



# **Indigenous Agricultural Adaptation to Climate Change: Study of Southeast Nigeria**

**African Technology Policy Studies Network**  
**TECHNOPOLICY BRIEF | No. 25**

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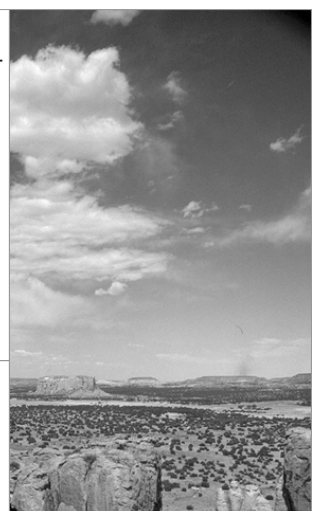
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Published by the African Technology Policy Studies Network  
P O Box 10081, 00100 GPO Nairobi Kenya

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ISBN: 978-9966-030-08-5



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## Acknowledgement

This policy brief was produced as part of the implementation of the African Technology Policy Studies Network (ATPS) Phase VI Strategic Plan, 2008 – 2012 funded by ATPS Donors including the Ministerie van Buitenlandse Zaken (DGIS) the Netherlands, Rockefeller Foundation, amongst others. The authors hereby thank the ATPS for the financial and technical support during the implementation of the program. The Authors particularly thank the ATPS Climate Sense Program Director, Dr. Kevin Urama (ATPS); and the Program Coordinators including Prof. Francis Mutua (ATPS Kenya); Dr. George Essegbey (ATPS Ghana), Prof. Eric Eboh (ATPS Nigeria), Dr. Nicholas Ozor (ATPS), and Ms. Wairimu Mwangi (ATPS) for their technical support during the research process.

## Introduction

Climatic change, which is attributable to natural climate cycle and human activities, has adversely affected agricultural productivity in Africa (Ziervogel et al. 2006). As the planet warms, rainfall patterns shift, and extreme events such as droughts, floods, and forest fires become more frequent (Zoellick 2009), which results in poor and unpredictable yields, thereby making farmers more vulnerable, particularly in Africa (UNFCCC, 2007). Farmers (who constitute the bulk of the poor in Africa), face prospects of tragic crop failures, reduced agricultural productivity, increased hunger, malnutrition and diseases (Zoellick 2009). It is projected that crop yield in Africa may fall by 10-20% by 2050 or even up to 50% due to climate change (Jones and Thornton, 2003), particularly because African agriculture is predominantly rain-fed and hence fundamentally dependent on the vagaries of weather. As the people of Africa strive to overcome poverty and advance economic growth, this phenomenon threatens to deepen vulnerabilities, erode hard-won gains and seriously undermine prospects for development (WBGU 2004, Zoellick 2009).. There is therefore the need for concerted efforts toward tackling this menace.

Much of climatic change agricultural research has tended to concentrate on assessing the sensitivity of various attributes of crop systems (e.g. crop/livestock yields, pest, diseases, weeds etc) - the bio-physical aspects of food production, with little or no regard to the socioeconomic aspects. These partial assessments, most often consider climatic change effects in isolation, providing little insight into the level of awareness of the farmers on the issue, what and how they are doing to cope with climate change, etc. To better address the food security concerns that are central to economic and sustainable development agenda, it is desirable to also address these aspects of climate change and agriculture. Wisner et al (2004) reports that the vulnerability of agriculture is not determined by the nature and magnitude of environmental stress like climate change per se, but by the combination of the societal capacity to cope with and/or recover from environmental change. While the coping capacity and degree of exposure is related to environmental changes, they are both also related to changes in societal aspects such as land use and cultural practices. This could be at the root of the much talked about poverty alleviation and food security for the vulnerable groups in Africa, who are most at risk when agriculture is stressed. In addition, there is need for increased awareness, teaching, learning and research by

Universities and Research Institutes so as to develop a multi-pronged capacity to tackle this imminent danger which is slowly eroding the gains of the fight against starvation, hunger and poverty among farming communities in Africa. This project was aimed at promoting the understanding of the most cost-effective and sustainable indigenous climate change adaptation practices in southeast Nigeria. This was achieved by providing answers to the following policy questions:

To what extent are local farmers aware of climate change? What are the activities of farmers that could contribute to climate change in the area? What are the patterns of climate change impact on agriculture? What are the indigenous climate change adaptation practices and how cost-effective are they? What factors drive these adaptation practices?

In order to address the above questions, two states namely Enugu and Imo, were randomly selected from the southeast geo-political zone of Nigeria. From each of them, two agricultural zones were randomly selected - Owerri and Okigwe in Imo state and Enugu and Nsukka in Enugu state. In each agricultural zone and with the assistance of the extension services Department, farming communities were compiled, from which two communities were randomly selected making a total of eight communities for the study. In each selected community, a list of farm households was compiled, also with the assistance of extension agents, from which fifty farmers were randomly selected, bringing the total sampled respondents to four hundred.

The data collected included status of awareness of climate change and its link with agriculture, land use practices that could exacerbate climate change, effects of climate change, coping strategies and estimated costs and returns, etc.

## Key findings

Almost all the farmers were aware of climate change. The sources of this information were, in order of importance, friends, Extension workers, radio/television, researchers and then farmers' cooperatives. Majority of the farmers were also aware that climate change will affect agriculture, but do not agree that farming contributes to climate change.



The most often practiced farm related activities that could contribute to climate change in the area were, in order of intensity, burning of wood fuel, the use of fertilizers and bush burning.

Majority of the respondents indicate that in the past ten years, climate change variables associated with uncertainties in the onset of farming season (such as unusual early rains that are not sustained, erratic rainfall, delay in the onset of rain, long period of dry season, etc.), except heavy/long period of rainfall and no/reduced hamattan, have all been increasing. This was also the trend (increasing) for extreme weather events (such as thunderstorms, heavy winds, floods, drought, heat waves etc.), pests, diseases, weeds and signals of land degradation (declining soil fertility and drying up of streams/rivers). The respondents also indicate that climate change was responsible for all the changes in these variables. Although there was no significant difference between Enugu and Imo States regarding the extent to which climate change was contributing to the changes in some of these variables, its (climate change) contribution to their (the variables ) changes was however generally significantly higher for Imo than for Enugu.

In order of importance, the biggest effects of climate change on agriculture were reduced income, reduced yield, streams/rivers drying up, reduction in storage quality of crops, loss of pastureland/vegetation, changes in the population of fish, destruction of wildlife ecosystem and reduction in farm size. In line with the preceding paragraph, the effects were significantly higher in Imo than Enugu for most of these variables, except reduction in farm yield and income, which were significantly higher in Enugu than Imo.

Some of the indigenous adaptation practices used by the farmers, which had relatively high Profitability Indices (PI), were, in order of importance, multiple/intercropping, agro-forestry, afforestation, mulching, expansion of cultivated land area, the use of herbicides and pesticides, purchase/harvest of water for irrigation and use of resistant varieties.

The most important household level factors motivating farmers to invest in climate change adaptation practices were experience, which was indexed by age, number of years of formal education of the farmer and his level of awareness of climate change issues.

At the societal level, the major factors constraining them from adapting to climate change were poverty; farmland scarcity and lack of more efficient inputs, lack of information and requisite skills, land tenure and labour constraints.

## Conclusion and policy options

Virtually all the respondents were, not only aware of climate change, but also aware that some of its variables like extreme weather events and uncertainties in the onset of farming season have been on the increase. In addition, they were also aware of the effect of climate change on agriculture, but were not aware that some agricultural practices could exacerbate climate change. The effect of climate change on most of the considered agriculture related weather variables were generally more pronounced in Imo than Enugu State. However, the overall impact (farm yield and income) was significantly higher in Enugu than in Imo state, essentially because of Enugu's inherently drier weather; being closer to the North. The biggest effect of climate change in the region was reduced farm yield and income, drying up of streams/rivers, reduction in storage quality of crops, loss of pastureland/vegetation and destruction of wildlife ecosystem.. Some of the coping strategies adopted by the farmers with a relatively high PI include multiple/intercropping, agro-forestry/aforestation, mulching, purchase/harvest of water for irrigation and use of resistant varieties. The major factors identified to be driving farmers' investment in adaptation practices were age and level of education of the farmer as well as his/her level of awareness of climate change issues. At the societal level, the major factors constraining them from adapting to climate change were poverty; farmland scarcity and lack of more efficient inputs, information and training constraints, land tenure and labour constraints.

The foregoing suggests that multiple/intercropping, agro-forestry/aforestation, mulching, irrigation and use of resistant varieties are some of the adaptation practices that should be encouraged among farmers, perhaps through extension services. There is also the need for farmers' education, vigorous awareness creation, poverty alleviation and the provision of more efficient inputs for them, as these could be potent tools for climate change adaptation in the area.





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## Science, Technology and Innovation for African Development

ISBN: 978-9966-030-08-5