

FEDERAL REPUBLIC OF NIGERIA



FEDERAL MINISTRY OF AGRICULTURE & FOOD SECURITY (FMAFS) FEDERAL GOVERNMENT OF NIGERIA

THE CLIMATE SMART AGRICULTURE POLICY FRAMEWORK (CSAF) DOCUMENT FOR NIGERIA

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List of Acronyms

ADPs	Agricultural Development Projects
AESZ	Agro Ecological Sub Zone
AEZs	Agro Ecological Zones
AfDB	African Development Bank
AMRTI	Agricultural Rural Management Training Institute
APP	Agricultural Promotion Policy
ARDA	African Radio Drama Association
ATA	Agricultural Transformation Agenda
AU	Africa Union
BAU	Business As Usual
BMGF	Bill and Melinda Gates Foundation
BoA	Bank of Agriculture
BOI	Bank of Industry
CBN	Central Bank of Nigeria
CBO	Community-Based Organizations
CCNN	Climate Change Network Nigeria
C4C	Coalitions for Change
CRPSA	Climate Resilience Practices for Sustainable Agriculture
CSA	Climate Smart Agriculture
CSAC	Climate Smart Agriculture Champions
CSACTF	Climate Smart Agriculture Coordination Task Force
CSJ	Centre for Social Justice
CSOs	Civil Society Organization
DFID	Department for International Development
ECOWAS	Economic Community of West African Countries
ERGP	Economic Recovery and Growth Plan
EU	European Union
EWS	Early Warning Systems
FAO	Food and Agricultural Organization
FCT	Federal Capital Territory
FMARD	Federal Ministry of Agriculture and Rural Development
FMAWR	Federal Ministry of Agriculture and Water Resources
FMEnv	Federal Ministry of Environment
FRA	Forest Resource Assessment
FRIN	Forest Research Institute of Nigeria
FRN	Federal Republic of Nigeria
GCA	Global Centre on Adaptation
GDP	Gross Domestic Product
GFSS	Global Food Security Strategy

GHG	Greenhouse Gas
IAR	Institute of Agricultural Research
IFAD	International Fund for Agricultural Development
IITA	International Institute for Tropical Agriculture
INDC	Intended Nationally Determined Contribution
IoT	Internet of Things
ITD	Inter-Tropical Discontinuity
LCRI	Lake Chad Research Institute
LGCs	Local Government Councils
M&E	Monitoring and Evaluation
MT	Metric Tonnes
MDAs	Ministries, Departments and Agencies
NABG	Nigeria Agribusiness Group
NAFPP	National Accelerated Food Production Programme
NAIC	National Agricultural Insurance Corporation
NAP	National Adaptation Plan
NAPAP	National Agricultural Productivity Action Plan
NARF	National Agricultural Resilience Framework
NASPA-CCN	National Adaptation Strategy and Action Plan on Climate Change for Nigeria
NATIP	National Agricultural Technology and Innovation Policy
NAIP	National Agriculture Investment Plan
NBS	National Bureau of Statistics
NCF	Nigeria Conservation Foundation
NCRI	National Cereal Research Institute
NCA	National Council on Agriculture
NCCP	National Climate Change Policy
NCSAF	National Climate Smart Agricultural Framework
NCSACT	National Climate Smart Agriculture Coordination Team
NDC	National Determined Contribution
NEST	Nigerian Environmental Study Action Team
NFDP	National Fadama Development Project
NGN	National Government of Nigeria
NGO	Non Governmental Organizations
NRCRI	National Root Crop Research Institute
NIMET	Nigerian Meteorological Agency
NIOMR	Nigerian Institute for Oceanography and Marine Research
NIRSAL	Nigeria Incentive-Based Risk Sharing System for Agricultural Lending
NLTP	National Livestock Transformation Plan
NNHS	National Nutrition and Health Survey
NRCRI	National Root Crop Research Institute,
OFN	Operation Feed the Nation
OXFAM	Oxford Committee for Famine Relief
PROMAD	Programa Nacional de Modernização da Advocacia
PSALI	Partnership for Securing Agricultural Lands and Investments

RBDA	River Basin Development Authority
REDD+	Reducing Emission from Deforestation and Forest Degradation
RTEP	Roots and Tuber Expansion Programme
SAP	Structural Adjustment Programme
SMOAs	State Ministries of Agriculture
SSA	Sub-Saharan Africa
SSPs	Small-Scale Producers
TADs	Trans-boundary Animal Diseases
TNC	Third National Communication for Nigeria
UNCCD	United Nations Convention to Combat Desertification
UNDESA	United Nations Department of Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nation International Children’s Emergency Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
US	United States
USD	United States Dollar
WEP	Women Environment Programme
WFP	World Food Programme
WHO	World Health Organization
WMO	World Meteorological Organization
WOFAN	Women Farmers Advancement Network

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1.0 INTRODUCTION

1.1 Global Context on CSA and its Relevance to Nigeria

Climate change refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC 2012) Since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas. Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures (UNFCCC, 2022). The effects of the changing climate are therefore far-reaching effects on all aspects of human lives, livelihood, and society, ranging from health, food systems, housing, public infrastructure and supporting economic activities. Climate change's negative impacts are already being felt, in the form of increasing temperatures, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and more frequent extreme weather events. The vulnerabilities to the impacts of climate change are also not uniform with people and communities living in small island nations and developing countries rendered the most vulnerable due to limited coping mechanisms and capacities. Conditions like sea-level rise and saltwater intrusion have advanced to the point where whole communities have had to relocate, and protracted droughts are putting people at risk of famine. The incidence and the number of "climate refugees" are expected to rise.

In terms of its broad impacts on Agriculture, climate change is reducing crop yields, the nutritional quality of major cereals, and lowering livestock productivity. Substantial investments in adaptation will be required to maintain current yields and to achieve production and food quality increases to meet demand. Between now and 2050, the world's population will increase by one-third. Most of these additional 2 billion people will live in developing countries. The FAO estimates that agricultural production will have to increase by 60 percent by 2050 to satisfy the expected demands for food and feed. Agriculture must therefore transform itself if it is to feed a growing global population and provide the basis for economic growth and poverty reduction. Climate change will make this task more difficult under a business-as-usual scenario, due to adverse impacts on agriculture, requiring spiralling adaptation and related costs (FAO, 2013).

Nigeria, like many other African countries, finds itself in the midst of a climate emergency. Africa's drylands, which cover about 60% of the continent, are warming at a rate twice the global average, putting about 500 million people at risk, and compromising about 4% of GDP by 2040. Even if climate change mitigation efforts maintain global warming at sub-2°C, the continent will still face climate change adaptation costs of about US\$ 50 billion per year by 2050. The reality of climate change has been experienced in Africa in the last few decades. Flooding on the continent has increased by 500% since the 1990s, with many of them being extreme floods. Droughts are

becoming more severe also, with countries in the horn of Africa and Sahel, like Somalia suffering agriculture losses of about \$1.5 billion and widespread malnutrition (World Bank, 2021).

Climate change poses systemic threats to not just agriculture, but to other systems like healthcare and public infrastructure. The challenge is particularly more critical for the agricultural sector with its heavy dependence on rain-fed farming. Agricultural productivity has consequently been hampered by erratic and unreliable weather systems and a lack of planned alternative support and practices.

Climate change is therefore one of the most significant threats to Africa's under-nourished population, which will rise from 282 million to 350 million by 2050. According to the World Bank, 27 million people across West Africa needed urgent food support due to a number of factors including; drought, poverty, high food import prices, environmental degradation, displacement, poor trade integration, and conflict (GCA, 2021).

In Nigeria, the environmental systems are increasing the risks of the country's fragility. This being characterized by "fiercer, longer dry seasons and shorter, more intense rainy seasons", have increased the challenges faced by local communities. A wave of climate-induced desertification has led to increasing cultivation and overgrazing, making large swaths of land in northern Nigeria unproductive. In Southern Nigeria, unpredictable and higher-intensity rainfall has resulted in the loss of crops, destabilizing communities across the region. Situating this with a population growth rate of 2.5% per year, these depleting environmental resources provide a significant food security challenge for the country. The country's performance at the 2021 Notre Dame Global Adaptation Index was less than inspiring as the country ranked as the 53rd most-vulnerable country and the 6th least-ready country in the world to adapt to climate change. Similarly, the WFP links Nigeria's climate change threat to the wider weakened human development indicators that are currently observed. Climate change is contributing to persistent poverty which affects more than half the population, most severely in the Northeast and Northwest regions. This is driven by the periodic droughts and floods which have an adverse impact on agricultural output and increased the vulnerability of populations, especially in rural areas.

This has led to increased desperation among various groups, increasing resource conflicts across Nigeria. The conflicts between farmers and herders in the last decade or so have been blamed largely on desertification in Northern Nigeria, which has led to herders finding 'greener pastures' further down South in Nigeria.

This aforementioned therefore, calls for a re-think into how agricultural systems, services and productivity take into account the impact of climate change, ensuring that it is sensitive and responsive. "Climate-smart agriculture" (CSA) may therefore be defined as an approach for transforming and reorienting agricultural development under the new realities of climate change (Lipper et al. 2014). According to FAO 2013, CSA integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing climate change and food security through three pillars (sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and, reducing and/or removing

greenhouse gases emissions, where possible) CSA is an approach to developing the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change. The magnitude, immediacy and broad scope of the effects of climate change on agricultural systems create a compelling need to ensure comprehensive integration of these effects into national agricultural planning, investments and programs. The CSA approach is designed to identify and operationalize sustainable agricultural development within the explicit parameters of climate change.

1.2 Situational Analysis

1.2.1 Geographical Setting

Nigeria lies on the south coast of West Africa between latitudes 4° and 14°N and longitudes 2° and 15°E. It has a total landmass of 926,000 km² (Fig 1) representing about 14% of land area in West Africa.



Figure. 1: Location of Nigeria. Source (TNC, 2020)

It is the most populous country in Africa, and more than half of Nigeria's estimated 218 million people based on data projections from the World Bank (World Bank, 2022). The annual population growth rate is 2.6 per cent, and the population is set to double by 2050. The World Bank projection is that Nigeria will become the world's third most populous country by 2050 with over 400 million people. It consists of 36 autonomous states and has a multi-ethnic and culturally diverse society, with more than 250 ethnic groups. The climate is dominated by the influence of three main wind currents: the Tropical Maritime air mass, the Tropical Continental air mass and the Equatorial Easterlies (Ojo, 1977, Gbode, et al., 2019). The Tropical Maritime and Tropical Continental air masses meet along the Inter-Tropical Discontinuity (ITD), which is a key driver of Nigeria's climate. Its position and oscillation in the course of the year affect the spatial and temporal distribution of key climate characteristics (Adegoke and Lamptey, 1999). Following the annual movement of the ITD across the equator, the rainy season advances from the coast to the

inland areas from March to August and retreats from September to November, with a pronounced dry period between December and February. The Equatorial Easterlies air mass blows over occasionally to actively undercut the Tropical Maritime or Tropical Continental air masses, giving rise to squall lines or dust devils. The interaction of these air masses and the ITD creates humid conditions in the southern parts of the country with annual rainfall over 2000 mm³, and semi-arid conditions in the north with annual rainfall less than 600 mm³. Six commonly-recognized vegetation zones (Fig 2)

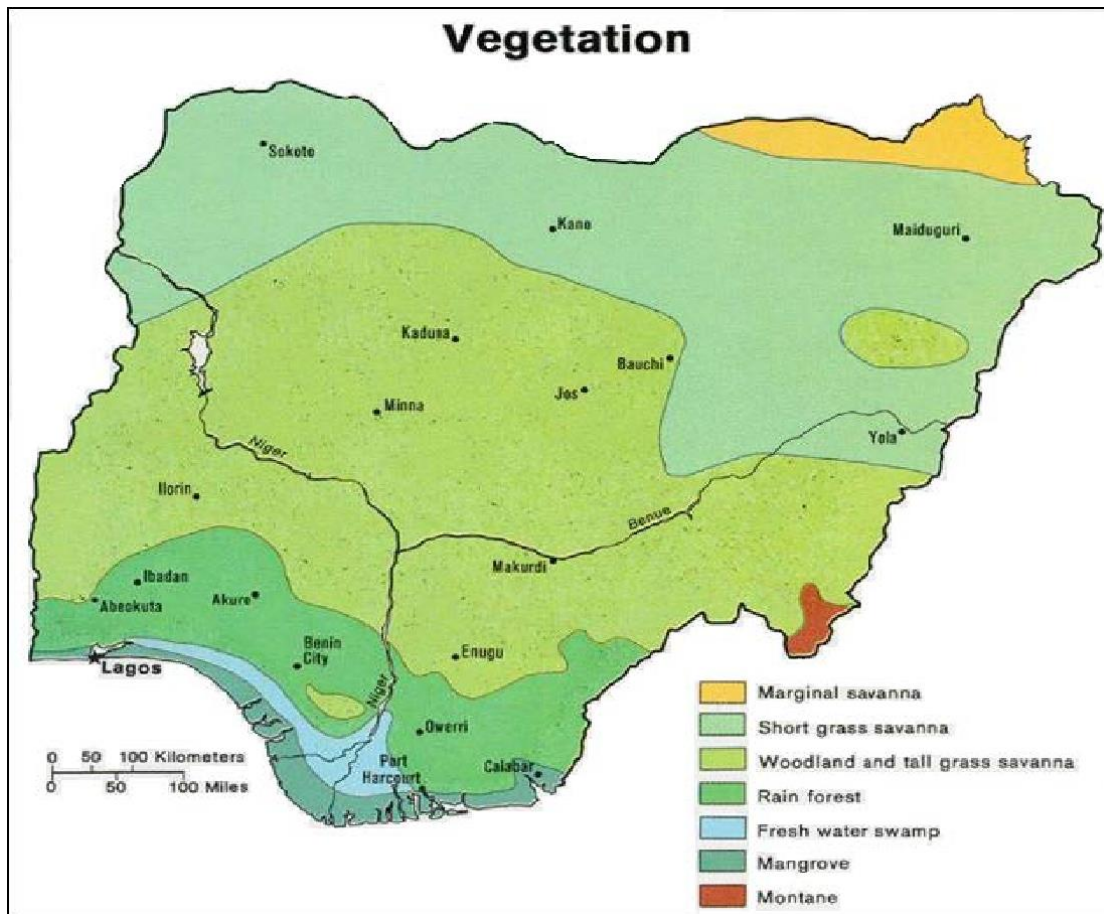


Figure 2. Vegetation zones of Nigeria (NASPA-CCN, 2011)

These are Mangrove and Freshwater swamps along the coast, giving way northwards to Rain Forest, Guinea savanna, Sudan savanna, and Sahel savanna (Ogbeibu and Oribhabor, 2023). Virtually everywhere, actual vegetation cover bears the heavy imprint of centuries of human disturbance

1.2.2 History of Agricultural Development in Nigeria

Agriculture as an indigenous occupation in Nigeria has gone through various phases of development. This development spans three phases from pre-colonial, colonial and post-colonial era (See Femi Ibirogbu (2018), and these are briefly highlighted in this section.

Pre-Colonial Era

Before Nigeria's colonization, its indigenes were sustained primarily by farming as the major occupation with the use of crude implements. Nevertheless, they produced enough food crops to feed themselves and also produced cash crops used for trade by barter system.

Colonial Era (1861 to 1960)

The colonial era in Nigeria placed emphasis on research and extension services (Abbas, 2019). The establishment of the Department of Botanical Research in 1893 in the former Western Nigeria was the first notable activity of the era. The Department was saddled with the responsibility of conducting research in Agriculture. In 1905, the British Cotton Growers Association acquired 10.35 square kilometres of land at the site now called Moor Plantation, Ibadan for growing cotton to feed the British Textile Mills. In 1910, Moor Plantation, Ibadan became the headquarters of the Department of Agriculture in Southern Nigeria, and a Department of Agriculture was established in the North in 1912. In 1921, a unified Department of Agriculture was formed in Nigeria, after the amalgamation of the North and the South to increase production of export crops for the British market which was ready to absorb it for its industrial growth. In 1941, a fisheries organization was established as a Fisheries Development Branch of the Agricultural Department of the Colonial Office and a Senior Agricultural Officer was appointed to conduct a survey of the industry and its possibilities. The Fisheries Development Branch headquarters was sited at Apese village and later at Onikan in Lagos, from where, assisted by a part-time voluntary officer, preliminary experiments in fish culture in brackish water ponds at Onikan were carried out and surveys were conducted on the canoe fisheries of Apese village and Kuramo waters around Victoria Island, Lagos.

Post-Colonial era (1960-2022)

The post-colonial period policies were formulated to actualize more equitable growth in agriculture (IRC, 2020). The earlier surplus extraction policies were quickly translated into the pursuit of an export-led growth. This led to the demarcation of the country into the Western Region (cocoa), Northern Region (groundnut) and Eastern Region (oil palm), and sequel to this, there was cocoa production revolution in the western region which successes were well renown as the sources of revenue for the first television in Africa; University of Ife, the Cocoa House edifice in Ibadan, among other achievements associated with cocoa economy. The groundnut pyramid also emanated from a focus on the northern Nigeria's strength in groundnut production, while the eastern Nigeria became famous in the production of palm produce.

Some of the specialized development schemes initiated or implemented during this period included Farm Settlement Schemes, Operation Feed the Nation, launched in 1976; River Basin and Rural Development Authorities, established in 1976; Green Revolution Programme, inaugurated in 1980; The World Bank-funded Agricultural Development Projects (ADPs).

National Accelerated Food Production Programme (NAFPP) was an agricultural extension programme initiated in 1972 by the Federal Department of Agriculture during General Yakubu Gowon's regime. It aimed at bringing about a significant increase in the production of maize, cassava, rice and wheat in the northern states through subsistent production within a short period of time. The programme was designed to spread to other states in the country after the pilot stage that was established in Anambra, Imo, Ondo, Oyo, Ogun, Benue, Plateau and Kano states.

Operation Feed the Nation (OFN) evolved on May 21, 1976 under the military regime of General Olusegun Obasanjo. It was launched in order to bring about increased food production in the country through the active involvement and participation of everybody in every discipline, thereby making every person capable of partly or wholly feeding himself or herself. Under this programme every available piece of land in urban, sub-urban and rural areas was meant to be planted while government provided inputs and subsidies.

The River Basin Development Authority (RBDA): Decree 25 of 1976 established 11 River Basin Development Authorities (RBDAs). The initial aim of the authorities was to boost economic potentialities of the existing water bodies, particularly irrigation and fishery, with hydroelectric power generation and domestic water supply as secondary objectives. The objective of the programme was later extended to other areas, covering production and rural infrastructural development.

The Green Revolution was a programme launched by former civilian President Shehu Shagari in April 1980, aimed at increasing production of food and raw materials in order to ensure food security and self-sufficiency in basic staples. Secondly, it aspired to boost production of livestock and fish in order to meet home and export demands and to diversify the nation's foreign exchange earnings through production and processing of export crops. This was never achieved.

National Fadama Development Project (NFDP): The first National Fadama Development Project (NFDP-1) was designed in the early 1990s to promote simple low-cost improved irrigation technology under World Bank financing. The main objective was to sustainably increase the incomes of the Fadama users through expansion of farm and non-farm activities with high value-added output. The programme covered 12 states of Adamawa, Bauchi, Gombe, Imo, Kaduna,

Kebbi, Lagos, Niger, Ogun Oyo, Taraba, including the Federal Capital Territory (FCT). It adopted community driven development approach with extensive participation of the stakeholders at early stage of the project.

Roots and Tuber Expansion Programme (RTEP) was launched on 16th April 2003 under Olusegun Obasanjo's administration. It covers 26 states and was designed to address the problem of food production and rural poverty. At the local farmer's level, the programme hopes to achieve economic growth, improve access of the poor to social services and carry out intervention measures to protect poor and vulnerable groups. At the national level, the programme is designed to achieve food security and stimulate demand for more affordable staple food. Small holder farmers with less than two hectares of land per household were the targets of the programme while special attention was paid to women who played a significant role in rural food production, processing and marketing. RTEP also targeted at multiplying and introducing improved root and tuber varieties to about 350,000 farmers in order to increase productivity and income.

Agricultural Transformation Agenda (ATA) was launched in 2011 by the Dr Goodluck Jonathan-led government with the aim of changing the perception about agriculture as a development issue instead of pure business. The vision in the transformation strategy is to achieve a hunger-free Nigeria through an agricultural sector that drives income growth, accelerates achievement of food and nutritional security, generates employment and transforms Nigeria into a leading player in global food markets to grow wealth for millions of farmers. To achieve this vision, the value chain approach was emphasized. Fertilizer procurement and distribution, marketing institutions, financial value chains and agricultural investment frameworks were proactively emplaced.

The Agricultural Promotion Policy (APP) succeeded the Agricultural Transformation Agenda (ATA). The Agricultural Promotion Policy (APP) sets out the vision for the agriculture sector in the future. The vision of the APP is *'for agriculture to work with key stakeholders to build an agribusiness economy capable of delivering sustained prosperity by meeting domestic food security goals, generating exports and supporting sustainable income and job growth*. The purpose is to ensure that productivity growth is achieved through a 'Climate-Smart' approach to ensure GHG efficiency, thus minimising GHG emissions. The Federal Ministry of Agriculture and Rural Development (FMARD) prioritized improving productivity into a number of domestically focused crops comprising rice, wheat, maize, fish (aquaculture), dairy milk, soya beans, poultry, horticulture (fruits and vegetables), and sugar.

At the expiration of the Agricultural Promotion Policy (APP) 2016-2020, the Federal Government launched the National Agricultural Technology and Innovation Policy (NATIP) to provide an integrated approach to agricultural development in terms of access and application of improved inputs, improve the linkage between agricultural research and training institutions. The policy, according to the government, would also enhance the provision of input to farmers, improve agricultural mechanization, extension services, provide rural Infrastructure and increase access to affordable funding. It would also ensure climate change management and sustainable agriculture, nutrition, and security of agricultural land and investments.

These initiatives have helped in ensuring that the agricultural sector achieved some progress but left a lot to be accomplished in terms of national food and nutrition security. Principally, domestic production of most food commodities had not kept pace with demand. Population growth, climate change, change of food preference, urbanization, inflation and demand from neighbouring countries are among some of the factors that continued to affect food availability, its accessibility and affordability to most Nigerians

1.2.3 Climatic Systems and the Climate Change Trend in Nigeria

As mentioned earlier, the Nigerian agriculture and food systems are climate dependent and are considered as one of the most vulnerable sectors to climate change. More than 90% of agricultural production in Nigeria is rain-fed and thus susceptible to extreme climatic events. Agro-ecological zones (AEZs) are the spatial units most relevant when considering the impact of climate variability or climate change on agriculture. In Nigeria, agro-ecological zones range from humid to dry and are defined based on the combined effects of temperature, humidity and rainfall.

The variations that occur in rainfall govern types of indigenous plants that grow, or the exotic types that can be introduced successfully into the country. For instance, in the humid tropical forest zone of the south, the longer rainy season support plantation crops such as cocoa, oil palm, rubber, coffee, and staple crops like, yam, cassava, cocoyam, and sweet potatoes. The north with its lower rainfall and shorter rainy season consists mainly of the Sudan and Sahel savannas and represents almost 80% of the vegetation zones of the country (Figure 3).

The savanna is ideal for grain cultivation such as sorghum, millet, and cowpea. It is also an excellent natural habitat for grazing livestock. Because precipitation and cropping patterns differ across the agro-ecological zones, the impacts of climate variability and climate change will vary across the zones (Fig. 3).

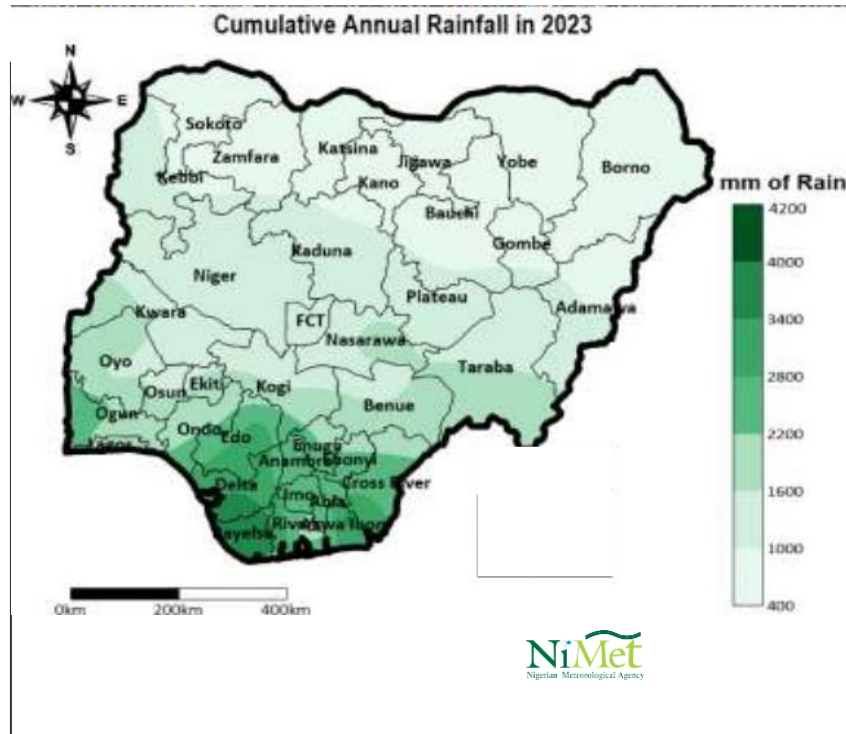


Fig. 3 Cummulative Annual Rainfall in 2023
 Source: NiMet 2023.

As a coastal state with 853 km of coastline dominated by the Niger Delta, Nigeria has an additional AEZ namely, the ocean environment which supports a vast fishery. The continuum of coastal and offshore waters together with their associated watersheds represent a distinct economic and food security source. Rising ocean temperatures have led to global sea level rise and the generation of more frequent and intense storms. These storms dump heavy rains on land, produce storm surges that inundate large expanse of agricultural lands in addition to affecting the productivity of the ocean (NARF, 2014).

The standardized rainfall anomaly analysis over Nigeria in 2023 continues to be on an increasing trend. From the analysis reported by NiMet (2023), the standardized rainfall over Nigeria was 1.3 showing that 2023 was placed as the third wettest year in Nigeria since 1981. 2019 and 2012 were the wettest and second wettest year in Nigeria since 1981 respectively. The NiMet report also shows that with the exception of 2021, 2015 and 2013, there have been consistently wet years in the country since 2006.

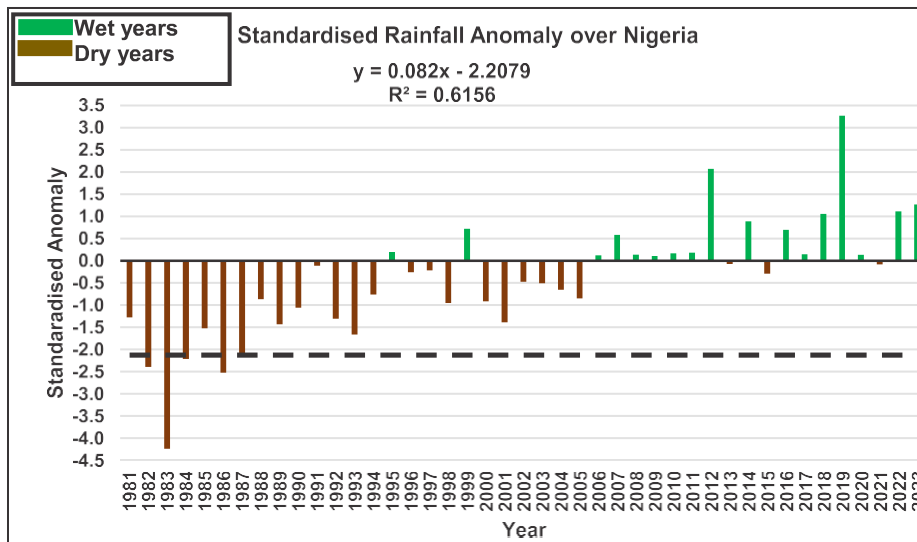


Fig. 4 Standardized Rainfall Anomaly over Nigeria, Source: NiMet 2023.

The Nigerian Meteorological Agency (NIMET, 2008) assessed the Nigerian climate over the period 1941 to 2000 and demonstrated that between 1941 and 1970, only patches of the country, in the northeast, northwest, and southeast experienced late onset of rains. However, from 1971 to 2000, late onset of rains had spread to most parts, leaving only a narrow band in the middle of the country with normal conditions (Figure 5, which shows the change in mean onset dates of the rainy season relative to the 1911-1940 period)

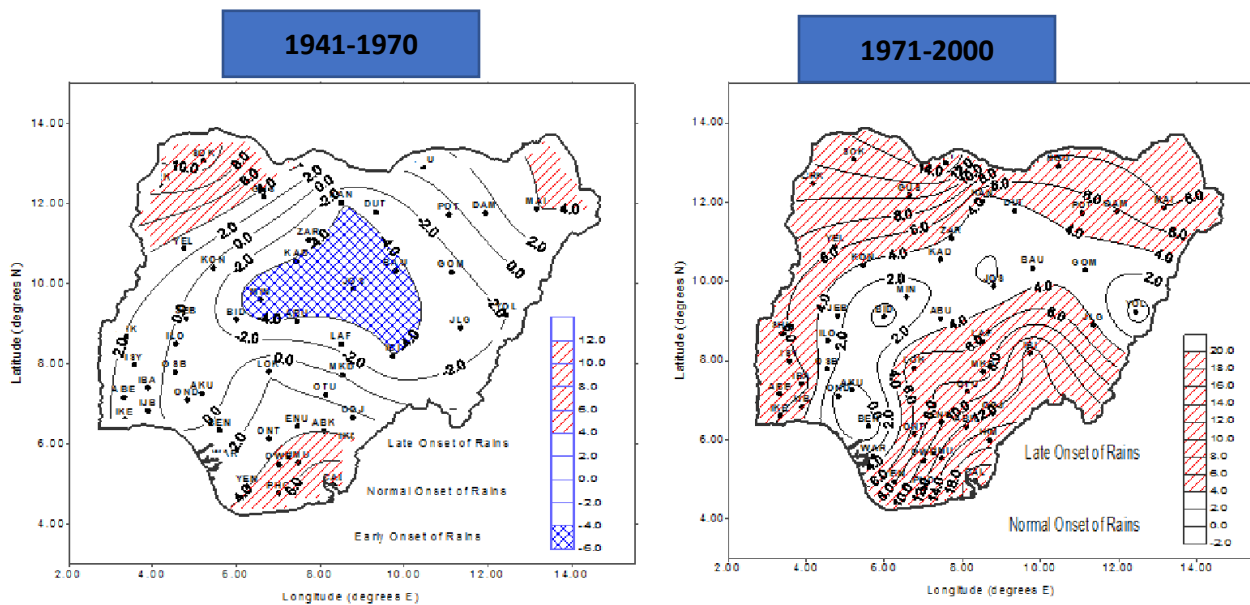


Figure 5: Nigeria: Pattern of Onset of the Rainy Season: 1941-1970 and 1971-2000 (NIMET 2008)

Similarly, only a small patch of the country in the southwest recorded early cessation of rains between 1941 and 1970, while from 1971 to 2000 early cessation of rains had covered much of the country (Figure 6), which shows the change in mean cessation dates of the rainy season relative to the 1911-1940 period. The combination of late onset and early cessation shortened the length of the rainy season in most parts of the country. In addition, between 1941 and 2000, total annual rainfall decreased by 2-8 mm³ across most of the country, but increased by 2-4 mm³ in a few places, most significantly around Port Harcourt.

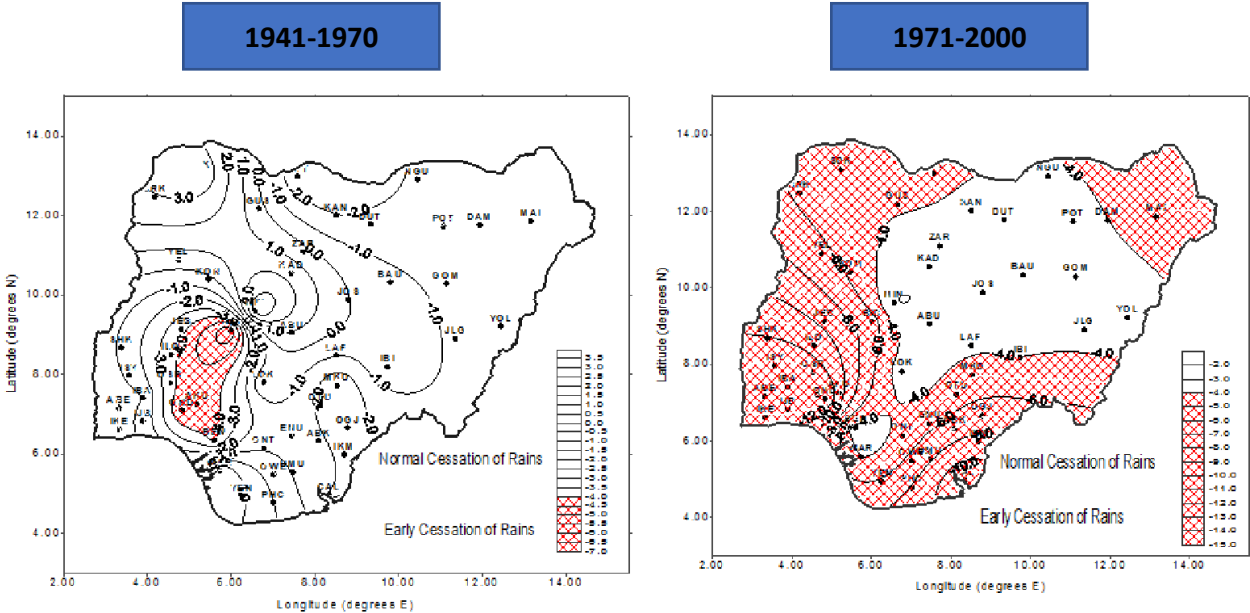


Figure 6: Nigeria: Pattern of Cessation of the Rainy Season: 1941-1970 and 1971-2000 (NIMET, 2008)

The National Agricultural Resilience Framework (2014) suggests climate change-induced yield losses of between 5 and 25% by 2050 for crops such as rice, sorghum, maize, yam, millet and cassava. Significant investments in infrastructure will be required to reduce post-harvest losses in storage and transportation. Furthermore, farmers will need to optimize the use of their inputs, such as fertilizers and pesticides. In the northern areas, there is evidence of a gradual shift in vegetation from bushes and occasional trees to grass and expansive areas of sand. This is likely to be a result of overgrazing of inappropriate grazing management and the dependence on firewood.

Future climate change is generally presented using climate scenarios, an analytic tool that provides long-term perspectives on expected changes in climate parameters under a business-

as-usual (BAU) scenario, agricultural productivity could decline between 10 to 25% by 2080. In some of the Northern parts of the country, the decline in yield in rain-fed agriculture could be as much as 50%. This reduction could reduce GDP by as much as 4.5% by 2050, even though the share of agriculture in GDP will decline from 40 to just 15%. Furthermore, in the absence of mitigating measures, the net import of rice is expected to increase by as much as 40% (Nigeria's NDC, 2016).

The projected changes in rainfall vary across the country, with the A2 scenario suggesting a wetter climate in the south, but a drier climate in the northeast. For the 2046-2065 period the projected change ranges from an average increase of 15 cm annually in the south to an average decrease of 7.5 cm annually in the north. Although projected annual rainfall increases in some parts of the country and decreases in others, all areas show increases in rainfall during at least some part of the year.

The projected changes in rainfall vary across the country, with the A2 scenario suggesting a wetter climate in the south, but a drier climate in the northeast. For the 2046-2065 period the projected change ranges from an average increase of 0.4 mm per day in the south (15 cm annually) to an average decrease of 0.2 mm³ per day (7.5 cm annually) in the north. Figure 7 shows these projected changes across the country.

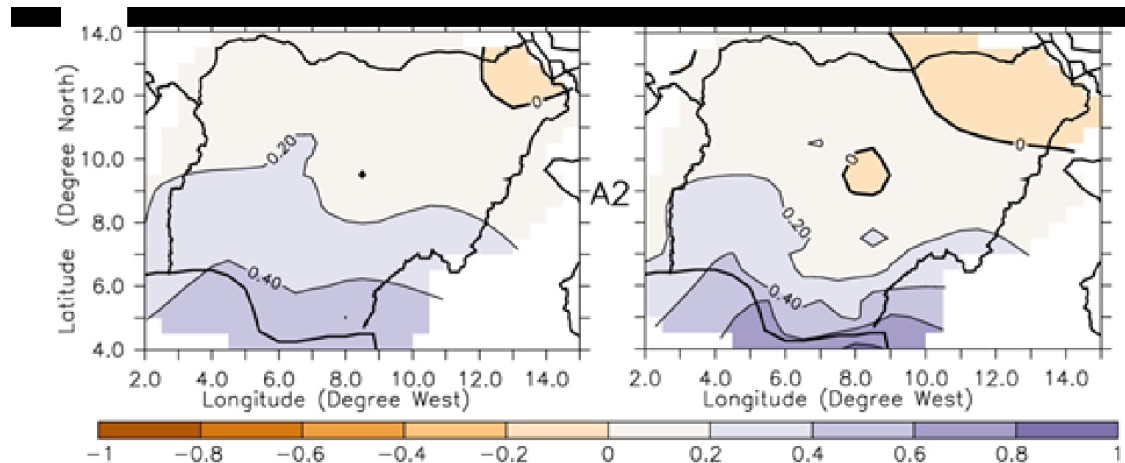


Figure 7: Projected Changes in Average Daily Rainfall over Nigeria (mm/day relative to the present-day climate) (NIMET, 2008)

Although projected annual rainfall increases in some parts of the country and decreases in others, all areas show increases in rainfall during at least some part of the year. The scenarios show a peak increase in monthly rainfall in the 2046-2065 period of about 2 mm³/day in the mangrove and rainforest zones, and about 1 mm³/day in the savanna zones. In the mangrove, rain forest

and tall grass (Guinea/Sudan) savanna, the scenarios project earlier rainfall season onset and later rainfall season cessation, resulting in a longer rainfall season by up to two weeks by the 2046-2065 period. In contrast, the scenarios project a shorter rainfall season over short grass (Sahel) savanna, with a potential decrease greater than one week. Figure 8 shows these projected changes to the rainfall season.

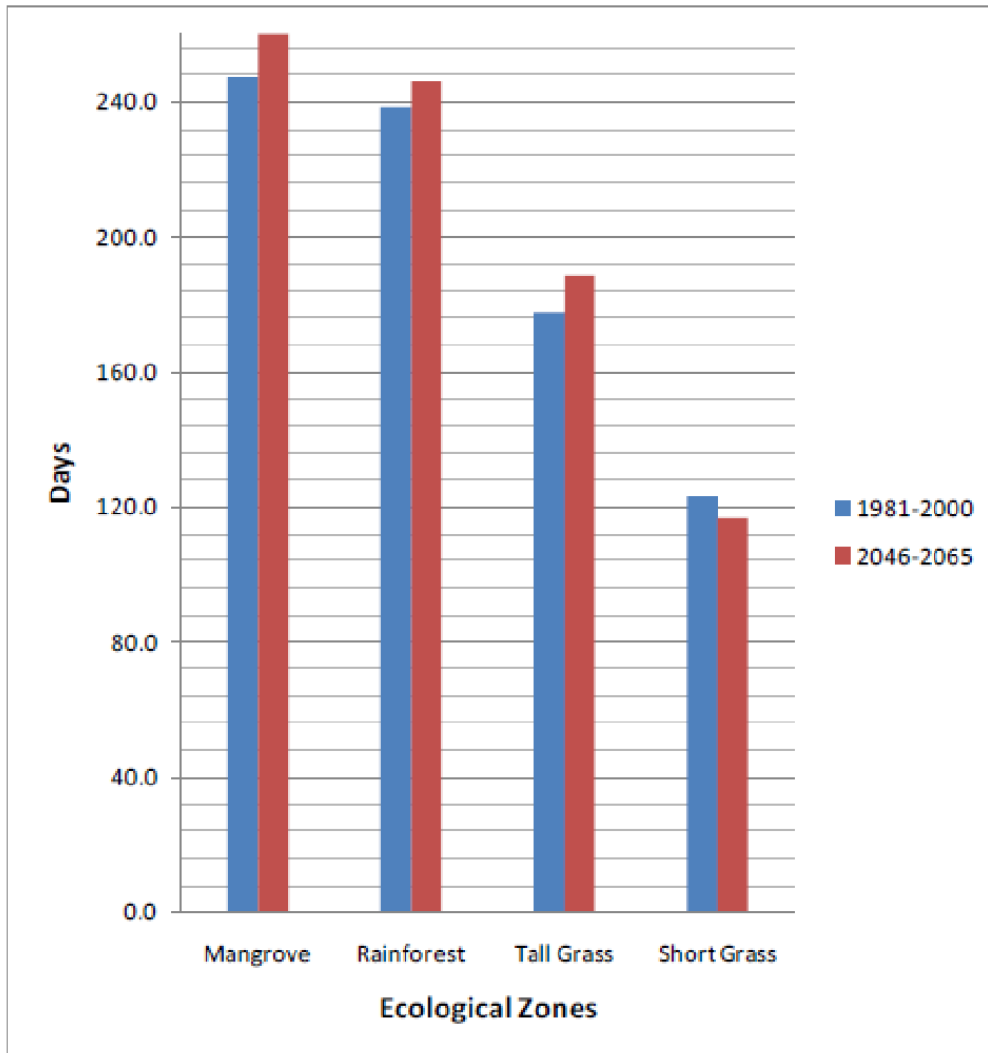


Figure 8: Projected Length of the Rainy Season by Zone (NARF, 2014)

These changes are consistent with the projected increase in temperature. The higher temperatures along the coast would increase evaporation from the ocean and produce more rainfall over the coastal region, provided there are mechanisms to trigger the precipitation process. On the other hand, a warmer climate in the semi-arid region (i.e. northeast) would decrease the atmospheric humidity (moisture in the air), and thereby reduce the chance of cloud formation and rainfall.

Overall, the scenarios suggest a warmer climate in the future. For instance, the A2 scenario projects a temperature increases of 0.04 °C per year from now until the 2046-2065 period, rising to 0.08 °C per year after 2050. However, regional variations are expected, with the highest increase (4.5 °C by 2081-2100) projected in the northeast. Figure 9 shows the projected increases in maximum daily temperature across Nigeria, presented in °C relative to the present-day climate.

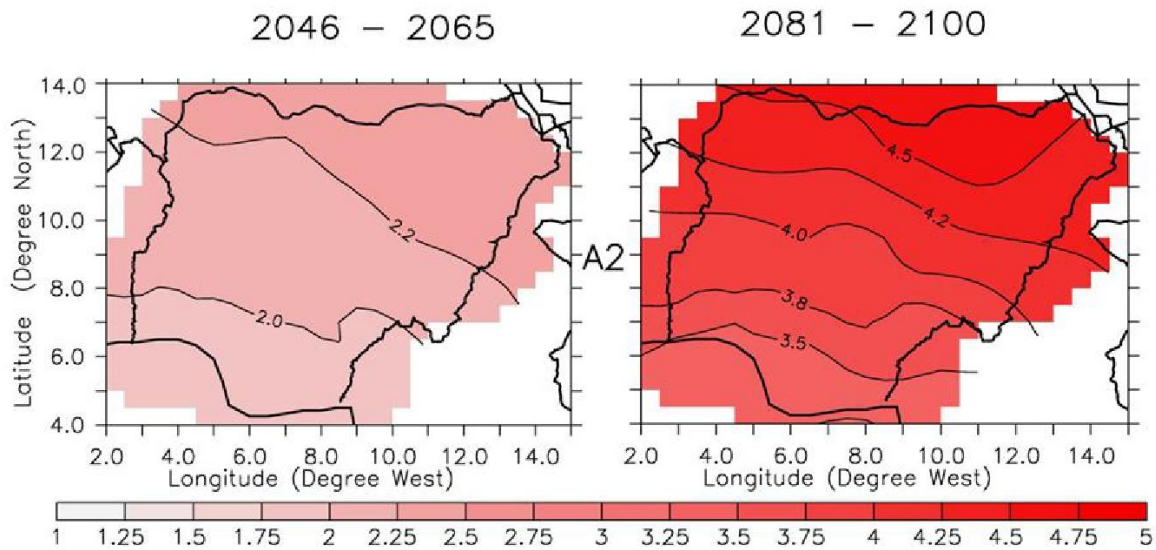


Figure 9: Projected Increases in Maximum Daily Temperature over Nigeria (°C relative to the present-day climate) (NASPA-CCN, 2011)

From 1941 to 2000 there was evidence of long-term temperature increase in most parts of the country. The main exception was in the Jos area, where a slight cooling was recorded. The most significant increases were recorded in the extreme northeast, extreme northwest and extreme southwest, where average temperatures rose by 1.4-1.9 °C (Fig 10a&b).

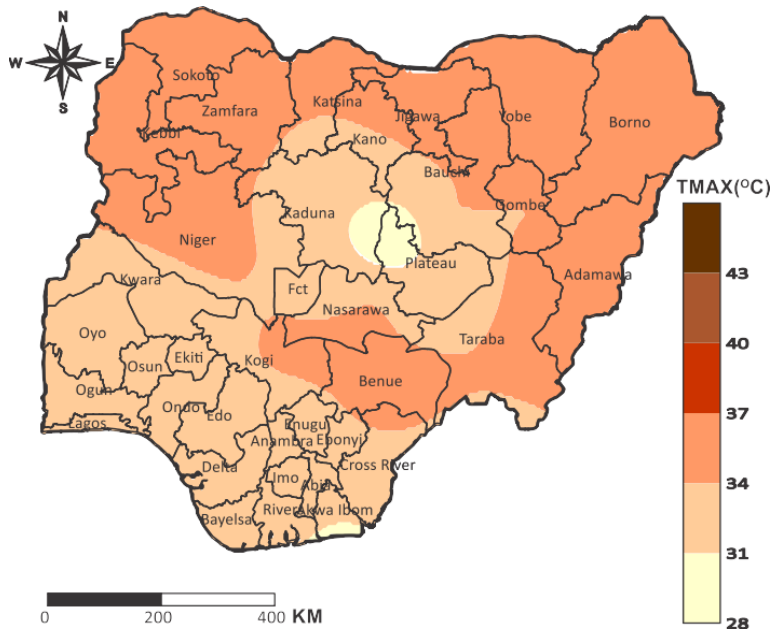


Figure 10a: Annual Mean Maximum Temperature ($^{\circ}\text{C}$) (NIMET, 2023)

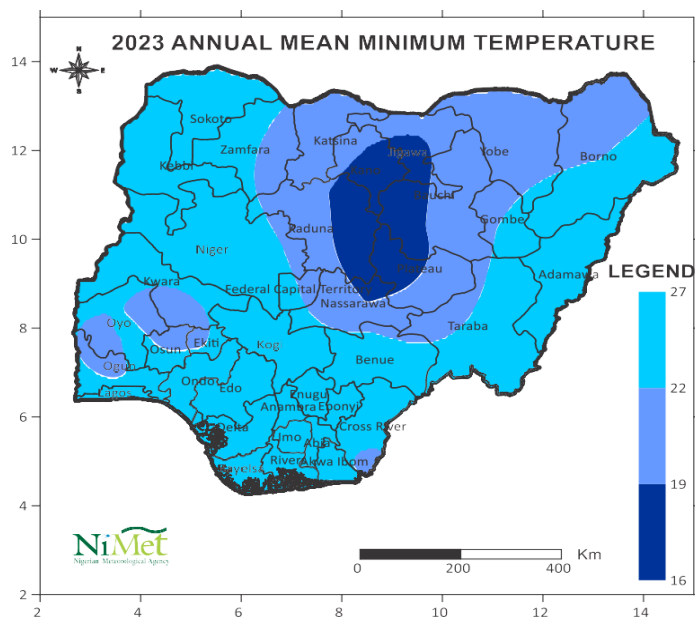


Figure 10b: Annual Mean Minimum Temperature ($^{\circ}\text{C}$) (NIMET, 2023)

The variability and changes in temperature and rainfall patterns are already impacting agriculture, food and nutrition security, as well as the hydrological regimes of rivers in the Lake Chad Basin leading to water scarcity, scarce resources and violent extremism. These effects, coupled with the low adaptive capacity, poverty, low level of technology, dearth of information on climate science and poor land management practices have greatly increased the uncertainties of climate related hazards in Nigeria. These impacts are expected to increase in the future. It is

estimated that in the absence of adaptation, climate change could result in a loss of between 2% and 11% of Nigeria's GDP by 2020, rising to between 6% and 30% by the year 2050. This loss is equivalent to between N15 trillion (US\$100 billion) and N69 trillion (US\$460 billion). This large projected cost is the result of a wide range of climate change impacts affecting all sectors in Nigeria (NASPA-CCN, 2011).

1.2.4 Climate change impact on agriculture

Nigeria has over 84 million hectares of arable land, abundant and reliable rainfall, diverse resources for agricultural production, a large population of 213.4 million people and a large labour force who are predominantly of working age (World Bank & USCB, 2021). The high population growth in Nigeria is increasing the demand for food production. This is important to reduce malnutrition and worsening poverty conditions and food insecurity in the country. It has been argued that half of the 2.4 billion increases in global population that will occur between 2013 and 2050 will occur in sub-Saharan Africa (SSA), and 47% of Africa's population is currently living in urban areas (Statista; 2023).

Meeting food demand for a growing population is already a formidable challenge for the agricultural sector, but it will further be exacerbated by climate change. The expected effects of climate change – higher temperatures, extreme weather events, water shortages, rising sea levels, the disruption of ecosystems and the loss of biodiversity – will generate significant effects on the different dimensions and determinants of food security by affecting the productivity of rainfed crops and forage, reducing water availability and changing the severity and distribution of crop and livestock diseases (Leslie *et al*, 2018).

Agriculture is the mainstay of Nigeria's economy, employing approximately two-thirds of the country's total labour force and contributing about 23 percent to Nigeria's GDP (Financial Watch, 2016). Despite Nigeria's huge agricultural potential, Nigeria is a food-deficit nation and depends on the importation of staple food such as grains, livestock products and fish to meet the demands of its teeming population (IFAD, 2012; Jung, 2023).

Climate change is capable of putting future food, fodder and fibre production and ecosystem services under additional risk and uncertainty. The changing and erratic rainfall patterns in the country make it difficult for farmers to plan their operations, may reduce the cropping season and can lead to low germination, reduced yield and crop failure. Climate futures have therefore become very uncertain and unpredictable in most parts of the country.

Climate change will make the cultivation of certain crops difficult in some areas or places in the country. Anticipated climate change will result in less rainfall and warmer temperatures in some

places. Other projections predict that rainfall will continue to be erratic and will take more extreme forms (Läderach *et al*, 2010; IPCC, 2023;).

The agriculture sector is not only among the most vulnerable sectors to the impacts of climate change, but also directly responsible for 14 percent of global greenhouse gas emissions. The impacts of climate change will reduce productivity and lead to greater instability in production in the agricultural sector (crop and livestock production, fisheries and forestry) in communities that already have high levels of food insecurity and environmental degradation and limited options for coping with adverse weather conditions (Ani *et al*, 2022).

Climate change will have significant impacts on agricultural yields, post-harvest losses and food security. Climate change will put future food, fodder and fibre production and ecosystem services under additional risk and uncertainty. Changing and erratic rainfall patterns make it difficult for farmers to plan their operations, may reduce the cropping season and can lead to low germination, reduced yield and crop failure (Ibrahim *et al*, 2015). Climate future has therefore become uncertain and unpredictable. The sector is a major contributor to greenhouse gas emissions

Under a BAU scenario, agricultural productivity could decline between 10 to 25% by 2080. In some of the Northern parts of the country, the decline in yield in rain-fed agriculture could be as much as 50%. Climate change has the potential to jeopardize all the opportunities associated with agriculture in the country. Climate change will make it difficult for a typical smallholder farmer to produce enough to feed and clothe his households. Farmers are exposed to little or no financial facilities to enhance their engagement in climate smart agriculture. With climate change some of the relevant funds such as the Green Climate Fund, Adaptation Fund for Smallholder Agriculture programme, and Green Bond may not be available for the farmers to access. The substantial contribution of agriculture to local economies will be lost. There will be a loss of full-time employment opportunities for over 80% of Nigerians who depend on it both directly and indirectly as a source of livelihood.

Also, very important is the taxes that agricultural land and agribusinesses provide to support government services. These losses to climate change will include other important non-traditional economic impacts that local agriculture creates through tourism, wildlife viewing, fisheries, hunting, and recreation. All the three sectors of agribusinesses will be affected by climate change. These major sectors of agribusiness include the agribusiness input, agribusiness output, and agriservices. Climate change will also affect all five sub-systems of agribusinesses which include the input subsystem, the production subsystem, the processing subsystem, the marketing subsystem and the support subsystem. Climate change will also result in the loss of the

contribution of agriculture to National GDP and world economies. All these will result in a vicious cycle of heightened insecurity and no agribusiness. Other impacts of climate change include scarce land, less food to eat (hungry man is an angry man), more violent conflicts and heightened insecurity.

Climate change can also result in loss of agricultural lands and death of livestock as witnessed during the 2012 floods, which affected 7 million people in 30 of the 36 states, displaced 2.3 million people, and killed 363 (Amangabara & Obenade, 2015). Its cost to the economy was at the time estimated to be NGN 2.6 trillion / USD 17.3 billion or 1.4% of GDP. In 2018, the country was again struck, with floods affecting 12 states. Over 2 million people were impacted, with 199 deaths and over 4,000 people injured. More than 600,000 people were internally displaced. The damages to property and agricultural land were massive (FMEnv, 2021).

1.2.5 Agricultural Production Trends in Nigeria

The agricultural GDP is contributed by Crops (85%), Livestock (10%), Fisheries (4%) and Forestry (1%). More than 90% of the agricultural output is accounted for by small-scale farmers with less than two (2) hectares under cropping. It is estimated that about 75% (68 million ha) of the total land area has potential for agricultural activities with about 33 million ha under cultivation. Similarly, of the estimated 3.14 million ha irrigable land area, only about 220,000 ha (7%) is utilized (FMARD Food Security Programme, 2008). Nigeria has diverse and rich vegetation capable of supporting a heavy population of livestock as well as 267.7 billion m³ of surface water and 57.9 billion m³ of underground water. The country is also blessed with a reasonably abundant rainfall of between 300 mm³ to about 4000 mm³ per annum as well as an extensive coastal region that is very rich in fish and other marine products.

The trends in agricultural production in Nigeria are discussed under crops, livestock, fisheries and forestry in the sections below.

1.2.5.1 Crop production

Nigeria has 79 million hectares of fertile land. However, only 32 million hectares (46%) of these are cultivated. More than 90% of agricultural output is accounted for by households with less than 2 hectares under cropping. Typical farm sizes range from 0.5 hectares in the south to 4 hectares in the north (FMAWR, 2008). The States in Nigeria with comparative advantage in crop production are listed in Table 1.

Table 1: States in Nigeria with comparative advantage in crop production (FMARD, 2008)

S/No.	Commodity	State	Estimated Ha Required for Self Sufficiency (*000)
1	Rice	Anambra Bayelsa, Benue, Delta, Ebonyi, Edo, Kebbi ,Kogi, Kwara , Niger, Ogun, Rivers , Taraba, Kano, Kaduna	To be determined at State level for all commodities. Minimum of twenty thousand (20,000) ha is expected to be brought under cultivation in each State of the Federation and the FCT in the first phase.
2	Wheat	Bauchi, Borno, Jigawa, Kano, Katsina, Kebbi, Yobe, Zamfara	
3	Sugarcane	Adamawa, Kano, Kogi ,Kwara, Niger, Taraba, Zamfara,	
4	Tomato	Adamawa, Kano, Katsina. Kogi , Kwara Niger, Taraba, Zamfara	
5	Cotton	Gombe, Kano, Jigawa, Katsina, Ogun, Oyo, Zamfara	
6	Soybeans	Benue, Kaduna, Taraba, Niger, Kano	
7	Maize	Plateau, Kaduna, Niger, Taraba, Borno, Ogun	
8	Cowpea	Zamfara, Kaduna, Borno, Niger, Kano	
9	Cocoa	Ondo, Edo, Osun, Ogun, Oyo, Kogi, Ekiti, Cross River	
10	Jatropha	Katsina, Jigawa, Kebbi, Sokoto, Borno, Yobe, Kano	
11	Rubber	Edo, Delta, Ondo, Ogun, Abia, Imo, Cross River	
12	Oil Palm	Kogi, Ebonyi ,Edo, Abia, Imo, Anambra ,Rivers,Cross River, Akwa Ibom	
13	Groundnuts	Kano, Katsina, Sokoto, Jigawa, Kaduna	
14	Cassava	Benue, Ogun, Imo, Oyo, Taraba, Kogi, Kaduna, Ondo, Cross River, Enugu	

Although arable land in Nigeria is suitable for cultivating most crop types, crop yields are far below potential as clearly demonstrated in Figures 11. Consequently, Nigeria records on the overall average about 4 tonnes of agricultural product/ hectare compared to about 13-14 tonnes/ hectare in some other countries.

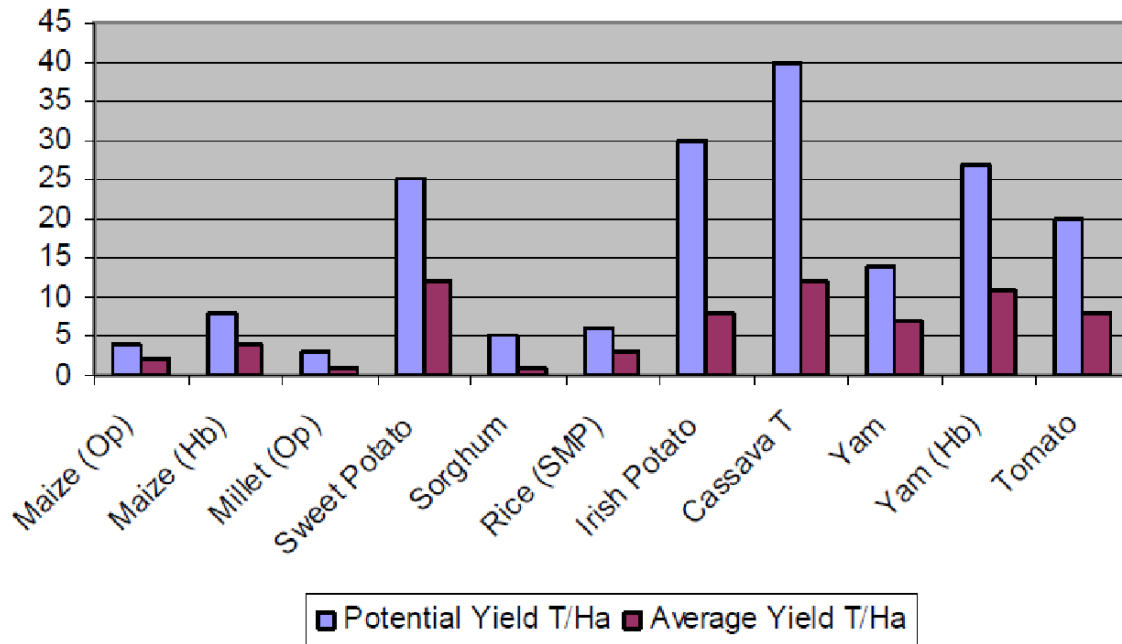


Figure 11a: Crop yield in Nigeria versus Potential yield (Source FMA & WR Analysis 2008)

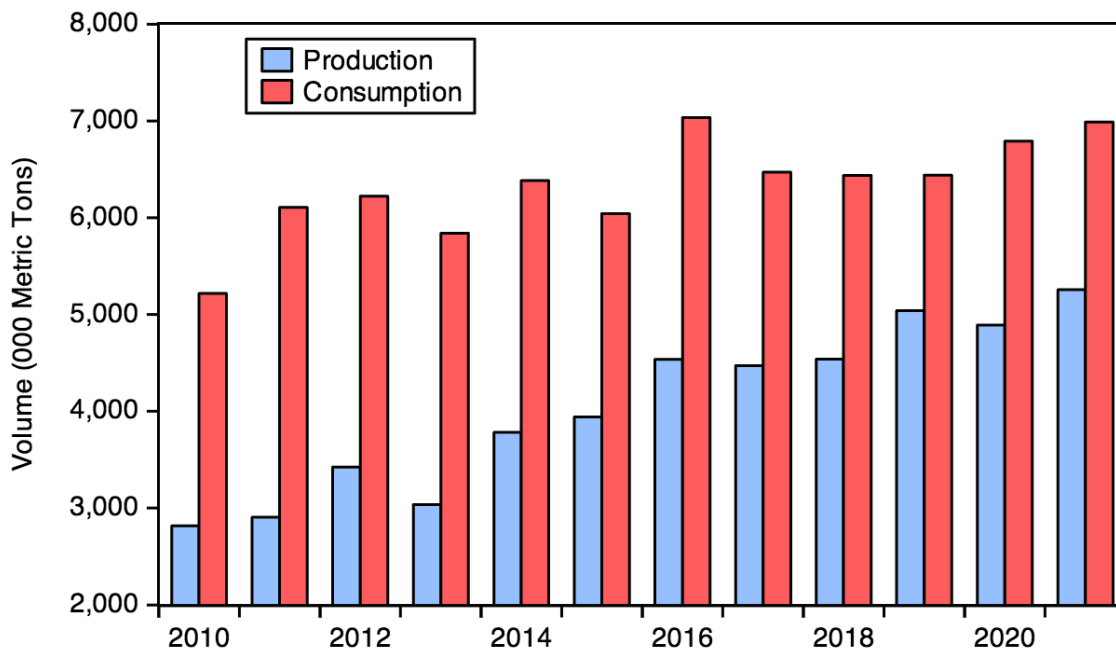


Figure 11b. Rice Production and Consumption Trends in Nigeria (2010 – 2021) Source: Sani et al, 2023.

Climate impact on agriculture varies considerably by agro-ecological sub zone (AESZ) and crop type. The results of the World Bank case study indicate lower yields in the longer term (2050)

with negative median values for all crops in 2050. The consensus of models is clearer for 2050, with 70 % pointing to lower yields and rice appears to be the most vulnerable crop throughout, with yields falling as much as 7 % in the short term and 25 % in the longer term. Despite the significant level of variability across space, by 2050 the aggregated yield decline is pronounced in the northern part of Nigeria. On the other hand, while an increase in total annual rainfall could have a beneficial effect on the productivity of cassava and ginger, the productivity of yam, maize, tomato, and melon is threatened by an increase in total annual rainfall.

The projected mean annual precipitation could also threaten such productivity. On the other hand, extreme temperatures have a negative association with cassava and sweet potato yields, which indicate that temperature change is likely to be the major driver of yields shocks, rather than precipitation. As the annual maximum temperature increase in 2050 and 2070 under both scenarios (RCP4.5 and RCP8.5) could range from +3°C to +4°C, the impact on cassava and sweet potato could be a negative impact on the productivity of these crops.

Using crop modelling projections, the study by Hassan *et al* (2013) predicted a 5-25% loss of yield in areas planted with sorghum in the northern Sahelian zone, which is already prone to extreme climate variability. This is likely the result of the expected temperature increase making it too hot for sorghum cultivation in these areas. The expected impact of climate change on food production is not all negative. For example, millet production and yield are predicted to increase in all scenarios, although the area planted with the crop will remain unchanged. Similarly, the production of cassava and other root crops as well as sweet potatoes and yams is projected to increase in all scenarios (Hassan et al., 2013). The results of the World Bank study (Cervigni et al., 2013a) are similar in some regards but with important distinctions. The key findings are that by 2050, the probability of lower yields in all cereals in all the agro-ecological zones is very high, except for Millet and maize, where projections for parts of the country are uncertain. Rice is particularly vulnerable in the northern parts of the country where yield declines of 20-30 percent are predicted (Figure 12). Notably, the results for root crops, cassava and yams, show high variability with some models. These results suggest yield decline in both 2020 and 2050, while other models show significant increases in cassava yield for both periods (Cervigni et al., 2013a).

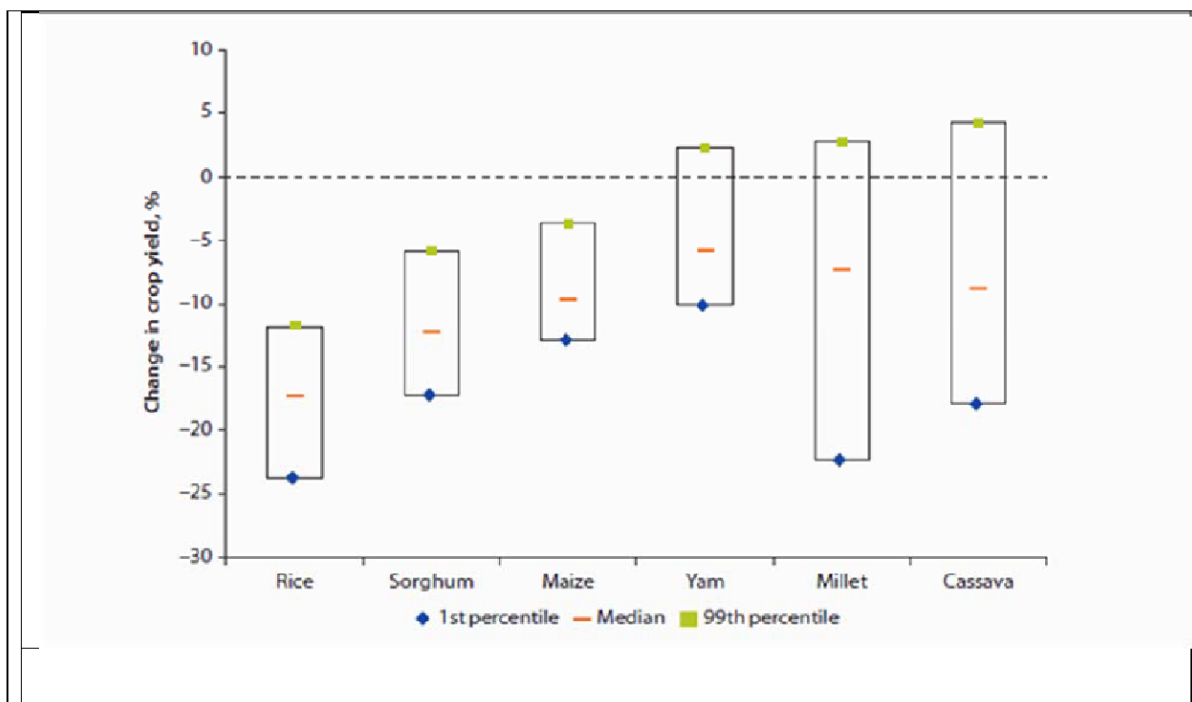


Figure 12: Projected changes in crop yields over Nigeria by 2050 Source: Cervigni et al 2013a

In order to ensure the highest impact from the NFS Program (FMAWR, 2008), 12 crops have been identified as being of strategic importance and will attract primary attention in specific locations in the quest for food security in Nigeria. These are:

Table 2: Strategic Crops per geographic areas in Nigeria

	North East	North Central	North West	South West	South East	South South
Crops	Wheat Rice Maize Millet Sorghum Vegetables Sugar Cane Cassava Cow pea Tomato Cotton	Rice Maize Millet Sorghum Yam Vegetables Sugar Cane Cassava Cow pea Tomato Cotton	Wheat Rice Maize Millet Sorghum Vegetables Sugar cane Cassava Cow pea Tomato Cotton Ginger	Rice Yam Vegetables Cassava Cowpea Cocoa Oil Palm	Rice Yam Vegetables Cassava Cocoa Oil Palm	Rice Yam Cassava Vegetables Cocoa Oil Palm

The objective is to encourage specific locations to focus on the production of specific crops (at least 2 crops per state for which it has comparative advantages with the goal of achieving optimal

productivity. Centres of excellence (Farmer Support Centres) for these crops will be established in selected locations to serve as demonstration, research and support centres. Centres for fishery and livestock will also be created in strategic locations across the country.

In the National Agricultural Technology and Innovation Plan (NATIP, 2021-2024), the key actions in crop sub sector are to:

- Increase the yield of priority foods and cash crops per unit area
- Increase farmers access to quality inputs nationwide
- Reduce production and postharvest losses by 50% in food and cash crops by 2023
- Increasing storage capacity of Nigerian Strategic Reserve from 1.3 to 2.5 MT by 2023
- Produce 70% of the total food and feed demand of the country by 2023
- Provision of 25 agro-processing facilities tied to the silos and other cottage industries for value addition by 2023 and
- Support the establishment of 10 large-scale rice processing mills nationwide by 2023.

1.2.5.2 Fisheries and aquaculture

Fish supply in Nigeria has continued to be in short supply relative to demand (Byrd et al, 2022). Nigeria's fish supply come from four main sources; small-scale fisheries, large scale fisheries, aquaculture, and imported products. Combined, these four sources supply an estimated 1,859,000 metric ton of fish and other aquatic foods. Most fish harvested in Nigeria are captured by small-scale fisheries; in 2017 approximately 941,000 metric tons of fish and other aquatic products were harvested by small-scale fisheries, compared with 13,000 metric tons from large scale fisheries. Attempts have continued to be made to bridge the demand/supply gap through imports (about 700,000 mts of fish annually at a significant cost of over of US\$500.0m per year). The shortfall in fish supply could have been substantially addressed if the 1.7m hectares of available inland water bodies had been utilized for fish production and aquaculture, while also ensuring value addition in the entire production chain. Aquaculture remains an underdeveloped sector in Nigeria, and mainly focuses on two fish species: catfish and tilapia (Subasinghe et al, 2021).

Figure 13 also indicates the capacity utilization of the fishery potentials of the country. In fact, the preponderance of peasant farmers produces at far below average yield. Consequently, 40% of household income is spent on food in a country where, according to the World Bank, 54% of the population lives on 1 dollar per day (World Bank, 2015b).



Figure 13: Capacity utilization of the fishery potentials of the country

To address the challenges of fish production, the National Agricultural Technology and Innovation Plan (NATIP, 2021-2024) has the following key actions in fishery and aquaculture subsector, which include to:

- Establish 7 fish farm estates in each of the geopolitical zone including FCT (6 medium scale estates and 6 mega integrated estates)
- Establish 7 fish feeds production centres and processing plants nationwide
- Increase the production of fingerlings per annum from 500 million to 2.0 billion to boost fish production from 26.3% to 36.3% by 2023
- Promote shrimp culture and ornamental fish culture to boost export to earn a minimum of \$100 million annually.

1.2.5.3 Livestock

Nigeria's livestock sector plays a vital role in the economy, contributing about 17% of the agricultural GDP and 5% to the national GDP (ILRI, 2023). Livestock production accounts for one third of Nigeria's agricultural GDP, providing income, employment, food, farm energy, manure, fuel and transport (Nuru, 1986). Approximately 75% of all the livestock in Nigeria are in the northern region (World Bank, 1992). Table 3 shows the major areas of livestock and poultry distribution in Nigeria.

Table 3: Major areas of livestock and poultry distribution in Nigeria (Njoku, 2007)

Species	Zones	% Concentration
Cattle	NE/NW/NC	85
Goats	NW/NE/NC	80
Sheep	NE/NW/NC	70
Pigs	NC/SW/SE	80
Poultry	SW/SE/SS	85

The climate change hazards affecting livestock in Nigeria include late onset of rains, higher than normal temperatures, flooding, salt-water intrusion and windstorms. The late onset of the rainy season causes a lack of available water for livestock and reduces forage production. Higher than normal temperatures lead to poor livestock health which reduces their market value, thereby reducing the farmers' income. Flooding leads to loss of livestock, destruction of livestock enclosures and outbreak of diseases.

The livestock sub-sector is particularly susceptible to climate change due to the extent that livestock depend on water for survival. Shortage of rainfall, late onset of rains and rising temperature in the Sahel and Sudan savannas will result in declining livestock productivity and production as well as increased incidence of diseases. In the rainforest and coastal zones, flooding and erosion will displace livestock farmers, destroy their assets and increase disease infestation on livestock farms. This trend will ultimately reduce animal protein supply in the country as much as the livestock production in Nigeria comes from these regions.

In livestock production, local supplies have been inadequate with an estimated 30% of livestock slaughters imported from neighbouring countries. The daily animal protein intake per head per day is currently at 10 grams compared to FAO recommended 36 grams. The Livestock Population levels for the period between 1992 and 1999 and 2001 and 2007 are respectively depicted in Figure 14 and Table 4

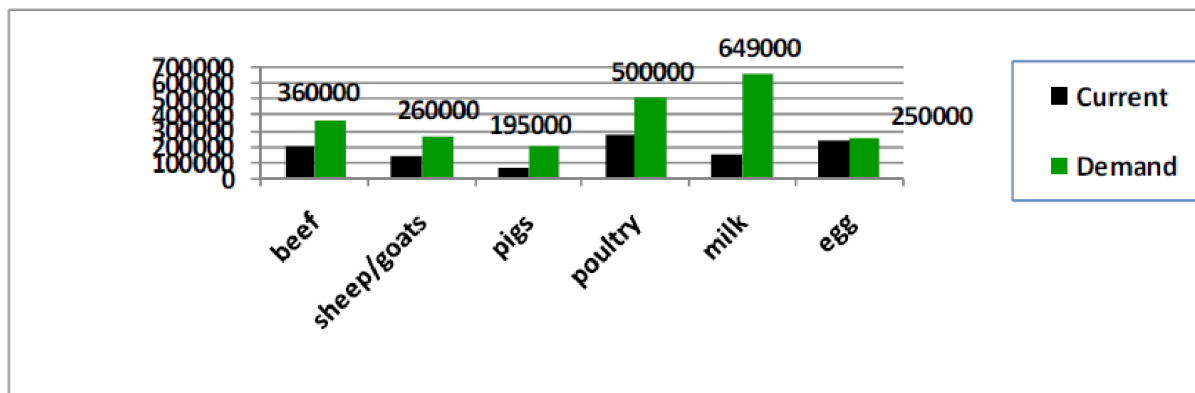


Figure 14: Livestock Production Levels in Nigeria (MT) Source: ILCA, NISER, Animal Science Department UI, PDLPCS between 1992-1999)

Table 4: Livestock production in Nigeria 2001-2007 Source: Federal Dept. of Livestock

Species	2001	2003	2005	2007
Cattle	15,334,618	15,602,601	15,875,267	16,152,698
Goats	45,260,430	47,551,739	49,959,046	52,488,222
Sheep	28,692,632	30,086,406	31,547,883	33,080,353
Pigs	5,249,538	5,677,901	6,141,217	6,642,341
Poultry	123,966,884	136,673,490	150,682,522	166,127,481

As at 2011, livestock production levels were estimated as follows: Cattle 16 million, Sheep 33 million, Goats 52.4 million, Pigs 6.64 million and Poultry, 166 million. Meanwhile, current estimates of Poultry & Milk supply are 0.27million metric tonnes and 0.15million metric tonnes respectively while demand estimates are 0.5 million metric tonnes and 0.65m million metric tonnes. This scenario creates an annual shortfall of 0.23m million tonnes for Poultry and 0.4million metric tonnes for milk (NASPA-CCN, 2011). Factors contributing to this performance in livestock include the following: Increased pressure on grazing land, Trans-boundary Animal

Diseases (TADs), Ineffective Livestock Marketing System, Lack of efficient and hygienic Livestock Processing facilities, Poor genetic quality (slow growth & low milk yield (NASPA-CCN, 2011).

In the National Agricultural Technology and Innovation Plan (NATIP, 2021-2024), some of the key actions to address these challenges in the livestock sub sector include to:

- Reactivate intensive smallholder livestock fattening scheme
- Reseed and rehabilitate grazing reserves
- Increase the number of milk collection centres in each of the production clusters
- Increase 15,000 km stock routes and grazing corridors from the current 8,966 km
- Upgrade the existing Animal Genetic Resource Centres to serve farmers needs
- Strengthen animal extension service delivery
- Partner with the private sector to increase the hatchery capacity for broiler, layer and turkey by 50 percent
- Increase support to livestock feeds production
- Strengthen veterinary services

It is obvious that the current situation in the agricultural sector requires an urgent and concerted effort with all stakeholders actively participating. Government's role will be to provide an enabling environment and chart a course of action. Overall success will only be guaranteed if there is synergy and active participation among all stakeholders (public, private sector, civil society organizations and development partners).

1.2.5.4 Forestry

Nigeria's forests extend over 6,993,000 hectares, which is 7.7% of the country's total land area. The forestry sector plays an important role in the Nigerian economy in the provision of goods and ecosystem services and contributes to the sustainability of the environment. The sector has historically been important to the Nigerian economy as a major contributor to the national GDP. The sector provided employment for a large number of people and contributed two-thirds of GDP in the 1970s, before this contribution declined significantly over the past decades to about 2% of GDP (Nigeria's REDD_ Strategy, 2021). The sector offers opportunities for sustainable livelihoods and poverty eradication in the country, particularly in rural areas where the majority of the people live. Forestry products contribute between about 0.41 % to the total Gross Domestic Product at 2013 basic price (FRN, 2014), or 2.4% as reported in Nigeria's Country Report for Nigeria for the Forest Resource Assessment (FRA) Report (2015).

However, forest resources in Nigeria have undergone changes from both natural and human-induced activities. Global climate change is a new challenge as it is having a significant negative impact on this natural resource and weakening its capacity to provide critical ecological resources and services. The direct and indirect climate change hazards that affect the forest ecosystem include: Land use change and deforestation, Drought, Flooding of low-lying landscapes, Erosion,

Sea level rise, Changes in precipitation, and Warmer temperatures. The national deforestation rate, estimated at 3.7%, is one of the highest in the world. The change in the forestry sector is a high net source of GHG emissions in Nigeria, accounting for 40% of the country's total GHG emissions in the year 2000, mainly due to losses of forest and other woody biomass stocks. There has been a significant decrease in Nigeria's forest resources between 2000 and 2015 with a total rate of loss in terms of area (especially primary, and other naturally regenerated forests) remaining consistently at around 400,000 ha/a between 2000 and 2015. The corresponding loss in biomass was 42%, which equates to almost 2 billion tonnes of carbon (Nigeria's REDD+ Strategy, 2021). Figure 15 shows the trend in forest cover and land use between 1975-2013.

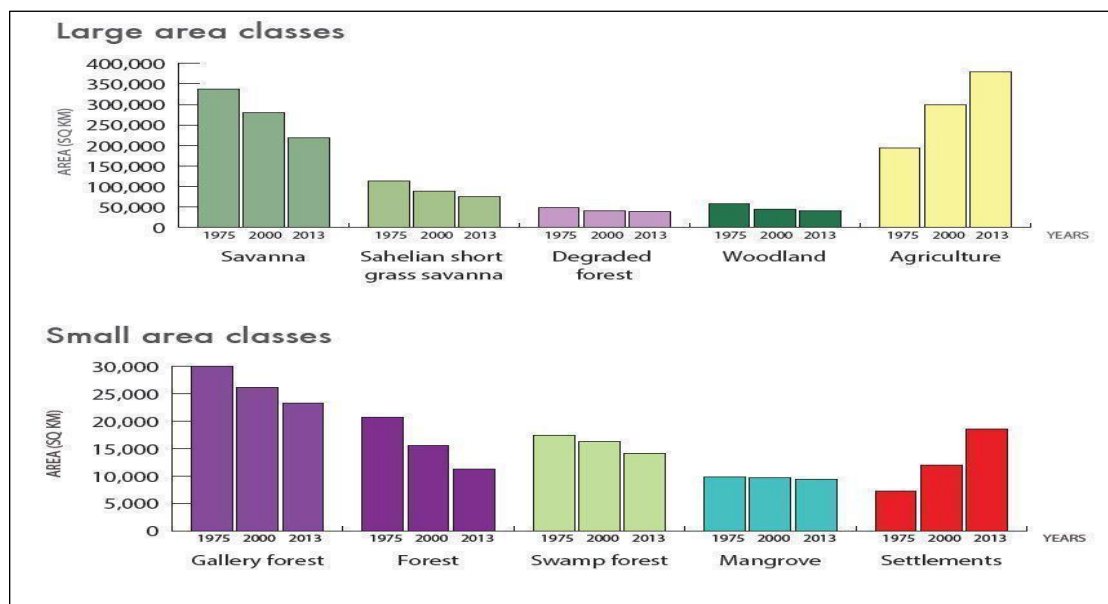


Figure: 15 Trends in forest cover and land use between 1975 and 2013 (REDD+ Strategy, 2021)

Some of the changes in forest cover changes between 1975 and 2013 include:

- Increases in land use cover for mangrove, freshwater swamp and water bodies due to increasing invasion of the ecosystem by invasive species, especially *Nypa palm (Nypa fruticans)* and other coastal vegetative bluff as well as increased water volume in lakes, dams and creeks, resulting partly from sea water inundating estwhile well-drained coastal lands and probable coastal subsidence especially around the Niger Delta;
- Decreases in land use cover for undisturbed forests, disturbed forests, tree crop plantation and forest plantation due to agriculture, logging, and bush burning among others; and
- Decreases in the areas of savanna ecosystems due largely to expansion in agricultural lands.

In view of these increasing changes, key objectives of REDD+ Strategy for Nigeria (2021) are to:

- i. Implement sustainable forest management programmes, focusing on reduction of major drivers of deforestation and degradation across the ecological regions of Nigeria.

- ii. Build capacity of local communities in improving forest management by introducing sustainable livelihood programs.
- iii. Promote good governance at all levels for the sustainable management of the country's forestry resources.
- iv. Ensure equitable access and distribution of REDD+ co-benefits to all affected parties, including women, youths and other vulnerable groups.
- v. Facilitate access to global and national resources and partnership for the sustainable management of the country's forest resources.

1.2.6 Institutional arrangements for agricultural development

Nigeria is a Federal State with 36 states and the Federal Capital Territory of Abuja. The Country is governed by Federal, State and Local Government Institutions. Most of the federal government institutions and departments are represented at the state level. Under the current constitutional guidelines, the Federal Government sets the policy framework while the state governments develop their own specific policies to fit within the overall framework. Furthermore, the Federal Government can influence the operational policies and institutional arrangements in the states and local governments through macroeconomic policy direction, for which it has executive powers, and by directly intervening in agriculture and rural development using its own budget and resources.

At the Federal level, the Federal Ministry of Agriculture and Rural Development (FMARD) is responsible for development, review and implementation of policies for agricultural development dealing with crops, livestock, fisheries, and forestry, which is now subsumed under the Federal Ministry of Environment. FMARD has the mandate to ensure food security in crop, livestock and fisheries; stimulate agricultural employment and services; promote the production and supply of raw materials to agro-industries; provide markets for the products of the industrial sector; generate foreign exchange and aid rural socio-economic development. Their vision is to *grow Nigeria's agriculture sector, drive income growth, accelerate food and nutrition security, generate employment, and transform Nigeria into a leading global food market with wealth for farmers* while the mission is to *organize and manage the agriculture sector and facilitate agribusiness for increased food security and employment along commodity value chains and agro-industrial development to earn foreign exchange and contribute to socio-economic development of the country*. The FMARD has both Technical and Service Departments as well as Agencies and institutions that assist in the actualization of its strategic mandate.

Other key federal institutions that are directly involved in agriculture-related issues are the Federal Ministry of Water Resources, and the Federal Ministry of Environment. The policy actions of these ministries and departments are coordinated by the National Council on Agriculture (NCA), which has the Federal Minister of Agriculture and Rural Development as the chairman and the State Commissioners of the same as members. The specific function of NCA involves the

adoption of new agricultural policies and periodic provision of policy advice to the authorities about the implementation of existing agricultural programmes. The Federal Ministries of Water Resources, Environment, Finance, Trade and Industry and other agencies, which have related activities relevant to agriculture and natural resources management, are also active participants at NCA meetings. The Federal Legislatures play an important role in agriculture development through their budgetary appropriation and oversight responsibility for supervising the policy process in agriculture at the federal level.

At the state level, all state-level ministries are similar with minor differences based on each state's ecological situation and peculiarities. Usually, the following technical departments such as Agriculture Development, Livestock and Veterinary Services, Pest Control Department, Fisheries Department, and Forestry Department define the State Ministry of Agriculture. There is also the existence of some individual State Councils on Agriculture, even though they may not be as vibrant as the National Council on Agriculture at the federal level. The State Legislatures play an important role in agriculture development through their budgetary appropriation and oversight responsibility for supervising the policy process in agriculture at the state level.

The Local Government Councils (LGCs), which are the government tier closest to the rural community, have the function of supporting the state governments in agriculture and rural development. The Fourth Schedule of the 1999 Constitution of Nigeria, gives local councils, inter alia, the authority to; provide and maintain primary, adult, and vocational education; develop agriculture and natural resources other than the exploitation of minerals; and provide and maintain primary health services.

Apart from these three-tier structure, there are also the Development Partners/Donor Agencies, Organized Private Sector and Civil Society Organizations that are actively involved in the agriculture sector. The private sector and NGOs play vital roles in the food supply chain and can bring much needed finance.

Although these institutional arrangements exist, there have been challenges of duplication of functions, wastages of resources, capacity building and weak coordination. In addition, while the Federal, state and local tiers of government have definitive and complementary roles in implementing policy, collaboration between the public and private sector is often weak to facilitate effective resource flow and provision of efficient services to the agriculture and rural development sector. The CSA framework proposes a coordinating framework for the effective and sustainable development of Nigeria's agriculture and rural sector that is consistent with democratic decentralized governance and promotes collaboration and linkages both within the public sector and between the public and private sectors

1.2.7 Barriers and Challenges to Agricultural Development

Although the Nigerian agricultural sector has made some impressive strides in the past decade, these gains will continue to be diluted if some of the following obstacles to the development of the sector are not addressed. These barriers have been succinctly captured in the National Agricultural Transformation and Innovation Plan (NATIP, 2021-24). They include but not limited to:

- i. Ineffectual Synergy:** This relates to ineffective policy formulation and implementation structures at intra and inter-federal Ministries, Department and Agencies (MDAs) and weak synergy between federal and state MDAs. This problem persists from the era of the Structural Adjustment Programme (SAP) of the 1980s to the recent Economic Recovery and Growth Plan (ERGP), 2017-2020. The agricultural related development programmes and interventions are also characterized by over-fragmentation of mandates, such as that between FMARD, Ministries of Water Resources, Environment, and Power; CBN/NIRSAL and a handful of other Presidential initiatives. This has led to persistent inter and intra-agency rivalry in the sector.
- ii. Limited access to quality inputs:** The markets for agricultural inputs are largely unregulated even with the presence of various agencies responsible for enforcing strict adherence to quality standards. Similarly, the capacity for national production and supply of the much-needed inputs, such as fertilizer, seeds, cuttings, feeds, breed, vaccines and agrochemicals is very limited. Hence, the required high yielding seed varieties for many crops are inadequate even with the existence of various agricultural research institutions, seeds multiplication centres and private sector involvement in seeds production. Similarly, the lack of species-specific livestock research centres has also hampered the achievement of the full potentials of the country's livestock.
- iii. Weak linkages between agricultural research and training institutions, input providers and the farmers:** The weak working relationship between research institutions, extension organizations, and the different categories of farmers and farm organizations is one of the key institutional problems that is negatively impacting on growth and development of Nigerian agriculture. This problem has further led to low adoption of agricultural innovations among farming communities.
- iv. Low level of agricultural mechanization:** The availability and accessibility of macro and micro mechanization equipment such as tractors, power tillers, planters, combine harvesters and others needed for land preparation and other agricultural activities is very low in the country. Nigeria has only seven tractors per 100sqkm compared to the African average of 27 tractors per 100sqkm. This resulted in loss of man hours in clearing, ploughing and general cultivation activities resulting in inefficiencies and high harvest and post-harvest loses.
- v. Poor extension services delivery:** With an average of 1:10,000 extensions to farmer ratio across the country, farmers receive limited guidance and training in technology adoption.

This leads to limited skills in the application of key inputs, such as fertilizers, herbicides and pesticides, leading to overutilization or underutilization of agro-inputs, thereby resulting in low output per unit area, thus reduced export opportunities.

- vi. Inadequate rural Infrastructure:** The capacity of the rural communities for massive agricultural production and on-farm processing has been constrained by inadequate road networks, power supply, irrigation infrastructure, storage and processing facilities. Frequently, the incentive for increased production is lowered by the possible harvest and post-harvest losses caused by inadequate access to storage/preservation facilities and profitable markets.
- vii. Limited access to affordable credit:** Farmers grapple with limited access to finance and high interest rates even with the interventions by the CBN. This is mainly due to poor synergy among MDAs, weak delivery mechanisms and low capitalization and negligible involvement of the Bank of Agriculture (BoA) and National Agricultural Insurance Corporation in agricultural lending. More worrisome is that commercial banks are averse to agricultural lending.
- viii. Inadequate funding for the agricultural sector:** funding is inadequate to drive agricultural development in Nigeria. Achieving agricultural transformation would require funding beyond what the current budgetary allocation would provide. The country is yet to establish an Agricultural Development Trust Fund which would direct substantial resources to research, appropriate technology generation, extension, innovation and critical value chain development. Dedicated Trust Funds have yielded positive results in other sectors such as oil, communications and education.
- ix. Threat of Climate Change for Sustainable agriculture:** Climate change is negatively affecting the Nigerian agricultural sector while the policy response and the needed interventions to mitigate the impact has remained largely ad-hoc. Thus, food security is continually threatened by drought, floods and land degradation in many parts of the country. Similarly, the natural resource management system is largely mundane.
- x. Poor Nutrition:** Nutrition and community awareness on nutrition remain a challenge in Nigeria. Recent UNICEF reports revealed that no fewer than 50 percent of children under five in Nigeria are malnourished. This corroborates the 2018 National Nutrition and Health Survey (NNHS) which revealed that acute malnutrition is affecting nearly 60% of children. Clearly, the Food Systems required for providing healthy diets and improved access to nutrient rich foods and affordability is weak and underfunded.
- xi. Insecurity of Agricultural land and investments:** Insecurity is currently posing greater risk to agricultural production, processing, marketing and delivery of essential services, such as extension and animal health management. Many parts of the country are facing peculiar security challenges, with insurgency in the Northeast restricting upland and lowland farming, livestock production and fishing. Within the other geopolitical zones,

particularly, the north-west and the north-central, insecurity in the forms of kidnapping, armed robbery, cattle rustling, banditry and communal and farmers and pastoralists conflicts have devastated livelihoods and investments of hundreds of farming and pastoral communities. Similarly, agricultural investments by private sector organizations particularly in production and processing had been significantly hampered by insecurity and conflicts.

xii. Limited access to Market: there is inadequate access to profitable markets due to poor product standardization, inadequate transportation facilities, adulteration of products and limited access to international markets. Moreover, commodity markets, commodity exchange, warehouse receipt systems remain underdeveloped thereby increasing market risks and transaction costs.

xiii. Weak Capacity for Research and Innovation: There is gross inadequacy of human and material resources that are necessary for smooth operations of public agricultural research organizations in Nigeria. At present, most of the research institutions are underfunded, understaffed, with insufficient state of the art equipment for cutting edge research. Hence, the sector continued to rely on research output from abroad in spite of problems of ecological and socio-cultural incompatibility.

xiv. Insufficient Value addition and Agro-industrial Processing Facilities: Nigerian agricultural commodities are characterized by low value addition at different stages due to low investment along the value chain, and among the different actors involved in the transfer of the commodity. This problem limits the Nigerian farmers' access to processors thereby weakening the country's industrial base and capacity to generate massive employment.

xv. Low Agricultural Export: export of agricultural commodities is one area that is grossly unexploited by many Nigerian farmers due to lack of access to commodity exchange market, insufficient capital, inadequate information about export requirements and limited government support to cross border commodity trading.

As a result of these obstacles, various programmes and policies enunciated over the years and supported by Donor/Development partners did not achieve their development objectives or desired impacts. In the NATIP 2021-2024, the Federal Government is making concerted efforts to reverse the past trends. The Plan aims to ensure that knowledge and technology drive agriculture to achieve sustainable national food security and nutrition; diversification, jobs creation and resilience. Ultimately, the Plan generates innovative systems and processes leading to the development of high potential value chains and improved agricultural investment climate.

1.3 Review of Existing Policies and Regulations on Agriculture and their relevance to Climate Smart Agriculture

In order to ensure effective implementation of the Climate Smart Agriculture framework in Nigeria it is imperative to examine past and extant policies to ascertain how they align with the elements of CSA and how they contribute to Nigeria’s efforts to adapt and build resilience in the agriculture sector under the National Adaptation Plan (NAP) Framework, as well as Nationally Determined Contribution (INDC). These policies have been summarized in Table 5.

Table 5: Key policies and their relevance to the implementation of CSA in Nigeria

Key Policies	Their relevance to the implementation of CSA in Nigeria
National Agricultural Transformation and Innovation Plan NATIP(2021-2024)	<p>NATIP is built on the following key components and 11 strands:</p> <p>Key components:</p> <ul style="list-style-type: none"> i. Generation and promotion of appropriate technologies, research and innovations for production, processing and marketing of crops, fisheries and livestock ii. Establishment of mega agency to address agricultural funding inadequacies iii. Reviving and strengthening extension service delivery iv. Increasing access to agricultural finance and promotion of agricultural insurance scheme v. Promotion of Climate Smart Agriculture (CSA) and Organic Agriculture for improved income and agricultural productivity vi. Increasing access to agricultural land and productivity enhancement vii. Developing value chains of key crops and livestock enterprises; viii. Improving food and nutritional security; ix. Increasing the competitiveness of agricultural products in local and international markets; x. Creating enabling environment for agricultural investment and, xi. Improving the livelihood of rural dwellers and building rural economy resilience <p>11 Strands:</p> <ul style="list-style-type: none"> i. Synergy and MDA Alignment: ii. Livestock development: iii. Knowledge creation and transfer: iv. Access to mechanization: v. Quality extension service delivery: vi. Strengthening Value-Chains for priority crops: vii. Fisheries and aquaculture: viii. Development of marine resources ix. Market Development: x. Establishment of Agricultural Development Fund. xi. Partnership for Securing Agricultural Lands and Investments (PSALI):

Agricultural Sector Food Security and Nutrition Strategy 2016 – 2025	Guiding principles and priorities that relate to CSA include: Integration of Nutrition into Agricultural Value Chains; support for private sector to upscale agricultural development; food and nutrition security as a human right; post-harvest loss reduction; increase production and processing of crops and animal foods; increase access to markets etc.
National Climate Change Policy 2021-2030	The policy envisions a <i>low-carbon, climate-resilient Nigeria</i> with an overall mission to <i>ensure sustainable development and a climate proofed economy through multi-stakeholder engagement</i> . Key policy thrusts include Reduced vulnerability to climate change impacts across all sectors; Improved social, cultural, economic and ecological resilience; Reduced greenhouse gas emissions; Increased awareness of climate change impacts and adaptation and mitigation measures; Enhanced and strengthened research, innovation and technology development and transfer and systematic observations. Enhanced capacity to implement climate change related interventions at national, state and community levels; Climate change and its cross-cutting issues mainstreamed in development.
REDD+ Strategy, 2021	The vision is to <i>establish a climate resilient economy through sustainable management of forest to enhance carbon sink, and reduce GHG emissions by at least 20% by year 2050</i> while its mission includes to: <ul style="list-style-type: none"> - Strengthen the functioning of forest and land management institutions and systems; - Improve relevant laws and regulations and strengthening law enforcement across the land management and fiscal governance sectors; and - Improve the capacity of relevant Ministries, Departments and Agencies (MDAs) of government to manage land, forest and ecosystem resources.
Climate Change Act, 2021	Key pillars include mainstreaming of climate change actions in line national development priorities; reduction of GHG emissions; identification of risks and vulnerabilities; building resilience and adaptive capacities to the impacts of climate change; and adoption of nature-based solutions
Updated Nigeria’s Nationally Determined Contribution, 2021	Focus on GHG emission reduction in all sectors including agriculture; agribusiness economy; food security and adoption of CSA approach such as agroforestry and sustainable land management systems
National Agriculture Investment Plan 2017-2020	Key levers include Access to Land, Soil Fertility, Access to Information and knowledge, Access to Inputs, Production Management, Storage, Processing, Marketing & Trade;; Access to Finance, Agribusiness Investment Development, Institutional Realignment, Institutional Setting and Roles, Youth and Women, Infrastructure, Climate Smart Agriculture, Research & Innovation, Food, Consumption and Nutrition Security.
National Policy on Environment, 2021	Focus on conservation and management of natural resources e.g. water, vegetation, and land resources; climate change impacts on environment and hazards.

Nigeria's National Adaptation Plan Framework 2020	Key elements that relate to CSA include; Building appropriate capacity for adaptation action; Defining adaptation options at the various levels of governance; Creating an enabling environment for effective adaptation; Designing of a coherent approach to fund mobilization for effective climate change adaptation; Development of suitable strategies for engaging the private sector; Development of effective communication strategies in the various phases of the adaptation process; and Development of an effective monitoring and evaluation plan to facilitate implementation
Economic recovery and Growth Plan 2017-2020	Focus on enhancing productivity; private sector investment in agriculture; and Presidential initiative on fertilizers; integration of commodity value chain and improving access to markets
The Agriculture Promotion Policy (APP) (2016 – 2020)	The Agricultural Promotion Policy (APP) succeeded the Agricultural Transformation Agenda (ATA). The purpose of the policy document was to work with key stakeholders to build an agribusiness economy capable of delivering sustained prosperity by meeting domestic food security goals, generating exports, and supporting sustainable income and job growth Some of the key elements of relevance to CSA included Agriculture as a business Agriculture as key to long-term economic growth and security Food as human right Value chain approach Market orientation Factoring Climate change and Environmental sustainability Participation and inclusiveness Nutrition sensitive agriculture Agriculture's Linkages with Other Sectors
Agricultural Transformation Agenda (ATA) (2011 – 2016)	The ATA was built on the principle that agriculture is a business and therefore policy should be about supporting it. It was basically focused on building a self-sustaining agribusiness economy. It also focused on how to make Nigeria's agriculture sector more productive, efficient, and effective; generate foreign exchange, and; reduce spending on food imports. Key elements that relate to CSA include commodity value chain development and infrastructural development;
National Livestock Transformation Plan 2019-2028	Key pillars that relate to CSA include Livestock value chain; Capacity building to support Livestock value chain; and Deployment of research-based solutions
National Food Security Programme, 2008-2020	The vision of this programme was to "ensure sustainable Access, Availability and Affordability of quality food to all Nigerians and to be a significant net provider of food to the global community" The approach addressed every component of the entire agriculture value chain from production, storage, processing, and marketing for Crops, Livestock and Fisheries. It also adopted a collaborative approach.

Vision 20:2020 Agriculture and Food security	Increased agricultural production; adoption of appropriate technologies; livestock improvement techniques; expansion of dairy production and milk yield; and reduction of post-harvest losses
The National Agricultural Resilience Framework (NARF)	Focuses on CSA; innovative agricultural production strategies; risk management mechanisms to promote resilience in the agriculture sector and development of sector specific climate adaptation and risk mitigation programmes

1.4 Rationale for a National Climate Smart Agricultural Framework

In light of the aforementioned, the development of a climate-smart agriculture framework is both a necessity and a timely imperative that the Nigerian government must embark on. The CSA framework ties together existing and on-going efforts and initiatives to boost overall agricultural productivity and balance the needs for sustainability across the sub-sectors in the light of the threat of climate change. The Framework therefore must place a specific focus on the net reduction of GHG across the entire value chain of agriculture, which is done as a deliberate (and efficient) climate mitigation step and falls in line with the country’s Nationally Determined Contributions (NDC) to addressing climate change.

Within the context of the current agriculture policy landscape in Nigeria, there is very little inspiration for the adaptation of the country’s food systems to climate issues. Agriculture policy has focused more on shifting agriculture from a development initiative to a commercially viable business opportunity. Although the existing frameworks focused to some extent on building capacity for adaptation action, defining adaptation options, creating an enabling environment for effective adaptation and building a coherent approach to fund mobilisation for adaptation, there is significant scope to address these concerns in a comprehensive framework instead of the current disparate approaches that face challenges of implementation and coordination.

There is the need for a specific Climate Smart Agriculture Framework that leverages the country’s compelling agriculture credentials like its vast amount of arable land, youthful population and abundant natural resources to achieve nutrition and food systems adaptation towards sustainable growth and development. Such a national framework will create the rails that protect farmers from the challenges of fast-changing climate conditions.

The development of the CSA framework also leverages on the political opportunity and agency that the Nigeria Agribusiness Group (NABG), presents to convene renewed inter-departmental dialogue and cooperation on this important cross-cutting issue. The NABG as the premier private sector agriculture advocacy group in Nigeria, is well positioned to lead the design and implementation of the framework for climate-smart agriculture that leverages cross-sector knowledge in a way that;

- Mainstreams the concept of adapting Nigeria’s nutrition and food systems to ensure that the decision-making in the public and private sectors are done with the overarching objective of building an adaptive and climate-resilient system.
- Prioritizes investments to accelerate climate-smart agriculture, that embeds mitigation and adaptation practices for food and nutrition systems. Including innovative approaches such as targeted benefits to small-holder farmers and the industry from carbon trading.
- Deploys the innovative power and potential of the private sector to achieve adaptation of food and nutrition systems, given that the current climate challenges are equally a threat to the viability of private sector businesses.
- Provides a targeted and systematic engagement of at-risk and vulnerable communities, in cognisance of the disproportionate and uneven burdens that climate change has across the country
- Strengthens the active and profitable participation of Small-scale producers (SSPs) especially young people, women and other marginalised groups to thrive in a green economy, through capacity development.
- Ensures that Nigeria plays a leadership role in Africa in ensuring an adaptive and sustainable future for food and nutrition systems.

The need for this framework is urgent, given the significant value agriculture adds to the Nigerian economy as mentioned above. Millions of smallholder farmers depend on agriculture for their livelihoods and these farmers are the backbone of any attempt at food and nutrition security. The benefits of this framework are beyond economic. They will provide, “stronger resilience to pandemics, lower inequities, more opportunities for women and youth, greater political stability, and billions of dollars’ worth of ecosystem services like clean water as landscapes are restored’ (GCA, 2021).

It is also worth noting that agricultural processes and practices can in themselves contribute to the production of GHG emissions and having a sectoral recognition and drive to firstly, account for this, and secondly plan detailed appropriate mitigation is critical and central to this climate-smart ambition. Lowering GHG emissions embedded in agricultural processes also has cascading effects on productivity, expanded job creation and ultimately reduces the critical risk factors of climate change by targeting the known root cause of anthropogenic emissions. As well as serve as a critical drive for the energy transition that the country and the sector needs; to push for a shift to cleaner, renewable sources and farm practices and implements that are less energy consumptive. This shift in the agricultural sector's energy mix, will prove pivotal in catapulting the nation onto a green economy and deriving the associated benefits from such endeavour.

The leveraged potential for the CSA framework to link to other innovative developments in the fight against climate change is also apposite. For instance, the establishment of the new Nigerian emissions trading scheme (ETS)¹ in line with the legal framework provided in the Climate Change Act 2021 to help in the reduction of greenhouse gas emissions through a carbon market, is a significant step that this CSA framework recognises, and seeks to align with and explore in its activities. The CSA framework explores ways in which Carbon trading can become an incentive for the participation of agricultural stakeholders, both from the public and private sectors to explore how to reduce emissions and raise capital. There is significant potential for the emissions trading scheme to drive industry and corporate behavioural shifts towards the low-carbon futures that Nigeria wants to achieve through its NDCs. It serves to help decouple carbon pollution from economic growth, and importantly, supports countries like Nigeria, in breaking away from a carbon-intensive development path, and consequently provides an incentive for companies and

entrepreneurs to engage in innovation activities. What this means is that there far-reaching benefits of the ETS can be reaped when strategically mapped into the CSA activities. The ETS will serve as a vehicle to drive needed investments, funding, technology transfer, modernisation drives, etc. Carbon-reduction projects which feed into ETS, are also an opportunity to engage with farming communities, and various agricultural stakeholders in a meaningful manner, thereby providing an opportunity to build capacities and upgrade skills. For instance, the benefits that accrue to smallholders from participating in these projects are associated with their access to technical information, training and inputs. The sustainable land management practices supported by these carbon projects not only increase yields, but diversified incomes, increased fodder and fuelwood production, and enhance farmers' resilience to climate change through improvements in soil health. Carbon projects also strengthened community groups, which not only managed elements of the carbon project, but also delivered other benefits such as marketing coordination, health training, and improved community cohesion.

Overall, the need for increased agricultural productivity reduced emissions and climate-resilient agriculture systems towards the achievement of food and nutrition security forms the ethos and basis of the development and delivery of the CSA framework.

¹ <https://climatechange.gov.ng/2022/08/24/nigerian-government-launches-emission-trading-scheme-ets/>

2.0 APPROACH & METHOD IN DEVELOPING THE FRAMEWORK

2.1 Approach

The approach adopted for the development of the CSA framework comprises three distinct phases of research design and inputs. These comprise an inception phase that comprises preparatory materials and scoping work, to prepare an initial overview and scope of the framework. This inception or initialisation period was also particularly useful to the design of the CSA framework as it allowed for the identification of relevant stakeholders, the landscape of policy engagements and the preparation for the further steps and activities that were critical to the development of the framework.

The second phase of the approach adopted was centred on the coproduction and participatory nature of the knowledge and inputs required for such a cross-cutting endeavour. The use of a workshop to convene multi-stakeholder engagement as well as follow up data collection through purposefully designed tools and data collection processes (refer to appendices). The use of in-depth interviews and follow up dialogues allows for the framework to capture both the breadth and richness of the diverse priorities and interests of all stakeholders involved.

The third phase of analysis and write up goes beyond the traditional approach for the presentation of findings and involves an iterative process of data verification and triangulation, which culminates in a planning validation process, inviting the feedback of all key stakeholders ahead of the finalisation of the framework.

The distinct features of the approach adopted that constitute the methodology are briefly elaborated below.

2.2 In-depth review of literature on extant policy and regulatory landscapes

The process of development of the CSA framework for Nigeria involved in-depth desk review of literature on past and extant policy landscape in the country. Relevant agricultural policy documents such as the Global Food Security Strategy (GFSS) Nigeria Country Plan August 2018; Federal Government of Nigeria's National Agriculture Investment Plan (NAIP 1&2); National Food Security Programme 2008; Agricultural Sector Food Security and Nutrition Strategy 2016 – 2025; the Agriculture Promotion Policy (2016 – 2020); Agricultural Transformation Agenda (ATA) (2011 – 2016); Draft Nigeria Country Strategic Plan (2019–2022); and, National Agricultural Resilience Framework (NARF); were reviewed. Others included past and extant policy documents such as the National Policy on Climate Change 2013; National Climate Change Policy for Nigeria 2021 – 2030; Nigeria's Climate Change Act 2021; Nigeria's National Adaptation Plan (NAP) framework,

2020; and, Nigeria's Nationally Determined Contribution (NDCs) 2021 Updated. The purpose is to highlight the concerted efforts by Nigeria in mainstreaming CSA practices into its national development priorities.

2.3 Gap analysis

A review of the policy and programmatic landscape of the country was complemented by a gap analysis that provided insights into gaps in the implementation of the CSA in Nigeria. The following strategies were employed:

- Extensive review of relevant literature and of past and extant policy documents
- Consultative approach that draws representation from multi-stakeholder/multi-disciplinary experts from relevant Ministries, Departments and Agencies, Civil Society Organization (CSOs), Non-Governmental Organizations (NGOs), Community-Based Organizations (CBOs), Private Sector, academia and communities.
- Roundtable workshop comprising plenary and technical sessions that examined Programmes and Plans in the agricultural sector, implications of climate change on the agricultural sector, and a stock-take of constraints and barriers to agricultural development. The workshop also considered stakeholder perspectives across the agribusiness value chain, environmental sustainability, and international development sectors, and served as a critical converging point for debate for all key stakeholders in the Nigerian agriculture and agribusiness sectors. The Workshop was facilitated by the Nigeria Agribusiness Group (NABG), an organized private sector platform working together to grow Nigeria's agricultural economy by creating jobs and lifting millions out of poverty. NABG engagement involves both governments and private sector organizations in the agribusiness value chain to set policy directions and regulatory reforms to enable sustainable inclusive socio-economic Agricultural growth.
- Interviews and Consultative sessions with key informants in the Federal Ministry of Agriculture and Rural Development; Federal Ministry of Environment and the Private Sector to be able to ascertain possible entry points.

2.4 Policy and regulatory alignment relevant to CSA

The effective implementation of the CSA framework will require analysis of past and extant national policies, programmes and plans. Nigeria has over the years developed policies,

programmes, and plans to enhance agricultural productivity, natural resource management and climate change interventions. Building on from the in-depth literature review exercise, these policy reforms that have substantially improved the agricultural sector were reviewed, analysed and their possible impact on CSA were highlighted in this CSA framework. This served as the first step to understanding how Nigeria has mainstreamed CSA practices in its development priorities.

2.5 Stakeholder mapping

Mapping of stakeholders helps to visualise the complex interplay of issues in CSA practices in Nigeria. The Stakeholders mapped in developing this CSA framework comprised a rich diversity of persons with in-depth knowledge of agriculture and CSA, as well as those who have the capacity to effect change and those considered most vulnerable to climate change impact on agriculture including SSPs. They also comprised key players with a broad spectrum of expertise, interests, influence and geographical locations. The list included the following:

- i. Federal Ministry of Agriculture and Rural Development.
- ii. Federal Ministries of Water Resources
- iii. Federal Ministry of Environment
- iv. Climate Change Desk Officers in the various MDAs
- v. State Ministries of Agriculture, Environment and Water Resource
- vi. Nigeria Meteorological Agency,
- vii. Nigeria Hydrological Agency,
- viii. Non-Governmental Organizations (NGOs) and Civil Society Organizations (CSOs)
- ix. Head, Environment & Climate Change Unit, Agricultural & Climate Change Management Services Department of the Federal Ministry of Agriculture and Rural Development.
- x. CSA specialists representing Crops, Livestock, Fisheries, Extension services and Land & Water Management, Federal Ministry of Agriculture and Rural Development.
- xi. Federal Ministry of Science and Technology
- xii. Federal Ministry of Communication
- xiii. Federal Ministry of Information
- xiv. Banks, Insurance companies, Bank of Agriculture (BOA), Bank of Industry (BOI)
- xv. NIRSAL
- xvi. Nigerian Agricultural Insurance Corporation (NAIC)
- xvii. Women in Agriculture
- xviii. Youth Groups in Agriculture
- xix. Farmers Association (Livestock, Fisheries, Crops and Forests)

2.6 Design and delivery of participatory workshops

The process of development of the National CSA framework involved two participatory workshops. For the first workshop hosted by the Nigerian Agribusiness Group (NABG) in collaboration with the Federal Ministry of Agriculture & Rural Development (FMARD), and with the financial support of the Bill and Melinda Gates Foundation held a two (2) day workshop at Statement Hotel Abuja from 7th to 8th July, 2022 with stakeholders and technical experts drawn from the Federal Ministries, Departments and Agencies, the Private Sector, Civil Society Organizations, women groups, agro-entrepreneurs as well as the Academia to deliberate on and provide further insights into the draft National Climate Smart Agriculture Framework (NCSAF). The workshop featured technical breakout sessions during which participants discussed the proposed action areas and ranked them in order of priority (see appendices for schedule). The prioritization was necessary to give insight into areas where emphasis should be placed in developing a CSA framework for Nigeria. Overall the workshop was both a critical data gathering and networking moment for key stakeholders fostering and deepening dialogue on the complex matter of CSA. The second workshop is scheduled for the end of the framework development process, following the review and amendments of the draft text. The final workshop draws on selected stakeholders that will be hosted by the NABG in a validation meeting for the CSA framework.

2.7 Key Informant Interviews and Consultations

Key informant interviews were employed in the process of data collection drawing from the pool of stakeholders who participated in the first roundtable workshop identified by the Nigeria Agribusiness Group (NABG) in July, 2022. They were drawn from relevant Ministries, Departments and Agencies, Civil Society Organization (CSOs), Non-Governmental Organizations (NGOs), Community-Based Organizations (CBOs), Private Sector, Academia, and Communities. The interview instrument comprises issues such as availability of policy documents, stakeholders mapping, barriers to agricultural development in Nigeria, climate change impacts; challenges of agribusiness; opportunities that climate change presents; essential elements for developing a CSA framework; institutions that should play coordinating role in the CSA framework; skills and capacities needed in implementing the CSA framework and possible sources of funding for implementing the CSA framework (see appendices).

Further selected follow-up consultative meetings were organized with some key informants to generate deeper reflections, clarifications and information that was necessary for the framework, as well as reflections on CSA practices and challenges in the field. Issues discussed

relate to climate change, agriculture, and food and nutrition security, as well as institutions to drive CSA implementation in Nigeria, amongst others.

2.8 Framework Validation

The process of the framework development concluded with a series of validation meetings to provide an opportunity for final discussion by the stakeholders on the Final draft CSA Framework for Nigeria. This involved the engagements with the representatives from the relevant ministries and public institutions identified in the stakeholders mapping which cut across public and private sector entities and farmer-based organizations. The consultative process of validation was also necessary to sustain the dialogue and engagement of the diverse stakeholder engaged in the process.

3.0 STAKEHOLDERS' CONSULTATIONS AND KEY CONSIDERATIONS FOR CSA

3.1 Rationale

The Agriculture sector is a critical sector that generates employment, income and the greatest source of food needed to meet domestic demand as well as the most important source of raw materials for the industrial (agro-processing) sector. Given the important role of agriculture and the linkages between the agriculture and other sectors, sustainable economic growth can best be achieved by improving the performance of the agricultural sector. It was therefore imperative as part of the framework development to delve deeper into the linkages of agricultural growth and the other sectors of the economy, and also to extrapolate key considerations (via lessons) the CSA framework would cover. This in-depth activity of consultations builds upon the overall methodology outlined in Section 2 above, and complementary to the reviews, and stakeholder workshops that were carried out.

To extract the lessons and information that will help improve the performance of the agricultural sector in general and to scale up climate-smart agriculture in particular, structured interviews were administered to, and interactive meetings were held with some key stakeholders in the agricultural space (See *Appendices* for the instruments administered and the list of respondents). Their responses were analysed and the lessons that could be learned from the analysis were documented. This section highlights the lessons learned and identifies possible entry points for promoting CSA practices in Nigeria.

3.2 Lessons learned from stakeholders' consultation and key informant interviews

3.2.1 Need for disaggregated programmes on agriculture

Due to misconception among many stakeholders that agriculture is restricted to crops alone, it was suggested that planned programmes and activities in the CSA Framework should be disaggregated to focus on targeted ***Programmes for Climate-Smart:***

- a. Livestock Production
- b. Crop production
- c. Fishery Production
- d. Forestry Production

Each programme would then foster climate-smart production and management practices and monitoring systems across each of the subsectors.

Although the mandate of the Federal Ministry of Agriculture and Rural Development covers only livestock, crops and fisheries, Nigeria also needs to control the loss of forests which leads to soil degradation and decreased agricultural productivity. Restoring soil carbon levels through forest management is also imperative for agricultural management. Thus, the issue of forestry, which is within the mandate of the Federal Ministry of Environment, should be incorporated in efforts to address agricultural productivity. Water resources is another aspect that must be considered. Water is needed for irrigation and fisheries. So many parts of Nigeria especially the northern part suffers from annual flooding during the rainy season and water scarcity during the dry season. So, innovative water harvesting techniques will go a long way to impact positively on farming activities and farmers wellbeing.

3.2.2 Need to align extant policies and regulations with climate smart agricultural practices

Several policies, programmes and regulations in the agricultural sector were listed by the stakeholders who participated in the interviews. These expanded on the initial literature review findings and include:

- National Agricultural technology and innovation policy (NATIP) 2021-2025.
- Updated Agricultural sector NDC 2021,
- National Livestock Transformation Plan (NLTP) 2019-2026
- Agricultural Promotion Policy (APP) 2015-2021 - the Green Alternative
- National agricultural resilience framework document (NARF) 2014
- Agricultural Transformation Agenda (ATA) 2011-2015
- Agricultural Extension, Technology Development and Transfer Policy
- Agricultural Credit Policy
- Agricultural Product Marketing Policy
- Agricultural Research Policy
- Agricultural Mechanization Policy
- Agricultural Commodity Storage Policy
- Food fortification regulations 2019
- Land Resources Policy
- Pest Control Policy
- Water Resources Development Policy
- Agricultural Manpower Development and Training Policy
- Agricultural Investment and Management Advisory Services Policy
- Agricultural Insurance Policy

- Agricultural Cooperatives Policy
- Agricultural Statistics and Data Bank Policy
- National Fisheries Policy
- Agricultural By-product Policy
- Industrial Crop Production Policy
- Rural Infrastructure Policy.
- Plant with Peace Programme
- National Agricultural Investment Plan (NAIP 1&2)
- Pre-packaged food (labelling) Regulations
- Climate Change Act (2021)

While these policies, programmes and regulations exist at the Federal level, there are still gaps in understanding and domesticating them at the subnational (State and Local Government) level as well as getting buy-in from the private sector. These gaps include weak institutions and regulations; constant policy changes, roles and responsibilities not clearly defined leading to overlaps and duplications; gaps in data/information; obsolete technologies; inadequate rural infrastructure; gaps in capacity; inadequate sustainable finance mechanism; and weak participation of the private sector. These gaps must be addressed for climate smart agricultural practices to be understood and practiced at the subnational levels and by the private sector.

3.2.3 Need for strong institutions to coordinate CSA activities

Several institutions were listed as critical in the coordination of the CSA framework in Nigeria. These included the following:

- a. Federal Ministry of Agriculture and Rural Development and its parastatals
- b. Federal Ministry of Environment and its parastatals
- c. Federal Ministry of Water Resources and its parastatals
- d. Federal Ministry of Science and Technology and its parastatals
- e. Federal Ministry of Trade and Investment and its parastatals
- f. Relevant State Ministries of Environment, Agriculture, Water Resources, Science and Technology

These institutions have distinct capacities and capabilities across the agricultural value chain that can be leveraged to support the implementation of the National framework on CSA in Nigeria. However, the interaction with stakeholders revealed that these identified institutions are not sufficiently equipped in terms of funding, technical expertise, and cutting-edge technologies to address climate change impacts in the agricultural sector. These gaps will need to be addressed while implementing the CSA framework.

3.2.4 Need to address barriers to agricultural development

The adoption and implementation of CSA practices are likely to face a variety of challenges. The barriers that are likely to impinge on the implementation of CSA practices were highlighted by key stakeholders, which include the following:

- i. Inadequate agricultural infrastructure: The productive capacity of agriculture depends on adequacy of infrastructure. Over the years, agricultural infrastructural investment has majorly been focused in the urban areas to the neglect of the rural areas. The infrastructural gap in the rural areas has prevented the attainment of the output potential of most agricultural value chains, increased poverty and fuelled rural-urban migration. To effectively implement CSA practices, all the basic facilities, institutions, equipment and services needed to increase agricultural productivity must be put in place to boost agricultural development, rural infrastructure.
- ii. Inadequate knowledge and data: There is inadequacy of knowledge and data in the agriculture (crops, fishery and livestock) sector. Specific information on climate projections; climate change impacts on crops, fish and livestock population, risks amongst others are few.
- iii. Climate change impacts: The agricultural sector (crop, fish and livestock) as well as forests are most vulnerable to the impacts of climate change. Most farmers depend on rain-fed agriculture, which is largely practiced at the subsistence level. The adaptive capacity and resilience of the rural farmers to the threats of climate change are extremely low. Climate change and other environmental problems are already disrupting social and economic activities of urban and especially rural dwellers in Nigeria, through destruction of land resources, farmlands and rural infrastructure. This is already leading to competition for scarce resources, conflicts and heightened insecurity in many parts of the country.
- iv. Inefficient processing and marketing systems: The agricultural sector is the potential catalyst for sustainable economic growth and development in Nigeria. Unfortunately, most of what the smallholder farmers produce are lost after harvesting due to inefficient processing and marketing systems. To achieve sustained increases in agricultural productivity, there is a need to improve processing and agricultural marketing systems. Competitive agricultural marketing systems involving public and private agribusinesses will have the potential to increase employment, productivity and incomes in rural areas. The marketing process in this case comprises

transportation, storage, packaging or handling, pricing, promotion and distribution. During this process, value is added to agricultural produce. This will have a significant positive impact on household and national incomes, domestic consumption, food security and foreign exchange earnings.

- v. Poor water management: Current agricultural practices involve a lot of water loss and weak harvesting techniques which are ineffective and at risk in the light of climate change. Improved water productivity in agriculture will be achieved by reducing water loss, harvesting water, managing excess water, and maximizing water storage.
- vi. Inadequate Funding: Large scale systematic investments are needed for CSA to be scaled-up. At the moment, however, there is difficulty in accessing the much-needed funds to boost CSA practices; and,
- vii. Heightened insecurity that is making it difficult for farmers to go to the farm.

3.2.5 Need to boost agribusiness enterprises-turn commitments to achievements

Nigeria has 34 million hectares of arable land but the contribution of agriculture to the national GDP is only 24% (Sasu, 2023). More than 90 percent of agricultural production in Nigeria is rain-fed and susceptible to the vagaries of climate and extreme weather events. Nigeria's vision for the agricultural sector in the Nationally Determined Contribution is *to work with key stakeholders to build an agribusiness economy capable of delivering sustained prosperity by meeting domestic food security goals, generating exports and supporting sustainable income and job growth*. The National Agricultural Transformation and Innovation Programme (2021 – 2025) also points to CSA as the way to achieve food and nutrition security and at the same time address the challenge of climate change in Nigeria. It is therefore imperative that we turn these commitments to actions and then to achievements in the nearest future.

3.2.6 Need to address gender gap and impacts of climate change on vulnerable groups

Climate change affects everyone. However, men and women experience the impacts of climate change differently. Women often are disproportionately affected because they have limited access to resources, less access to justice, limited mobility and limited voice in shaping decisions and in influencing policy. Women and other vulnerable groups are more likely to be impacted by climate change. There is the need to build effective responses to climate change which requires an understanding of how gender affects access to, and control of, institutional structures, social,

cultural and formal networks and decision-making processes. There is some effort that has been made in this regard through the development of a *National Gender Policy in Agriculture published in 2019 by the Federal Ministry of Agriculture and Rural Development, Nigeria*. The vision of the policy is to have *an agricultural sector that is driven by practices and operations that are based on gender equity and equal opportunities to all people with special needs and women in the agriculture value chain*. The policy seeks to promote and ensure the adoption of gender sensitive and responsive approaches towards engendering agriculture plans and programmes in such a way that men and women have access to and control the productive resources and facilities to bridge gender gaps. This initiative is consistent with the Lima Work Programme on Gender, which aims at gender parity in participation and a gender-based approach in terms of vulnerability and adaptation to climate change, mitigation and the development and transfer of technologies and the Global Agenda for Sustainable Development, which underscored the vital role of agriculture in sustainable development.

3.2.7 Need to foster collaboration between public and private institutions

The achievement of the overarching objectives of increasing productivity, reducing GHG emissions and building the resilience of farmers cannot be left to the central government alone. There is a need for stronger synergy across government, private and civil society organizations. The stakeholders revealed that partnerships between governments and the private sector (including civil society) can lead to more successful climate actions in the agricultural sector. The involvement of private sector and civil society groups greatly improve the prospects of implementation of good policy frameworks. Public–private involvement is key to building peaceful, equitable and sustainable implementation of policies. For instance, transformative agricultural approaches such as the development of agroparks (eg. by the Abuja-based ‘L & Z Agro Parks Limited’) which integrates local and scientific innovation systems and recognizes the contributions of small-scale farmers is an excellent way for local farmers to adapt to climate change.

3.2.8 Capacity building of various skills

For the effective implementation of CSA in Nigeria, some soft and hard skills and capacities would need to be developed across a wide range of sectors and thematic areas. Some suggested areas include capacities in:

- i. Weather forecasting and prediction
- ii. Documentation and archiving
- iii. Data collection and analysis

- iv. Concept notes development
- v. Accessing climate finances
- vi. Agricultural Policy Formulation and Implementation
- vii. Agricultural Research
- viii. Communication and Negotiation skills
- ix. Marketing
- x. Agricultural production
- xi. Land management
- xii. Storage and processing of agricultural produce
- xiii. Extension services
- xiv. Cold chain management
- xv. GHG emissions
- xvi. Insurance, and
- xvii. Digital agriculture, which entails the use of digital technologies, such as the Internet of Things (IoT) and analytic capabilities integrated into one system to make farming more precise, productive, and profitable.

It is to be noted that the skills and capacities needed vary according to the agricultural subsector (crops, fishery or livestock) including forestry, the literacy level of the farmers, educational attainment, agro-climatic zones, and gender differences, and therefore will need to be targeted or adapted where feasible.

3.2 Identification of entry points for promoting CSA practices in Nigeria

Entry points refer to persons, organizations/associations and institutions that can be used to facilitate implementation of CSA practices. They comprise those that can be engaged in the development of technologies; climate change models and scenarios, information technologies; insurance schemes; agricultural value chains; capacity; provision of funds, and the strengthening of institutional and regulatory enabling environment. CSA entry points integrate multiple interventions at the food system, landscape, value chain or policy levels.

CSA entry points also depend on the various agricultural value chains, which encompass the flow of products, knowledge and information between smallholder farmers and the consumers. The various agricultural value chains entry points include crop farmers; livestock farmers; fish farmers; people engaged in storage of agricultural produce; farm produce traders; agro processing enterprises; agricultural food packaging firms; agro allied industries; farm produce transporters (cold room for perishable produce/ products), agricultural marketing systems.

To promote CSA practices in Nigeria, it is imperative to note that there are many local, subnational, national and international actors already working on agriculture, environment and climate change-related initiatives. The identification of key players as the entry points for future implementation of the CSA framework draws on selected partners and stakeholders who are active in promoting CSA practices in Nigeria. CSA entry points in Nigeria cut across the various levels or spheres of influence according to the various tiers of government

The possible entry points for the effective implementation of CSA practices in Nigeria are highlighted in Table 3.1 below:

Table 6: Possible entry points for the implementation of CSA practices in Nigeria

S/N	Type of Entry Point	Examples from stakeholders mapped	Potential roles
1	Development Partners	United Nations Development Programme (UNDP); United Nations Environment Programme; European Union; African Development Bank; World Bank; Food and Agriculture Organization; Bill and Melinda Gates Foundation	<ul style="list-style-type: none"> ● Provision of funding for CSA implementation ● Support national capacity development for climate action and CSA implementation ● Support for CSA technologies transfers
2	Policy Makers at the Federal Level	Federal Ministry of Agriculture and Rural Development and its Parastatals; Federal Ministry of Environment and its Parastatals; Federal Ministry of Water Resources and its Parastatals; Federal Ministry of Industry, Trade and Investments and its Parastatals; Federal Ministry of Information and its Parastatals; Federal Ministry of Science and Technology and its Parastatals; Federal Executive Council; Inter-Ministerial Committees; National Assembly; Federal Executive Council etc	<ul style="list-style-type: none"> ● Seek external supports from Development Partners for CSA implementation in Nigeria ● Provide enabling environment to reduce the risk of climate-related hazards, boost agricultural infrastructure, increase agricultural yields, reduce emission from agriculture, reduce post-harvest losses ● strengthen existing and foster new bilateral and multilateral relationships with regional organization such as ECOWAS, African Union, and European Union which offer technical advice and capacity building in various areas of climate change adaptation including CSA. ● Participate in international negotiations and agreements to gain insights and learn best

			<p>practices in CSA implementation</p> <ul style="list-style-type: none"> ● Domestic international agreements & protocols related to climate change and agriculture ● Implement sectoral policies, programmes and plans ● Ensuring gender responsiveness of all climate actions in agriculture ● Ensuring inclusiveness in policies and programmes ● Build capacity and develop mechanisms to solve national agriculture-related problems ● Make budgetary allocations for climate actions and CSA implementation ● Support and promotion of extension services
3	Policy Makers at the Subnational Level (States and Local Government)	State Executive Councils; State Houses of Assembly; State Judiciary; State Ministries, Departments and Agencies engaged in climate change and agriculture-related activities	<ul style="list-style-type: none"> ● Provide enabling environment to reduce the risk of climate-related hazards, boost agricultural infrastructure, increase agricultural yields, reduce emission from agriculture, reduce post-harvest losses at the subnational level ● Make budgetary allocations for climate actions and CSA implementation at the subnational level ● Seek funding for CSA implementation

			<ul style="list-style-type: none"> ● Implement sectoral policies, programmes and plans at the subnational level ● Ensuring gender responsiveness of all climate actions in agriculture at the subnational level ● Ensuring inclusiveness in policies and programmes ● Build capacity and develop mechanisms to solve local agriculture-related problems at the subnational level ● Support and promotion of extension services ● Monitor CSA implementation at the subnational level ● Finance CSA programmes, Plans and Activities at the subnational level
4	Research Centres and Universities	Agricultural Research Council of Nigeria; International Institute for Tropical Agriculture (IITA); Forest Research Institute of Nigeria (FRIN); Centre for Climate Change and Fresh Water Resources; Nigerian Institute for Oceanography and Marine Research (NIOMR); Polytechnics and Universities	<ul style="list-style-type: none"> ● Through targeted research, development and innovation R&D, contribute to addressing climate problems affecting vulnerable human systems and ecosystems in all the agro-climatic zones of Nigeria ● Build national and regional capacity for addressing climate change and implementing CSA practices ● Develop national and subnational regional approaches to addressing climate change impacts; boost agricultural yield; build

			resilience and reduce GHG emissions from agriculture
5	Private Sector including Civil Society Organizations (NGOs, Faith Based etc)	<p><u>Business groups and networks</u> Nigeria AgriBusiness Group (NABG); Financial Institutions (Banks); Manufacturing Association of Nigeria;</p> <p><u>Selected private entities</u> Dangote group of Companies. Friesland Company; PyroGenesys; L & Z Agro Parks Limited;</p> <p><u>NGOs and CSOs</u> PROMAD; OXFAM; Women in Agriculture; Nigeria Young Farmers Network ; Nigeria Climate Action Network (NigeriaCAN); Nigerian Environmental Study Action Team (NEST); Climate Change Network Nigeria (CCNN);Nigeria Conservation Foundation (NCF); Women Farmers Advancement Network, Kano Nigeria (WOFAN); Women Environment Programme (WEP);</p> <p><u>Media :</u> Private Media Organizations; African Radio Drama Association (ARDA) Nigeria; Coalitions for Change (C4C).</p>	<ul style="list-style-type: none"> ● Seek funding for CSA implementation ● Finance CSA programmes, plans and activities at the subnational level ● Build capacity and develop mechanisms to solve local agriculture-related problems at the subnational level ● Support programmes and activities to reduce the risk of climate-related hazards, boost agricultural infrastructure, increase agricultural yields, reduce emission from agriculture, reduce post-harvest losses at the subnational level ● Carryout corporate social responsibilities in reducing climate risks; enhancing adaptive capacities of vulnerable groups; and CSA technologies ● Promote agribusiness activities ● Create awareness & knowledge and assist in CSA information dissemination ● Mobilize grassroots support for CSA implementation ● Mobilize finance resources for climate actions ● Develop local capacity (e.g., technical, financial, human,

			<p>institutional) for CSA implementation</p> <ul style="list-style-type: none"> ● Monitor CSA implementation at the subnational level
6	Local Communities, Local Associations and vulnerable groups	Riverine and coastal communities; communities in the savanna zones; desert frontline communities; Forest-dependent communities; Women and Children	<ul style="list-style-type: none"> ● Organize group/community response for CSA implementation (adoption of CSA technologies and improved yields) ● Organize for sustainable land and water management practices to boost agricultural yield ● Organize for sustainable agricultural funding and risk-sharing in the face of climate change ● Organize to build local adaptive capacity, enhance resilience and reduce GHG emissions from agriculture

4.0 THE CSA FRAMEWORK

4.1 Vision of the CSA Framework

The overall vision of the Nigerian CSA Framework is to achieve a long-term national low carbon climate resilient development pathway, whilst realizing the full potential of improved agricultural productivity and its contribution to national development goals and targets.

4.2 Framework Objectives

Given the context highlighted in the preceding sections and the need for a Nigerian National Climate Smart Agriculture Framework, which will incorporate a comprehensive approach to streamline the efforts of the public, private and donor sectors in building resilient, environmentally sustainable, and secure food and nutrition systems across Nigeria. The CSA framework therefore covers six major thematic objectives and serves as the basis for the development of specific action planning under each objective. The six parts of the framework can also be conceptualised as “pillars” and are not presented in a mutually exclusive manner, but intended in practice, to reinforce each other, whilst providing the scope for depth and specificity of the activities that fall within them.

In summary, the six objectives of the framework are as follow

1. Increasing agricultural productivity and food security: in a sustainable manner that meets the current and future demands of the growing population, improves livelihoods, reduces poverty and is supported by a buoyant and inclusive sector.
2. Mainstreaming resilient and regenerative agricultural practices: working with various stakeholders including SSPs and NABG platforms to reduce vulnerability to drought, pests, diseases and other climate-related risks and shocks; and improve capacity to adapt.
3. Reducing greenhouse gas (GHG) emissions: creating a specific focus on the net reduction of GHG across the entire value chains of agriculture, as a climate mitigation step. Including the avoidance of deforestation from agriculture and targeted ways of absorbing carbon out of the atmosphere.

4. Building capacity of smallholder farmers: recognising the critical role, scale, and potential volume of the contribution of SSPs, with a disaggregated emphasis on women and youth. This will also include designing and implementing tailor-made capacity development programmes to update their knowledge, skills, tools and practices for climate-resilient agriculture.
5. Building regional leadership in climate-smart agriculture: using the projectized dimension and action plans from the framework as a vehicle to elevate Nigeria's leadership in a very critical and urgent issue of development and international importance.
6. Sustainable financing: exploring innovative approaches and diverse sources to meet the financial requirements that support the implementation of the CSA activities. These range from donor funding, through to leveraging private and public capital that can be harnessed for climate-smart investments in agriculture. As well as funds that can be raised from carbon trading. As mentioned earlier, the innovative approaches of carbon trading will involve an active development of programmes and projects that support carbon accounting, which feeds into the trading schemes. And these specific carbon projects when designed and executed in a targeted manner will enable the meaningful engagement of small-scale farmers and the wider industry stakeholders to support carbon-trading, and reap reciprocal benefits from agricultural productivity and emission reduction. The participation of agricultural stakeholders in carbon projects and trading schemes, will balance the financial risk to stakeholders and widen their income streams both short- term livelihoods revenues and longer-term cash returns from carbon trading.

4.3 Framework components, activities and outputs

The following sections elaborate on the six objectives of the framework for climate-smart agriculture as “components” that support its delivery. It itemises and details the substantive actions and activities that are required under each component. The elaboration covers both the rationale/expanded description of the sets of activities to be undertaken as part of the delivery, and captures any specific planned outputs in a systematic manner. This is illustrated in Figure 16.

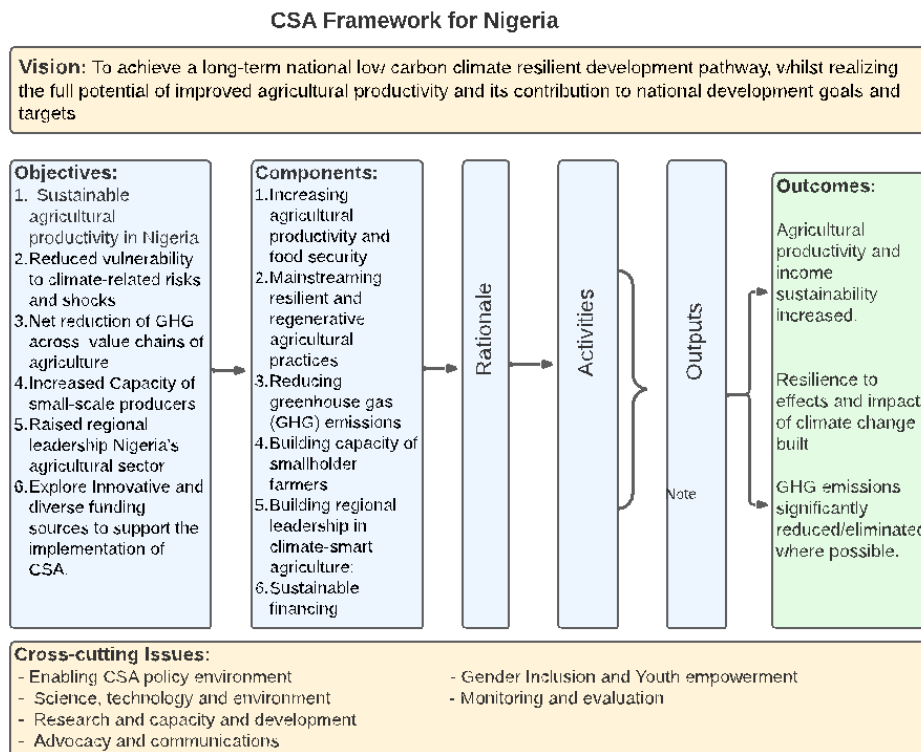


Figure 16: CSA framework for Nigeria

4.3.1 Component one: Increasing agricultural productivity and food security

4.3.1.1 Rationale

The first component of the CSA seeks to advance the sustainable increase in agricultural productivity in a way that does not have a negative impact on the environment. This is the foundation for an attempt at sustainable food and nutrition security builds on the knowledge of apparent productivity gaps and deficits that Nigeria is currently facing and how that efforts to address them require some systematization and collective planning for the short, medium and long-term. The considerations of productivity cuts across

- A. Livestock Production
- B. Crop Production
- C. Fishery Production
- D. Forestry Production

Food insecurity can be addressed by sustainable agricultural systems which are adapted to the context and geography of the country so that crop and animal products do not decline over time and are reasonably stable over normal fluctuations of weather. This recognises the need to consider the scale of need and demand (not only at present volumes) but to consider the variables that will support any projections for growth in food production. This component of the framework provides an opportunity for the NABG to work with a diverse set of stakeholders on the requisite data needs, data analytics and relevant integration of the prevailing policy landscape that will support and provide the optimal environment for increased productivity. Agricultural productivity, like climate change, is cross-cutting in nature, and this approach recognises the breadth and scope that will allow for meaningful progress.

It will also include the appraisal of critical gaps and barriers to productivity, in the light of climate vulnerability including both soft, intangible, structural and physical barriers to productivity. These include the lack of appropriate tools and implements and the need to provide targeted support at the production end of the value chain and beyond.

The critical bottlenecks around minimising post-harvest and transit losses for instance, will also be addressed, as well as the emergent role of appropriate technology, tools and implements. The development of low-cost, adoptable technologies that encourage small-scale enterprises and entrepreneurship in rural areas should be a primary focus. Increased food production (crop, livestock and fisheries) and processing through the establishment and strengthening of small-scale agro-industries can contribute to the year-round availability and variety of micronutrient-rich foods in rural and urban markets. Agro-processing industries will not only even-out seasonal price fluctuations, but also create jobs and income from such activities as processing, storage, distribution, and marketing. Agro-processing will also stimulate demand for farmers' products and give consumers additional choices.

4.3.1.2 Activities:

This component will be achieved through a series of activities that fall under a proposed distinct programme, namely:

- National Agricultural Productivity Action Plan (The NAPAP): This will catalogue a structured, evidence-based approach to improving productivity in the country, and account for the characteristics of the Nigerian climate, geography, needs etc. The NAPAP will tie in the normative needs for increased food security and the rising food demands of

the growing population, balanced with the awareness of the fragilities of the climate system.

Some of the substantive activities to be undertaken as part of this broad objective of increasing food security and the NAPAP are as follows:

- i. Scope and map a national climate risk scale, against priority sectors and sub-industries.
- ii. Conduct a national food needs/ production audit and modelling of future projections
- iii. Generate sufficient data and metrics to understand the unique national, sub-national (state) and further disaggregated levels of operation in support of the audit
- iv. Map Stakeholder and host a series of consultative workshops, for multi-sectoral inputs into the design of the NAPAP and subsequent strategy session.
- v. Appraise critical gaps and barriers to agricultural productivity (across livestock, crops, fisheries), and inventory (including forestry).
- vi. Catalogue and provide appropriate tools, implements and materials (including the supply, adaptation and utility of appropriate Agric technology)
- vii. Develop a framework for public, private and third-sector institutions to collaborate in the achievement of the goals of the NAPAP.

4.3.1.3 Outputs:

1. Development of a National Agricultural Productivity Action Plan (NAPAP)
2. Development of climate risk register and hotspot map
3. Curation of agricultural productivity metrics and indices
4. Development of public, private and third sector collaborations towards the achievements of the goals of NAPAP.

4.3.2 Component two: mainstreaming resilient and regenerative agricultural practices

4.3.2.1 Rationale:

The focus of this component is on the specific agricultural practices that can be undertaken to reduce vulnerability to drought, pests, diseases and other climate-related risks and shocks in Nigeria, whilst improving the capacity of stakeholders to adapt to changing climate conditions.

The development of climate-resilient practices will involve a multisectoral approach that will be steered by the NABG, and various stakeholders and external actors including SSPs and NABG platforms members.

4.3.2.2 Activities:

Substantively the development and deployment of appropriate climate-resilient agricultural practices will be centred around some key areas that contribute to the adaptation of the agricultural systems in Nigeria to climate change and the recovery and repair of degraded farmlands from the effects of neglect and poor practices. The activities are highlighted below :

- i. Cultivate tolerant crops and rearing of livestock: The cultivation of tolerant breeds to overcome the climate stress, water and nutrient management for efficient productivity and resource utilisation, as well as the breeding and rearing of livestock with more resilient traits. Both approaches consider the tactical preservation of indigenous crops and cultural and nutritional heritage across the country. The approach will tie in with the effort to improve yields, improve livestock and mitigate the risks of seasonal variabilities.

- ii. Provide Climate Agro-advisories: The provision and utilisation of climate agro-advisories for timely agricultural productivity and monitoring. This conforms with the broader utility of climate data and monitoring services (including liaising with the meteorological services) and the role that improved climate data can serve and guide farming, livestock rearing, fisheries and other agricultural practices. The approach will also ensure the appropriate translation, communication and dissemination of information in a decentralised manner, which meets the needs of local farmers and supports efficient and timely implementation efforts.

- iii. Improve Feed management for livestock: Improvement of feeding systems for livestock as a climate adaptation measure can indirectly advance the efficiency of livestock production. Some feeding methods include altering feeding time or frequency and modification of diet composition, including agroforestry species in the animal diet and training producers in the production and conservation of feed for various agro-ecological zones. It also considers the very sustainability of feed sources as a separate measure, and how feed production can be purposefully achieved in the light of the prevailing climate fragilities.

- iv. Promote specific conservation practices: Due attention will be paid to conservation agricultural practices that build soil organic carbon and build a congenial environment for

plant growth, manure management, and overall ecosystem integrity, as well as the cultivation and production of trees and agroforestry. The consideration of conservation goes hand in hand with efforts of adaptation but in a broader context of the need to preserve the integrity of the entire ecosystem. Consequently, agricultural practices will be considered within the broader ecosystems they occur in and appraise how to minimise the overall impact that they have beyond the confines of their respective farms.

- v. Promote Water-smart and water-saving technologies: There is the need to introduce water-smart technologies for crop and livestock production including furrow-irrigated raised bed, micro-irrigation, rainwater harvesting structure, cover-crop method, greenhouse, laser land levelling, reuse wastewater, deficit irrigation and drainage management can support farmers to decrease the effect of variations of climate. The conservation of water is singled out as a critical risk factor that Nigerian farmers must work to improve their resilience to. And in addition to the aforementioned, there are various advanced technologies based on a precision estimation of crop water needs; groundwater recharge techniques; adoption of scientific water conservation methods; altering the fertilizer and irrigation schedules; cultivating less water requiring varieties; adjusting the planting dates; irrigation scheduling; and adopting zero-tillage which may help farmers to reach satisfactory crop yields, even in deficit rainfall and warmer years.
- vi. Develop and deploy early warning systems (EWS): to explore the utility of EWS and tools for the benefit of disseminating vital climatic information and data. This will complement the work and role of climate advisories and the instrumentality of extension services.

4.3.2.3 Outputs:

1. Preparation of a “Climate Resilience Practices for Sustainable Agriculture” (CRPSA) programme (underpinned and as a specific operational tool of the National Adaptation efforts).
 - a. Design of a knowledge management technology platform that can disseminate content of this programme to farmers on their mobile devices
 - b. Strategy for leveraging mass media channels to disseminate knowledge from the CRPSA
 - c. Outreach-oriented approach to rural farmers in communities where neither radio nor mobile technology can reach so we leave no one behind
2. Collation, organization and prioritisation of a suite of climate-resilient cultural practices for Nigeria’s agricultural sector

3. Identification of priority at risk sub-sector and development of advocacy campaign in collaboration with other industry stakeholders
4. Launch of a National Climate Resilience and Conservation Day, celebrated and supported nationwide to galvanise concerted action.

4.3.3 Component three: Reducing Greenhouse Gas (GHG) Emissions

4.3.3.1 Rationale:

The third component of the climate-smart agriculture framework places a specific focus on the net reduction of GHG across the entire value chains of agriculture, which is done as a deliberate (and efficient) climate mitigation step and falls in line with the country's Nationally Determined Contributions (NDC) to addressing climate change. Agricultural processes and practices, across all subsectors of crop production, livestock rearing, and fisheries can in themselves contribute to the production of GHG emissions and having a sectoral recognition and drive to firstly, account for this, and secondly plan detailed appropriate mitigation is critical and central to this climate-smart ambition. Lowering GHG emissions embedded in agricultural processes also has cascading effects on productivity, expanded job creation and ultimately reduces the critical risk factors of climate change by targeting the known root cause of anthropogenic emissions.

Within the sector, the cultivation of organic soils is a major GHG contributor, with associated burning contributing to a significant amount of agricultural emissions. Within the livestock subsector, enteric fermentation is a major emissions source, while manure left on pastures follows closely behind. Nitrogen emissions are mostly induced by fertilization and the conversion of forest areas into farms. Additionally, the increasing demand of urban centres for charcoal and wood to satisfy household energy needs is speeding the degradation of soils, natural resources and increasing emissions trends.

The emphasis on the reduction of GHG emissions, therefore, follows closely with the conservation practices outlined earlier including the avoidance of deforestation from agriculture and promoting targeted ways of absorbing carbon out of the atmosphere. And within the context of this climate-smart agricultural framework, the two strands; climate-resilient practices, and the reduction of GHGs, remain closely complementary as climate change adaptation and mitigation efforts respectively.

Another area worth addressing is the need for a critical overhaul of the energy sources and demands of the sector, and to push for a shift to cleaner, renewable sources and farm practices and implements that are less energy consumptive. This shift in the agricultural sector's energy

mix, will prove pivotal in catapulting the nation onto a green economy and deriving the associated benefits from such endeavour.

Another innovative means through which agricultural GHG emissions will be reduced will be through the active participation in local and regional carbon trading markets that are emergent (highlighting the Nigerian government's strides in this regard to establish an emission trading scheme). The benefits to both the industry and for farmers are varied, in the sense that dedicated projects (carbon credit projects) can be designed to engage industry player and farmers to feed into carbon trading. Carbon credit projects are designed to engage a wide range of agricultural industry stakeholders both public and private. This will include a necessary emphasis on smallholder farmers that are engaged in land-based carbon sequestration, while providing equitable livelihood benefits for farming communities.

4.3.3.2 Activities:

- i. Develop a targeted national programme for the promotion of forest plantations, natural assisted regeneration of forests and management of protected areas championed by farmer associations and stakeholders.
- ii. Develop strategies for natural resources preservation to combat land and soil degradation, and desertification (a special emphasis is placed on combating desertification in light of the growing threat in the savanna and more arid northern regions of the country).
- iii. Promote programmes for land suitability analysis for certain crops. Incorporating investigations into how dominant crops may respond to changes in land suitability so that farmers may transition to crop systems better suited to their region.
- iv. Promote programme for improved livestock rearing practices aimed at reducing on-farm GHG production, and efficient use and disposal of farm waste.
- v. Develop programme for the control of high greenhouse gas emitting practices i.e. burning, over-reliance on fertilizers, and improper treatment of farm and agricultural waste, and providing an incentive for proper compliance mechanisms.
- vi. Develop an energy audit for the agricultural sector, appraising gaps and opportunities for critical changes in the light of targeted GHG emission reduction.
- vii. Develop innovative low energy transition programmes and pathways for the Agricultural sector and value chains, from production through to processing, in line with the recently developed Nigerian Energy Transition Plan.
- viii. Develop and explore innovative 'waste to energy' systems for the sector that can convert agricultural waste and by-products into cleaner sources of energy for operational and feed-in/off-grid options.

- ix. Establish a renewable energy fund for farmers (REF4F) etc to support the intended transition. .
- x. Establish a carbon credits programme (or series of pilot projects) that plug into and fully utilises the synergies and benefits of the Nigerian Emissions Trading Scheme (ETS), for the growth and sustainability of the agricultural sector.
- xi. Design a system of carbon pricing, and inventories of carbon accounting to augment the participation of agricultural stakeholders in emissions trading.
- xii. Design the requisite training and capacity building programmes for sector wide actors and stakeholders on the opportunities and benefits of participating in the Nigerian emissions trading scheme.

4.3.3.3 Outputs:

1. Preparation of a National Agricultural Energy audit
2. “Waste to energy” pilot projects
3. Preparation of guidelines for agricultural (and sub-sector specific) GHG reduction plans.
4. Review and development of enforceable standards on high GHG emitting practices
5. Development of a farmer assisted ‘National Afforestation Programme’
6. Preparation of a Carbon Project Programme / Suite of pilots.

4.3.4 Component four: Building capacity of smallholder farmers

4.3.4.1 Rationale:

Given the overall objectives and the drive for increased productivity through the CSA framework and the volume and scale of the contribution of smallholder farmers and SSPs to the Nigerian economy, a special emphasis will be placed on capacity building, as there is a need to close the obvious and more tacit knowledge gaps among smallholder farmers across Nigeria. By upskilling these farmers to implement best practices such as animal nutrition, farm management, food and water security and restoration of degraded soil and to help them prepare for climate induced-extreme weather conditions, we will increase their productivity, and incomes and by implication food security in the country.

Operationalising this component will involve the design of training modules to be administered to selected SSPs on a range of topical modules that impact their productivity, as well as some specific modules on climate change and environmental stewardship such as,

- Local climate-resilient practices
- Improving market profitability,

- Livelihood empowerment,
- Processing and minimising post-harvest losses and value addition
- Financing modalities for agriculture and efficient book-keeping
- Environmental stewardship and climate-smart methods
- Gender and youth empowerment

A dedicated effort will be made to pilot these with SSPs that are constituent members of the NABG but with the aim of opening it up and expanding to national coverage.

The programming will also be underscored by a comprehensive needs assessment to ascertain the types and levels of support that will directly be beneficial to all the SSPs identified, bearing in mind the respective capacities and geographical distribution across the country. The consequent gap analysis will enable the design of bespoke training needs that complement conventional modules of organisational and technical efficiency, and adapt to the unique circumstances of the Nigerian geography, political economy, market opportunities and a range of other nuanced considerations that are relevant to addressing climate change at the lowest level (Adesoji et al, 2016). The assessments will also duly recognise and differentiate the skills and capacities needed by staff, both within the NABG and in partnership with more external-facing technical advisory skills.

The mode of delivery will range from theoretical and classroom-style learning, to include very hands-field based and demonstration-oriented lessons that have a strong practical ethos and appeal to different age and demographic configurations.

Furthermore, a conscious effort will be made in the process of design of capacity building activities to translate and provide a range of accessibility tools and support for local SSPs including in conducting training in local languages, supporting the aged and disabled, and focusing on recruiting women and youth. A number of climate-smart agriculture champions will be selected from local farmers and farmer groups that will be supported and empowered to demonstrate tangible value.

4.3.4.2 Activities:

- ii Conduct a capacity and skills needs assessment
- ii. Design bespoke training modules

- iii. Design and delivery of training and advocacy materials through a multiplicity of training channels ranging from physical workshop training, on-field training, technology and mass media - platforms - enabled information dissemination.
- iv. Facilitate intra-regional and local exchange visits and peer trainer dialogues

4.3.4.3 Outputs:

1. Preparation of a national SSP training programme and delivery modalities
2. Catalogue of training tools
3. Curation of a community of practice between SSPs across the nation (including the election of CSA champions)

4.3.5 Component five: Building national and regional leadership in climate-smart agriculture

4.3.5.1 Rationale:

The final component of the climate-smart framework is aimed at leveraging the cross-cutting benefits of the programme to galvanise both the image and value of improved agricultural output, enhanced skills and practices, environmental and climatic sustainability, and improved use of tools, technology and data. The overall purpose of this is to consolidate on Nigeria's regional leadership as the largest economy and draw on the progress and the success of operationalising the framework to inspire and catalyse regional learning and knowledge exchange, to provide working examples and case studies that champion climate-smart agriculture in the light of the overall risks to the entire African continent.

There will be a concerted effort to document and share the stories of farmers and SSPs, using a broad mix of digital and traditional tools. As well as networking with the broader research, and practice communities in conferences (both regionally and internationally) to raise the profile and invite contemporary debate and feedback.

This leadership ambition will entail the purposive networking and partnership between institutional structures in other African countries responsible for the agricultural sector, whilst curating a shortlist of both institutional arrangements, and best practices that will support the strategic expansion of climate-smart knowledge and practices in Africa and the overall benefit to value chains, livelihoods and the economy.

Building on this strategic direction, a number of working visits and knowledge exchange fora will be facilitated to share and concretise the lessons, opportunities and benefits derived with

selected partner countries across the region. The exchange visits will also serve as opportunities for further peer learning, mutual dialogue and the development of partnerships that serve the long-term interests of addressing the dynamic challenges of climate change.

4.3.5.2 Activities:

- i. Design an impact framework for climate-resilient agriculture in Nigeria including regional and international considerations).
- ii. Catalogue lessons, opportunities and value of climate-smart agriculture in Nigeria
- iii. Design dedicated website/pages and suite of communication and information dissemination channels
- iv. Document successful pilot cases both locally and regionally, that contributes to shaping a positive narrative
- v. Attend and host international fora, conferences and knowledge exchange meetings including presentations at international climate change-related conferences such as UNFCCC COP meetings, United Nations Convention to Combat Desertification (UNCCD) meetings, etc to show the leadership credentials of the country in adaptation and resilience.

4.3.5.3 Outputs:

1. Climate-smart agriculture impact framework based on Nigeria's Nationally Determined Contributions (NDCs)
2. Periodic reports on cross-learning opportunities
3. Information and knowledge sharing platforms and meetings (hosted and attended).
4. Documentation of success stories and case studies

4.3.6 Component six: Sustainable Financing

4.3.6.1 Rationale:

The implementation of the CSA activities require significant effort to be put into securing adequate financing. This component will explore innovative approaches and diverse sources to meet the financial requirements that support the implementation of the CSA activities. These range from donor funding, through to leveraging private and public capital that can be harnessed for climate-smart investments in agriculture.

It also recognises that agriculture (and its subsectors) can offer an opportunity and pathway for inclusive, economic growth for Nigeria. With sufficient financing for sustainable and climate-smart production systems, the agricultural sector can unlock enormous economic potential while achieving several of the UN Sustainable Development Goals.

The consideration for securing suitable financing, places implementation at the very heart of programme design and delivery, recognising the fact that the lack of financing is the commonly cited limitation to implementation that most development-oriented frameworks encounter.

4.3.6.2 Activities:

- i. Design a funding framework and strategy document to support the operationalization of the CSA framework.
- ii. Map out the current landscape of funding flows and opportunities that will support the operationalization of the CSA framework.
- iii. Establish a set of guidelines and streamline mechanisms for domestic fund-raising opportunities and activities.
- iv. Prepare detailed budgets to support the implementation of component activities under the CSA framework
- v. Develop private sector dialogue and investment platforms to attract specific investments in climate smart technologies, processes and tools that will aid the implementation of the CSA framework.
- vi. Explore and foster dialogue in the development of innovative financing models, instruments and mechanisms including insurance products to support the CSA framework and the overall growth of the agricultural sector.
- vii. Link climate finance streams for adaptation and mitigation that are treated separately. (Sources of finance are rarely blended into a single project or programme. Beyond harmonizing mitigation and adaptation efforts, support for climate-smart agriculture may have the potential to link with conventional agricultural development programmes that are designed to benefit smallholder farming communities).

4.3.6.2 Outputs:

1. Sustainable CSA funding framework
2. Private sector – investor platform (and network events)
3. Curated list of potential CSA funders and Funding proposal templates

5.0 INSTITUTIONAL ROLES AND RESPONSIBILITIES

5.1 Overview of institutional roles

Strong and well-coordinated institutions are vital to agricultural development as well as the realization of resilient livelihoods. They serve as the main conduit through which climate-smart agricultural practices can be scaled up and sustained. It is therefore important to enhance institutional capacities and roles in order to efficiently implement CSA activities and initiatives.

To effectively operationalise the six components of the CSA framework in Nigeria, effective and well-coordinated institutional arrangements that allows for synergies across Ministries, Departments, Agencies, sub-sectors and key actors is vital. The institutional framework for the CSA implementation in Nigeria is designed in such a way that makes it scalable, inclusive, while leveraging the identified entry points in CSA practices undertaken by a variety of state and non-state actors. These actors identified have worked and are still working on a variety of CSA practices at various scales which can be streamlined through this framework. The institutions have been grouped according to their mandates, strengths and expertise in the CSA implementation process to allow for strong synergies to be brokered using top-down, bottom-up and horizontal participatory processes and models.

They are highlighted in Table 5.1 together with their roles and responsibilities

Table 7: Selected key Institutions, their roles and responsibilities in the CSA Implementation process in Nigeria

Scale	Examples of Institutions	Role and Responsibilities
International	United Nations Development Programme (UNDP), European Union (EU), Food and Agriculture Organization (FAO); World Meteorological Organization (WMO); World Health Organization (WHO), International Fund for Agricultural Development (IFAD; WaterAid Nigeria; World Bank; OXFAM, etc	<ul style="list-style-type: none"> ● Support the provision of funds, capacities, technologies and inputs for implementation of CSA practices in Nigeria
Regional	African Development Bank, ECOWAS etc	<ul style="list-style-type: none"> ● Support the promotion of CSA practices that will lead to increased agricultural productivity, resilience building and reduced GHG emissions in the agricultural sector in Nigeria ● Partner with Nigeria to implement the CSA objectives
Federal	Federal Ministry of Agriculture and Rural Development and its Parastatals; Federal Ministry of Water Resources and its Parastatals; Federal Ministry of Environment and its Parastatals; Federal Ministry of Industry, Trade and Investment and its Parastatals; Federal Ministry of Science and Technology and its Parastatals; National Assembly; Judiciary	<ul style="list-style-type: none"> ● Create enabling environment (effective, transparent governance structure, regulatory framework, budgetary provision and other incentives etc) for the development and mainstreaming of CSA practices into national development priorities ● Mainstream CSA practices into all development priorities at the national level ● Coordinate respective mandates and sectoral responsibilities in such a way that promotes CSA objectives ● Support the provision of weather-related and extension services to farmers at the subnational levels ● Support the adoption of climate-smart agricultural technologies, innovations and practices at the subnational levels ● Promote effective synergies across line Ministries, Departments and Agencies. ● Strengthen access to funding especially of Local Governments in Nigeria ● offtake agricultural goods produced at the subnational level to guarantee sustainable national food security

Subnational	States and Local Governments Ministries, Departments and Agencies; State Houses of Assemblies; Judiciary	<ul style="list-style-type: none"> ● Mainstream CSA practices into all development priorities at the subnational level ● Support the adoption of climate-smart agricultural technologies, innovations and practices at the State, Local Government and community levels ● Support the provision of weather-related and extension services to farmers at the State, Local Government and community levels ● offtake agricultural goods produced by small holder farmers ● Monitor CSA implementation at the subnational level
Research Institutions and Universities	<p>Agricultural Research Council of Nigeria, Abuja; Agricultural Rural Management Training Institute (AMRTI) Ilorin; Institute of Agricultural Research, Zaria (IAR); International Institute for Tropical Agriculture (IITA) Ibadan; Forest Research Institute in Nigeria (FRIN); Lake Chad Research Institute (LCRI) Maiduguri; National Cereal Research Institute (NCRI), Bida; National Root Crop Research Institute, Umudike; National Horticultural Research Institute, Ibadan; National Store Product Research Institute, Ilorin; Rubber Research Institute of Nigeria, Benin City; Cocoa Research Institute of Nigeria, Ibadan; Nigerian Institute for Oil Palm Research, Benin City; National Animal Production Research Institute, Zaria; National Veterinary Research Institute, Vom; National Institute for Fresh Water Fisheries, New Bussa; National Institute for Oceanography and Marine Research, Lagos; National Agricultural Extension, Research and Liaison Services, ABU Zaria;</p> <p>Faculties of Agriculture in Nigerian Universities; etc</p>	<ul style="list-style-type: none"> ● Coordinate research and innovation that have positive impact on CSA sustainability in Nigeria ● Through research and development, develop CSA models and practices that are location and sector specific, and inclusive ● Promote research and capacity building on land and crop suitability, seed production, drought-tolerant varieties, precision agriculture etc across agro-climatic zones ● provide balance among several institutions that are key to CSA implementation. ● Identify relevant kinds of synergies and collaborations that could best bring out institutional strengths and optimize CSA practices ● Engage in critical analyses of agricultural systems in Nigeria in terms of constraints, gaps and critical areas requiring intervention ● Provide network and knowledge sharing platforms for different stakeholders in the Agricultural value chain

Private Organizations	Nigeria Agribusiness Group (NABG)	<ul style="list-style-type: none"> ● Engage both governments and private sector organizations in the Agribusiness value chain to set policy directions and regulatory reforms for sustainable, inclusive, and socio-economic agricultural growth. ● Foster partnership and serve as a bridge between government and private/civil society organizations ● Seek funds and support the promotion of CSA practices that will lead to increased agricultural productivity, resilience building and reduced GHG emissions in the agricultural sector ● To work with relevant national line ministries, departments, and agencies as well as developmental and donor agencies through an efficient stakeholder consultation process for the advancement of CSA practices. ● Support and promote training programmes for technology and knowledge transfer at community level ● Support the creation of safety nets and insurance schemes to farmers ● Monitor CSA implementation in Nigeria
Private Sector, Civil Society Organizations and Media Organizations	Manufacturing Association of Nigeria; and Dangote group of Companies. Friesland Company; PyroGenesys; L & Z Agro Parks Limited; Private Media Organizations; PROMAD; OXFAM; Women in Agriculture; Nigeria Young Farmers Network ; Nigeria Climate Action Network (NigeriaCAN);Nigerian Environmental Study Action Team (NEST); Climate Change NetworkNigeria (CCNN);Nigeria Conservation Foundation (NCF);Women Farmers Advancement Network, Kano Nigeria (WOFAN); Women Environment Programme (WEP); African Radio Drama	<ul style="list-style-type: none"> ● To work with relevant national line ministries, departments, and agencies as well as developmental and donor agencies through an efficient stakeholder consultation process for the advancement of CSA practices. ● Support and promote training programmes for technology and knowledge transfer at community level ● Provide hands-on information to various stakeholders in the agricultural value-chain ● Monitor CSA implementation at the local level

	Association (ARDA) ; Nigeria; Coalitions for Change (C4C).	
Financial and Risk-sharing Institutions	Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL), Banks of Industry and Agriculture, Insurance companies, the CBN, and the National Council on Climate Change Fund.	<ul style="list-style-type: none"> ● Seek funds and support the promotion of CSA practices that will lead to increased agricultural productivity, resilience building and reduced GHG emissions in the agricultural sector ● Support the creation of safety nets (cooperatives), funding and insurance schemes to farmers ● Monitor CSA implementation at the local level

A more detailed catalogue of the full breath of the institutional landscape for the delivery of the components of the CSA framework (disaggregated by components is in the appendix)

5.2 CSA Coordination framework

The implementation of Climate Smart Agriculture requires significant coordination and integration in order to sustainably reduce vulnerability, increase resilience and boost agricultural productivity at the landscape levels. It also calls for major shifts in the way institutions and actors interact. This section examines extant institutional coordination arrangement, challenges with the current structure and proposes a coordination framework for CSA implementation in Nigeria.

5.2.1 Extant Institutional Coordination arrangement in the agriculture sector

Nigeria has a Federal system of Government comprising the Federal Government, the Federal Capital Territory, 36 States and 774 Local Government Areas. The Country is therefore governed by Federal, State and Local Government Institutions. Most of the federal government institutions and departments are represented at the State level. Based on the current constitutional guidelines, the Federal Government sets the policy framework while the state governments develop their own specific policies to fit within the overall national framework. In addition, the Federal Government influences the operational policies and institutional arrangements in the states and local governments through macroeconomic policy direction, for which it has executive powers. Thus, in relation to agricultural development, the Federal Government directly intervenes in agriculture and rural development using its own budget and resources.

The Federal Ministry of Agriculture and Rural Development (FMARD) and its eleven (11) technical departments is the lead institution responsible for the food and agriculture sector in Nigeria. The Ministry's objective is to improve agricultural production and, in turn, enhance national food security and alleviate rural poverty. It provides technical support, production infrastructure, and supplies inputs to promote adoption of productivity enhancing techniques. It has responsibility for the formulation of national food and agricultural policies and programmes and coordination of the implementation of these policies and programmes by the responsible agencies. It also performs monitoring and evaluation functions in respect of the national agricultural policies. Other key Federal Ministries that are critical for agricultural and rural development in Nigeria are the Federal Ministry of Environment and its Parastatals; Federal Ministry of Water Resources and its Parastatals, Federal Ministry of Science and Technology and its Parastatals; and the Federal Ministry of Industry, Trade and Investments and its Parastatals.

Apart from the Federal Departments and Agencies involved in agricultural and rural development, there are several agricultural training centres and institutions charged with the mandates of conducting specialized studies and research into management needs and problems

in agricultural and rural sectors; conduct training needs analysis; provide management training as part of interventions for identified needs and problems (including gender and youth related issues); provide consultancy services towards improving managerial effectiveness and efficiency in the agriculture sector; disseminate agricultural and rural information; contribute to policy development for effective management and improve management practice in the agricultural and rural sector through appropriate management interventions towards poverty alleviation.

At the state level, all state-level ministries are similar with minor differences resulting from each state's ecological situation. Typical technical departments at the State Ministries of Agriculture comprise the Departments of Agriculture Development; Livestock and Veterinary Services; Integrated Rural Development; Engineering; Fisheries; Forestry and Natural Resources Department. Some states in addition, have the Cooperative Development Department and the Produce Grading, Inspection and Pest Control Departments. Apart from its direct activities, the State Ministries of Agriculture also supervise other agencies including Area Development Agencies/Area Development Projects, input supply companies, and semi-autonomous agricultural development projects. Each of the state ministries in general terms have two service departments: Finance and Administration which is responsible for finance, accounts, budget, administration and personnel including human resource development; and Planning, Research and Statistics which collaborates with other departments in planning research, studies and data collection, management, rolling and annual plans, and monitoring and evaluation.

The Local Government Councils (LGCs) are the last tier of government and are closest to the rural communities. They support the Federal and State governments in agriculture and rural development. The Fourth Schedule of the 1999 Constitution of Nigeria, gives local councils, inter alia, the authority to; provide and maintain primary, adult, and vocational education; develop agriculture and natural resources other than the exploitation of minerals; and provide and maintain primary health services.

5.2.2 Challenges with the current institutional coordination arrangement

At the federal level, there is weak coordination across the Ministries, Departments and Agencies which leads to duplication of responsibilities and wastage of resources. Although a number of structures exist for consultation and policy harmonization such as the National Council on Rural and Agricultural Development, which includes the Federal Ministry of Agriculture and Rural Development (FMARD), and the State Ministries of Agriculture (SMOAs), and the National technical committees such as those for extension, research, fisheries, livestock and statistics,

which support these councils. They do not meet regularly to provide guidance and also review progress of the interventions in the agriculture sector. Similarly, national councils for other sectors like Environment, Water Resources and Science and Technology also exist and perform similar functions for environment, water resources, and science and technology. They also meet annually to deliberate on policy issues and advise on policy development in these sectors but the synergy between these councils and that of Agriculture and Rural Development is rather weak.

There have also been challenges of weak coordination at the inter-ministerial level, weak coordination across the federal, state and local governments on agriculture-related issues, weak coordination between the three-tiers of government and the private sector on agriculture-related issues, inadequate capacity for cross sectoral planning, as well as ineffective lines of communication across the three-tiers of government and with the private sector. The weak vertical and horizontal integration certainly requires a coordination framework for the CSA framework to be effectively implemented. An improved institutional coordination is imperative to achieve both horizontal and vertical integration, provide high-level guidance and to identify and define the roles of various stakeholders in the implementation of CSA programme.

5.2.3 Proposed coordination framework for implementation of CSA practices in Nigeria

It is hoped that the proposed coordination framework will improve Inter-Ministerial, State and Local Government coordination; enhance partnerships with private sector and civil society organizations; and strengthen coordination with development partners.

A proposed coordination framework for implementation of CSA practices in Nigeria is shown in Figure 5.1

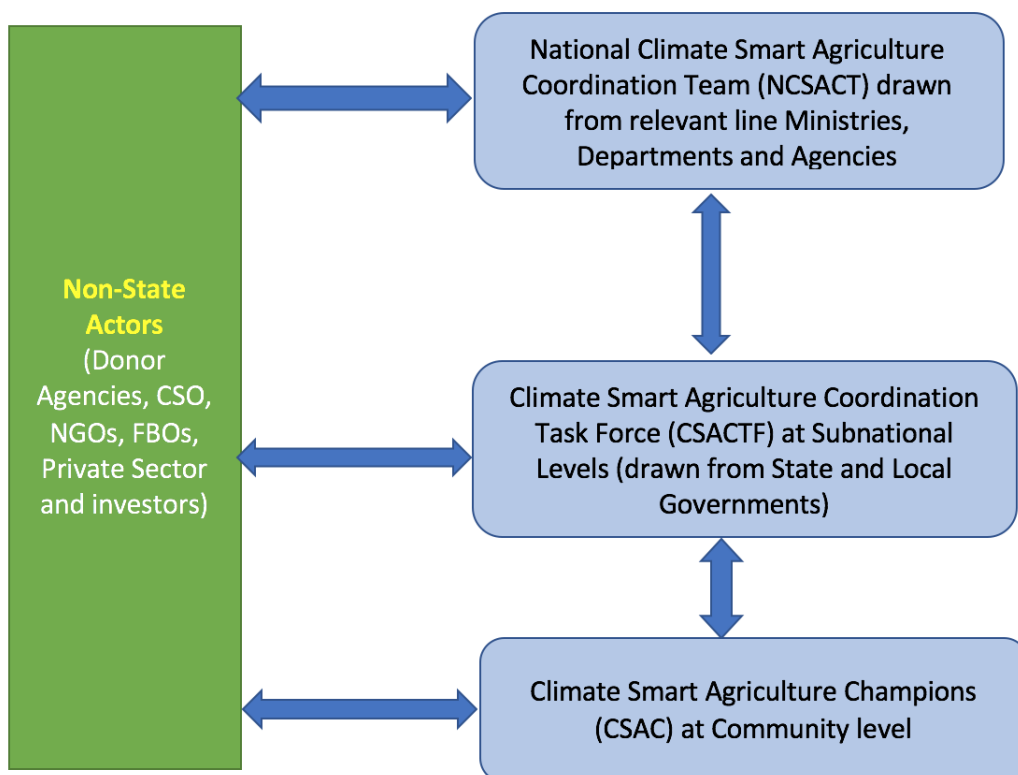


Figure 17: Proposed CSA Coordination Framework

5.3 CSA Coordination Activities

The National Climate Smart Agriculture Framework (NCSAF) will be domiciled in the Federal Department of Agricultural Land and Climate Change under the Federal Ministry of Agriculture and Rural Development. However, for effective coordination, a joint platform to be called the **National Climate Smart Agriculture Coordination Team (NCSACT)** consisting of CSA Desk Officers from Crop, livestock, fisheries, water, forestry, science and technology, finance, budget and planning, industry, trade and investments shall be drawn from relevant line Federal Ministries, Departments and Agencies. The Director, Federal Department of Agricultural lands and Climate Change is expected to chair the meeting of the NCSACT.

The role of the NCSACT will be to amongst others coordinate all CSA programmes and activities at the national level; provide evidence-based information and data to the Inter-ministerial Committee of the line Ministries, Departments and Agencies; build capacity of national and subnational staff in CSA practices; strengthen the planning, implementation, reporting,

monitoring and review of CSA programme at the national and subnational levels; and production of annual state of CSA programme implementation in Nigeria.

At the subnational level, the **National Climate Smart Agriculture Coordination Team (NCSACT)** will be complemented by the **Climate Smart Agriculture Coordination Task Force (CSACTF)**. The CSACTF membership will be drawn from line ministries, departments and agencies at the State level and representatives from the Local Governments. The CSACTF will be chaired by the Honourable Commissioner for Agriculture in the respective States.

The role of the CSACTF will include amongst others to: coordinate all CSA programmes and activities at the subnational level; provide evidence-based information and data to the NCSACT; build capacity of subnational staff in CSA practices; strengthen the planning, implementation, reporting, monitoring and review of CSA programme at the subnational level; and production of annual state of CSA programme implementation at the subnational level and report to the NCSACT.

The **Climate Smart Agriculture Champions (CSAC)** shall coordinate CSA activities at the community and local levels. Because they live with the communities, they serve as the gatekeepers to CSA implementation at the local level. They will meet regularly and provide periodic reports in terms of updates, challenges and constraints to CSA implementation at the local and community levels to the CSACTF.

The coordination framework also provides a broad relational platform within which Non-State actors including CSOs and NGOs shall operate, and their inter-relationships with state agencies. The CSOs and NGOs have important roles to play in CSA implementation at the national and subnational levels including rural communities. At the national level, they shall collaborate with the federal ministries, departments and agencies as well as donor agencies to address specific actions including sensitization of stakeholders, policy advocacy, information gathering and dissemination, and promoting linkages with similar groups and organizations at the sub-regional level. At the subnational levels, the CSOs and NGOs will be responsible for the implementation of CSA activities mainly through awareness creation, farmer training and demonstration of best practices, and provision of funding and inputs required for CSA practices. They will also be responsible for synergizing directly with farmers, pastoralists, fishermen, forest-dependent communities to ensure sustainable CSA practices at the community and local levels.

6.0 MONITORING AND EVALUATION OF THE CSA FRAMEWORK

A monitoring and evaluation (M&E) framework will be developed and implemented throughout the CSA implementation. The M&E framework will serve several functions including provision of information needed for impact-oriented CSA project implementation and management; platform for learning, for tracking progress and understanding change. Ultimately, it will guarantee coordinated and efficient data collection, analysis, utilization of information that will provide indications of outputs, outcomes, and impacts.

While monitoring measures CSA achievements at the activity and output levels, evaluation measures achievements at the outcomes and impact levels. Monitoring of CSA project activities will involve the selective observation of the day-to-day process of implementing the CSA project, paying particular attention to the achievement of the output goals as specified in the planned activities. Evaluation on the other hand, will focus on the wider impact of the CSA programme on a spatial scale (community, local government, state or national). It seeks as far as possible to identify the net financial or economic benefits derived from a CSA project. Evaluation ultimately provides a more accurate basis for decisions about whether to upscale, maintain, modify or close down an extant CSA project.

M&E tools such as regular supervision, use of monitoring and evaluation indicators, diagnostic/baseline survey reports, progress reports, use of programme log frame, activity-based result framework, evaluation reports, annual work plans and budget, annual reports, communication strategy, as well as audit of project activities will be deployed to ensure satisfactory monitoring and evaluation of the CSA project activities.

It is envisaged the M&E and reporting will be done throughout the life-cycle of CSA programme implementation, however milestone audits and reports will be done after the first year and thereafter every three years, to analyse impacts and progress, and evaluate lessons being learnt and the need for any strategic adjustments.

M&E will adopt a logical framework approach (See suggested template in appendices) to assess outputs, outcomes and impacts within the broader components of CSA which are to sustainably increase agricultural productivity and incomes; adapt and enhance resilience to the impact of climate change; and, reduce and/or remove greenhouse gas emissions, where possible, in the agriculture sector.

7.0 References

- Abbas, A. M. (2019). 'Crop Production on in Nigeria since 1914: Geo-Historical Analyses of Progress and Retrogress'. *Journal of Advanced Research Agriculture Science and Technology*; 2(2): 15-24.
- Adegoke, J., Araba, A. and Ibe, C. (Eds.)(2014). *National Agricultural Resilience Framework*. Federal Ministry of Agriculture and Rural Development, Nigeria.
- Adesipo, A., Oluwaseun, F., Kamil, K., Ondrej, K., Petra, M., Ali, S. and Mayowa, A. (2020). Smart and Climate-Smart Agricultural Trends as Core Aspects of Smart Village Functions. *Sensors*, 20, 5977.
- Adesoji, S. A., A.J. Farinde and O.A. Ajayi , (2006). "Assessment of the Training Needs of Fadama Farmers for Future Agricultural Extension Work Development in Osun State, Nigeria". *Journal of Applied Sciences*, 6: 3089-3095
- African Development Bank (2013), <http://www.afdb.org/en/news-and-events/article/nigeria-afdb-boardapproves-us-152-50-million-financing-for-agricultural-transformation-agenda-supportprogram-12488/>
- Agboola, J. (2021). Nature-based solutions: Advancing innovative local practices for ecosystems restoration in Nigeria. Enabling Sustainability. <https://medium.com/enabling-sustainability/nature-based-solutions-advancing-innovative-local-practices-for-ecosystems-restoration-in-nigeria-d8e7ca0ec0c6>
- Amangabara, G. T., & Obenade, M. (2015). Flood vulnerability assessment of Niger Delta States relative to 2012 flood disaster in Nigeria. *American Journal of Environmental Protection*, 3(3), 76–83.
- Ani, K. J., Anyika, V. O. and Mutambra, E. (2022) 'The impact of climate change on food and human security in Nigeria' , *International Journal of Climate Change Strategies and Management* Volume 14 Issue 2, p 148-167.
- Anyim, C. O. and Odoemelum, L.E. (2018). "Training needs of rural women farmers on small ruminant production in abia state, Nigeria" *International Journal of Current Research* Vol. 10, Issue, 05, pp.69253-69257
- Bruinsma, J. (2009). "The Resource Outlook to 2050", in Expert Meeting on "How to Feed the World in 2050".
- Byrd K. A., Fakoya, K., Akintola, S., Westlund, L., Isa, S., Cohen, P. J. (2022) The role of small-scale fisheries in Nigeria's food system. *WorldFish*, Penang, Malaysia.
- Campbell, B.M. (2014). Thornton, P.; Zougmore, R.; van Asten, P.; Lipper, L. Sustainable intensification: What is its role in climate smart agriculture? *Curr. Opin. Environ. Sustain.* 8, 39–43.
- Centre For Social Justice (CSJ) (2016). *Budgeting for Climate Change in Agriculture*. Centre For Social Justice, Abuja, Nigeria. www.csj-ng.org
- Cervigni, R., Rogers, J. A., and Henrion, M., eds, (2013). *Nigeria: Towards Climate-Resilient Development in Nigeria*. Washington, DC: World Bank.
- Cline, W.R. (2007). *Global Warming and Agriculture: Impact Estimates by Country*, Center for

- Global Development, Peterson Institute for International Economics.
- Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F.N. & Leip, A. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. *Nat Food*, 2: 198–209. <https://doi.org/10.1038/s43016-021-00225-9>
- Department for International Development (DFID). (2009). *Impact of climate change on Nigeria's economy: Final report*. Department for International Development
- Economic Recovery and Growth Plan, (2017). Available at <http://www.budgetoffice.gov.ng/index.php/economic-recoverygrowth-plan-2017-2020>.
- Engel, S.; Muller, A. Payments for environmental services to promote 'climate-smart agriculture'? Potential and challenges. *Agric. Econ.* 2016, 47, 173–184.
- Federal Ministry of Agriculture and Rural Development (FMARD)(2016). The Agriculture Promotion Policy (2016 – 2020). Policy and Strategy Document, Federal Ministry of Agriculture and Rural Development (FMARD), Abuja, Nigeria.
- FMARD (2017). National Agriculture Investment Plan (NAIP-2) 2017-2020. Federal Ministry of Agriculture and Rural Development (FMARD), Abuja, Nigeria.
- Federal Ministry of Environment (FME)(2016). National Policy on the Environment (Revised 2016). Federal Ministry of Environment, Abuja, Nigeria.
- Federal Ministry of Environment (FMEEnv)(2021). Nigeria's First Nationally Determined Contribution – 2021 Update. Federal Ministry of Environment, Abuja, 2nd July 2021.
- Federal Ministry of Agriculture and Water Resources (FMAWR)(2008). National Food Security Programme May 2008. Federal Ministry of Agriculture and Water Resources, Abuja, Nigeria.
- Financial Watch (2016). Agricultural Sector Contribution to GDP. <http://www.financialwatchngr.com/2016/04/14/agricultural-sector-contribution-to-gdpnow-at-24-18-cbn/>
- Fischer, G., Shah, M. and van Velthuisen, H. (2002). "Climate Change and Agricultural Vulnerability", in Contribution to the World Summit on Sustainable Development, Johannesburg, International Institute for Applied Systems Analysis (IAASA): Laxenburg.
- Food and Agriculture Organization of the United Nations (FAO)(2010). "Climate-Smart" Agriculture Policies, Practices and Financing for Food Security, Adaptation and Mitigation. FAO, Rome, Italy.
- Food and Agriculture Organization of the United Nations (2013) "Climate Smart Agriculture Rulebook", FAO, Rome, Italy.
- Food and Agriculture Organization of the United Nations (2013) Climate Smart Agriculture Source Book. Rome Italy
- Food and Agriculture Organization of the United Nations. (2015). The State of Food Insecurity in the World: Meeting the 2015 international hunger targets: taking stock of uneven progress. Available at <http://www.fao.org/3/a-i4646e.pdf>.
- Food and Agriculture Organization (FAO)(2020). AQUASTAT. In: Food and Agriculture Organization of the United Nations [online]. Rome. [Cited 5 November 2020]. www.fao.org/aquastat/statistics/query/index.html;jsessionid=542857BF71E3835737530C83DDC9AC89

- Food and Agriculture Organization (FAO)(2021). Climate-smart agriculture Projects from around the World. Food and Agriculture Organization of the United Nations Rome, 2021.
- Gbode, E. I., Adeyeri, O. E., Menang, K. P., Intsiful, J. D. K., Ajayi, V. O., Omotosho, J. A., Akinsanola, A. A. (2019) 'Observed changes in climate extremes in Nigeria'. *Meteorological Applications*. Volume 26: Issue 4. p 642–654
- Global Centre on Adaptation (2021) "GCA State and Trends in Adaptation Report 2021: Africa." https://gca.org/wp-content/uploads/2021/10/GCA_State-and-Trends-in-Adaptation-2021-Africa_full-report_low-res.pdf
- Global Food Security Strategy (GFSS) (2018). Global Food Security Strategy (GFSS) Nigeria Country Plan August 2018. Feed the Future, The U.S. Government's Global Hunger and Food Security Initiative.
- Godfray, H., Ch. J., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., Nisbett, N., Pretty, J., Robinson, Sh., Toulmin, C. and Whiteley R. (2010). "The future of the global food system," *Phil. Trans. R. Soc.* September 27, 2010, 365: 2769-2777.
- Goli, I., Azadi, H., Miceikienė, A., Tanaskovik, V., Stamenkovska, I.J., Kurban, A. and Viira, A.-H., (2022). "Training Needs Assessment: The Case of Female Rice Farmers in Northern Iran". *Agriculture*, 12(3), p.390.
- Holger A., Chakib J., Ede I., and Jamal S. (2022) "The urgency and benefits of climate adaptation for Africa <https://www.brookings.edu/blog/africa-in-focus/2022/03/24/the-urgency-and-benefits-of-climate-adaptation-for-africas-agriculture-and-food-security/>
- Ibiroga, F. (2018) The Guardian Newspaper 02 July 2018; <https://agriculture.lagosstate.gov.ng/history-of-agricultural-development/accessed/26/7/202>
- Ibrahim, S. B., Ayinde, I. A., and Arowolo, A. O. (2015) 'Analysis of arable crop farmers' awareness to causes and effects of climate change in south western Nigeria', *International Journal of Social Economics*, Vol 42, Issue 7, p614-628.
- ILRI (2023) 'Nigeria: What ILRI does' <https://www.ilri.org/where-we-work/west-africa/nigeria>
- IRC (2020) Impact of Selected Agricultural Policies And Intervention Programs In Nigeria – 1960 Till Date, <https://irglobal.com/article/impact-of-selected-agricultural-policies-and-intervention-programs-in-nigeria-1960-till-date/>
- IPCC (Intergovernmental Panel on Climate Change) (2023) Glossary of terms. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on ClimateChange (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564
- International Fund for Agricultural Development (IFAD)(2001). West and Central Africa Division Portfolio Performance Report. June 2011- June 2012. Accessed 30/09/2015.
- International Fund for Agricultural Development (IFAD)(2012). Rural Poverty in Nigeria:

- Agriculture in the Federal Republic of Nigeria. International Fund for Agricultural Development. Retrieved August 7, 2010 from <http://www.ruralpovertyportal.org/web/guest>
- Jung, I. (2023) 'Food Insecurity in Nigeria: Food Supply Matters: Nigeria', International Monetary Fund, <https://www.elibrary.imf.org/view/journals/018/2023/018/article-A001-en.xml>
- Knaepen, H., Torres, C. and Rampa, F. (2015). Making agriculture in Africa climate-smart From continental policies to local practices. European Centre for Development Policy Management. Briefing Note No. 80.
- Läderach, P., Hagggar, J., Lau, C., Eitzinger, A., Ovalle, O., Baca, M. (2010). *Mesoamerican Coffee: Building a Climate Change Adaptation Strategy*. CIAT Policy Brief No. 2. Cali: Centro Internacional de Agricultura Tropical (CIAT), 4.
- Lipper, L., Thornton, P., Campbell, B. *et al* (2014). Climate-smart agriculture for food security. *Nature Clim Change* **4**, 1068–1072.
- Leslie, L., Nancy, M., David, Z., Solomon, A. and Giacomo, B. (2018)(Eds.). *Climate Smart Agriculture; Building Resilience to Climate Change*. Food and Agricultural Organization of the United Nations.
- National Bureau of Statistics (NBS)(June 2017). Available at <http://www.nigerianstat.gov.ng/download/564>.
- National Climate Change Policy (NCCP)(2021). National Climate Change Policy for Nigeria 2021 – 2030. Federal Ministry of Environment (FMEnv) Abuja, Nigeria.
- Nigeria Zero Hunger Strategic Review, 2016. Available at <https://fscluster.org/nigeria/document/synthesis-report-nigeriazero-hunger>.
- Nigerian Meteorological Agency (NiMet)(2023). 2023 State of the Climate in Nigeria. NiMet, Abuja Nigeria
- Nkechi, I (2021). "NATIP Policy Implementation Will Fast-track Agricultural Revolution" <https://sciencenigeria.com/natip-policy-implementation-will-fast-track-agricultural-revolution-shehuri/>
- Ogbeibu, A. E. and Oribhabor, B. J. (2023) 'The Niger Delta Mangrove Ecosystem and Its Conservation Challenges' in Yllano, O. B. (eds) *Mangrove Biology, Ecosystem, and Conservation*, IntechOpen.
- Oni, O. A., Nkonya, E., Pender, J., Phillips, D. and Kato, E. (2009). 'Analyzing Drivers of Food Crop Productivity in Nigeria', *Journal of Economics and Rural Development* vol. 18 No. 1
- Owolabi, I.O., Ashaolu, J.T. & Twumasi-Ankrah, S. (2016). The New Nigerian Agricultural Policy: Efficient for Food Security? *Food Science and Technology* 4(1): 1-6.
- Oyekanmi, S. (2021). "Nigeria's Agric export surges to highest on record, here are the top" 23 Sep. 2021, <https://nairametrics.com/2021/09/23/nigerias-agric-export-surges-to-highest-on-record-here-are-the-top-items/>
- PWC (2020). "Current State of Nigeria Agriculture and Agribusiness Sector -" <https://www.pwc.com/ng/en/assets/pdf/afcfta-agribusiness-current-state-nigeria-agriculture-sector.pdf>

- Raji, K. (2020). "Our Food Heroes: The Average Nigerian Smallholder Farmer -." 17 Oct. 2020, <https://www.vanguardngr.com/2020/10/our-food-heroes-the-average-nigerian-smallholder-farmer/>.
- Sani, A., Ibrahim, H. I., and Adeola, S. S., (2023) Competitiveness and Comparative Advantage of Rice Production in Katsina State, Nigeria, *Diyala Agricultural Sciences Journal*, Vol. (15) No. 2: 11-24
- Sasu, D.D. (2023). Agriculture in Nigeria - statistics and facts <https://www.statista.com/topics/6729/agriculture-in-nigeria/#topicOverview>
- Stern, N. (2006). *Stern Review on the Economics of Climate Change*, HM Treasury, London.
- Subasinghe, R., Phillips, J. M., Byrd, K. A., Tran, N., Shikuku, K. M., Chan, C. Y., Dizyee, K., Steensma, J., Nukpezah, J., & Siriwardena, S. (2021). Nigeria Fish Futures: Report of the Scoping Study. WorldFish: Penang, Malaysia
- Suleiman, I.L. (2014). An Appraisal of Climate Change and Agriculture in Nigeria. *Journal of Geography and Regional Planning*. 7(9).
- United Nations Department of Economic and Social Affairs (UNDESA)(2013). World Population Prospects. The 2012 Revision. Volume 1: Comprehensive Tables. United Nations, New York.
- United Nations Department of Economic and Social Affairs (UNDESA) (2014). Urbanization Prospects. The 2014 Revision. Highlights. United Nations, New York.
- United Nations Development Programme (UNDP)(2018). *Human Development Indices and Indicators:2018 Statistical Update*. Available at <http://www.hdr.undp.org/en/content/human-development-indices-indicators-2018-statistical-update>.
- United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)(2017). 2018 Humanitarian Response Plan Nigeria. Available at https://reliefweb.int/sites/reliefweb.int/files/resources/2018_hrp_v5.4.pdf
- United Nation (nd). World Population Prospects 2022. Department of Economic and Social Affairs. <http://population.un.org/wpp/>
- World Bank (2012). World Bank Development Indicators. [Online]. Available: <http://data.worldbank.org>. Accessed on 04/10/2015.
- World Bank (2015a). Future of Food: Shaping a Climate-Smart Global Food System; World Bank: Washington, DC, USA.
- World Bank (2015b). Accelerating Climate-Resilient and Low-Carbon Development: The Africa Climate Business Plan; World Bank: Washington, DC, USA.
- World Bank (2022) 'Nigeria: total population data' <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=NG>
- World Food Programme (WFP)(2018). Draft Nigeria country strategic plan (2019–2022). World Food Programme, Via Cesare Giulio Viola, 68/70, 00148 Rome, Italy.
- World Food Programme (2022) 'Country outlook: Nigeria' <https://www.wfp.org/countries/nigeria>

Zechner, K. (2021). "Empowering smallholder farmers in Nigeria: An introduction to AgroMall"
<https://www.gsma.com/mobilefordevelopment/blog/empowering-smallholder-farmers-in-nigeria-an-introduction-to-agromall/>

8.0 Appendices

8.1 Appendix 1: List of key stakeholders participating in CSA workshop in July 2022

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Climate Smart Agriculture Framework for Nigeria

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Adedotun Aina	Dotank Global Ent.	dotankglobal@gmail.com

8.2 Appendix 2: CSA workshop Panel Discussion & Breakout Session Guide

Format of Panel Discussion and Breakout Sessions:

The participatory nature of the workshop will be enhanced through a panel discussion and two breakout sessions. The panel discussion will be moderated by the MC/At Harvey consultant, using the question prompts below and facilitating a balance in responses, time used and audience participation in the follow-up Q&A. Key insights will be documented by the delegated rapporteurs. The subsequent breakout sessions will also be anchored by rapporteurs who will help document the reflections and discussions generated. Groups will be divided randomly and participants mixed across the room.

Rapporteurs will also be responsible (either personally or via a delegated member of the group) for the summarised group report back at the end of the discussion.

Panel/ Open discussion (Day 1: 12:55 – 1:30 pm)

Main question:

- In what context is the country implementing climate-smart Agriculture and what principles should underpin its implementation?

Sub-questions:

1. What are the most significant climate risks, impacts & vulnerabilities in the country?
2. How will climate risks impact the agricultural sector and economy? Who is most vulnerable?
3. How can Nigeria mitigate the effects of climate change through climate-smart measures?
4. What current practices support and enhance climate-smart agriculture and what are the critical bottlenecks?

Break out session one (institutional arrangements for the development and delivery of CSA): Day 1, 3:15 – 4:00 pm

Overview: The purpose of this session is to rapidly assess and appraise the landscape of stakeholders that will support the operationalisation of the CSA framework.

Questions:

1. Reflecting on the five components of the draft CSA, what are the key institutions and stakeholders that are critical to its operationalisation?
2. What institutions are “cross-cutting” and are differentiated from component-specific institutions?
3. What key private sector / commercial players (including multi-stakeholder platforms) in particular are critical to the CSA?
4. What are the existing principal civil society, NGOs and pressure groups that will enhance the operationalisation of the CSA in Nigeria?

Break out session two (Thematic and Sectoral Assessments of CSA components): Day 2, 9:15 – 10:30 am

Overview: The session aims to provide an opportunity for participants to reflect on the broad components of the CSA, the rational and constituent thematic areas, as well as the proposed list of activities. The aim is to open up a discussion and present the opportunity for participants to amend, expand or create new content as applicable.

Questions:

1. Reflecting on the rationale for each of the five components, what additional theme/issue could be covered under each?
2. Reflecting on the proposed activities per component, what additional policy actions and activities can be accommodated? What proposed activity(ies) can be removed?
3. Reflecting on the current five components, is there room for the suggested changes in (1) and (2) to propose an additional component? – if yes, provide a brief justification and description.

8.3 Appendix 3: Interview Schedule for post-workshop stakeholder engagement

INTERVIEW SCHEDULE FOR CRITICAL STAKEHOLDERS ON THE DEVELOPMENT OF A NATIONAL FRAMEWORK FOR CLIMATE SMART AGRICULTURE FOR NIGERIA

INTRODUCTION

Thank you for your participation in the recently concluded workshop organized by the Nigeria Agribusiness Group (NABG) in partnership with the Federal Ministry of Agriculture and Rural Development (FMARD) and the Bill and Melinda Gates Foundation.

Further to the invaluable inputs you provided at the Workshop, we seek to get further insights from you that will assist in the development of a National Framework on Climate Smart Agriculture for Nigeria.

Kindly provide answers to the questions below to the best of your knowledge and experience AND SEND YOUR RESPONSE ON OR BEFORE 29TH JULY 2022 TO THE FOLLOWING EMAIL ADDRESS: hkayuba@yahoo.com and copy eoruonye@gmail.com Your response will be treated in confidence.

Sincerely,

Prof Haruna Kuje Ayuba

GENERAL INFORMATION

1. Your Names (optional).....
2. Department or Name of NGO.....
3. Ministry.....
4. Your Designation (position) in the Ministry/NGO.....
5. Contact details: Phone/email (for optional follow-up)

INTERVIEW QUESTIONS

6. List the extant National policies and regulations related to Agricultural Development in Nigeria that you know
7. What do you think are the barriers to Agricultural Development in Nigeria?
8. In what way(s) is climate change impacting agriculture in Nigeria
9. What do you think are the challenges to agribusiness in Nigeria?
10. In what ways does the climate change crisis also present an opportunity for agricultural/agribusiness development.
11. Do you think that a National Framework on Climate Smart Agriculture (CSA) for Nigeria is essential?
 - If Yes, provide reasons for your answer.
 - If No, provide reasons for your answer
12. What do you think should be the overarching vision of a National Framework on Climate Smart Agriculture for Nigeria?
13. In developing a National Framework on Climate Smart Agriculture (CSA) for Nigeria, what essential elements should be incorporated? Please list them.
14. Suggest names of the institution(s) you think should play the role of implementation of the CSA framework in Nigeria

15. Suggest names of institution(s) you think should play the role of Coordination of the CSA framework in Nigeria
16. What skills and capacities (across different stakeholder groups) are needed to support the effective implementation of CSA in Nigeria?
17. Suggest how the CSA elements and activities should be funded (please provide details of any known potential funders/funding sources instead of generic clusters like “donor agencies” or “government” etc).
18. Provide any other information (including copies/links to documents) that would assist in the development of the framework on CSA for Nigeria.

Thank you for your time and your responses

8.4 Appendix 4: Interview guide for in-depth selected stakeholder engagement

GUIDE INTERVIEW SCHEDULE FOR CRITICAL STAKEHOLDERS ON THE DEVELOPMENT OF A
NATIONAL FRAMEWORK ON CLIMATE SMART AGRICULTURE FOR NIGERIA

GUIDE INTERVIEW QUESTIONS FOR INTERACTION WITH KEY INFORMANTS

1. In developing a National Framework on Climate Smart Agriculture (CSA) for Nigeria, what essential elements would you want to see incorporated? Please mention some of them.
2. What do you think should be the overarching vision of a National Framework on Climate Smart Agriculture for Nigeria?
3. Could you suggest how you think the CSA elements and activities would be funded?
4. Which Ministry, Department and Agency should play the Coordinating role when the CSA framework is developed
5. Could you provide us with any other information that would assist in the development of the framework on CSA for Nigeria?

THANK YOU

8.5 Appendix 5: List of participants engaged in in-depth structured interviews

LIST OF PARTICIPANTS IN THE STRUCTURED INTERVIEWS AND /OR INTERVIEW GUIDE

Climate Smart Agriculture Framework for Nigeria

S/No	Name	Designation	Organization	Sector/Remark
1	Mrs Winifred Lai-Solarin	Director, Livestock Department	Federal Ministry of Agriculture and Rural Development	Government
2	Mr. Imal Silva	-	L&Z SILADE Agro Park located at Lokogoma, Abuja	Private
3	Mr. Manguts Yabans	Assist. Director, Quality Control, Food and Strategic Resources	Federal Ministry of Agriculture and Rural Development	Government
4	Alh. Dr. A.M. Yauri	Deputy Director and Head (EAO), Dept. of Climate Change, Abuja	Federal Ministry of Environment	Government
5	Jonah D. Barde	-	Department of Climate Change	Government
6	Mustapha Lawal			
7	Benson Ajibi	ASST. COMPTROLLER OF QUARANTINE	NIGERIA AGRICULTURAL QUARANTINE SERVICE FMARD	Government
8	Mustapha Iyabo	Chief Land Resources Officer (CLRO).	Dept of Agricultural Land and Climate Change Management services (AL&CCMS). FMARD	Government
9	Jerome K. Olowoyeye	AGM (Planning/Research)	Nigerian Agricultural Insurance Corporation (NAIC), FMARD	Government

Climate Smart Agriculture Framework for Nigeria

10	S. T. Mahmood (Mrs.)	Deputy Director Irrigation Agriculture and Crop Development	Federal Department of Agricultural Dev FMARD	Government
11	Taiwo Adeleke Johnson	Principal Geologist Hydrology (Climate Change Division)	Federal Ministry of Water Resources	Government
12	Weleh Maruoko Noah	Principial Registrar of Cooperative Federal Department of Cooperatives	FMARD	Government
13	Mrs Lizzy Igbine	President	Nigerian Women Agro-allied Farmers Association (NIWAFA)	Private Sector/CSO
14	Simon Reef Musa	Columnist	Media	Private Sector /CSO
15	James Ijambi Adamu	-	Nigeria Meteorological Agency. NIMET	Government
16	Engr Simon Ighofose	-	Pyrogenesys	
17	Abbana Waziri Abba	-	Rural Development, FMARD	Government
18	Patrick Esene	-	Animal Husbandry Division, FMARD	Government
19	Oduwole Modupe Esther	-	Federal Ministry of Science and Technology	Government
20	Cyril Bikom	-	Dept of Agricultural Land and Climate	Government

			Change Management services	
21	Salako O Tony	-	Environmental Climate change Unit, FMARD	Government
22	Mrs Ifeoma Anyanwu	Head, Gender	Federal Ministry of Agriculture and Rural Development	Government
23	Abubakar Bamai	-	Nigerian Young Farmers Network	Private Sector/CSO
24	Dan Oyoboh	National Sales Manager	Daytee Farms Ltd, Nigeria	Private Sector/CSO
25	Nnena Madu	Deputy Director (Plant resources)	Agricultural Research Council of Nigeria	Government

8.6 Appendix 6: Institutional Landscape and Support system per CSA component

WHAT ARE THE INSTITUTIONAL SUPPORT SYSTEMS REQUIRED TO ACHIEVE COMPONENT – “REDUCING GREEN HOUSE GAS EMISSION” ?

S/N SUGGESTIONS	RATIONALE
1. Federal Ministry of Environment	Policy
2. National Environmental Standards & Regulation Enforcement Agency	Implementation/Regulation
3. National Oil Spill Detection & Response Agency	Implementation/Regulation
4. Forest Research Institute of Nigeria	Research/Information
5. National Agency for Great Green Wall	Implementation
6. Federal Ministry of Agriculture & Rural Development	Policy
7. Agricultural Research Council of Nigeria	Research/Information
8. Institute for Agricultural Research	Research/ Information
9. National Agriculture Research Institutes (NRCRI, NCRI etc.)	Research
10. Nigeria Centre for Agricultural Mechanism	Research

WHAT ARE THE INSTITUTIONAL SUPPORT SYSTEMS REQUIRED TO ACHIEVE COMPONENT-
“MAINSTREAMING RESILIENT AND REGENERATIVE AGRICULTURAL PRACTICES”?

S/N SUGGESTIONS	RATIONALE
1. Federal Ministry of Water Resources	Irrigation
2 National Agricultural Insurance Cooperation	Insurance
3 NIRSAL	Funding
4 Central Bank of Nigeria	Funding
5 Bank of Industry	Funding
6 NIMET	information
7 Research Institutions/Universities	Research/Information
8 National Biotechnology Development Agency	Research/ Information
9 Agricultural Research Council	Research
10 Africa Development Bank	Funding
11 National Seed Council	Research
12 NAFDAC	Regulation
13 Nigerian Agricultural Quarantine Service	Regulation
14 NGOS/CSO	Information
15 NESREA	Regulation
16 National Biosafety Management Agency	Regulation
17 International Institute of Tropical Agriculture	Research/Information

WHAT ARE THE INSTITUTIONAL SUPPORT SYSTEMS REQUIRED TO ACHIEVE OBJECTIVE –
“BUILDING REGIONAL LEADERSHIP”

S/N SUGGESTIONS	RATIONALE
1. Federal Ministry of Agriculture	Policy and regulatory oversight.
2 University of Agriculture/Agricultural research Institutes	Development of novel climate resistant seed varieties
3 Federal Ministry of Environment	Policy and regulatory oversight in sustainable use of resources.
4 Federal Ministry of Water Resources	Promoting sustainable water use through policy and regulation
5 Climate Change Desk Offices across Ministries	To ensure that development of policy across value chains takes climatic impact into account.
6 Civic Societies, Farmers’ Associations and NGOs	Raising awareness on role of regionals in climate change adaptation and mitigation
7 Development bodies; e.g. African Development Bank, ECOWAS	Funding and advisory
8 CBN	Funding

Climate Smart Agriculture Framework for Nigeria

WHAT ARE THE INSTITUTIONAL SUPPORT SYSTEMS REQUIRED TO ACHIEVE OBJECTIVE – “CAPACITY BUILDING”

S/N SUGGESTIONS	RATIONALE
1. Federal Ministry of Environment	Information on environment protecting regulations
2 Non-governmental Associations, CSOs, Developmental Partners (USAID, BMGF, WFP, DFID)	Funding and advisory
3 Federal Ministry of Agriculture	Policy, sensitisation
4 International Institution for Agriculture	Global best practices, advisory
5 Agric Extension Workers	Farmer sensitization
6 Agricultural Research Council of Nigeria	Research promotion
7 Organized Private Sector	Funding
8 National Information Technology Development Agency	Information, capacity building
9 National Orientation Agency	Sensitisation

WHAT ARE THE INSTITUTIONAL SUPPORT SYSTEMS REQUIRED TO ACHIEVE OBJECTIVE – “INCREASING PRODUCTIVITY AND FOOD SECURITY”

S/N SUGGESTIONS	RATIONALE
1. Farmers’ Associations and Cooperatives, Local market Associations Non-governmental Associations, CBOs	To develop local content and aid in the sensitization of farmers
2 Developmental Partners (USAID, BMGF, WFP, DFID)	Funding
3 NIRSAL	Funding and risk management for agribusinesses
4 Academia and Research focused Institutions (Agricultural and others): e.g. ARCN	These will be responsible for driving the development and implementation of novel techniques in farming.
5 Relevant MDAs : e.g FMOWA, NITDA, Technological Agencies, NCS, Ministry of Transport, NIPC, NEPC	To support development of policy/ regulations to support the aspirations of the CSA framework,
6 Young Farmers’ Clubs	To revive the interest of youths in agriculture.
7 Organised Private Sector	Funding, investment, innovation and marketing ,
8 Multinational Companies	Funding
9 Financial Institutions e.g. BOI, BOA, Microfinance Banks	Funding
10. Federal Ministry of Science & Technology	Research/Policy
11 Rural Electrification Agency	
12 National Information Technology Development Agency	Research/Information
13 National Fresh Water Research Institute	Research
14 Nigeria Animal Production Institute	Research/Regulation

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15	National Biosafety Management Agency	Regulation
16	International Institute of Tropical Agriculture	Research/Information
17	Nigeria Institute for Oceanography & Marine Research	Research/Information
18	African Region Agricultural Centre	Research/Information
19	Centre for Dry Land Agriculture	Research/Information
20	Poultry Association of Nigeria	Regulation
21	Cattle Breeders Association	Regulation
22	PyroGenesys	Research/Technology
23	All Farmers Association of Nigeria	Regulation
24	Nigeria Agro Input Dealers	Regulation

8.7 Appendix 7: Draft template and features for M&E and reporting

CSA Purpose/Components	Programme	Projects	Objective	Outcome	Key performance Indicators	Means of verification	Risks Assumption	and General Remarks

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