

## **The Role of the Agricultural Economist in Agricultural Adaptation to Climate Change in the Oil Palm Industry in the Southern Nigeria**

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### **Abstract**

When human activities which cause climate change raise threats to the environment, the Agricultural Economist who is also a policy maker should take careful measures even if some cause and effect relationships are not established. The vulnerability of Nigerian Agricultural sector to climate change is of particular interest to policy makers in the economy accounting for higher percentage of the labour force. There are many adaptation options which can be adopted by farmers at low cost but proper estimates of adaptation cost and benefits are currently deficient due to the involvement of wrong climate change

actors. As is the case with making an economic decision, the astute response by an Agricultural Economist will depend on equating and or comparing benefits and cost. When the expected benefits of adaptation are positive, the rational decision maker (the Oil Palm farmer) will take adaptive actions. Policy options in particular must become available. Climate change will almost surely make life even harder for the world's poorest and most vulnerable Oil Palm farmer. An Agricultural Economist must play his role in reducing the society's vulnerability to losses from climate change and avoid restricting farmers' capacity to adapt by limiting their options. The devastating effects of climate change and the need for an integrated response requires resilient and adaptive institutions and exemplary actors like the Agricultural Economist to lead the process towards creating an enabling environment for adaptation to climate change. This paper described the potential role the Agricultural Economist can play in climate change adaptation, in the Oil Palm industry and aims to address the question: what policy and institutional changes are needed to encourage agricultural adaptation strategies/practices to develop the industry and the nation as a whole. The paper concluded that advances in understanding of climate change adaptation can come from collection of better data, development of new methods and models, observation of changes in climate and its effects, by an Agricultural Economist in order to accommodate new dimensions brought about by climate change.

**Keywords:** Agricultural economist, adaptation, climate change, oil palm and policies.

## INTRODUCTION

An agricultural economist focuses on understanding the economic activity within agricultural markets. They research on statistics and data pertaining to the agricultural industry and project-attainable patterns and trends within the economy. Many hold a graduate degree in economics. Agricultural economists examine information and

statistics to identify trends and make predictions for the agricultural market. These professionals could work in a variety of agricultural sectors and often perform their own research. Education in this field is variable, but can include a formal education, typically an academic degree (Kuehne, Llewellyn, Pannell, Wilkinson, Dolling, Ouzman, & Ewing, 2017).

The Agricultural Economist is one who is trained and has a degree in agricultural economics. He is the link between biological sciences and the real world market scenario. He brings into practical use, the various researches that are being conducted in the research institutes and universities. The cost of the research itself can in most cases be reduced if the agricultural economist is taken into confidence when experiments are being designed (Cramer, Paudel & Schmitz, 2018; Adegeye & Dittoh, 1985). Central to the agricultural sector is agricultural production.

From this, core Agricultural Economics extends out in several directions and includes:

- \*Government policy as it directly or indirectly affects agricultural production; Example, policies that ensure that new forms of adaptation to climate change do not heighten inequality but contribute to reduction in poverty.
- \*The ownership and allocation of resources (land, labour, capital management and technology used in agricultural production.
- \*The processing, transportation and marketing of agricultural inputs and outputs.
- \*The relationship between the agricultural sector and the other sectors in the economy as well as the impact of the agricultural sector on the overall economy.
- \*The institutions (for example, cooperatives, financial organizations, marketing boards) concerned with agriculture.
- \* The general institutional social and political frame work within which agricultural activity takes place (Nwagbo, 2006)

Climate change has obvious and direct effect on agricultural production. Greenhouse gas (GHG) implications are also obvious and huge. The intergovernmental panel on climate change (IPCC) has reported that agriculture is accountable for over a quarter of total global greenhouse gas emissions. Given that agriculture's share in global gross domestic product (GDP) is about 4%, these figures suggest that agriculture is GHG intensive. Climate change have the capacity to reverse major achievements in human development across a range of sectors if not addressed properly and managed well (Ojemade, Osuafor, Bankole, Akagbosu & Osifo, 2018). Providing that climate change and policy do not interrupt long term income growth or do not result in a long term decline in relative food prices so much that the trail towards improved diets is reversed, aggregate food demand will continue to grow in conjunction with population and income growth (Lybbert & Summer, 2010).

The oil palm (*Elaeis guineensis*) is indigenous to West Africa. The main oil palm growing area in Nigeria is the South especially the South Eastern and mid Western regions ecologically conforming to the tropical rainforest and derived savannah portion of Nigeria. Annual rainfall in these regions ranges from 1,500mm in the derived savannah to 3,000mm in the tropical rainforest. The primary products of commerce of the oil palm tree are palm and kernel oil and kernel cake (RMRDC, 2004; FAO, 2002). Oil palm produce (especially palm oil and palm kernel) had been the bedrock of Nigeria's foreign exchange earnings within the years before the oil boom of the 1970's. Rural women often engage in agro-based food processing and preservation activities on a small scale basis such as garri-making, maize processing, fish smoking and palm oil extraction (Okorji,1991). In Africa for instance, the farming systems are inherently risky because they are fundamentally dependent on the vagaries of weather. Weather variation, incidence of disease, pest, fire and a host of other less obvious factors cause farming yields and thus income to fluctuate unpredictably (Enete & Achike, 2008). However, enough

efforts have not been directed towards the rural oil palm households and or farmers within the ongoing global campaign on climate change (Amalu & Iren, 2012).

However, Southern Nigeria is extremely sensitive to variation in climatic factors most especially rainfall and sunshine hours (Uyigwe & Agho, 2007). There are possibilities that the Agricultural Economists may have responded in certain ways to promote economic development and scale back poverty, improve oil palm adaptation and pave the way for more effective climate change mitigation through oil palm agriculture. Creating the necessary cost effective adaptation strategies and harnessing them to enable oil palm farmers to adapt their oil palm systems to changing climate, will require an Agricultural Economist to provide solutions in areas of innovation in policy and institutions.

Concerns about adapting to global climate change are renewing the impetus for investments in agricultural research and are emerging as additional innovation practices. In the coming decades, the development and effective diffusion of new agricultural practices and technologies will largely shape how well farmers adapt to climate change (Lybbert & Summer, 2010). Some economists have argued that the cost of adaptation are likely to be the most significant impacts of climate change, especially if the rate of change is high (Quiggin & Horowitz, 2003). Economist have long emphasized that an economic approach to climate policy must compare the entire set of measures to choose a portfolio of cost effective measures. Adaptation is now also on the radar of national and international political institutions such as the OECD (2008) and the European Commission (2009). There are many climate actors (research personnel, local communities, private sector, civil society organizations, farmers) in Nigeria but they are not able to properly and effectively present Nigerians current future efforts to address climate change vulnerability and adaptation. Policy makers have therefore recognized the need to integrate climate change adaptation into all spheres of public policy-making (Masego, 2014).

Adaptation measures that consider climate change are being implemented, on a limited basis, in both developed and developing countries. These measures are undertaken by a range of public and private actors through policies, investments in infrastructure and technologies, and behavioral change. Policy makers need to take a precautionary approach to environmental protection. We must acknowledge that uncertainty is inherent in managing natural resources, recognize it is usually easier to prevent environmental damage than to repair it later and shift the burden of proof away from those advocating protection toward those proposing an action that may be harmful (Appell, 2001). On the other hand, there is dearth of information on the role the agricultural economist plays in climate change adaptation, in the oil palm industry, in Southern Nigeria. No government has all the technological, scientific financial and other resources needed to tackle climate change alone. The challenges are global and recently we have seen international efforts to tackle environmental issues. Across the world, policy makers are actively developing policies, plans and strategies to help communities adapt to the impacts of climate change (Mimura *et al.*, 2014). The development of national climate policies and plans is complex, given the uncertainties in both climate change and its impacts. Scientific and technical information that includes representation of uncertainty can help guide the policy making process and create evidence-based policies to tackle climate change.

In addition, policy makers often have limited time, resources or ability to review and use the scientific information that is being produced (Heller & Zavaleta, 2009; Moserd & Luers, 2008; Dabelko, 2005; Morss *et al.*, 2005; Rayner *et al.*, 2005). The result is that climate change policy is often formulated without significant input from science (Sarewitz & Pielke, 2007; Abbasi, 2006), even though policy makers are interested in incorporating research results into the policy making process (Sarachick & Shea, 1997).

Consequently, it is a huge responsibility on the Nigerian government to know exactly to what extent oil palm farmers adapt to climate change effects and the extent

their farms and properties are vulnerable to the ongoing climate change. These can be valued and quantified in monetary terms with cost effective methods by an Agricultural Economist. This prompted this paper.

### **EVIDENCE OF CLIMATE CHANGE IN SOUTHERN NIGERIA.**

The southern part of Nigeria is prone to flooding, and in particular Lagos state, the commercial nerve centre of Nigeria is noted to be one meter above sea level and is threatened with possible extinction (Agbo, 2001). In the south, sea level increases the risk of flooding, salt water intrusion and displacement of people and livestock. Erosion associated with heavy rainfall and flooding is now a frequent threat in most ecological zones in Nigeria, especially in the rain forest where mudslides occur. Loss of biodiversity is now a common trend in all ecological zones of Nigeria and this trend only makes natural resource dependent communities more vulnerable (NEST, 2011).

Trend analyses indicate that both rainfall and temperature have been on the increase in Akwa Ibom, Rivers and Ondo States. The trend lines for rainfall and temperature are found to be positive for the 3 states in Southern Nigeria except natural in rivers states. The trend for rainfall in Rivers State is negative indicating that rainfall amount has been on the decline over the years. The observations of the respondent across the states and agro ecological systems also indicate a lack of pattern or uniformity of either temperature or rainfall amount (NEST, 2011). According to a report by the intergovernmental panel on climate change (IPCC, 2001a), rainfall is expected to increase, accompanied by an increase in cloudiness and rainfall intensity, particularly during severe storms. This was also expected to result in shifts in geographical patterns of precipitation and changes in the sustainability of the environment and management of resources. (NEST, 2004). In the Niger Delta (located in the Atlantic coast of Southern Nigeria where the River Niger divides into numerous tributaries), the main direct effects are through changes in temperature, precipitation, length of growing season, and timing

of extreme or critical threshold events relative to crop development (NEST, 2011). The Niger delta cuts across 9 states in Southern Nigeria which includes; Abia, Akwa Ibom, Bayelsa, Cross Rivers, Delta, Edo, Imo, Ondo and Rivers state. (Uyigwe & Agbo, 2007). The region is a coastal environment, the rise in sea level has been linked with global warming by the IPCC. According to IPPC (1990), Working with records over the last years, have shown that a strong correlation exists between greenhouse gases emission and climate change and between global temperature and sea level rise of global temperature is expected to rise by between 0.2°C-0.5°C per decade. The rise in temperature is expected to cause thermal expansion of sea and melting of polar ice. These will cause the sea level to rise for about 3-10 cm per decade during the next century (Uyigwe & Agho, 2007).

#### **THE ROLE OF THE AGRICULTURAL ECONOMIST IN CLIMATE CHANGE ADAPTATION, IN THE OIL PALM INDUSTRY.**

- 1) To carry out impact assessments including the cost of adaptation for the oil palm production sector and for the broader food industry.
- 2) Evaluating cost under alternative scenarios for the rate of climate change, climate variability and occurrence of extreme events.
- 3) Addressing cost and returns associated with the choice of adaptation strategies adopted by oil palm farmer in coping with climate change.
- 4) Investing in better information and forecast.
- 5) Investing in public agricultural research and development in the oil palm industry.
- 6) Investing in risk pooling and diversification measures i.e. diversifying the produces, production portfolio so as to stabilize their revenue or production of basic food in face of volatile conditions.
- 7) Addressing issues on the economic analysis of climate change adaptation.



- 8) To assess ecosystem based approaches to adaptation and synergies between adaptation and mitigation in local initiatives of national policies.
- 9) Data collection, gathering and compilation.

## **POLICIES NEEDED TO ENCOURAGE AGRICULTURAL ADAPTATION**

The development of adaptive strategies depends on policies and institutions.

On policies;

- Mainstreaming of climate change into economic framework is of great importance in order to ensure adaptation responses. The present state of adaptation strategies in Nigeria makes it difficult for agricultural economist and planners to have a general perspective of adaptation priorities both at the national and local levels.
- Mainstreaming of adaptation into broader policies to promote resilience and sustainable development.
- policies at the national level need to be reviewed to ensure they build resilience of the poor and improve their capacity to adapt to climate change effects.
- more assessment of climate change studies and vulnerabilities needs to be carried out to enable identification of adaptation priorities.
- Enhancing adaptation capacity through collaboration with decision makers;
- Maintenance of climate monitoring and effective communication of information, support for research, systems analysis, extension capacity, industry and the regional networks that provide this information.
- The federal government should facilitate and support efforts to identify and transfer technologies that contribute to climate change adaptation in Nigeria.
- The government should review current policies and programmes if any.

On institutions:

- There is need to increase funds for the most vulnerable in the society ie women, children, poor small scale Oil Palm farmers.

- Integration of adaptation into the planning of government structures.
- Building capacities at all government levels to enhance accountability.

The economic cost arising from the emission of some pollutants and the over-exploitation of some resources are well known. Action taken now to fight climate change effects can avoid significant economic costs in the future.

### **ADAPTATION STRATEGIES TO CLIMATE CHANGE IN SOUTHERN NIGERIA**

Adaptation refers to adjustments in practices, processes or structures in response to projected or actual changes in climate (Dixon *et al.*, 2003), with the goal of maintaining the capacity to deal with current and future changes. Adaptation to climate change also refers to activities that reduce the negative impacts of climate change and/or takes advantage of new opportunities that may be presented. It includes activities that are taken before impacts are observed (anticipatory) and after impacts have been felt (reactive). Eboh (2009) stated that even if efforts to reduce greenhouse gas (GHG) emissions are successful, it is no longer possible to avoid some degree of global warming and climate change. This is supported by Francesco *et al.* (2008) which stated that as a result of greenhouse gases already in the atmosphere from past and current emissions, our planet is already committed to at least as much warming over the 21st century as it has experienced over the 20th century (0.75°C). This implies that in addition to mitigation practices being developed to combat climate change, adaptation to the anticipated climate change is essential.

Long term responses to climate change and food insecurity are referred to adaptation strategies (Davies, 1993). This fact is also made more explicit in Ozor & Cynthia (2010) which stated that while mitigation is necessary to reduce the rate and magnitude of climate change, adaptation is essential to reduce the damages from climate change that cannot be avoided. The Nigerian Agricultural sector in the 21st century will therefore be facing dual significant challenges, arising from the need to increase the

nation's food supply as well as adjusting to variation in climate. Also the fact that Agriculture is practiced across a broad range of climates and environmental conditions makes it necessary for the country to develop an array of adaptation options that will meet the different conditions of the different ecological locations of the nation. There are two basic types of adaptation; planned adaptation and autonomous adaptation. Autonomous adaptation refers to reaction of farmers to changing precipitation patterns, in that he/she changes crops, uses different harvest and planting/sowing dates while planned adaptation measures are conscious policy options or response strategies, often multi-sectorial in nature and aimed at altering the adaptive capacity of the agricultural system of facilitating specific adaptations. As lot of adaptation options have been tried on the different areas of agriculture. Some yielded positive results while the effects of the rest are still being observed.

Climate change is expected to trigger more frequent and fiercer storms; floods, landslides, forest fires, temperature extremes and droughts, and developing countries will bear the brunt of these blows. These countries are home to poor populations who live and work in flood plains, mountain slides and deltas. When disaster strikes, they lose their homes, crops and livelihoods. Consequently, adaptation was seen as a viable option in reducing vulnerability associated with anticipated negative impacts of climate changes (Jones, 2010). Adaptation methods are those strategies that enable the individual or community to cope with or adjust to the impact of climate in the local areas (Jones, 2010; Nyong *et al.*, 2007). Such strategies will include the adaptation of early maturing, drought resistant varieties and keeping of livestock in areas where rainfall declined.

Following Ojemade (2016), the main forms and or choice of adaptation strategies by Oil Palm farmers in Southern Nigeria include use of resistant varieties, mulching, purchase of water for irrigation, planting trees, multiple/ intercropping, crop diversification, changing planting dates and migration for income. In their own contribution, Enete *et al* (2011) observed that the indigenous climate change adaptation

measures practiced by farmers in Southern Nigeria include Purchase of water for irrigation (liters), mulching, use of wetlands/river valleys (e.g fadama), planting of trees, use of resistant varieties, expansion of cultivated land area, increased used of fertilizers, intensive manure application, use of chemical, herbicides, pesticides, multiple/intercropping, use of agro forestry, and change from arable to permanent crops. According to Sofoluwe *et al.* (2011), the adaptation measures employed by farmers include soil conservation, planting trees, planting different varieties, early or late planting and irrigation.

### **Conclusion and Recommendations**

Most countries have adaptation plans for its farmers to shore up resilience of communities but they fail to make an Agricultural Economist part of the equation. The effects of climate of climate on Oil Palm production and the Oil Palm's ability to adapt to mitigate the effects of climate change are critical issues for Oil Palm households as well as the agricultural economist who is a policy decision maker. Inadequate institutional support and inappropriate policies can act as a constraint to adaptation and limit access to needed natural resources by communities dependent on such resources for survival and adaptation to climate change. States Emergency Management Agency (SEMA) should be empowered for prompt rescue mission in case of hazards and to assist victims materially and financially. There is need for estimation of adaptation cost and reassessments of impacts using various models. Thus, there is need for effective and reliable access to information on changing climate. In addition, empowerment (credit or grant facilities) is crucial in enhancing farmers' awareness. This is vital for adaptation decision making and planning.

There is need to mainstream climate change adaptation into national policies and planning. Knowledge and information on Oil Palm adaptation in the Oil Palm industry is necessary for environment study assessment and proper planning. There is a need for

future research on climate change and adaptation issues to be co-generated with policy makers (agric- economists) and designed to address specific knowledge gaps and policy questions in the oil palm industry. The generation of scientific information that is relevant to the needs of policy makers will greatly enhance the ability of policy makers to develop effective, evidence-based policies for climate change, including the much-needed policies and plans for helping smallholder oil palm farmers adapt to climate change. Clear economic benefits will arise once the right policies are implemented and the right personnel such as an Agricultural Economist is included in the scheme of events. The Agricultural Economist is expected to gather and analyze data, make recommendations to management and government regarding the course of action to be taken as regards oil palm adaptation to climate change, hence his role as a policy maker.

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