Smallholder Farmers and the Need for Climate Smart Agriculture in Nigeria

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Abstract

Adaptation strategies that can be implemented during droughts serve as a foundation for planning response to future climate change. Climate change is already affecting the livelihoods of smallholder farmers in northern Nigeria who rely on rain-fed agricultural techniques, and it is expected to make food shortages more acute as the region is facing challenge from insurgents-Boko Haram and herdsmen. Farmers in the region are trying to cope with irregular rainfall, flooding, farm destruction by militant groups and degraded soil. Farming households are changing agricultural practices as a result of global observation of climatic and environmental changes. With the shift towards Sustainable Development Goals (SDGs) approaches that severe multiple purpose and provide cross-cutting benefits are highly needed in Nigeria and elsewhere. For example, achieving food security is unmanageable without adaptation and resilience to climate smart agricultural practices that not only support smallholder farmers in producing enough food to meet people's nutritional needs, but that also preserve ecosystems from degradation. The objective of this paper is to determine the effects of climate change on smallholder farmers in northern Nigeria and to explore possible ways to promote uptake and integration of climate smart agriculture practices and innovations into policy and practice in Nigeria and Africa as a whole through the development of actionable roadmaps to facilitate the process.

Keywords: Adaptation, Climate Change, Climate Smart Agriculture, Smallholder Farmers, Nigeria.

1. Introduction

Agriculture aside crude oil plays an important role in the Nigerian economy with many practicing subsistence farming as a source of livelihood. Many of these farmers live in the rural areas. Hence the importance of the agricultural sector in job creation and boosting economic growth in Nigeria cannot be underestimated. Agriculture primarily relies on environmental factors and weather variations have huge impact on food production. The practice of agriculture in Nigeria is currently faced with the challenge of insecurity, banditry, kidnapping and land tenure insecurity, among several others. Poor soil fertility, degraded ecosystems and climate variability are among other problems associated with agriculture in Africa (USAID 2016). This has continued to hamper agricultural growth and food production by smallholders. Climate change adaptation has to do with any spontaneous and/or premeditated action adopted to deal with the impacts of, or reduce vulnerability to a changing climate. The concept of climate smart agriculture (CSA) indicates a process of climate responsiveness, development and agricultural integration. The purpose is to achieve food security amidst changing climate, rising new dietary and food demands. CSA is a type of agriculture that strengthens adaptation and resilience to climate change. It is aim to increase farmers' income, improve living standard and productivity. It integrates socioeconomic and ecological components that ensure current food production activities do not affect the ability to produce food in the future. Nigeria's CSA profile provides an outlook of a country's baseline that initiates a discussion on the need and importance of investing in climate smart agriculture (CSA).

2. Discussion

A report by the Food and Agriculture Organization (FAO) indicates more than 19 million people across Nigeria are expected to face food insecurity between June and August 2022. This report was produced in

conjunction with the Federal Ministry of Agriculture and Rural Development of Nigeria. The FAO report went further to suggest that the food crisis will affect people living in 21 states of Nigeria, including the Nation's capital Abuja and about 416,000 Internally Displaced Persons (IDPs). The analysis, published in March 2022, covered Abia, Adamawa, Benue, Borno, Cross River, Edo, Enugu, Gombe, Jigawa, Kaduna, Kano, Katsina, Kebbi, Lagos, Niger, Plateau, Sokoto, Taraba, Yobe, and Zamfara states and the FCT, Abuja. Climate change and insecurity were identified as key drivers of the intending food crisis. Climate change's negative impacts are already being felt in the form of increasing temperatures, weather variability, shifting agro ecosystem boundaries, invasive crops and pests, and more frequent extreme weather events. In Nigeria and several other parts of Africa, where the agricultural production system is predominantly dependent on rain, more than 60 percent of essential foods are produced from rain-fed agriculture. This leaves the agriculture sector very susceptible to climate change. Flooding, droughts, erosion, off season rains amongst others are some of the effects of climate change which has the effect of unbalancing the agriculture growing season of a country that is dependent on rain-fed agriculture. A 2022 report by the Foundation for Environmental Rights, Advocacy and Development (FENRAD) shows that climate change is reducing crop yields, the nutritional quality of major cereals, and lowering livestock productivity in Nigeria. Due to the desertification and water depletion in the northern part of Nigeria, nomadic herdsmen are now shifting towards the south of the country in search of grazing fields and water for their animals, resulting in violent conflict with crop farmers in the south. The Sahara desert is advancing southward at an alarming rate of 0.6km per year. Consequently, Nigeria loses about 350,000 hectares of land to desertification, maiming arable land and displacing thousands of people in villages across 11 states in the north of the country. According to FAO, climate change is likely to cause significant crop yield losses, thereby adversely affecting smallholder livelihoods in Africa. The country representative of FAO, Fred Kafeero, in the aforementioned report, advised the Nigerian government to design and implement national food systems transformation action plans. In its 2022 report on Community Women Solution for Local Community Farmers, FENRAD indicated the need for climate-smart agriculture (CSA) practices, which could see to the reduction of greenhouse gas emissions and their negative effects on agricultural productivity in Nigeria.

3. Climate Smart Adaptation Models Adopted by Nigerian Farmers

A farmer's choice to reject or accept a technology or adaptation model for farming is based on his or her perception. This implies that a farmer may decide to use a particular model of farming only if he was aware of it and develops interest as well. The dynamics in weather fluctuations especially in northern Nigeria has been a source of concern. Amidst the devastating impacts of extreme climate change events on healthy and sustainable food production, climate smart agriculture has become irresistible. Smallholder farmers are known to have in the past somehow practiced Climate Smart Agriculture as part of their habitual farming system in Northern Nigeria (Fanen and Olalekan 2014). Some other strategies used in mitigating climate change effects include relocation from climate risk areas, prayers to God, recycling of waste and multiple cropping. Further evidence has showed that farmers in Nigeria have continued to adopt climate smart practices to mitigate the effect of climate change which resulted in increased productivity. The modern day farmers who are mostly youths in Nigeria are adopting new climate smart technologies and adaptation strategies to combat climate change impacts and also increase agricultural production. Some of these CSA adoptions are outlined below.

i. The Greenhouse farm model is one of the climate smart adaptation strategies practiced by some Nigerian smallholders to mitigate the devastating effects of climate change on food production. This model involves planting an improved crop seedling in a protected and enclosed environment, where humidity, temperature and water exposure to plants are controlled. The aim is to prevent unnecessary pest and disease infestations on crops planted due to weather

fluctuations. The advantage of this model is that it allows a farmer to predict the outcome of his produce. Greenhouse can be expensive though and the farmer needs to invest in capacity training and skills of employees.

ii. The Integrated Farming system involves the recycling of agricultural waste on a farmland for the benefit of other segments of the farm. It is a specialized type of mixed farming that allows for growing different crops and rearing of livestock on a farmland without the use of inorganic inputs like fertilizers and pesticides. Waste from animals are collected and processed into organic manures to increase and produce healthy crop yields. Most of the waste from farm is carbon oriented and this has to be harnessed properly before it gets into the atmosphere, which can increase atmospheric temperature leading to climate change.

iii. Sack farming is another local climate smart adaptation model adopted by smallholder farmers in Nigeria to mitigate the impact of climate change. This model has been helpful to yam growers which allow them to grow yam all through the year. Farmers make use of poultry feed sacks to grow yams and nearby stream or wastewater from fish ponds serves as irrigation. It is important the sacks are filled with good soil and create stake for the yam tendrils to climb as it sprouts. Unlike the regular yam mounds, a farmer will not face much trouble of weeding, and weeds that will grow on the sacks won't pose much stress on the crops planted. Sack farming can be stress free and helps in maximizing land usage.

iv. Hydroponic Farming: The Nigeria Farmers Group and Cooperative Society at Gaate community of Nasarawa state use this model to grow a wide range of agricultural commodities and highly nutritious livestock grasses. The grasses are of very high nutrients for animals and help to restrict the movement of cows, preventing them from eating up crops planed. This model of CSA hydroponic farm substitute water, for soil by making use of baskets to grow substantial quantities of grains such as maize, rice and sorghum within a small area.

4. Challenges Faced by Smallholder Farmers in CSA Practices in Nigeria

There are many hindrances along successful implementation of climate smart agriculture in Nigeria that are institutional and socio-economic. Many of these farmers are illiterates; hence they find it difficult to convert knowledge gained into practice. There is also the challenge of poverty and inadequate access to technical information. In Northern Nigeria, funding has been reported to be a huge setback in accepting CSA, where farmers and extension workers lack adequate understanding of the process. The lack of support and few opportunities for local CSA practitioners to engage in policy decisions/formulation at local level is a sign of weakness in the effort at combating climate change impact by accepting the adoption of climate smart agriculture. Other hindrances identified include lack of support from government, high cost of executing the practices and insufficient training on the practices (Adebayo and Ojogu 2019)

5. Conclusions/Recommendations

The adoption of climate smart agriculture is an important adaptation measures to increase agricultural productivity. It helps to reduce greenhouse gas emissions while boosting food security. Climate Smart Innovations are therefore needed that will address the anticipated challenges to ensure opportunities are sustained for safe production of agricultural products. Also important is the need to ensure the agricultural sector is accorded more budgetary allocation in line with the Maputo declaration, Increase the operational capacity of the strategic grain reserves and reintroduction of farming clusters to be financed through public private partnership (PPP) arrangement. It is important that a framework is developed to help city leaders and governments at all levels make informed decisions for sustainable agricultural development through climate smart agriculture in their various states. This framework should also respond to climate change impacts to avoid supply chain disruptions, higher food prices and

serious economic fallout for the smallholder farmers. It is advised that there should be many strategies that can support community resilience, protect access to agricultural goods and services, and limit the economic impact of food loss due to climate change. If food supply value chain in Nigeria, especially in our cities is to be transformed to achieve food security, to drive economic growth and improve living standards post Covid-19; Nigeria must create and expand rural job opportunities, build capacity of smallholders and promote climate smart agriculture practices among the farmers, and reduce migration to towns to boost the entire value chain.

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