Cells, making a total number of one hundred and twenty respondents. The data for the study were collected from both primary and secondary sources. Frequencies and percentages were used to analyse the socio-economic characteristics for farmers (respondents) and identifying farmers' adaptation method to climate change. The determinants of adaptation strategies to changing climatic conditions were estimated using the multivariate regression techniques. The model for determinant of adaptation strategy was specified as follows:

$Y = f(X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + U$

Y = Adaptation strategy (Farmer adapts strategy = 1, other wise = 0)

X_1 = Age (years)

X_2 = Household size (number of persons)

X_3 = Farming experience (in years)

X_4 = Farm size (in hectares)

X_5 = Extension contact (the number of times visited in a month)

X_6 = Income per month (in Naira)

X_7 = Mixed crop/Livestock farms yes = 1, otherwise = 0)

U = Error term

Results and Discussion

Table 1 shows that majority of the respondents fall within 31-40 years age bracket (40.85%) while 21-30 years age bracket the least (9.16%). 59.17% of the respondents were female, while male were 40.83%. 37.50% had attained secondary educational status. The highest household size is 1-3 persons (47.50$) and the smallest is 10 persons and above (10.00%). 60.33% had farming experience between 1-10 year(s) majority of the respondents had 0.6 – 1.0 hectare of farm (79.17%) and majority of them (68.33%) hand only one contact with extension officer/agent per month and 52.12% earned between N10,000 – N50,000 monthly.

Table 2 shows that crop diversifications is the most commonly used strategy as 29.17% of the respondents confirmed this while 2.50% of the respondents practised the use of irrigation strategy in drier period. Greater adoption of crop diversification as an adaptation strategy was associated with their income level, the lower expense and ease of access of materials by the respondents, while the use of irrigation was the least and was attributed to the need for more capital and low potentials. Also, 40.83% of the respondents indicated no use of adaptation strategy, due to lack of awareness and lack or information on climate change. Appropriate soil conservation technique, varying planting and harvesting dates are used to ensure that critical sensitive growth stage does not coincide with very harsh climatic conditions within a planting season. These strategies can be used to modify length of the growing season, and these adaptation strategies should not however be independent strategies but should be used in a complementary way. eg., the use of irrigation should be accompanied by other good crop management practices.

Table 3 shows that all the explanatory variables included in the model were significant determinants of adaptation strategy. It implies that farmer's socio-economic characteristics significantly affected adaptation to climate change. However, the interpretation of the model result indicates that: Income level of farmers has a positive effect on crop diversification, soil conservation technique and use of irrigation as adaptation measures to climate change. Higher income farmers have more access to information, conservative and long-term planning than the low-income farmers.

Also, mixed crop and livestock farmers are associated with positive and significant adaptation to changes in climatic conditions. This implies that mixed farming systems are not able to cope with changes in climatic conditions through undertaking various changes in management practices which reduces productivity. These findings agree with that of Onumadu (2011) who attributed it to diversification to new crop species and varieties that could mitigate the effect of climate change. He also linked the decrease in productivity of livestock to reduction in stocking rate or livestock density. Also, Nkeme and Ndaeyo (2011) stressed the need for adequate information dissemination so that farmers can be better equipped to adjust to the adverse effects of climate change. Extension contact increases adaptation to climate change which implies that extension services are important for reducing the negative effect of climate change on farmers by disseminating climatic information as well as agricultural management practices. Extension

services have the potential to increase farmers' awareness to climatic changes. This conforms to the priori expectation. Farm size negative and indicates that, the more the farm size, the lower the adaptation of the adaptation strategy. This has not conformed to a priori expectation since farmers with more farm size are expected to adopt more of the adaptation strategy to increase their productivity. Years of farming experience increases the adaptation of all adaptation measures well experience farmers have access to information concerning climate change forecasting, adaptation options and crop and livestock management practices. Progressive farmers in the rural areas are the well experienced farmers who encourage other farmers to adapt to changing climatic conditions. This conforms to the priori expectation. Household size of farms has a positive coefficient to all adaptation options. Household size of the farmers significantly increases the uptake of diversification of crops, soil conservation, and variation in planting and harvesting dates which demands additional labour from the farmers. This agrees with the priori expectation. Age of farmers affected adaptation to climate change. Age of the farmers has a positive coefficient to changing climatic condition planting dates, irrigation and soil conservation techniques show the positive relationship between farmers age and adaptation options. This agrees with the priori expectation but shows negative effect to crop diversification. It reveals that age decreases the probability of taking up crop diversification as adaptation measures to climate change.

Conclusion

This study has shown that adaptation is important for farmers to achieve their farming objectives such as food and livelihood security. The result revealed that majority of the respondents (farmers) adjusted in their farming activities by adapting in various ways to climate change. The common adaptation measures used by farmers in Akwa Ibom State are crop diversification, soil conservation and mixed crop/livestock practices, while few farmers use irrigation system due to rainfed agriculture in the area. However, more farmers need to be exposed to extension services for awareness creation and climate change innovation adoption to mitigate its effect on agricultural productivity.

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Table 1: Socio-economic characteristics of the respondents

Variable	Categories	Frequency	Percentage
Age (inyears)	21 – 30	11	9.16
	31 – 40	49	40.85
	41 – 50	38	31.67
	51 - 60	22	18.33
Gender	Male	49	40.83
	Female	71	59.17
Educational Status	No formal education	39	32.50
	Primary education	21	17.50
	Secondary education	45	37.50
	Tertiary education	15	18.33
Household Size	1 – 3 persons	57	47.50
	4 – 6 persons	21	17.50
	7 – 9 persons	30	25.00
	10 persons and above	12	10.00
Years of experience in farming	1 – 10 year(s)	73	60.33
	11- 20	36	30.00
	21 – 30	14	11.67
	31 – 40	7	5.83
Farm Size (ha)	0.1 – 0.5	17	14.17
	0.6-1	95	79.17
	2 and above	8	6.87
Frequency of extension contact (monthly)	No visit	13	10.33
	Once	82	68.33
	Twice	17	14.17
	Thrice	8	6.87
Monthly income (in Naira)	10,000 – 50,000	65	52.12
	51,000 – 90,000	38	31.67
	91,000 – 130,000	10	8.33
	above 130, 000	2	5.83

Source: Field survey, 2010.

Table 2: Adaptation Strategy among Akwa Ibom State farmers

Adaptation strategies	Frequency	Percentage
Crop diversification	35	29.17
Mixed crop/Livestock farming	15	12.50
Changing planting & harvesting dates	8	6.67
Irrigation	3	2.50
Soil conservation	28	23.33
No adaptation	49	40.83

Source: Field survey, 2010.

Table 3: Result of multivariate analysis of determinants of adaptation strategies

Variables	**Crop Diversification**	**Changing Planting harvesting dates**	**Irrigation**	**Soil Conservation**	**Tillage**
x_1	-0.009	0.030**	0.002	0.001	0.005
x_2	0.243*	0.560***	0.321***	9.342	0.157*
x_3	0.018**	0.036	0.011*	0.002	0.015***
x_4	-0.317***	0.026*	-0.039*	-0.022*	-0.004***
x_5	0.302***	0.109**	0.067	-0.135	0.013**
x_6	0.000	0.006*	0.000*	0.001	0.004
x_7	0.75	0.012*	0.071	0.008	0.164*
Constant	-4.4744	2.406	1.154	-2.308	1.582
Base category			**No Adaptation**		
Log Likelihood Ratio			1635.4256		
Probability level (prob>$x^{2)}$			0.000		

*** = significant at 1% = ;
** = significant 50%
Source: computer printout of spss result.