



Prioritization of Adaptation Research to Strengthen, Accelerate, and Scale Up Smallholder Agriculture in Nigeria

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EXECUTIVE SUMMARY

Nigeria is a fast-growing lower-middle-income country with over 200 million people, playing the leading role in the economy and politics of Africa. The economy is largely dependent on the primary agricultural sector providing 38% of total employment but characterized by limited mechanization. The agriculture sector contributes 23.69% to the Gross Domestic Product (GDP) with a performance increase of 0.18% in 2024 (NBS 2024). Despite the vital role in livelihood security, the sector has been grappling with climate change and escalating input costs. The most recent Climate Change Vulnerability Index classifies Nigeria as a region of high risk. The frequency and intensity of severe weather events are expected to increase due to climate change while many regions lack the capacity to adequately respond to the climate risks. Temperature increase has also been recurrent over the past three decades, and projected increase across all ecological zones. The decline in rainfall and rising heat have rendered the North-East and North-West regions the most vulnerable, and have compounded aridity, drought, and desertification, and the reduction in biodiversity, especially in the northern part of Nigeria. Despite these risks, many regions lack the capacity to respond adequately, therefore enhancing the adaptive capacity will accelerate the pace of progress towards climate resilient agriculture.

In response, Nigeria is advancing climate adaptation strategies through policies like the National Agricultural Technology and Innovation Policy of 2022-2027 and the National Climate Change Policy of 2012-2030. In the last decade, the country has legislated over 28 climate-related policies into law, yet challenges persist in agriculture adaptation. The major gaps are limited readiness for adaptation, inadequate climate-resilient research interventions, and a lack of appropriate funding. These gaps necessitate a multi-stakeholder approach in reviewing Nigeria's priorities in agricultural adaptation at both national and sub-national levels to assess the uptake and effectiveness of current policies and strategies under the changing climate. As Nigeria transitions from the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) to the National Adaptation Plan (NAP), there is a critical need for action-oriented research to guide evidence-based policies aimed at strengthening the resilience of agriculture, ensuring food security, and enhancing nutrition. This calls for the need to harness diverse perspectives from a wide range of stakeholders in the Nigerian agriculture sector to assess the best practices, options for adaptation, emerging gaps, and identity of the priority areas that require investment in action-oriented research and potential for increase in adaptation investment in the agriculture sector.

The project addresses critical research issues regarding inadequate availability of climate information at local scale and predictive models relevant for the different agroecological zones of Nigeria; weak extension systems that makes limit the diffusion of climate-smart agricultural technologies; poor coordination between research institutions, policymakers, and the local community in adaptation processes; marginal involvement of women, youth, and other vulnerable groups in the processes of planning and decision-making on adaptations development; and inadequate investment in research, innovation, and scaling up of proven adaptation practices. It is in this context that the African Group of Negotiators Experts Support, in collaboration with the Adaptation Research Alliance, supported by the Bill and Melinda Gate Foundation, co-designed a series of national and sub-national workshops within the Nigerian Agricultural Sector. The prioritization of adaptation research for accelerating smallholder agriculture in Nigeria addressed the need for scalable, locally led agricultural adaptation strategies in view of the increasing climate vulnerabilities. The engagement was implemented by convening national and sub-national stakeholders which include a wide array of stakeholders of government officials, researchers, smallholder farmers, private sector actors, and NGOs, across six agroecological zones of Nigeria, to identify priority research areas that strengthen adaptation efforts and foster collaboration.

The objectives of the project are to assess the extent of implementation and effectiveness of national policies and actions at both the national and sub-national levels within a changing climate; identify the best locally-led agriculture adaptation options at the sub-national level; and prioritize action-oriented research areas for adaptation investment that advance smallholder agriculture adaptation. The methodology involved participatory and inclusive approach that captured breadth and diversity in inputs and perspectives. National and sub-national workshops were conducted with robust stakeholder mapping, thematic breakout sessions by agricultural sub-sector thematic tracks, expert-led interactive group on climate impacts, existing adaptation

practices, prioritization of emerging research priorities, and plenary sessions on actionable solutions. Stakeholder matrix was designed for the engagement ensure inclusive representations and effective feedback. Over three hundred high-priority multi-stakeholders were engaged in the process. The co-creation approach informed relevant research and resources on climate resilience in smallholder agriculture through a systematic review, scoping, and synthesis of outcomes of previous national and sub-national adaptation projects. This informed the organization of six workshops in a bid to capture wide spatial meanings across geographical, agroecological, and socio-economic contexts in Nigeria.

The major findings from the co-creation process reveals that localized climate impacts vary significantly across Nigeria's agroecological zones, necessitating tailored adaptation strategies. Inadequate access to technology is hindering access to affordable climate-smart technologies such as improved crop varieties, precision agriculture tools, and efficient irrigation systems while weak extension services resulting into poor knowledge dissemination restricts the adoption of sustainable practices among smallholder farmers. Gender, equity, and youth inclusion face the barriers of participating in adaptation initiatives, low investment in adaptation research with low private sector engagement narrows the scope for innovation and scaling. Disconnection between research, policy, and practice limiting the transformation of actionable policies into action. The recommendations for policy action which arises from the prioritization process are stated:

- Climate data infrastructure should be strengthened by the state and non-state actors which include private sector, for the collection and monitoring agroecological zone-specific climate data and invest in predictive models to drive localized adaptation strategies.
- Locally-led and cost-effective technological uptake and adoption should be enhanced to develop and subsidize access to climate-smart technologies for smallholder farmers.
- Agro-climatic advisory extension services should be expanded with private extension and digital services to ensure wide and broad dissemination of innovative practices across scale and bridging the gap between researchers and smallholder farmers.
- Institutional partnerships and collaboration between government, research institutions, the private sector, and local communities should be strengthened to drive coordinated adaptation efforts.
- Multi-stakeholder platforms should be created with enabling policy environment that support continuous stakeholder engagement in adaptation planning.
- Public and private sector investments should be scale up for adaptation research and implementation with incentives provided for smallholder farmers through subsidies and credit schemes.
- Gender-responsive and youth-inclusiveness should be incorporated into overall adaptation policy plan, project development and implementation.
- Capacity development and enhancement for women and youths to take leadership in decision making process of driving adaptation processes.
- Development of a framework that guide research outputs towards translating into policies. Policy-Research Gap:

The engagement can be achieved through a multi-actor collaboration of research interventions, enabling policy, scalable best practices, and finance mechanisms for implementation to make Nigerian agriculture resilient in changing climate systems and a model for the West Africa region. The policy actions has potential to accelerate, strengthen, and scale up an inclusive and impactful locall-led smallholder agriculture adaptation in Nigeria.

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CHAPTER ONE

1.0 INTRODUCTION

Nigeria is a fast-growing lower-middle-income country with a massive economy which makes it of great regional economic and political significance, and opportunities in Africa. The growing population of over 200 million people amplifies its climate change vulnerability, and climate-led systemic disruptions with the potential to greatly impact the African continent. The Nigerian economy is largely dependent on the primary agricultural sector, providing 38% of total employment in 2022, characterized by limited mechanization and dominance by about 75% of women workforce. Its agricultural export products generate most of its national revenue with a total agricultural area of 71 million hectares. In 2022, the sector contributed 23.69% to the GDP with a performance increase of 0.18% in 2024. Despite the vital role in livelihood security, the sector has been grappling with idiosyncratic risks such as insecurity, climate change, and escalating input costs. Consequently, the food inflation rate reached the unprecedented level of 35.41% in January 2024 compared to 33.93% in December 2023.

The most recent Climate Change Vulnerability Index classifies Nigeria as a region of high risk, one of the most vulnerable countries in the world. The frequency and intensity of severe weather events, especially rise in sea levels resulting into coastal inundation and flooding in low-lying regions, are expected to increase due to climate change while many regions lack the capacity to adequately respond to the climate risks. Temperature increase has also been recorded over the past three decades, and projected increase across all ecological zones. The decline in rainfall and rising heat have rendered the North-East and North-West regions the most vulnerable, and have compounded aridity, drought, and desertification, as well as causing the shrinking of wetlands, and the reduction in biodiversity, especially in the northern part of Nigeria. In view of these nuances, enhancing the adaptive capacity will accelerate the pace of progress towards climate resilient agriculture.

Nigeria is implementing the National Agricultural Technology and Innovation Policy (NATIP) 2022-2027 with specific focus on climate resilient agriculture through the Federal Ministry of Agriculture and Food Security (FMAFS). This initiative marks a strategic shift towards enhancing the achievements of prioritized policies to address socio-economic challenges from climate shocks facing smallholder farmers in Nigeria. The new Nigerian Agricultural Policy (NATIP 2022-2027) acknowledges the impacts of climate change related to nutrition, undeveloped rangelands and grazing reserves, insecurity concerning agricultural land and investments, inadequate value addition, and insufficient agro-industrial processing facilities. The key objectives include sustainable utilization of agricultural land and water resources, enhancing access to agricultural land through rural infrastructural development, and bolstering the livelihoods and community resilience of rural inhabitants. In addition, the policy promotes Digital and Climate-Smart Agriculture (CSA), organic farming practices, efficient water management to enhance productivity and income in a changing climate.

Nigeria's climate policy landscape is rich with over 28 adaptation relevant policies enacted over the past 10 years. The main policy thrust is to reduce the population's vulnerabilities by promoting community and ecosystem resilience in the face of climate change, however there are some gaps in adaptation and resilience (A&R) readiness in Nigeria. The Nigeria adaptation compass describes the overall A&R funding estimated to be a minimum of \$120 billion up until 2030 but annual inflows are less than \$1 billion. The cost of inaction is nonetheless even higher at the estimated 30% of Nigeria's GDP by 2050. This compass has identified over \$22 billion investments needed immediately to strengthen A&R initiatives in Nigeria with expected \$40 million for policy and planning including mainstreaming of adaptation into national development; \$265 million for risk assessment and tracking including to develop early warning systems and disease surveillance solutions; \$610 million for response including optimizing disaster response services; and \$21.1 billion for key sectors including agri-food, water and sanitation, forestry and biodiversity as well as some multi-sectoral opportunities.

In this regard, the 2012-2030 National Climate Change Policy (NCCP) being implemented by the Federal Ministry of Environment (FMEV) aims to increase adaptation by strengthening indigenous knowledge-based adaptation measures, facilitate an enabling environment for enhanced public and private sector participation and financial investments to achieve adaptation at scale, increase access to adaptation finance through economic incentives and value chain initiatives, and strengthen regulatory and institutional capacity to implement and disseminate technical solutions in adaptation to agriculture, among others. The policy issues for reflections at this point are to consider if these policies on adaptation are being implemented with sufficient research for innovations, whether projects interventions are designed with local context, if interventions are meeting actual needs of target users, and are impactful to smallholder farmers in Nigeria.

A multi-stakeholder approach is needed to evaluate Nigeria's national priorities in agriculture adaptation, looking specifically at the extents of uptake at national and sub-national levels, and their effectiveness under a changing climate. This approach will provide baseline understanding of the adaptation progress and emerging gaps requiring adjustments at both national and sub-national levels. As Nigeria is transitioning from the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) to the National Adaptation Plan (NAP), it becomes imperative to develop action-oriented research that will shape evidence-based policies and interventions aimed at bolstering the resilience of the agricultural sector and safeguarding food and nutrition security.

It is therefore important to harness diverse perspectives from a wide range of stakeholders in the Nigerian agriculture sector to assess locally-led best practices, adaptation options, emerging gaps, and identify priority areas for investment in action-oriented research and potential for increased adaptation investment in the agriculture sector. It is based on this context that the African Group of Negotiators Experts Support (AGNES) together with the Adaptation Research Alliance (ARA), supported by the Bill and Melinda Gate Foundation (BMGF) co-designed a series of national and sub-national workshops within Nigerian Agricultural Sector.

1.1 PROJECT OBJECTIVES

The specific objectives of the national and sub-national baseline workshops were to:

- i. introduce stakeholders to the goals and expected outputs of the projects and identify entry points for their contributions;
- ii. assess the level of deployment and effectiveness of national policies and actions at the national and sub-national levels in a changing climate;
- iii. identify locally-led best agriculture adaptation practices, adaptation options, and gaps at sub-national level;
- iv. prioritize action-oriented research areas for adaptation investment that advance smallholder agriculture adaptation.

CHAPTER TWO

2.0 NIGERIA CLIMATE RISKS AND ADAPTATION POLICY LANDSCAPE

This chapter presents a broad outlook of climate risks assessment in Nigeria's agricultural sector especially across the agro-ecological zones of the country where the sub-national co-creation workshops. A review of the historic, current and projected climate risks, geographical and socio-economic context, adaptation priorities and key challenges. The chapter also highlights the climate adaptation policy landscape addressing guiding climate action in the Nigerian agriculture.

2.1 Assessment of Climate Risks in Nigeria's Agriculture Sector

Climate change represents one of the most serious and threatening global challenges facing humankind in the 21st century. A few periods of climatic change have occurred in the past but current changes are more rapid than any known events in the history of the earth. Recent evidence suggests that there will be more rapid changes, which will be more impactful and, in some cases, may be irreversible. The effects of climate change are not just on people, but species and ecosystems. The impacts of climate change and variability on smallholder agriculture in Nigeria are profound. The region heavily relies on rainfed agriculture (crop and agroforestry; livestock and fisheries; and water resources management), facing vulnerability due to shifting weather patterns. Unpredictable and erratic rainfall patterns such as late onset and/or early cessation of rainfall, increased frequency and/or severity of droughts and heavy rainfall events affect planting/cropping and harvesting schedules, crop failures, reduced yields, and food insecurity. Occasional heavy rainfall with some dry days in-between leads to prolonged dry spells, while the heavy rainfall washes the fertile topsoil away, hence degrades the land and at times leads to flash flooding. Flash flood occurrence as a result of heavy rainfall destroys farmland, disrupts natural ecosystems of aquatic animals and fishing activities. Other effects of climate change directly affecting smallholder agriculture in Nigeria are rising temperatures, heat stress and sea level rise.

Rising temperatures manifest in unequal increase in daily maximum, minimum and mean surface temperatures. Rising temperatures negatively impact crop growth and development due to dehydration and a lack of water, it disrupts growth cycles and increases water stress, which can lead to lower crop yields. Livestock can experience heat stress, feed shortages, and the spread of parasites and diseases. Heat stress in plants/crops results in reduced yields and quality, and expansion of pests and diseases that affect crops. Some of the direct effects of climate change on smallholder agriculture in Nigeria can include discouraging farmers, changes in livelihood activities, migration from rural to urban regions, reduced farm profits, and reduced agricultural employment.

Carbon dioxide (CO₂), Methane (CH₄) and other greenhouse gases (GHGs) concentrations are higher than any time in the last 400,000 years. Amounts are now beyond the range of natural variations experienced over the past 700,000 years. GHGs' concentrations are predicted to continue increasing to 1.5 - 3 times the present values by 2100. Man is modifying the CO₂ concentrations via burning of fossil fuels, livestock rearing, waste incineration, etc. Therefore, mitigation and adaptation strategies are the inevitable steps to take. How much each country contributes to climate change depends on its residence, lifestyle and consumption patterns. The rich countries are the most responsible for

contributing a larger percentage and unfortunately, the poor countries are the greatest victims of climate change while contributing the least to the emission/problem - an ethical dilemma. Climate fluctuation and variability, and inaccuracy in their predictions have affected and is still affecting smallholder agriculture in Nigeria.

2.2 Climate Conditions and Geography of Selected Regions

The prevailing Nigeria's climatic condition, geographical characteristics and socio-cultural diversity are very important for the multi-stakeholder co-design process to ascertain effective locally-led climate adaptation strategies for smallholder agriculture. The co-design workshops were conducted in three regions with diverse agro-ecological characteristics, namely the *Sudano Sahelian Agro-Ecozone*; *Rainforest Southern Guinea Savannah Agro-Ecozone*; and *Southern Guinea Savannah, Lowland Rainforest, Freshwater and Mangrove Swamps Agro-Ecozones*. The selected states from the six geopolitical zones were based on the agro-ecological differences.

2.2.1 Sudano Sahelian Agro-Ecozone

The observed impacts of extreme climate events have intensified in recent years, including prolonged dry spells, abnormal rainfall patterns, consequent shortage of water, and heat stress in the Sudan and Sahel regions, including West Africa. (Chikoore and Jury, 2021, Thoithi et al., 2021, Wainwright et al., 2021a). These are not only affecting human activities but it also has serious implications on food security status of the countries. This becomes a concern given that subsistent agriculture dominates the key livelihoods but also depends on agricultural land and rainfed crop production, with minor irrigation (Sarr et al., 2021). The Sudano-Sahelian Ecological Zone (SSEZ) Zone is regarded as the most vulnerable region to climate change which extends across many West African countries, including Nigeria (Cuthbert et al., 2019).

The Sudano-Sahelian Ecological Zone (SSEZ) of Nigeria is experiencing acute seasonal and inter-annual climatic variability, leading to severe droughts and dry spells. The recurring Sahelian droughts and desertification processes have left large number smallholder farmers impoverished and responsible for the general poor quality of life, especially among the less privileged. The prevailing situation is being aggravated by the increase in human population, which appears to be stressing the natural support system over the past few decades.

The North West (NW) geopolitical zone of Nigeria which comprises seven states namely, Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara and the North East (NE) geopolitical zone consists of six states namely, Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe, are both situated in the Sudano-Sahelian Ecological Zone (SSEZ). The NW and NE regions exhibit distinct vegetation patterns based on climate and soil conditions. The NW is characterized by a mix of savanna and woodland vegetation such as the Guinea Savanna with an average annual precipitation ranging from 1000 to 1400 mm and the Sudan Savanna with an annual precipitation below 1600 mm and drier soils in the dry season than its Guinea Savanna counterpart. The Sahel savanna is found in the extreme NE and NW of the country with sparse vegetation that is dependent on uncertain rainfall, dominantly

grasses with discontinuous shrubs and scattered trees, which are often thorny, and extensive sparse grasses. Savannah plants are faced with some delimiting factors, such as seasonal drought, low water and nutrient availability, the impacts of regular fire, and herbivory, among others, which threaten their survival. The NE zone shares similarities with the NW but with distinct features. The agricultural sector in the zones is dominated by about 80% of smallholder farmers who operates on rain-fed agriculture.

The regions are predominantly Hausaland by culture and the indigenous homeland of the Hausa people. Economically, urban areas such as Kano contribute significantly to Nigeria’s economy while rural areas face challenges due to insecurity, low education rates, among other political factors.

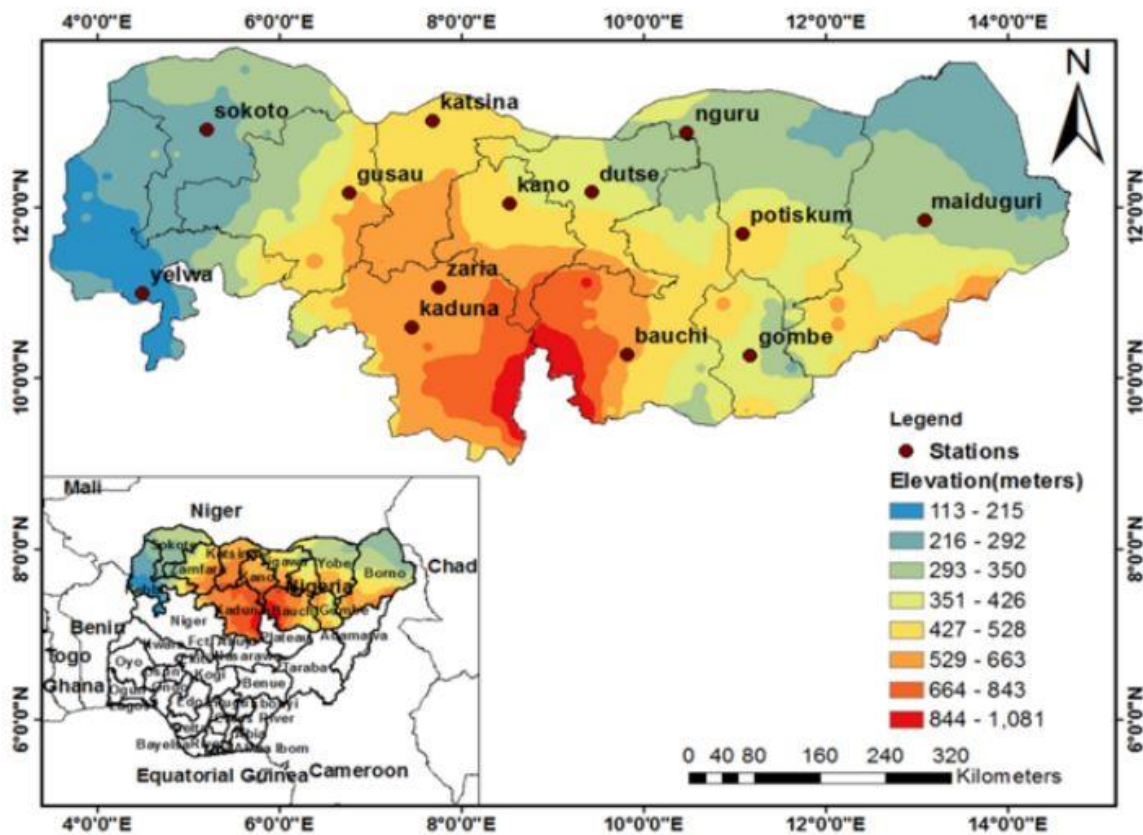


Figure 1: Map of Nigeria showing the Sudano-Sahelian Ecological Zone (Makanju & Alex, 2021).

2.2.2 Rainforest Southern Guinea Savannah Agro-Ecozone

The Rainforest-Southern Guinea Savannah Zone (RSGSZ) of Nigeria is evidently a source of social, economic and health for humans and forest ecosystems. The RSGSZ, however, is undeniably experiencing fast depleting ecosystem and biodiversity, resulting into serious environmental and economic concerns. The observed impacts in the Rainforest-Southern Guinea Savannah Zone (RSGSZ) of Nigeria have intensified in recent years with prolonged dry spells, abnormal rainfall patterns, consequent shortage of water, and heat stress in the tropical savannah regions. These

consequences are not only affecting the people's socio-economic activities but also have serious implications on food security situation, natural capital stocks, environmental sustainability, migration, and resource conflicts.

The Southwest (SW) geopolitical zone of Nigeria comprises six states namely, Oyo, Osun, Ogun, Ondo, Ekiti and Lagos States, are situated in the tropical rainforest Zone and the Southern Guinea Savannah Zone, though with swampy forest in the coastal regions in Lagos, Ogun, Ondo and Delta States. Rain-fed agricultural sector forms the base of the overall development thrust of the zones which cover a land area of about 114,271 km² representing 12% of the country's total land areas. The Southern Guinea Savannah Zone of SW Nigeria is characterized by a wet season which lasts for 6–8 months with an annual rainfall of between 900–1200 mm. The average annual temperature is 27.3°C with the mean annual minimum and maximum temperatures of about 24 °C and 35 °C in Guinea savannah. The tropical rainforest zone of SW Nigeria is characterized with a prolonged rainy season and bimodal peak in rainfall, resulting in mean annual rainfall of about 1500mm from April to October annually. The mean annual minimum and maximum temperature are about 21 °C and 30 °C in the rainforest zone.

The Southwest region is one of the six geopolitical zones significantly contributing to the economic growth of Nigeria. The population of the SW is over 50 million representing over 22% of the Nigeria population with a Gross Domestic Product (GDP) worth of over \$80b.

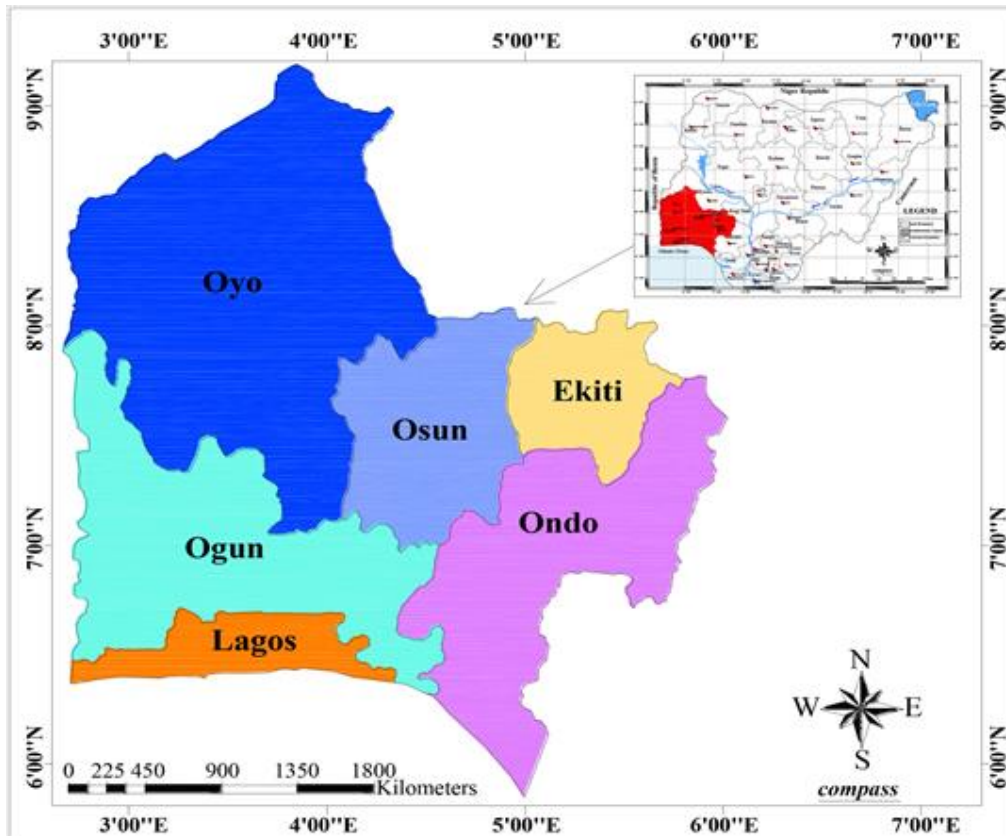


Figure 2: Map of Nigeria showing the Rainforest-Southern Guinea Savannah Zone

2.2.3 Southern Guinea Savannah, Rainforest, Freshwater and Mangrove Swamps Agro Ecozones

The Southeast (SE) geopolitical zone of Nigeria is made up of five states namely, Abia, Anambra, Ebonyi, Enugu and Imo States, and the Southsouth (SS) or Niger Delta geopolitical zone of Nigeria which comprises Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States, both occupy the southern guinea savannah (SGS), lowland rainforest (LR), freshwater zone (FW) and mangrove swamps zone (MS) agroecological zones. The SGS zone is part of the most extensive guinea vegetation in the Middle belt of Nigeria which consists of a mixture of trees and grass. The LR zone covering the southern part of Nigeria, experiences high rainfall throughout the year, and ideal for a wide range of crops, such as cocoa, oil palm, rubber, and various fruits and vegetables. It is also known for its biodiversity and potential for agroforestry initiatives. The FS zone is a wetland environment which includes freshwater swamp forests. During the dry season, the terrain is quite uneven, with numerous spots of open water. During the wet season, they are frequently inundated, hence form a fringe of coastal vegetation after the mangroves in Nigeria's Niger Delta region. The MS zone is the coastal areas of the Niger Delta region, characterized by brackish water and marshy lands for primary economic activities, mainly fishing and aquaculture, oil palm and rice cultivation. Protection of these wetlands is crucial to maintaining the ecological balance for steady supply of fish and other aquatic resources.

The SE of Nigeria occupies an estimated total land area of 36, 100Km², accounting for 3.9% of Nigeria's total land area while the SS also covers a total area of 78,612Km², representing 8.5% of the Nigeria's total land mass. They experience strong tropical rainfall events during the rainy season from March to October with annual rainfall amounts of over 2,000 mm which sometimes can reach up to 4,000 mm or more in the South-South (Niger Delta), and temperature pattern-mean daily and annual temperature at 28°C and 27°C. The vegetation of the Southern areas is currently grappling with depletion attributed to erratic sequence of rainfall and deficit wetland supplies impacted by climate fluctuations, and consequently resulted in declining crop and livestock productivity. The two southern zones are known as the core oil palm belt of the country, commercial production of food and tree crops such as rubber, cocoa, cassava, yam, plantain, banana, maize and timber. In addition, the zones are the major location of the crude oil and natural gas deposits of the nation.

The SE region has a population of about 36 million people, representing about 18% of the country's total population with a Gross Domestic Product (GDP) worth of over ₦20.4trillion while the SS region has a Gross Domestic Product (GDP) of over ₦34.6trillion. Agricultural economy of the SE and SS regions, with the food crop production sub-sector occupying about 94% of its agricultural sector, others include livestock farming, including poultry and small ruminants. The SE and SS regions both produce palm oil, cocoa, cassava and rubber in commercial scale for national exports.

The impact of climate change is significant in these regions already suffering with about 20% decline in the cycle of growing days. Many forest resources are also gradually going into extinction due to high exposures to extreme weather events and climate variability and change. In the livestock sub-sector,

the rapid increase in temperature has affected productivity, especially poultry, swine, cattle, sheep, and goats leading to about 15% reduction per annum in livestock production

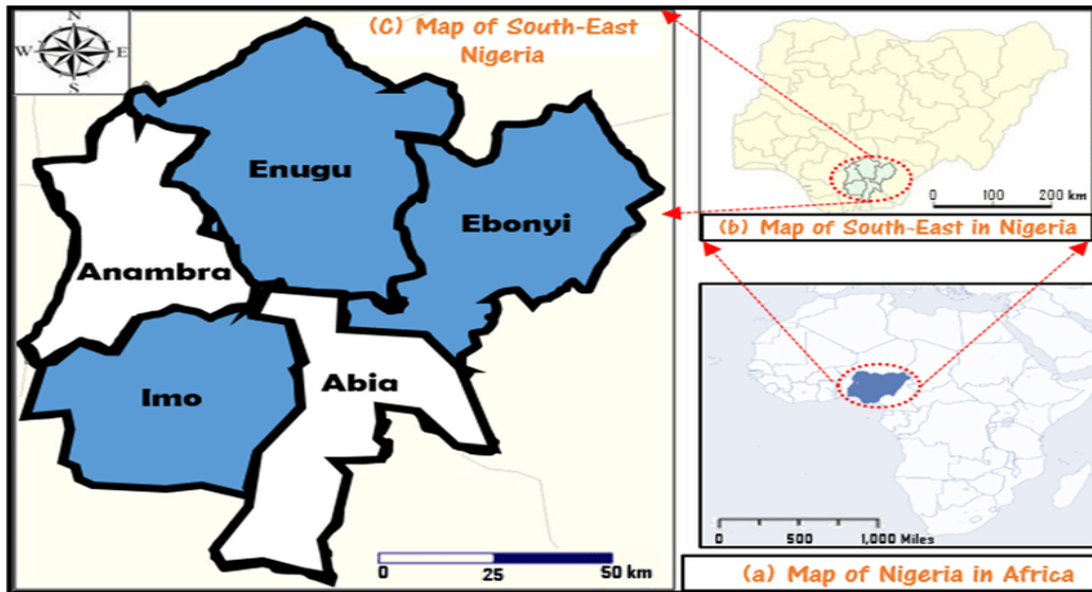


Figure 3: Map of (a) Africa showing the position of Nigeria, (b) Nigeria with SE circled and (c) the SE region

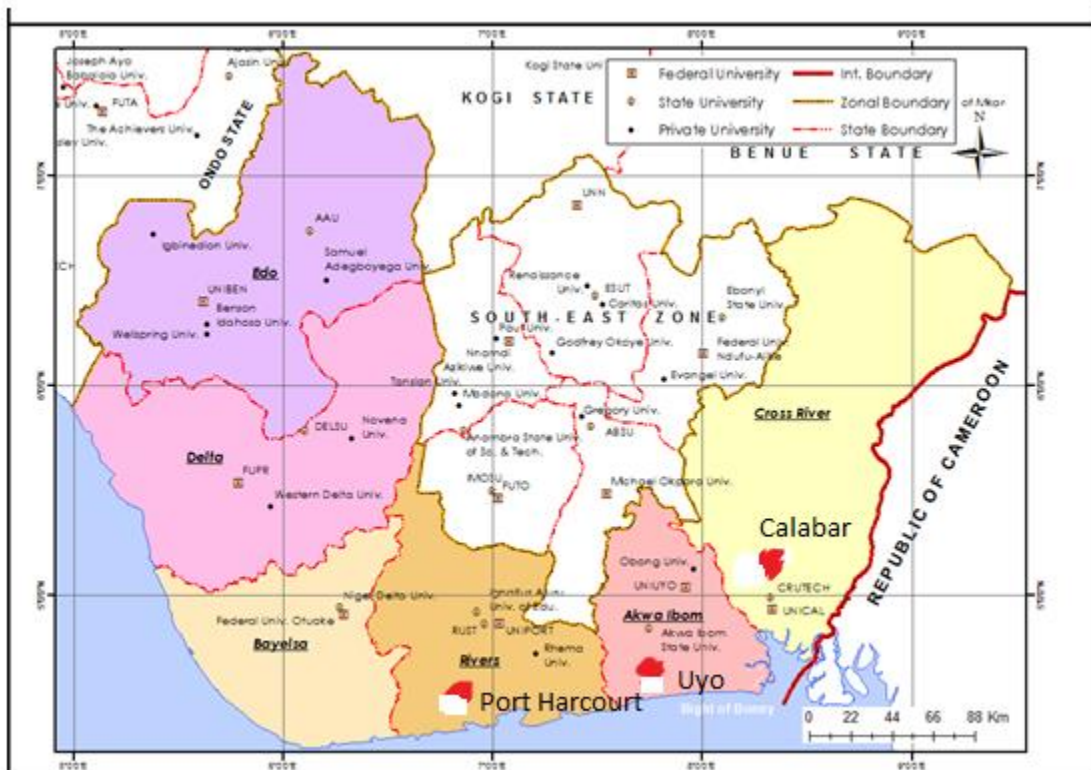


Figure 4: Map of Nigeria showing the South-South of Nigeria

These unfavourable conditions are leading into land degradation, drought, and desertification posing a significant threat to food security, in the region generally characterized by high temperatures throughout the year. Addressing these challenges through best adaptation practices is critical to ensuring food security, enhancing resilience, and improving livelihoods. Climate adaptation interventions designed at the local levels have huge significance to the farming communities and overall national food security agenda. Firstly, the impacts of extreme events are most felt and understood at the local level where the vulnerability and adaptive capacities are context-specific to local circumstances. Secondly, most adaptation alternatives require implementation at the grassroots level, hence successful best practices which had been pioneered locally and have been successful, need to be replicated and scaled-up at the national scale.

2.3 Perspectives on Climate Adaptation Policy Landscape

2.3.1 Global Outlook

The global climate policy landscape is driven by the pressing necessity to tackle climate change, a profound challenge with wide-ranging environmental, economic, and social implications for humanity. According to the Global Climate Risk Index 2020, between 1999 and 2018, over 12,000 extreme weather events caused approximately 495,000 fatalities and resulted in economic losses exceeding \$3.54 trillion globally. In response to these alarming trends, the international community established a framework Convention on Climate Change (UNFCCC) on March 21, 1994. It serves as a cornerstone of international climate policy, with 197 member countries committed to limiting greenhouse gas (GHG) emissions and mitigating the impacts of global warming. Central to the UNFCCC is its annual Conference of the Parties (COP), where member states assess progress, negotiate agreements, and strategize to enhance climate resilience. Through international frameworks like the Paris Agreement, adopted at COP21 in 2015, nations have pledged to limit global temperature rise to below 2°C above pre-industrial levels, with efforts to keep it under 1.5°C. This commitment requires significant reductions in GHG emissions, the transition to renewable energy sources, and enhanced climate adaptation measures, especially for vulnerable nations. As a signatory to the UNFCCC, Nigeria has demonstrated its commitment to addressing climate change and contributing to global efforts to mitigate its impacts.

2.3.2 Regional Outlook

Africa is marked by a growing recognition of the severe threats of climate change that threaten its ecosystems, economies, and the population with disproportionate impacts on the continent. The World Meteorological Organization (WMO) has confirmed that Africa is warming faster at about 1.5°C than the global average of around 1.1°C since pre-industrial times. The Intergovernmental Panel on Climate Change (IPCC) further highlighted that this increase in temperature has led to more frequent and intense heatwaves, prolonged droughts, increase in flooding and altered rainfall patterns which exacerbate water scarcity, disrupting food production cycles, and health risks spreading due to changing environmental conditions. The coastal regions are facing rising sea levels that threaten coastal infrastructure, livelihoods, and ecosystems. These changes are undermining agricultural productivity, water supply, and food security, affecting already vulnerable populations with significant

consequences. These impacts have far-reaching social and economic impacts exacerbating existing inequalities, straining economies, forced displacements and social systems particularly in countries where poverty, weak infrastructure, fragile health system, and fragile development prospects limited ability to adapt to climate shocks.

African Union has developed strategies to strengthen climate change mitigation and adaptation. There are commitments to promote climate action by implementing global climate laws and policies, building capacity for climate-related negotiations, fostering cooperation, promoting public awareness and providing funds to tackle climate change in Africa. African Union's Climate Change and Resilient Development Strategy and Action Plan (2022–2032); sets out principles, priorities and action areas to facilitate climate cooperation and engender long-term climate-resilient development. Although the Global Climate Fund (GCF) offers an opportunity for Africa to finance climate actions across the continent, only five countries have passed climate change legislation. Kenya in 2016; Benin in 2018; Mauritius in 2020; Uganda in 2021; and Nigeria also in 2021 are the only countries in sub-Saharan Africa with statutory laws concerning climate change.

2.3.3 National Landscape

Nigeria recognized its leadership role in Africa and sub-regional levels thereby meeting up to its obligations to the UNFCCC and supporting the implementation of climate change initiatives of ECOWAS and African Union. Nigeria, like other parties to UNFCCC and other treaties aimed at stabilizing GHG emissions (i.e. the Kyoto Protocol and Paris Agreement). Nigeria participated actively in the 2021 UN Climate Change Conference (COP26) which took place between October and November 2021 in Glasgow. COP26 was meant to renew commitment to securing net-zero targets by mid-century and to keep the 1.5°C target within reach; protect communities and natural habitats; mobilize finance to deliver on the first two goals; and to work together to deliver on the various goals. During COP26, Nigeria committed to achieve net-zero by 2060, and barely a week after the conference, the then President signed into law the Climate Change Act, 2021 (the Act), which was passed by the National Assembly in October 2021. The Act provides a framework for achieving low GHG emissions and to mainstream climate change actions into national plans, strategies and programmes.

Nigeria's Nationally Determined Contribution (NDC) outlines the country's climate change priorities for the post-2020 period and include not only targets, but also concrete strategies for addressing the causes of climate change and responding to its effects. It serves as Nigeria's central pillar of its development policy, thereby integrating it with existing national development agenda and the SDGs. The NDC represents an integrated and comprehensive strategic approach towards promoting a low carbon high growth climate-resilient path for national sustainable development. Nigeria is now implementing its NDC as a catalyst for a comprehensive national climate action that offers the country a few opportunities to advance the course of sustainable development. Nigeria's NDC provides high-level and strategic vision for climate action with five priority sectors such as agriculture, forestry, and land use; food security and health; energy and transportation; waste management; and water and

sanitation. The updated NDC takes a collaborative and inclusive participation of a wide range of stakeholders such as relevant MDAs, state and local governments, the private sector, and civil society organizations (CSOs), as well as the UNDP. Nigeria submitted its first NDC in 2015 and the revised NDC in 2021.

In addition to the NDC, Nigeria has developed several Actions Policy Framework and Strategies (APFs) for climate change. The majority of these APFs highlight Nigeria's bold and ambitious plans, actions, goals, and strategies for mainstreaming adaptation across all spheres of governance. Some of these policy documents include: the updated NAP framework; the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN); the Nigeria Climate Change Policy Response and Strategy (NCCPRS); the Nigeria Climate Change Act (CCA) 2021; the National Climate Change Policy for Nigeria 2021 – 2030; the National Action Plan on Gender and Climate Change for Nigeria (NAPGCC); and other national policy frameworks that have components of adaptation and economic development plans. An analysis of these policy frameworks shows that the Nigerian government has made concerted efforts to increase adaptation actions in thirteen priority sectors: agriculture; freshwater resources; coastal water resources and fisheries; forests; biodiversity; health and sanitation; human settlement and housing; energy; transportation and communication; industry and commerce; disaster, migration, and security; livelihoods; vulnerable groups; and education.

Specifically, the National Climate Change Policy and Response Strategy (NCCPRS) was developed in 2012 to promote low-carbon, high-growth economic development and build a climate-resilient society. Revised in 2021. NCCP outlines strategic policy actions for climate change management, aiming for a climate-resilient sustainable development pathway. The main purpose of the National Climate Change Policy is to establish a comprehensive framework to guide the country's response to climate change challenges. The overall goal of the policy is to promote a low-carbon, climate-resilient and gender-responsive sustainable socio-economic development. It also ensures sustainable development and a climate-proofed economy through multi-stakeholder engagement. Other NCCP policy directions are to reduce vulnerabilities and promote resilience to climate change impacts; engage women, girls, and other vulnerable groups in planning and implementing long-term adaptation interventions; and enhance agricultural resilience to climate risk. Protect the livelihoods of small and marginal farmers, especially women and youth. It was noted that Nigeria recognizes the need for concerted adaptation efforts to reduce vulnerability. The nine (9) NCCP policy measures to enhance agriculture were highlighted, these includes to:

- (i) promote efficient, gender-responsive, socially inclusive, and climate-smart crop production, fishery, and livestock development practices;
- (ii) promote and support effective research and knowledge development and management to connect farmers, policymakers, businesses, and researchers to adapt to dynamic current and future climate scenarios;
- (iii) develop and apply improved production and risk management technologies in agriculture;
- (iv) increase the uptake of adaptation measures at farm and community levels;

- (v) reinvigorate extension services, capacity building, and technology transfer approaches to provide support to a wider group of farmers, including women and youth;
- (vi) strengthen indigenous knowledge-based adaptation measures;
- (vii) facilitate an enabling environment for enhanced public and private sector participation and financial investments to achieve adaptation at scale;
- (viii) increase access to adaptation finance through economic incentives and value chain initiatives; and
- (ix) strengthen regulatory and institutional capacity to implement and disseminate technical solutions in adaptation to agriculture.

The major adaptation strategies employed by the Nigerian government include:

- i. **Capacity Building:** The federal government of Nigeria (FGN), through the Ministry of Agriculture and Rural Development, plays a leadership role by setting up and supporting several institutions and agencies that interface with the state and local governments in building capacity, and delivering knowledge and relevant skills at the community level. The FGN and many local and international Civil Society and Organizations (CSOs) employ “training the trainers” via extension workers;
- ii. **Early warning systems:** The FGN has strengthened its adaptive capacity to climate change through the World Bank-supported Nigeria Erosion and Watershed Management Project (NEWMAP), which has completed the installation of automated flood early warning systems and other hydro meteorology devices to minimize flood related disaster in ten States;
- iii. **Climate Smart Agriculture:** Nigeria’s Climate Smart Agriculture approach is an integrated path that leads to a sustainable increase in productivity and resilience (adaptation);
- v. **Gender Responsiveness:** In its efforts to mainstream gender, the Nigerian government became a signatory to several United Nations treaties and conventions including the Convention on the Elimination of All Forms of Discrimination Against Women. It also developed the NAPGCC and established the National Gender Policy to address issues of imbalance in the opportunities available to women.

2.3.4 Sub-National Landscape

Climate change policies at the State level in Nigeria are generally guided by the overarching national frameworks but vary in implementation depending on the States’ priorities and resources. In other words, while State-level actions vary, they align with national and international frameworks. Several States in Nigeria have developed climate change policies or implementation plans. A 2024 desktop review of subnational climate policies in Nigeria by the Society for Planet and Prosperity reveals that only seven (7) States—Cross River, Delta, Ebonyi, Lagos, Osun, Rivers, and Yobe—have accessible climate policy documents. Among these, Rivers and Ebonyi have taken further steps by enacting their policies into Climate Change Laws/Acts. In contrast, eight (8) States—Akwa Ibom, Anambra, Enugu, Kaduna, Kogi, Nasarawa, Plateau, and Ondo—appeared to have drafted climate policies or related documents that are yet to be finalized or officially adopted. The remaining 24 States currently show no evidence of having a climate policy in place. The focus areas of Climate Policies and Action Plans in these States are sustainable transport, energy efficiency, waste management, agriculture and

resilience to sea-level rise, anti-deforestation, community-based forest management initiatives, water management, rural electrification, renewable energy, afforestation, and waste-to-energy projects.

CHAPTER THREE

3.0 CO-CREATION METHODOLOGY

This chapter presents the approach and methodology for the co-creation process in prioritization action-research priorities, and identification of scalable locally led adaptation strategies for smallholder farmers in different agroecological regions of Nigeria. The structure of the workshops conducted at the national and sub-national regions, the approach used in engaging the multi-stakeholders in the agriculture sector, and the methods applied in prioritizing actionable research are highlighted in later sections. The chapter further addresses the gender equality and social inclusion (GESI) strategy used to ensure a balanced representation of ideas and the technique in assessing stakeholder feedback.

3.1 Approach to the Co-Design Process

The co-creation approach was done through an initial review, scoping and synthesizing outcomes and learning from past national and sub-national adaptation projects and programmes in identifying relevant smallholder agriculture and climate resilience research and reference and resources for the workshops was conducted. A total of six (6) co-creation workshops were conducted: two workshops at the national level and four workshops at the sub-national level, covering key strategic regions selected to represent diverse geographical, agroecological regions and socio-economic contexts for smallholder farmers within the country. The sub-national workshops were organized by regional selection, with groupings by counties to ensure that local perspectives and priorities were captured and included in the discussions. Figure 5 illustrates the flow of workshops and intended deliverables produced.

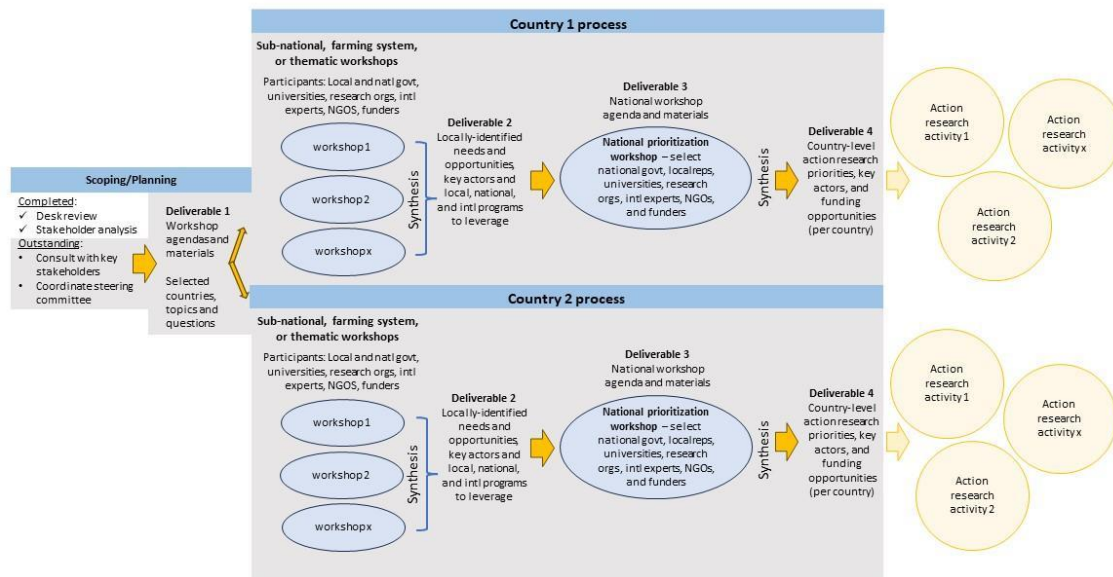


Figure 5. Framework of the Workflow of the Co-creation Process — from the scoping to the generation of actionable research priorities

3.2 Stakeholder Mapping

The critical aspect of the co-design process was identification and engagement of a key multi-stakeholder which traverse across different sub-sectors of Nigeria agriculture. Our stakeholder mapping for the workshops used similar approaches throughout by identifying all relevant stakeholders who may influence or be impacted by the building climate resilience of smallholder agriculture. This included internal participants such as team members, leadership, and subject matter experts (crop and livestock production, fisheries, and water resources), as well as external stakeholders especially Non-Governmental Organisations (NGOs) or vendors in delivering climate services. We then categorized these stakeholders based on their level of influence and interest using a stakeholder matrix, which helped us determine how much involvement each group requires be able to provide. Stakeholders were grouped into four categories namely: ***Government Representatives*** (extension workers, desk officers on climate change from Ministries of Agriculture and Environment; subject matter specialists; ***Farmers Representatives*** (crop/irrigation, livestock, water resources and fisheries farmer groups); ***Academic/Research Institutions*** (universities and crop and livestock research institutes; ***Non-Governmental Organisations (gender empowerment initiatives, adaptation intervention vendors)***. This classification guided us in tailoring our engagement efforts for each group in ensuring that every participant is actively involved and pulled an influence on the process. We then assessed likely needs, expectations, and preferred interactive/communication methods to be used at the workshops. The intention was to allow us to create a targeted engagement strategy that addresses the specific interests and concerns of each group. We highly prioritized stakeholders with high influence and interest especially: Farmers Representatives; Academic/Research Institutions who are from various sub-national regions across the country. The process also included establishing a feedback mechanism to assess the participants' satisfaction and incorporate their insights into future working sessions. In overall, we have three hundred and one (301) selected stakeholders who participated in the co-design workshops in Nigeria.

3.3 First National Workshop (Baseline)

The first national workshop conducted was baseline which convened a multi-stakeholder group in the agriculture sector working at the national level, for various sectors, government agencies, and organizations to provide a comprehensive overview of national climate priorities and adaptation needs for smallholder farmers. The baseline was used to introduce stakeholders to the goals and expected outputs of the projects and identify entry points for their contributions and further provide initial assessment of the level of deployment and effectiveness of national policies and actions at the national and sub-national levels in a changing climate. The second national workshop (prioritization) workshop was conducted to prioritize action-oriented research areas and scalable locally-led adaptation strategies for smallholder agriculture adaptation investment. The workshop was conducted with different stakeholders from both sub-national and national level, as depicted by number on gender basis in

Figure 6. The approach was a coordinated and inclusive engagement approach which created opportunity for peer-to-peer learning and feedback from sub-national workshops.

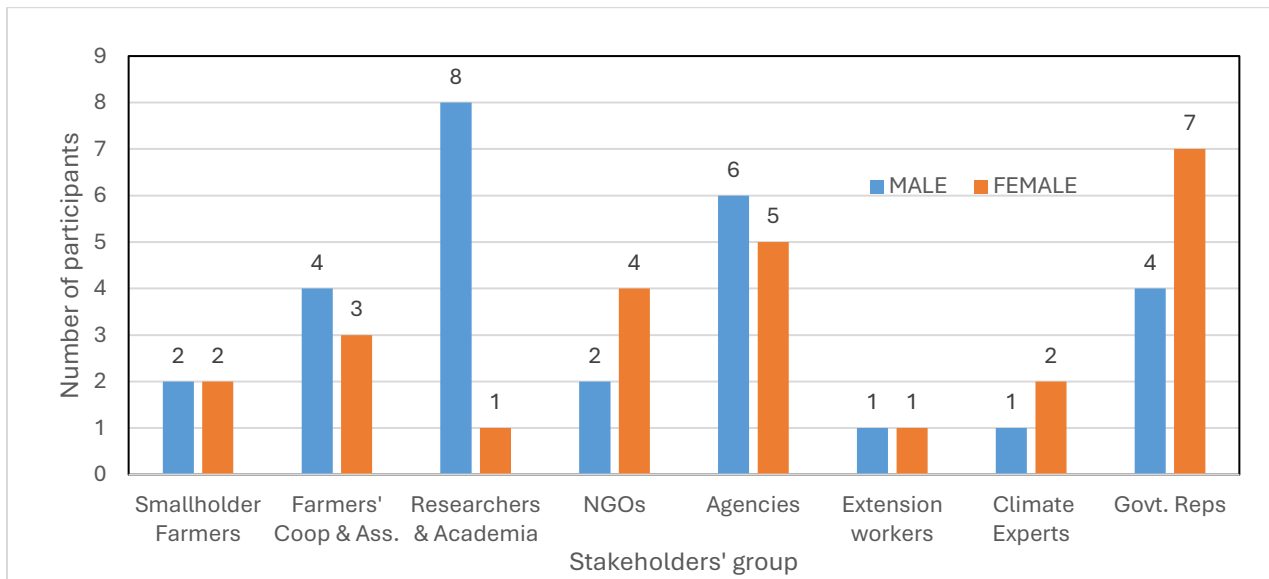


Figure 6: Distribution of participants in the national baseline workshop by stakeholders' groups

3.4 Sub-National Workshops

The three sub-regional workshops, namely the Kano Workshop represented Kano, Niger, Jigawa, Bauchi, Kaduna, Kebbi, Zamfara, Kastina, and Plateau States from the North-East and North West, Nigeria. Secondly, the Ibadan Workshop represented Ondo, Ogun, Osun, Ekiti, Kwara and Lagos States from the South West of Nigeria while Owerri Workshop represented Edo, Enugu, Imo, Akwa Ibom, Ebonyi, Abia, Anambra, Cross River, Rivers, Bayelsa States from South East and South South of Nigeria were conducted to identify action research priorities and locally-led best agriculture adaptation practices, adaptation options, and gaps which are specific to the needs, challenges and priorities of smallholder farming systems in the three sub-national levels across the agro-ecological zones of Nigeria. This approach of co-creation process ensured that localized smallholder agriculture issues, challenges potential solutions and locally led adaptation strategies were highlighted. Different stakeholders that include: farmers and farmer organisations/groups; State departments; research institutions (universities) and Development Partners engaged in workshop participated in many iterative breakout groups, plenary sessions guided by a set of questions and agenda points and post-workshop iterations. This bottom-up approach to smallholder agriculture co-creation process provided valuable insights into current knowledge gaps, action research priorities and current adaptation processes that can be scalable to address the specific regional contexts and applied different specific-tailored approached that will reflect actionable research needs. Figures 7, 8 and 9 are the distribution of participants by gender across the stakeholder groups for the three subnational workshops at Kano, Ibadan and Owerri respectively. While the Kano workshop covers the NW and NE, the Ibadan covers the SW and that of Owerri covers the SE and SS.

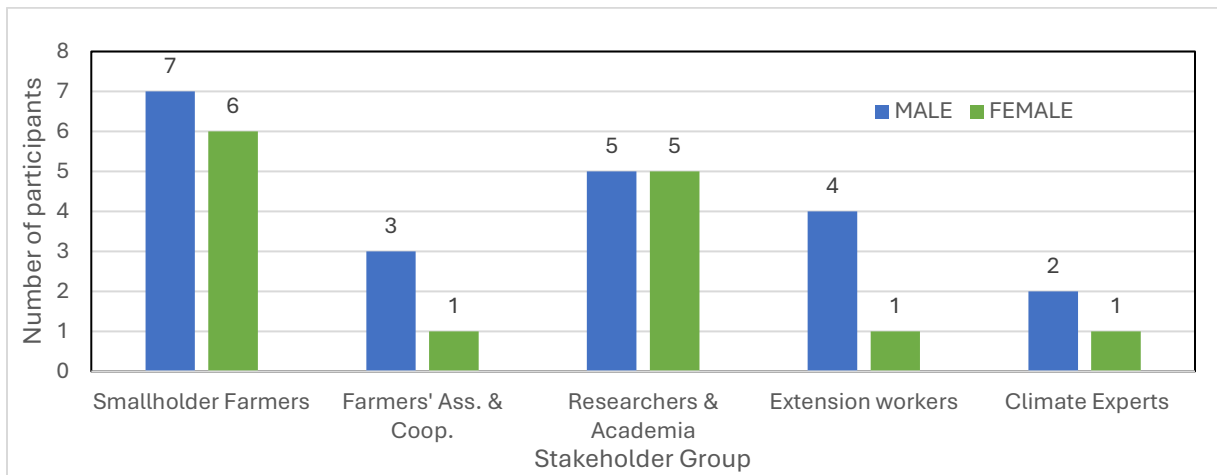


Figure 7: Distribution of participants in the 1st subnational workshop (Kano) by stakeholders' groups

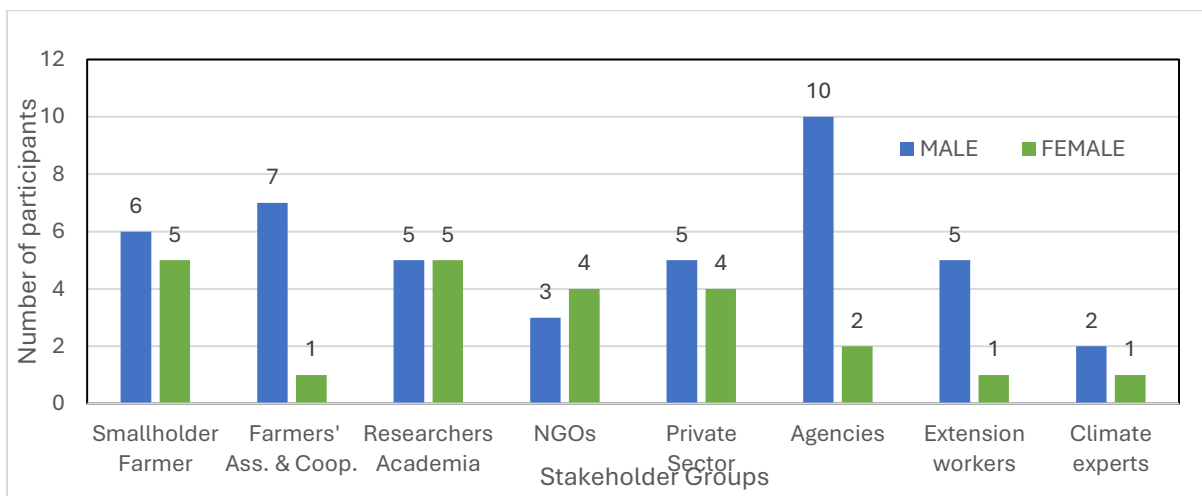


Figure 8: Distribution of participants in the 2nd subnational workshop (Ibadan) by stakeholders' groups

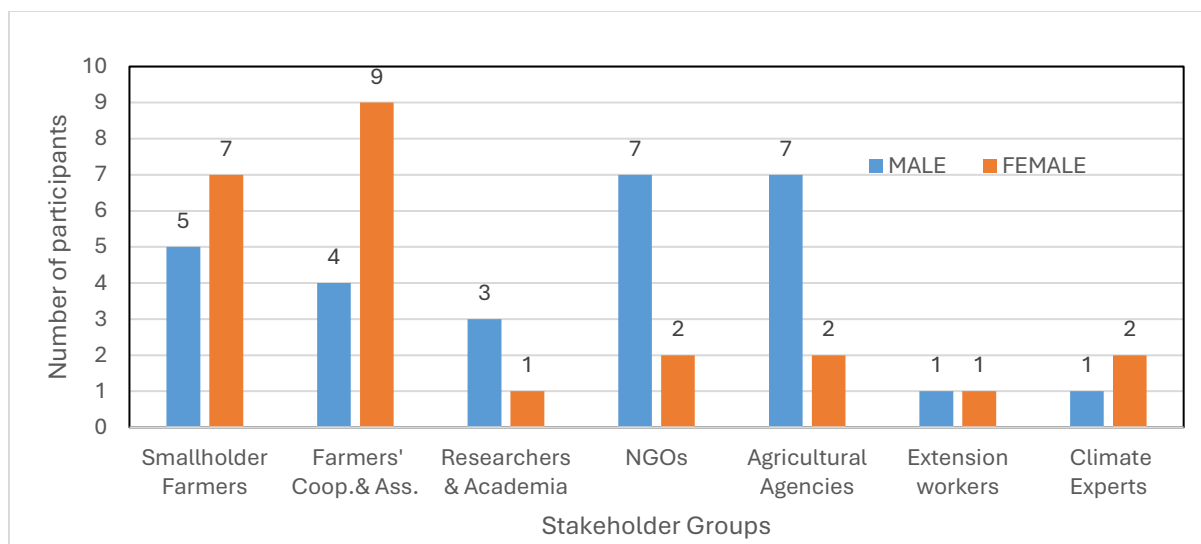


Figure 9: Distribution of participants in the 3rd subnational workshop (Owerri) by stakeholders' groups

3.5 Mode of the Co-Creation Process

3.5.1. Sub-National Level

In our effort to ensure an inclusive, collaborative and interactive participation, a variety of methods of engagement were used throughout the sub-national workshops:

- **Expert Presentations:** There were few expert presentations to sensitize the audience, and stimulative thinking about the overall climate risk assessment and current and future impacts in the country; government policy actions and catalogs of success stories and challenges of locally-led adaptation efforts. This set the scene for the other parts of the programme.
- **Breakout Groups:** Participants were divided into smaller breakout groups based on sectors of expertise and gender groups. Using guiding questions (section 3.3.1), these group discussions were facilitated by a selected group lead within each group and a rapporteur. The group lead conduct robust discussions on targeted topics, encouraging participants to exchange ideas in a mode of peer-to-peer learning among representatives/stakeholders from different fields/expertise. Each group was seconded by a member from the AGNES team to ensure that participants continued asking the rights questions and their discussions reflected on their experiences and knowledge. This approach helped in brainstorming on many cross-cutting issues.
- **Plenary Sessions:** Every breakout group presented their findings from their working sessions at the plenary sessions. This enabled other workshop participants to provide some reflections and experiences on some key areas of concerns. Plenary sessions helped to harmonize ideas from all groups, identify overlapping priorities, and clarify divergence/convergence submissions among stakeholders.
- **Post-Workshop Iterations:** Participants were followed up with a post-workshop engagement after the workshop. This presents an opportunity to review workshop activities, outcomes and regional-specific feedback. This iterative approach ensured that ideas and priorities are refined based on ongoing insights, responses and adaptability of the process.

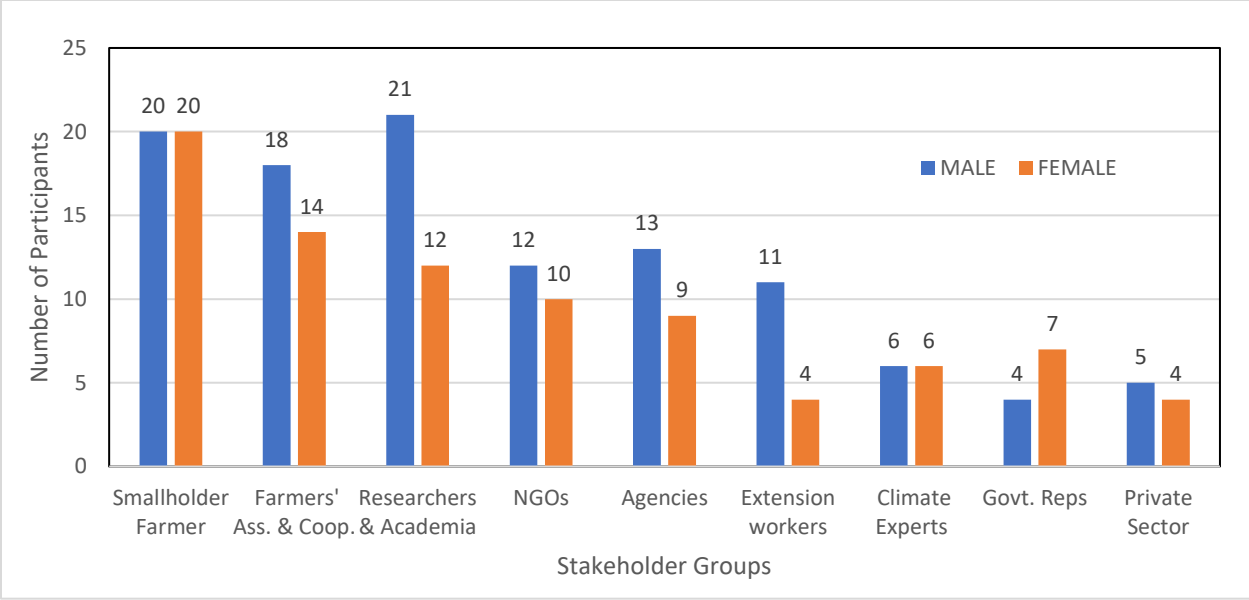


Figure 10: Distribution of total project participants across all the stakeholder groups

3.5.2. Workshop Guiding Questions

All the breakout discussions were conducted with specific purpose using a set of guiding questions developed in consultations with ARA and BMGF. These questions were tailored to uncover gaps in current adaptation efforts, identify knowledge gaps and actionable research areas required to inform practice at smallholder level, and explore ways to enhance collaboration between research institutions, local and national actors/decision makers and communities. The guiding questions further provided a framework for systematic identification of adaptation priorities and research needs from diverse regions.

Box 1: Workshop Guiding Questions

- What are the most significant practices and knowledge gaps in current adaptation research in the agricultural sector?
- How can existing adaptation efforts be scaled up or modified to better meet the needs of communities across the different agro-ecological zones?
- Are there gender-dynamics within the community that influence adaptation effort?
- How can research institutions and local communities collaborate more effectively to inform, develop and implement adaptation actions?
- What specific actionable research areas will help address the adaptation needs of smallholder farmers in the crop/irrigation, livestock, and fisheries sub-sectors in the region?
- What are the knowledge gaps that could assist smallholder farmers to better adapt to climate risks across the different sub-sectors?

3.6 National Prioritization Workshop

A two-day National Research Adaptation Prioritization Workshop was held in Abuja, Nigeria, from October 10–11, 2024. The workshop aimed to harmonize locally-led adaptation priorities across various agro-ecological zones in the country. Participants included representatives from federal

government agencies, researchers, and farmers' groups, reflecting a multi-stakeholder approach to tackling agricultural adaptation challenges. The goal of the workshop was to provide feedback on findings from earlier national and the three sub-national workshops aimed to prioritize action-oriented research areas that address the current and future needs of smallholder agriculture adaptation in Nigeria. The workshop offered a comprehensive understanding of the region-specific adaptation needs and challenges. The objectives of the National Adaptation Prioritization Workshop were to:

- i. provide feedback on the findings obtained from the 1st National and three (3) sub-regional workshops; and
- ii. prioritize action-oriented research areas and scalable locally-led adaptation strategies that advance smallholder agriculture adaptation.

The outcomes of the prioritization workshop include:

- i. final draft report on prevailing status of the national and sub-national priorities in adaptation, and knowledge and practice gaps; and
- ii. checking for alignment of national and local priorities through research priorities that support locally-led initiatives in crops and water resources/irrigation, fisheries, and livestock.

The national prioritization workshop brought together stakeholders from the various agroecological zones to finalize areas of high priority on actionable research and scalable locally led adaptation strategies. Ranking of priorities was done by participants by voting for research areas that were of high, medium and low priority across the thematic areas of crops/agroforestry, livestock and fisheries, and water resources and irrigation.

3.7 Gender Equality and Social Inclusion (GESI) Considerations

One major component of the co-design was the application of gender equality and social inclusion (GESI) principle in delivering on the expected outcomes of the process. These borders on giving consideration for gender inclusiveness and responsiveness in every activity carried out as stated:

- **Stakeholder Mapping for Breakout Groups:** Each breakout group was composed of diverse stakeholders to ensure diversity in representation especially women, youth, elderly, PLWD, marginalized communities, and other vulnerable groups. This composition of diverse participants aimed to capture a broad range of perspectives that ensured that the voices of underrepresented groups were heard and included the conversations. Breakout groups were also moderated with the reflection of the diversity such that every attendee is encouraged to speak his/her minds, even in their respective languages and local dialects, especially in communities where less educated women and youth dominated are found.
- **Gender Differences in Isolating Adaptation Needs:** Recognizing that gender differences and effect on the dynamics of influence in the local communities regarding identification of adaptation needs and priorities, GESI principles were applied in the design of the questions for discussion and in the modality of creating the breakouts. The set of questions for discussions examined how men and women are impacted differently by climate change and how adaptation strategies can be tailored to account for these differences. While some

stakeholder groups exhibit a relatively balanced gender distribution, others are predominantly male-dominated or female-dominated.

These differences could highlight varying levels of engagement or access among genders within specific sectors or roles. This mix ensure a broad co-design strategies and inclusive dialogue that covers the practical, technical, policy, and financial aspects necessary for driving agricultural adaptation in the region. The diversity of the stakeholder groups are presented from Figures 5 to 9.

3.8 Evaluation Assessment

An assessment of the effectiveness of the workshops was conducted to gather feedback and evidence that x-ray the co-creation process and provide opportunity for learning. Satisfaction surveys were distributed to participants after every workshop. Data were collected on various aspects of the workshop delivery which include:

- **Relevance of Content:** Participants were asked to rate the relevance of the workshop content to their work and interests.
- **Quality of Facilitation:** Feedback was gathered on the quality of facilitation, including clarity, responsiveness, and ability to engage all participants.
- **Inclusiveness:** Surveys assessed whether participants felt that the workshops were inclusive and that their perspectives were valued.
- **Overall Satisfaction:** An overall satisfaction score provided insights into the participants' experience of the workshop. The results of the satisfaction surveys were used to refine future workshops and improve the overall co-creation process, ensuring continuous improvement and responsiveness to participant needs.

CHAPTER FOUR

4.0 CO-CREATION FINDINGS

This chapter presents the findings from the co-creation process for the smallholder agriculture sector at sub-national and national levels in Nigeria on adaptation to climate change. The findings are categorized into outcomes of findings from the co-design process and the workshops conducted.

4.1. Outcomes of the Co-Creation Process

The co-creation process was organized to ensure that critical areas of locally led adaptation strategies and high priority actionable research areas could be identified from through engagement with smallholder farmers and associated organizations in Nigeria. Stakeholders came together at the national level to discuss general outlook of smallholder agriculture in Nigeria, and climate change policy outlook impacting agriculture in the country. The organizers, thereafter, went to the grassroots or smallholder farmers in their various agroecological zones to identify with them on their various adaptation strategies for reducing impacts of climate risks in the agriculture sector. Areas of actionable research were also harvested during the sub-national workshops. Other criteria used were food security, ease of implementation, cost efficiency or value for money, and alignment with government policy. Key actors and beneficiaries for the proposed actionable research were identified, and potential zones for possible implementation were also suggested. The co-creation workshop was a success as harvested from the comments and survey responses from the participants.

4.1.1 Opportunity for Peer-to-Peer Learning

The learning process was facilitated in all the workshops (national and sub-national) through various interactions among stakeholders with different expertise. The crop/agroforestry sub-sector constituted the most interesting group, because it was a mix of professors/researchers from universities, technical/desk officers from ministries, and farmers. They often have thorough discussions or argue it out to reach resolutions, which were usually beneficial to all participants in the group.

- Participants were often excited and usually promised to implement new practices from the new knowledge gained on different sectors of agriculture under discussion (crops; livestock; fisheries and water resources).
- In Southwest workshop held at Ibadan, a participant from soil less farm laboratory in Ogun state reiterated the high involvement of youths in their project across Nigeria and also suggested soil less farming as an approach to scale-up adaptation. He stated that soil less farm lab is involved in the training of 1000 youths every quarter covering females between 18 and 35 years and males between 18 and 29 years of age. These comprised 70% females and 30% males. He informed the workshop participants that the soil less laboratory has already constructed and owns 560 greenhouses as of September 2024. Participants were elated with the knowledge-driven approach in the soil less laboratory.
- Another interesting knowledge shared was on the importance of extension agents who explained that they are being used by the researchers to convey new farming innovations to farmers i.e., through Small Plot Adaptive Techniques (SPAT), and On-Farm Adaptive Research. After adopting, then Management Training Practices (MTP) would be done in which every community would adopt all. This was also considered to be important, and they all raised one voice on the need to rejuvenate extension services, particularly in southwestern Nigeria.

4.1.2 Stakeholder Networking

Networking among stakeholders was very effective in all the workshops. The workshops presented an opportunity for Farmers and Farmer Organisations to meet with Directors from the Ministries of Agriculture and Environment, researchers and other Development Partners. There were also exchange of contacts among researchers and farmers for possible future collaborations and most importantly on the actionable research areas and with Development Partners especially on scalable adaptation strategies in different contexts. The National Prioritization Workshop gave participants the opportunity to network and interact with the funder's representatives, who participated physically to see for themselves the success of the final workshop. The project team was also able to meet and interact with the funder's representatives and the Advisory Committee members.

4.1.3 Anecdotes

Find below some anecdotes from the workshops.

- **Knowledge Transfer:** A female participant from Imo State, who gained something new from one of the sub-national workshops, went back and organized a small training for her colleagues in her community. She shared pictures to show that the training was successful, and the participants were excited to gain new ideas on farming practice;
- **Ethnicity in Nigeria:** The issue of ethnic differences almost crop-up during the prioritization workshop, but we were able to manage it through expert facilitation and also with assistance of Government Representatives. Some participants placed emphasis on the north and some placed emphasis on the south.
- **Gender Inclusion Debate:** There was serious debate about gender-based research to be included as one of the high priority actionable research areas. This was raised by one of the female participants in Abuja prioritization workshop who insisted that gender-based research must be included. It was noted that gender will always be considered in every research but to prioritize gender-based research was actionable as a project. The gender debates amongst the workshop participants were learning opportunities for everyone as we had gender experts amongst the participants to intervene and provide expert direction.

4.2. Sub-Sector Policies

4.2.1 Highlights of Current Policies

Many of the identified agriculture and climate change policies are currently being implemented, but the level of uptake posed major concern among the participants (Table 2). For example, promotion of sustainable land and water management practices through soil survey, water harvesting techniques, establishment of mini-earth-dam is on-going in 8 out of 36 states. Establishment of Meteorological Stations in all Federal Ministries of Agriculture and Rural Food Security (FMAFS) State offices to have adequate and reliable data for forecasting purposes exist only in a few states across the country. The policy to integrate farming systems with agroforestry, supplemental irrigation, and water and soil conservation techniques has been implemented in 10 states (9 Northern State and Ekiti in Southwestern Nigeria) under the Green Bond in 2018, Agricultural Development Projects (ADPs) and State Ministries of Agriculture were involved. Status on mechanization indicates that most of the mechanization services provided by state governments are almost moribund. Current status on crop varieties indicates that the extent to which seeds are released, which takes climate change issues into consideration, is not very clear. The release of TELA Maize is currently creating a lot of controversies

which will further limit the ability to use this strategy. It was noted that Lagos and a few other states are performing well in implementing climate change policies and addressing climate change impacts across all sectors of the economy.

Table 2: List of policies applicable to the three agricultural sub-sectors.

Crop/Agroforestry	Livestock and Fisheries	Water Resources and Irrigation
<ul style="list-style-type: none"> • National Agricultural Technology and Innovation Policy (NATIP: 2022-2027) • Nigerian Climate Change Adaptation Compact (NCCAC: 2023) • National Climate Change Policy (NCCP: 2021-2030) • National Agricultural Resilience Framework (NARF: 2013) 	<ul style="list-style-type: none"> • National Dairy Policy – 2023 – 2028 • National Animal Feed Policy – 2023 - • National Livestock Development Policy - 2021 – 2026 • National Livestock Transformation Plan (NLTP) - 2019-2028 • National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) – 2011 • Agricultural Promotion Policy – 2016 – 2020 • National Fisheries Policy – 2013 – 2025 • WorldFish Nigeria Strategy – 2018 – 2022. • Nigeria Livestock Roadmap for Productivity Improvement and Resilience - 2020 – 2026 • Livestock Health and Productivity Improvement Programme (LHPIP) - Quarantine Policy • National Action Plan to Reduce Short-lived Climate Pollutants • Technological Needs Assessment for the Agricultural Sector • National Fisheries Development Plan 	<ul style="list-style-type: none"> • National Water Resource Master Plan 2013. • National Irrigation and Drainage Policy and Strategy of 2015. • National Water Resources Policy of 2016. • National Climate Change Policy (NCCP: 2021). • National Climate Resilient Water Management Plan (NCRWMP) is currently being developed by the ministry of environment.

4.2.2. Adaptation Needs

The adaptation needs, as identified by the participants through the co-creation workshops, are summarized in Table 3 below.

Table 3: The identified adaptation needs by the three agricultural sub-sectors across the country

Crop/Agroforestry	Livestock and Fisheries	Water Resources and Irrigation

<ul style="list-style-type: none"> - The need for appropriate soil nutrient (soil health) and moisture management to minimize the effect of drought and/or dry spells. - There is a need to establish a appropriate message on climate smart agricultural practices to be adopted by all smallholder farmers. - There is need to train local artisans to fabricate the equipment required to support the National Agricultural Technology and Innovation Policy (NATIP) for mechanisation of smallholder agricultural systems. - The need for farmers to understand how to use agro-forestry to improve their productivity and increase their income. - The local farmer should have knowledge on seed that are specifically adaptable to his own environment and suitable to local cultural practices. 	<ul style="list-style-type: none"> - Knowledge on how to upgrade indigenous/local breeds - There is a need for innovative, integrated livestock management for improved nutritional values - There is need for insurance penetration tailored to smallholder agricultural systems to mitigate losses resulting from climate related losses. - Using Climate Smart solutions like wind, solar powered solutions, and indigenous innovations. These can also reduce carbon emissions from existing electricity solutions. 	<ul style="list-style-type: none"> - Evolving needs include enhanced water management systems. - Improved access to tailored and context specific climate information and early warning systems. - There is need to train smallholder farmers to develop their water harvesting technologies based on available resources and maintain them as appropriate. - Improved knowledge and accessibility to small scale irrigation facilities such as drip irrigation to conserve water. - Promoting appropriate water harvesting technologies and innovations i.e.. building of pocket of small earth dams, which promotes dry season farming.
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4.2.3. Research Needs

Action-oriented research areas, as outlined by the participants, were presented during technical feedback from each of the sub-sectors at the national level. Key research areas are summarized in Table 4 below.

Table 4: List of action-oriented research areas by the three agricultural sub-sectors.

Crop/Agroforestry	Livestock and Fisheries	Water Resources and Irrigation
<ul style="list-style-type: none"> • The need to design warning systems that will forecast probability of losses due to climate change phenomena. • Research that will help smallholder farmers adapt to climate change, fostering large scale transformation in their livelihood trajectories. • There is a need to do research on crop resistant varieties. 	<ul style="list-style-type: none"> • There is a need to do research on high-quality feeds for livestock and fisheries. 	<ul style="list-style-type: none"> • Research needs are on biological, mechanical and chemical climate smart technologies.

4.3. Outcomes of the Sub-National Workshops

4.3.1 Sudano-Sahelian Savannah Zone

4.3.1.1 Adaptation Gaps

The changing climate is adversely affecting the productivity and livelihoods of Nigerian smallholder rural farmers. The bottom-up approach of Locally Led Adaptation (LLA) provides an avenue that could play a significant role in unlocking the potential and benefits of climate action in Nigeria especially at the community level, where such actions are urgently required. Smallholder agriculture in the Sudano-Sahelian Savannah zone of Nigeria faces many challenges in adapting to climate change, many of these gaps, as provided by smallholder farmers in the zone, are summarized in Figure 10 below. For example, religious and cultural barriers, and Socio-cultural beliefs of the farmers, such as Consultation with gods: Farmers may consult gods to ask for guidance on which practices to use, such as which seeds or fertilizers to use. Cultural restrictions: Some ethnic groups may prohibit farming on certain days of the week. Chief approval: Chiefs may have a strong influence over their subordinates, especially in rural areas, and their approval of new technologies may affect adoption. Libations to ancestors: In rural communities, people may pour libations to their ancestors to seek their approval of new technologies. Religious restrictions: Religious groups may set aside days as holidays when farming is not permitted, except for worship. Beliefs about drought: Farmers may believe that drought is caused by supernatural forces, such as ancestors or God, as punishment for some unknown wrongdoings

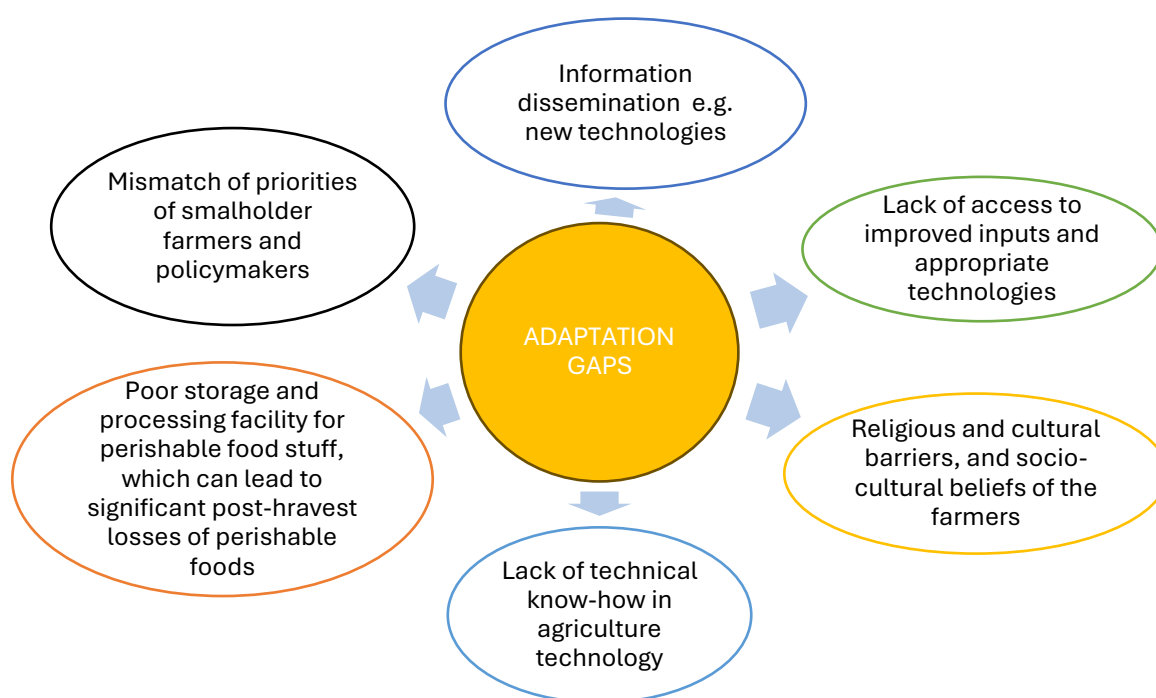


Figure 10. Adaptation Challenges in the Sudano-Sahelian Savannah zone of Nigeria

4.3.1.2 Emerging Action Research Priorities

Priority actionable research-oriented areas were identified during the sub-national workshop in Kano. These are summarized in Table 4 below.

Table 4: Some actionable research areas identified in Kano sub-national workshop.

Crop/Agroforestry	Livestock and Fisheries	Water Resources and Irrigation
<ol style="list-style-type: none"> 1. Research on light-weight farm tools and equipment to ease farming operations (appropriate mechanization). 2. Research on storage and processing facilities: Soil health and fertility management, postharvest and value addition. 3. Research on Improved awareness on the use of climate resistance varieties 	<ol style="list-style-type: none"> 1. Research on Integrated pest and disease management methods 2. Research on low-cost feeds formulation for livestock and fish 	<ol style="list-style-type: none"> 1. Research that will provide adequate knowledge and understanding of weather trend to farmers 2. Research on Improved irrigation facility that will encourage local fabricators to come up with light machines

4.3.2 Rainforest Southern Guinea Savannah Agro-Ecozone

4.3.2.1 Adaptation Gaps

In the Rainforest and Southern Guinea Savannah Zone, the adaptation gap being the disparity between what has been implemented/current level of adaptation efforts and what is needed to effectively address the impacts of climate change is reflected in terms of information gap, resource limitation, competing priorities and the challenges in financing and planning.

Common adaptation strategies for smallholder farmers in this zone include; combination of organic and inorganic fertilizers or switching from inorganic to organic fertilizer that is more favourable when there is little or no rainfall. An adjustment in planting dates, adoption of drought tolerant variety of crops, switching from well-drained area to swampy areas and wetlands for farming, agroforestry, mulching at the planting stage, water harvesting for irrigation, early harvest and immediate sun drying, planting of covered crops to reduce erosion. The use of fish holding tanks, VATS to house fishes, alternative sources of fish feed like maggot production, the use of tap water for piggery by pumping directly and using immediately, earthen pond- Flow through system, farmers cooperatives to enable them put resources together for bulk buying and access to funding. The use of ashes to control soldier ants and as a disinfectant in the housing of small ruminants, planting of plantain at the dike of fishponds to cool the environment to reduce heat. The local early warning systems in this zone include the abundance of black butterflies (dragon fly) around November, an indication that there will be severe drought in the following year. Early high sun rise; a signal for heavy rainfall that may cause flood, birds migration signifies the time for harvesting, evolution and flowering of some plants (Akintola plant) signifies the beginning of the dry spells. Unfortunately, most of these early warning signs are failing farmers because of climate change.

According to participants, the most significant gaps in current adaptation practices in the agricultural sector in the region are:

- a. Information gap especially on research finding and funding sources,
- b. Missing linkage between extension services, research institutions and farmers. This information/ Knowledge gap is even worse among the women farmers.
- c. There is a need for demonstration plots/pilots in which farmers could see the research innovations and technologies that they could use in their production systems.
- d. The need to translate scientific results to farmer friendly information (how to best disseminate scientific information to smallholder farmers in a manner that they could best understand).

4.3.2.2 Emerging Action Research Priorities

The following were the research needs by the participants from the southwest region of Nigeria. They include but not limited to;

- a) Research Priorities for Crop/Agroforestry:
 - Further research to explore the benefits and effectiveness of combining organic and inorganic fertilizers. The goal is to determine how this combination can improve soil health, enhance crop yields, and provide a more sustainable approach to agriculture, although the present purpose is to reduce cost of using inorganic fertilizers
 - More Research in Biocontrol of pests and diseases:
- b) Research Priorities for Livestock and Fisheries:
 - Research to explore how water hyacinth, an invasive aquatic plant, can be used as a sustainable source of feed for livestock (such as pigs and poultry) and as a natural fertilizer for crops
 - Research into the effectiveness and the use of ashes to control soldier ants and as a disinfectant in the housing of small ruminants
 - More research into the use of cassava root as an alternative energy source
- c) Research Priorities for Water Resources and Irrigation
 - Research is needed to develop an early warning system that uses local signs, such as changes in soil conditions, to predict and assess the extent of drought in a specific area. By monitoring these local indicators, communities can be alerted early to the risk of drought, allowing them to take preventive measures and reduce the impact on agriculture and water resources
- d) Research Priorities for the women in the community
 - Research into improving storage and processing techniques to reduce post-harvest losses and increase the shelf life of agricultural products.
 - Strengthening market linkages and value chains to ensure farmers get fair prices for their produce and access to larger markets should also be looked into

The new and evolving areas of focus in this zone informed by the participants across the subsectors include; More online marketing (e-marketing) especially for women farmers, research in the use of cassava root as an alternative energy source, Creation of a database of all farmers in South West Nigeria, E-messages should be adopted in place of unavailable extension agents, Provision of internet service and social amenities to rural areas. Development of clean energy processing equipment, development of clean energy power generating machines for powering production processes on the farm.

4.3.3 Southern Guinea Savannah, Rainforest, Freshwater & Mangrove Swamps

4.3.3.1 Adaptation Gaps

Smallholder farmers in the Southern Guinea Savannah, Lowland Rainforest, Freshwater & Mangrove Swamps agroecology have adopted several effective locally adopted strategies to combat climate change. These strategies include installation of solar dryers for processing agricultural products; adoption of improved livestock and climate-smart management practices; and engaging in nature-based solutions like bamboo tree afforestation. However, farmers, including women and People with Disabilities (PWD), identified significant gaps in current adaptation research in the agricultural sector:

- a. limited access to climate change information services for farmers to engage in informed farm activities;
 - b. Inadequate extension services and government support;
 - c. Lack of government commitment to implement research findings;
 - d. Lack of capacity building and training on climate related issues;
- b. (v) Poor adoption of climate-resilient crops and livestock among farmers due to limited access to agricultural extension services amongst others.
- c. The identified adaptation gaps for women and people with disabilities include:
- (i) Limited participation in community engagement potentially due to cultural, or societal constraints;
 - (ii) Paucity of female professional limits their representation and influence in key areas such as agriculture, technology, and community leadership;
 - (iii) Lack of access to information and resources, inputs, and opportunity that could aid in adaptation efforts;
 - (iv) Exclusion from decision-making processes due to cultural or traditional norms in their communities.

People with Disabilities shared their experience of marginalization and exclusion from participating in community activities due to lack of tailored resources, tools, or technologies that accommodate their needs, and limited capacity-building opportunities to improve their technical skills. These findings highlight the need for targeted support and research to address the unique challenges faced by smallholder farmers in the region.

4.3.3.2 Emerging Action Research Priorities

During the deliberation, the discussion on emerging research priorities in the Southern Guinea, Lowland Rainforest, Freshwater, and Mangrove Swamp regions highlighted several gender-sensitive recommendations to address the unique challenges faced by different genders in these areas. These priorities were centered around specific needs for man, women and youths as presented below:

- a. Research Priorities for Men:
 - **Synergy with Local Communities:** Establishing partnerships between researchers and local communities to ensure that research aligns with the communities' needs and priorities.

- Advocacy and Awareness Campaigns: Promoting gender-sensitive education on conservation and sustainability to reduce ecological degradation and enhance community-driven conservation practices.
 - Encouraging Local Communities in the Translation of Research Finding: Translating scientific findings into local languages and culturally appropriate formats to ensure comprehensibility. This is crucial for inclusive engagement across gender lines.
- b. Research Priorities for Women:
- Development of climate resilient crop varieties: These varieties should be tailored to withstand the region's unique environmental conditions, such as fluctuating rainfall patterns, saline intrusion in mangrove areas, and drought-prone seasons in Southern Guinea. Such innovations would empower women to adapt better to the adverse effects of climate change and maintain food security in their communities.
 - Enhanced Whether Forecast and Early Warning System: Early warning mechanisms should be localized and accessible, ensuring that women farmers can plan their activities around impending weather conditions, such as storms, floods, or dry spells. This would significantly reduce crop losses and increase productivity.
 - Increased Funding for Women Community Farmers: The discussion called for targeted funding mechanisms that address their specific needs. These could include microcredit schemes, grants, or subsidies to enable women to invest in better farming tools, technologies, and practices. It was also proposed that funding programs should focus on capacity building, providing women with the knowledge and skills necessary to manage their resources sustainably.
- c. Research Priorities for Youths:
- Youths Inclusion in Research Problem Solving: Youths are seen as catalysts for innovation and sustainable solutions, and their inclusion ensures fresh perspectives and long-term engagement
 - Establishment of Community-led Research Stations: The community-led research stations will foster grassroots-level participation and sustainable research outcomes.
 - Development and Promotion of Teaching Aids: Gender-responsive educational tools were identified as necessary to improve knowledge transfer among local communities, especially for women and girls

4.4 Evolution of Gender Roles

Gender roles and responsibilities in Agriculture have changed, in response to climate change across all the agro-ecological zones of Nigeria. Many of these new roles have shifted towards the women, which is negatively impacting them. This aims to explore how policymakers and communities can develop inclusive strategies that empower individuals of all genders, fostering stronger and more equitable responses to climate challenges. The responses are presented in table 5.

Table 5: Evolution of gender roles in climate change adaptation process

Male	Female	People with Disabilities (PWD)
<p>Gender stereotypes as providers and protectors, which can lead to insecurity when they are unable to fulfill these roles, particularly in situations like crop failures, job losses, or resource scarcity caused by climate change.</p>	<p>Increased roles and responsibilities on the side of the women which reduce their time for education, income-generating activities, or participation in community decision-making</p>	<p>Communal Land Tenure systems often favor men, particularly in land allocation, limiting women's and marginalized groups' access to resources needed for climate adaptation</p>
<p>Vulnerability on the part of men due to insecurity which may separate them from their families and support systems, increasing their vulnerability to exploitation or unsafe conditions.</p>	<p>Religion and traditional factors against the women which often place women in roles tied to caregiving, homemaking, and nurturing, while men take on roles associated with authority, decision-making, and provision.</p>	<p>Water Abstraction: Persons with Disabilities are typically marginalized in these processes due to physical, social, or infrastructural barriers. Their participation in water abstraction has historically been limited or overlooked</p>
<p>Men have been responsible for physically demanding tasks such as working the fields, herding livestock, or managing water resources, roles that are highly vulnerable to the impacts of climate change</p>	<p>Women are more likely to experience the negative health effects of climate change, including heat stress, malnutrition, waterborne diseases, and respiratory conditions due to climate-induced pollution</p>	<p>Migration: When climate-induced disasters (e.g., floods, droughts, storms) force migration, people with disabilities may encounter barriers in accessing safe evacuation routes, transportation, or shelters.</p>

CHAPTER FIVE

5.0 NATIONAL ADAPTATION RESEARCH PRIORITIZATION WORKSHOP

5.1 Adaptation Gaps Summary

This session identifies the emerging adaptation gaps within each agroecological zone, highlighting key areas where targeted interventions are necessary to support sustainable agricultural practices and enhance resilience.

(a) The adaptation gaps in the Sudano-Sahelian Ecological Zone (SSEZ) in Northeast and Northwest of Nigeria include:

- i. inadequate information dissemination on weather information for smallholder farmers to make informed decisions;
- ii. lack of improved seeds and seedling varieties such as maize, rice, cassava, yam, soybean and oil palm seedling
- iii. lack of access to improved inputs and technologies. The irrigation kits are expensive and often time out of reach of target farmers;
- iv. lack of technical know-how on how to implement climate resilience agricultural technology and best adaptation strategies;
- v. inadequate implementation of national policy. Most often Governments at all levels allocate limited funds due to competing priorities which prevent full scale implementation;
- vi. lack of awareness of adaptation practices among the youth;
- vii. lack of security. Due to instability in some States of the zones especially in the Northeast, some people are more focused on survival needs (safety and food) than long term adaptation; and
- viii. insufficient understanding of climate information disseminated to farmers.

(b) Rainforest-Southern Guinea Savannah Zone (RSGSZ) in Southwest of Nigeria, the adaptation gaps include:

- i. lack of strong links between extension agents, research institutions, and farmers;
- ii. absence of demonstration plots for farmers to see research findings;
- iii. research is often not farmer-friendly and ignores socio-cultural beliefs;
- iv. insufficient sensitization and advocacy for innovations in small smallholder agriculture;
- v. inadequate social amenities in rural areas such as healthcare, education, transportation and may significantly limit quality of life and socioeconomic development;
- vi. lack of seed and data bank in various zones; and
- vii. communication disconnects between government citizens which often results in poor and timely feedback. When decisions are made based on incorrect data, it may lead to resistance or lack of buy-in from those impacted by the changes.

(c) Southern Rainforest Guinea Savannah (SRGS) in Southeast as well as Mangrove Forest (MF) Zone in South of Nigeria, the adaptation gaps are:

- i. limited access to climate change information;

- ii. inadequate extension services and support for smallholder farmers;
- iii. inconsistencies in government policies and lack of commitment to implementing research findings;
- iv. limited finance and credit facilities for smallholder farmers;
- v. inadequate and unreliable data collation and management in areas such as disaster management to support sustainable and adaptive decision making; and
- vi. lack of capacity building, including training and implementation.

5.2 Identified Actionable Research Areas Summary

Ranking of priorities was done by participants by voting for research areas that were of high, medium and low priority across the thematic areas of crops/agroforestry, livestock and fisheries, and water resources and irrigation. The table below presents a summary of the outcome of the overall top five (5) high priority research areas for Nigeria. However, additional three (3), numbered 6 - 8, were left for further or future consideration taking into account Nigeria's population dynamics.

Table 6: Summary of the identified actionable-research areas

S/N	THEMATIC AREAS	RESEARCH AREAS	POTENTIAL ACTORS/INSTITUTIONS	RECOMMENDED REGIONS
1	CROP	Research on collaboration among farmers, extension services and research institutions	Research Institutions, Academia, Federal and State Ministries of Agriculture, ADPs, Farmers organizations, Media, Community based leaders, Development partners, Donors, etc. Institutions, Financial Institutions, NGOs, CSOs	All Agro-ecological zones in Nigeria
2		Climate/Weather Information Services – appropriate weather information for smallholder farming systems	Research Institutions, Academia, Federal and State Ministries of Agriculture, ADPs, Farmers organizations, Media, Community based leaders, Development partners, Donors, etc. Institutions, Financial Institutions, NGOs, CSOs	All Agro-ecological zones in Nigeria
3		Research on utilization of high yielding and resilient seed varieties	NARIs, Academia, CGIAR centers in Nigeria, Private sector research outfits	All Agro-ecological zones in Nigeria
4		Appropriate pest management technology	NARIs, Academia, CGIAR centers in Nigeria, Private sector research outfits	All Agro-ecological zones in Nigeria
5		Storage and post-harvesting technologies	NARIs, Academia, CGIAR centers in Nigeria, Private sector research outfits	All Agro-ecological zones in Nigeria
1	LIVESTOCK	Research on sustainable, integrated livestock management system to minimize post-harvest	NARIs, Academia, Government, Relevant professional bodies, financial institutions, Development partners, Relevant CGIAR centers	The Sudano-Sahelian Zone is more prominent with livestock while the Tropical Rainforest, Mangrove and

		losses due to climate variabilities	in Nigeria, Private sector research outfits, NGOs, CSOs	Freshwater Swamps Zones are known for fisheries
2		Fodder and pasture production research	ARCN (NAPRI, IAR&T), NASC, Academia, Development partners,	All Agro-ecological zones in Nigeria
3		Alternative feed (protein supplement) for both livestock and fisheries based on local resources	NARIs, Academia, Government, Relevant professional bodies, financial institutions, Development partners, Relevant CGIAR centers in Nigeria, Private sector research outfits, NGOs, CSOs	All Agro-ecological zones in Nigeria
1	WATER RESOURCES / IRRIGATION	Research on development of low-cost and energy efficient irrigation facilities	NCAM, Government, Academia, Private sector, Farmers, Extension agents, Development partners	All Agro-ecological zones in Nigeria
2		Research on localized Weather Information Services for smallholder farmers to adapt	NiMet, NAERLS, Farmers, NARSDA, other relevant MDAs, Media,	All Agro-ecological zones in Nigeria
3		Research into livestock and aquaculture (Vaccine, Chemotherapy and Zoonosis) in reducing livestock mortality	NARIs (NVRI, NIOMR, NIFFR, NITPR), NCDC, Academia, Development partners, Relevant professional bodies, Private sector	All Agro-ecological zones in Nigeria
4		Innovative interventions to address Farmers-Herders Conflict in regions where shared natural capital stock or resources are prominent	Government, Farmers, Private sector, affected Communities	All Agro-ecological zones in Nigeria

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusion

Smallholder farmers in Nigeria are faced with many challenges in the production systems and these include: erratic and unpredictable rainfall patterns which results to droughts in the north, floods in the south, and crop infestation by pest and diseases; soil health depletion; rising temperatures which affects both crops and livestock and fishery; and heat wave. One way to address these challenges is by organizing a co-creation workshop, aimed at bringing stakeholders in agricultural and water resources together. This would help to identify, enlist and understand the needs of smallholder farmers and provide action-oriented solutions to their needs. This bottom-up approach of locally-led adaptation strategies, where stakeholders work closely with the smallholder farmers to identify their needs and therefore co-produce actionable research-oriented areas, has proven to be effective based on the outcomes of this workshop. The stakeholder mapping captured participants from ministries, research institutions, local smallholder farmers, among others, and gender inclusiveness was of high priority. Guiding questions were designed in-line with the various workshop objectives to guide the participants during breakout discussions.

There were fantastic outcomes from each of the sub-sectors, which covered key policies and their effectiveness, gaps (knowledge, implementation, technical, and policy), needs (adaptation, research, and implementation), and local-level priorities. Highlights on gender and climate change were discussed exhaustively in most of the workshops. The workshops were also able to identify common crops grown in each of the agroecological zones of Nigeria. Climate change risks and impacts prevalent to each agroecological zone were also identified. Successful practices and locally-led adaptation strategies in each agroecological zone, and most importantly actionable research-oriented priorities across Nigeria were co-produced.

The learning process was bi-directional, because every participant gained new knowledge from each other during the workshop. There was networking among participants in all the workshops. Participants looked forward to funding the research priorities as outlined from the prioritization workshop.

6.2 Recommendations for BMGF

The recommendations based on the high priority actionable research-oriented areas are grouped under the BMGF thematic and fundable areas as:

1. Climate Information Services

The three sub-sectors (crop/agroforestry, livestock and fisheries, and water resources and irrigation) unanimously agreed that “Research on collaboration among farmers, extension agent and research institutions” be given the highest priority for actionable research. The crop/agroforestry justified that “through collaboration and linkages between the actors (researchers, extension agents, farmers and other stakeholders), demand-driven crop varieties and other agricultural production input can be produced. This can also help bridge the gap in

communication and advocacy among the major actors”. The livestock and fisheries argued that “Research into better methods of information dissemination through extension services to livestock farmers are urgently needed in a manner in which the farmers can understand and utilise the information”, and that “There are now better and more effective method of disseminating information due to emergence of new technology. The research is to test which of these new technologies can be used to reach different categories of livestock farmers (cattle herders, poultry farmers and piggery farmers)”. The water resources and irrigation sector opined that limited linkage often delays practical adaptation strategies from reaching farmers efficiently and farmers’ insights are often excluded from research, reducing local relevance of information and solutions.

2. Water Resources Conservation

The second most prioritized actionable research area is on water resource conservation. It is “Research on development of low-cost and energy efficient irrigation facilities”. It was suggested that center such as “National Centre for Agricultural Mechanization (NCAM), Ilorin, Faculties and Departments of agricultural engineering and other sister institutions should be empowered to develop or fabricate simple farming tools and other machineries that farmers can afford and adopt. The tools should be low energy efficient and sustainable for irrigation purposes and to increase farmers' capacity to cope with unpredictable weather patterns.

3. Climate Resilient Seed Varieties

As part of our recommendations, there is the need for further “Research on utilization of high yielding and resilient seed varieties, pest management technology, storage and harvesting technologies”. Funding should be made available for research institutions to develop early maturing, high yielding and drought-resilient crop varieties that meet the farmers' preference.

4. Generating High-Quality Data and Evidence

The need for accurate and evidence-based weather information and data were prioritized for actionable research. The research on localized Weather Information for Smallholder Farmers will reduce losses. Without localized forecasts, farmers struggle to make timely decisions for climate-resilient planting. Lack of precise weather data increases vulnerability to sudden climate events, reducing crop yields. Inadequate weather information limits smallholders' ability to implement effective, localized adaptation strategies. Localized weather information also will increase productivity for climate smart agriculture.

5. Livestock Production

There is a pressing need for research on livestock to minimize post-harvest losses due to climate variabilities and fodder and pasture production research. Stakeholders in this sector argued that post-harvest loses have always been an issue due to unavailability of preservative facilities. Nigeria has lost several square kilometers of rangeland due to climate change. This has increased migration of cattle herders and insecurity and need to afforest the lost rangeland.

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ANNEXURES

Annex 1. Sub-Regional Reports

- Kano State Sub-National Workshop Report:
 - [UPDATED 1st SubNational_Kano_Report_February 2025.docx - Google Docs](#)
- Ibadan Sub-National Workshop Report:
 - [UPDATED 2nd SubNational_Ibadan_Report_February 2025.docx - Google Docs](#)
- Owerri Sub-National Workshop Report:
 - [UPDATED 3rd SubNational_Owerri_Report_February 2025.docx - Google Docs](#)

Annex 2. Guiding Questions at the Sub-National Workshops

Breakout Session 1: Understanding Climate Change Risk and Impacts Assessment

Guiding Questions: Sectors_ Livestock/Crop/Fisheries/Water Resources & Irrigation

1. What crops do you grow/ livestock do you keep?
2. List the primary climate change risks currently affecting smallholder farmers in your local areas?
3. Mention specific impact of climate risks on agricultural productivity/livestock keeping/water resources in recent years?
4. How have gender roles and responsibilities in agriculture (crop/livestock farming/fisheries/water use) changed in response to climate change?
5. What are specific socio-economic impacts of climate change on smallholder farmers in your area?
6. What local early warning systems are in place to prepare for anticipate climate risks? Do you use them? If not, why not? Are they effective?
7. Additional information you think is relevant.

Breakout Session 2: Identifying Successful Practices and Locally-Led Adaptation Strategies

Groups: Male, Female, PWD/Elderly & Youth

Guiding Questions: Group: Livestock/Crop/Fisheries/Water resources/Irrigation

1. How has your livelihoods change/develop over the last few years (in the face of climate change)?
2. What are the most effective adaptation strategies for smallholder farmers in your community?
 - How has crops and livestock farming adapted their resource management in response to climate change?
 - Any successful examples of local farming practices which have improved resilience to climate shocks?
 - What are the trends in fisheries production/fish farming as livelihood adaptation mechanism in the region?
 - Are there new alternative agri-livelihood activities in your region?
3. What traditional, local knowledge and practices are successful and could be enhanced to better cope with climate change?
4. What role do local communities and leaders play in promoting and implementing adaptation practices?
5. How has access to production inputs and technology (improved soils, seeds and irrigation, weather information, etc influenced agricultural resilience?
6. What is the type of adaptation financing or insurance for farming practices have you received in your region? If not, why not?
7. What roles do local government institutions and national strategies play in addressing these adaptation gaps? What areas require improvement?
8. Other issues

Breakout Session 3: Identifying Adaptation Needs, Knowledge Gaps, and Research Priorities

Groups: Male, Female, PWD/Elderly & Youth

Guiding Questions: Group: Livestock/Crop/Fisheries/Water resources/Irrigation

1. What are the most significant gaps in current adaptation research in the agricultural sector in your region?
 - What challenges are facing smallholder farmers (livestock, crop and fisheries) in accessing adaptation data, information, resources and support?
2. How can existing local adaptation approaches be scaled up or modified to better meet actual needs of communities in your region?
3. Are there gender-factors within the community that influences adaptation effort?
4. How can research institutions and local communities collaborate more effectively to inform, develop and implement adaptation strategies?
5. What specific problems/issues that require more action-oriented research to address the needs of smallholder farmers in crop/livestock/fish farming in the region?
6. What are the missing information/knowledge that could assist smallholder farmers to better adapt to climate risks across the different aspects of agriculture (livestock, crops and water/fisheries)?
7. Other related matters

Annex 3: Stakeholder Participation Matrix

The stakeholders were identified from across all the subsectors of agriculture namely crop, agroforestry, livestock, fisheries and aquaculture, water resources and irrigation to ensure diversity. Gender equality and social inclusion strategy was used to ensure a balanced representation of ideas and the technique in assessing stakeholder feedback. The stakeholder participation matrix is hereby presented in Annex 3:

	Stakeholder Description	Kano Sub-National	Ibadan Sub-National	Owerri Sub-national	1st National Baseline Workshop	2nd National Prioritization workshop	Total
1	Male	33	43	34	50	46	206
2	Female	24	27	27	18	21	117
3	Youth Networks	6	7	3	0	3	19
4	Farmers	13	11	12	5	10	51
5	State/Fed/Ministry Directors	0	2	2	8	1	13
6	Sub-National Extension officers	7	6	4	1	5	23
7	State/Nigerian Meteorology Agency	1	1	0	2	2	6
8	State/Fed/Ministry Agric Officers	2	10	12	27	13	64
9	Farmers Organizations/cooperative representatives	1	11	7	8	3	30
10	PWD Representative /Marginalized Rep	1	0	1	0	0	2
11	Women Farmers Association/ Gender Representative	6	3	7	4	4	24
12	Private partners (Agri-Sector)	0	3	2	2	2	9
13	Research Institutions/ Universities	15	10	5	9	16	55
14	NGO's	1	5	6	2	8	22
	Total Participants by Group Analysis	110	139	122	136	134	641

Annex 4: Evaluation Feedback from the Participants

The most valuable part of the workshop	
Items	Comments from the Participants
Presentations	<ul style="list-style-type: none"> •Discussions on projected climate risks across various agricultural sectors •Understanding the concept of adaptation and its significance • Adaptation strategies and measures- early warning systems and timely preparedness • Examining adaptation from a gender perspective
Group Discussions	<ul style="list-style-type: none"> • Diverse gender representation provided a range of perspectives during discussions. • Teamwork was evident, with women in separate groups feeling more comfortable to express themselves. • Engaging and in-depth discussions allowed everyone the opportunity to share ideas and opinions.
Sharing of Experiences	<ul style="list-style-type: none"> • Exploring diverse farming methods and techniques. • Social interaction and exchanging practices from various agroecological zones. • Adaptation needs, gaps, and research priorities identified by agroecological zones. • Discussing gender-inclusive activities that enhance agricultural productivity. • Understanding climate adaptation efforts from the lens of pastoralists and agro-pastoralists. • Learning about newly adapted farming technologies.
Interaction with experts	<ul style="list-style-type: none"> •Knowledge gained •Opportunity to know and learn about global climate change processes and how it cascades into local level •Better knowledge about the different agriculture and climate change polices •Advise and exposure on how approach some sources of funding
Recommendations for Future Workshops	
<ul style="list-style-type: none"> • Increase training opportunities on climate change. • Implement a Training of Trainers (ToT) program to strengthen knowledge-sharing efforts. • Extend the workshop duration. • Actively involve more young people to encourage their engagement in agriculture. • Invite additional industry experts to enrich discussions and learning experiences. • Allow participants the flexibility to arrange their own accommodations if preferred. • Maintain the current interactive and engaging workshop format. • Improve participant representation by including more farmers, individuals with disabilities, and extension workers at the ward level. • Conduct training at the grassroots level, equipping community mobilizers as ToTs. • Enhance farmer service centers and promote exposure learning and networking opportunities. 	

Annex 5: Top Five Priority Areas for Actionable Research Areas from the Sub-Sectors

S/ N	Crop/Agroforestry	Justification	Livestock and Fisheries	Justification	Water Resources and Irrigation	Justification
1	<p>Research collaboration among farmers, extension agent and research institutions</p>	<p>Collaboration and linkages between the actors (researchers, extension agents, farmers and other stakeholders) is a driver to towards demand driven crop varieties and agricultural production inputs. This can help bridge the gap in communication and advocacy among the major actors.</p>	<p>Extension Services: Research into better methods of information dissemination to both crop and livestock farmers</p>	<ul style="list-style-type: none"> • There are better and more effective method of disseminating information now available due emergence of new technology. • Research is to test which of these new technologies can be used to reach difference categories of livestock farmers (cattle herders, poultry farmers and piggery farmers) 	<p>Linkage between researchers, extension agents and farmers is limited.</p>	<ul style="list-style-type: none"> • Limited linkage delays practical adaptation strategies from reaching farmers efficiently. • Farmers' insights are often excluded from research, reducing local relevance of solutions. • Extension agents struggle to bridge gaps, weakening climate adaptation on the ground

2	<p>Development of low-cost and energy efficient irrigation facilities with high water usage efficiency</p>	<p>National institutions such as National Centre for Agricultural Mechanization (NCAM), Ilorin, Faculties agricultural engineering and other related institutions should be empowered to develop or fabricate simple farming tools and other machineries that farmers can afford and adopt. The tools should be low energy efficient and sustainable</p>	<p>Animal Health: Research with respect to climate change issues on livestock and aquaculture (Vaccine, Chemotherapy and Zoonosis)</p>	<p>Climate change has heightened different types of livestock diseases leading to increased mortality and poor performance of the livestock sector. The cost implication of high mortality and poor performance are food insecurity and poverty.</p>	<p>Lack of suitable technologies (seed production, pest management, storage, harvesting and irrigation)</p>	<ul style="list-style-type: none"> • Inadequate technology limits farmers' ability to adopt resilient seed varieties for changing climates. • Poor pest management tools hinder crop protection, increasing vulnerability to climate-related pests. • Insufficient storage facilities and less effective irrigation technologies reduce farmers' capacity to cope with unpredictable weather patterns
3	<p>Inadequate access to information and communication on policy, funding and adaptation strategies</p>	<p>Timely and adequate release of climate and weather-related information and other emerging research initiatives that are climate smart should be communicated to farmers in real time and in the languages, they best understand</p>	<p>Breeding for Better performance under climatic variability (meat and milk of cow)</p>	<p>Existing livestock material will increasingly find it difficult to cope with changing climate/weather variables. The changes are leading to loss of grazing land increasing in temperature, and among others</p>	<p>Lack of localized weather information for smallholder farmers to adapt to climate change.</p>	<ul style="list-style-type: none"> • Without localized forecasts, farmers struggle to make timely decisions for climate-resilient planting. • Lack of precise weather data increases vulnerability to sudden climate events, reducing crop yields. • Inadequate weather information limits smallholders' ability to implement effective, localized adaptation strategies.

4	Control of climate change induced pest and diseases	<p>Research Institutions should be encouraged to monitor trends of pest and diseases that are climate induced and develop rapid response strategies to address the intending damages using IPM</p>	Value Addition: Research on livestock to minimize post-harvest losses due to climate variabilities	Post-harvest loses have always been a big issue in the livestock sector of Nigeria	Poor Water Resources Management for Smallholder Farmer	<ul style="list-style-type: none"> • Inefficient water management systems limit smallholder farmers' access to reliable irrigation during droughts. • Poor water governance increases vulnerability to water scarcity, reducing crop resilience to climate change. • Inadequate resource management leads to overuse or underutilization, worsening climate-related water stress for farmers.
5	Adoption of high yielding and resilient seed varieties	<p>Research Institution should develop early maturing, high yielding and resilient crop varieties that meets the farmers preference.</p> <p>The national seed council should profile genuine seed companies for the distribution of certified seed.</p> <p>Agricultural Research Council of Nigeria (ARCN) is permitted to establish spin off companies to take up research output of the NARIs for commercialization (on-going)</p>	Fodder and Pasture production research	Nigeria has lost several square kilometers of rang land due to climate change. These has increased migration of cattle herders and insecurity.	Effect of Farmers-Herders Conflict on Farmer Productivity	<ul style="list-style-type: none"> • Farmers-herders conflicts disrupt farming activities, reducing productivity and resilience to climate change impacts. • Conflicts over land and resources hinder long-term planning, making climate adaptation strategies less effective. • Violence and displacement from conflicts limit farmers' access to land, reducing food security and livelihoods

Annex 6: Ranking Priority Proposals for actionable research areas

Ranking of priorities was done by participants by voting for research areas that were of high, medium and low priority across the thematic areas of crops/agroforestry, livestock and fisheries, and water resources and irrigation. Table 7 presents a summary of the outcome of the overall top five (5) high priority research areas for Nigeria. The other three (3), numbered 6 - 8, were left for further or future consideration.

PRIORITY AREAS	1 (High Priority)	Food Security	Ease of Implementation	Cost Efficiency/ Value for Money	Alignment with Govt. Policy	Criteria Total	Priority Total	Rank
CROP								
Research on collaboration among farmers, extension agent and research institutions	16	5	4	4	5	18	288	1
Research on utilisation of high yielding and resilient seed varieties, pest management tech, storage and harvesting technologies	4	5	5	3	5	18	72	3
LIVESTOCK								
Research on livestock to minimize post-harvest losses due to climate variabilities	1	5	3	3	5	16	16	5
Fodder and Pasture production research	1	5	3	3	5	16	16	5
WATER RESOURCES								
Research on development of low-cost and energy efficient irrigation facilities	5	5	3	5	5	18	90	2
Research on localized Weather Information for Smallholder Farmers to Adapt	1	5	4	4	5	18	18	
Research into livestock and aquaculture (Vaccine, Chemotherapy and Zoonosis) in reducing	0	5	3	3	5	16	0	
Farmers-Herders Conflict on Farmer Productivity	0	5	3	4	5	17	0	

Annex 7: Identification of Key Stakeholders (actors and beneficiaries)

PRIORITY AREAS	RANK	CROP			LIVESTOCK AND FISHERIES			WATER RESOURCES AND IRRIGATION		
		Potential Actors/Institutions	Potential Beneficiaries	Recommended Regions	Potential Actors/Institutions	Potential Beneficiaries	Recommended Regions	Potential Actors/Institutions	Potential Beneficiaries	Recommended Regions
CROP SUB-SECTOR										
Research on collaboration among farmers, extension agent and research institutions	1	Research Institutions, Academia, Federal and State Ministries of Agriculture, ADPs, Farmers organizations, Media, Community based leaders, Development partners, Donors, etc. Institutions, Financial Institutions, NGOs, CSOs,	Agricultural value chain actors (Farmers, input suppliers, processors, service providers, etc.) Government, Private sector,	All Agro-ecological zones in Nigeria	FMAFS, All State ADPs, Federal department of extension services, NAERLS, Private extension service providers, Research institutes (IAR&T, IAR, IITA, NIHORT etc)	All farmers, consumers and value chain actors, training institutions	All regions	Federal Universities such as Federal University of Technology, Akure (Departments of Agricultural and Resource Economics and Meteorology and Climate Science); University of Calabar (Departments of Agricultural and Bio-Resources Engineering); Extension Agents in State and Federal Ministries of Agriculture; Donor agencies (Bill and Melinda Gates; World Bank, AfDB) and Small holder farmers	Smallholder Farmers	National
Research on utilization of high yielding and resilient seed varieties, pest management tech, storage and harvesting technologies	3	NARIs, Academia, CGIAR centers in Nigeria, Private sector research outfits,	Farmers, Seed companies, Agro-allied industries, Off-takers,	All Agro-ecological zones in Nigeria	FMAFS, All State Ministries of Agriculture, NASC, Private companies, Nigerian Stored Products Research Institute (IAR&T, IAR, IITA, NIHORT, CRIN, NCRI), Development partners: AfDB, Harvest Plus, Bill and Melinda foundation, CBN. Professional bodies (Plant Breeders Association of Nigeria, Crop Life, Weed Management Society of Nigeria. GAIN	All farmers, consumers and value chain actors, training institutions. Famers Group	All regions	Federal University of Technology, Akure (Departments of Agricultural and Resource Economics; Crop, Soil and Pest Management; Meteorology and Climate Science); University of Calabar (Departments of Agricultural and Bio-Resources Engineering); Extension Agents in State and Federal Ministries; Donor agencies and Small holder farmers	Smallholder Farmers, Agro-allied industries	National
LIVESTOCK SUB-SECTOR										
Research on livestock to minimize post-harvest losses due to climate variabilities	5	NARIs, Academia, Government, Relevant professional bodies, financial institutions, Development partners, Relevant CGIAR centers in Nigeria, Private sector research outfits, NGOs, CSOs	Livestock value chain actors (farmers, processors, marketers etc.), Relevant MDAs	All Agro-ecological zones in Nigeria	NAPRI, Nigerian Institutes for Trypanosomiasis Research, NVRI, All Animal and Poultry private sectors/company, international livestock research institutes, FMAFS, All State Ministries of Agriculture, ADPs,	All livestock value chain actors	All regions	Federal University of Technology, Akure (Departments of Agricultural and Resource Economics; Animal Production and Health; Meteorology and Climate Science); University of Calabar (Departments of Agricultural and Bio-Resources Engineering); Extension Agents in	Smallholder Farmers	National

								State and Federal Ministries; Donor agencies and Small holder farmers		
Fodder and Pasture production research	5	ARCN (NAPRI, IAR&I), NASC, Academia, Development partners,	Livestock Farmers, Private seed companies, Consumers, Industries (Diary, Tanning, textile)	All Agro-ecological zones in Nigeria	Federal Ministry of Livestock, NAPRI, Agricultural research institutes/ Universities, Collage of Agricultures, IITA, National Institutes for Animal Science, National Veterinary Research Institute, ARCN	Stake Holders in Ruminants Animal Value Chain	All regions	Federal University of Technology, Akure (Departments of Agricultural and Resource Economics; Animal Production and Health); University of Calabar (Departments of Agricultural and Bio-Resources Engineering); Extension Agents in State and Federal Ministries; Donor agencies (Bill and Melinda Gates; World Bank, AfDB)	Smallholder Farmers,	Northwest and Northeast
WATER RESOURCES SUB-SECTOR										
Research on development of low-cost and energy efficient irrigation facilities	2	NCAM, Government, Academia, Private sector, Farmers, Extension agents, Development partners	Farmers, Off-takers,	All Agro-ecological zones in Nigeria	Federal Ministry of Water Resource, Nigerian Institute for Oceanography and Marine Research, Ministry of Marine and Blue Economy, Nigeria Hydrological Services Agency (NIHSA), Nigeria Integrated Water Resource Management Commission, River Basin Development Authorities	All famers (Crop famers, livestock farmers, aqua farmers)	All Regions	Federal University of Technology, Akure (Departments of Agricultural and Resource Economics; Agricultural Engineering); University of Calabar (Departments of Agricultural and Bio-Resources Engineering); Sokoto Energy Research Centre Extension Agents in State and Federal Ministries of Agriculture; River Basin Development Authority Non-governmental Agencies (Energy Solutions and Climate Consulting; Foundation for Environmental Right, Advocacy and Development) Donor agencies (Bill and Melinda Gates; World Bank, AfDB)	Smallholder Farmers	National
Research on localized Weather Information for Smallholder Farmers to Adapt		NiMet, NAERLS, Farmers, NARSDA, other relevant MDAs, Media,	Farmers, investors, financial institute,	All Agro-ecological zones in Nigeria	NIMET and Training Institutions	All famers (Crop famers, livestock farmers, aqua farmers)	All Regions	Federal University of Technology, Akure (Departments of Meteorology and Climate Science; West African Science Service Centre for Climate Change And Adapted Land Use	Smallholder Farmers	National

								[WASCAL] Nigerian Meteorological Agencies (NiMET) Non-governmental Agencies (Foundation for Environmental Right, Advocacy and Development) Donor agencies (Bill and Melinda Gates; World Bank, AfDB)		
Research on livestock and aquaculture (Vaccine, Chemotherapy and Zoonosis) in reducing emissions		NARIs (NVRI, NIOMR, NIFFR, NITPR), NCDC, Academia, Development partners, Relevant professional bodies, Private sector	Farmers, Government, Private sector.	All Agro-ecological zones in Nigeria	National Institution for fresh water, fisheries and research, NAPRI, Nigerian Institutes for Trypanosomiasis Research, NVRI, All Animal and Poultry private sectors/company, international livestock research institutes, FMAFS, All State Ministries of Agriculture, ADPs,	livestock and aqua farmers, processors and all value chain actors		Federal University of Technology, Akure (Animal Production & Health Services; Department of Fisheries and Aquaculture); West African Science Service Centre for Climate Change And Adapted Land Use [WASCAL] Nigerian Meteorological Agencies (NiMET) Non-governmental Agencies (Foundation for Environmental Right, Advocacy and Development) Donor agencies (Bill and Melinda Gates; World Bank, AfDB)	Smallholder Farmers, Pastoralists, Agro-allied industries	National
Farmers-Herders Conflict on Farmer Productivity		Government, Farmers, Private sector, Affected Communities	Farmers, Affected Communities, Government	All Agro-ecological zones in Nigeria	Federal ministry of Livestock, Religion and Traditional Leaders, LGA Chairmen, MIYETTI, Famers Associations	Crop Famers, Herders, community leaders	All Regions	West African Science Service Centre for Climate Change And Adapted Land Use [WASCAL] Nigerian Meteorological Agencies (NiMET) Non-governmental Agencies (Foundation for Environmental Right, Advocacy and Development) Donor agencies (Bill and Melinda Gates; World Bank, AfDB)	Smallholder Farmers, Pastoralists, Agro-allied industries	National
							All Regions			