

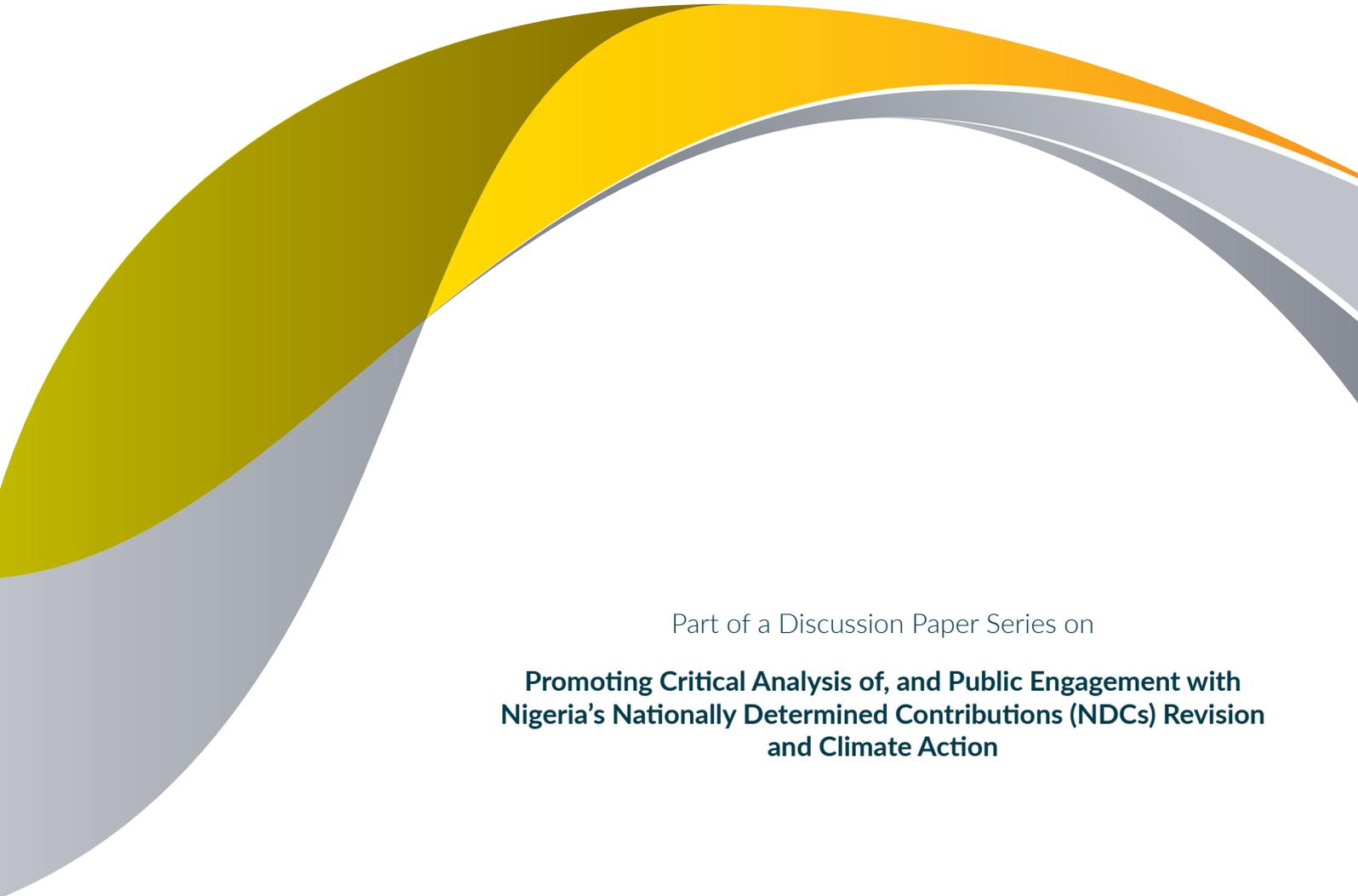


CENTRE FOR CLIMATE
CHANGE & DEVELOPMENT

OPTIONS FOR PROMOTING CLIMATE-SMART AGRICULTURE IN THE NEW NDC IN NIGERIA

By

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Part of a Discussion Paper Series on

**Promoting Critical Analysis of, and Public Engagement with
Nigeria's Nationally Determined Contributions (NDCs) Revision
and Climate Action**

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Promoting Critical Analysis of, and Public Engagement with Nigeria's NDC Revision and Climate Action Project

'Promoting Critical Analysis of, and Public Engagement with Nigeria's NDC Revision and Climate Action' is a project implemented by the Climate Change and Development Centre, Alex Ekwueme Federal University, Ndufu-Alike Ikwo, in partnership with the World Resources Institute, with funding from the IKEA Foundation. The project is geared towards providing independent critical analysis and input into the revision process of Nigeria's Nationally Determined Contribution (NDC) which was due for submission in November 2020. The project is also intended to increase public awareness of, and stakeholders' engagement in, the revision of the NDC and its subsequent implementation. In addition, the project is expected to increase public awareness of climate change in Nigeria more broadly. The project aims to help widen the horizon of discourse and is designed to strongly compliment the government-led NDC revision process with the support of the NDC Partnership through the Climate Action Enhancement Package (CAEP), injecting academic analysis and more public debate into the process.

Disclaimer

This report was written by independent experts who have not been nominated by their governments. Any views expressed in the paper do not necessarily reflect the views of CCCD-AEFUNAI or WRI.

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1.0 Introduction

Nigeria submitted its Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change (UNFCCC) at the Conference of Parties (COP) 21 in Paris in December 2015. Subsequently, Nigeria ratified the Paris Agreement in March 2017, and the INDC was converted to a Nationally Determined Contribution (NDC). The NDC's primary development priorities are to ensure economic and social development for Nigeria. Its authors worked based on a 5% annual economic growth projection up to 2030, with associated improvements in the standard of living and in access to electricity. The NDC describes Nigeria's plans for tackling greenhouse gas (GHG) emissions and adapting to climate change. In the NDC, Nigeria committed to reducing GHG emissions by 20% below business-as-usual (BAU) GHG emissions by 2030 (based on a 2010 baseline scenario) or 45% below BAU GHG emissions in 2030, conditional on international support.

Signatories to the Paris Agreement are currently enhancing their Nationally Determined Contributions (NDCs) with progressive ambitions. To deliver the overall targets

described above, Nigeria's NDC anticipated that the agriculture, forestry and other land-use sectors would contribute to an annual reduction of GHG emissions of 74 million tonnes (or 15%) below business-as-usual by 2030, through the implementation of climate-smart agriculture, reforestation, and elimination of charcoal use. The purpose of this paper is to provide suggestions about how agriculture should be treated in the revised NDC. The strategy followed here is to revisit what was done in the current NDC and review the extent to which the NDC's provisions in the agricultural sector were implemented.

This report covers the period from 2015, setting out how the old NDC treats the agricultural sector. More specifically, it describes the set targets, contexts, arguments, and the narratives of the old NDC. It goes on to narrate what has happened since 2015 to implement the targets set. It concludes by recommending ways in which the revised NDC can more ambitiously incorporate agriculture as a key target, and by noting the opportunities and challenges for implementing the recommendations.

2.0 Background

2.1 The agricultural sector

Nigeria's agriculture comprises crop production, livestock-rearing, forestry, and fishing (the sector is under the Intergovernmental Panel on Climate Change (IPCC)'s Agriculture, Forestry, and Other Land Use sector, or AFOLU). The country has an abundance of agricultural resources covering several agro-ecological zones (AEZ), with agricultural land spanning about 70.8 million hectares (ha), which represents approximately 77.7% of a total land area of 91 million ha (World Bank, 2020). Forests represent about 7.2% of the total land area. Much of the land is rich and favorable to a wide variety of crops and livestock. The country's extensive freshwater resources and vast coastline along the Gulf of Guinea offer great potential for fisheries and aquaculture (FMARD, 2014).

Although the Federal Government depends mainly on revenues from the crude oil sub-sector, the agriculture sector is vital to Nigeria's economy. It contributes about 26% of the country's GDP, and it is often reported that as much as 70% of the labor force may be involved with agricultural activities to varying extents (NBS, 2017). The agricultural sector is closely linked with various other sectors of the country's economy and is vital for the broad-based growth necessary for development (FMARD, 2014).

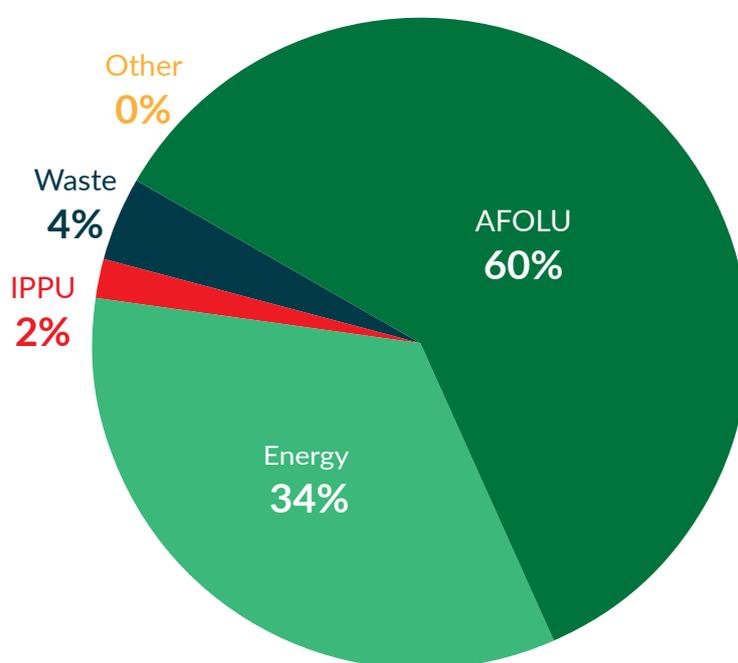
Nigeria's agricultural production is mainly carried out by rural smallholder farmers who operate farm sizes ranging from 0.75 to 2.5 ha (NAERLS & FMARD, 2020), mostly under rain-fed conditions (Onyeneke et al., 2020). The most important staple crops are maize, cassava, sorghum, yam, beans, rice, groundnut, and, to a lesser extent, millet, soybean, and cocoyam. The main cash crops are palm oil, cottonseed, cocoa, cashew, and sugarcane.

Although several larger farms exist, smallholder farmers account for roughly 95% of the country's total agricultural output, with average cereal crop yields varying from 0.67 to 2.05 tonnes per ha (NAERLS & FMARD, 2020). Numerous challenges are facing Nigeria's agricultural sector. The food security challenge in Nigeria is significant, not only because of the enormous pressure from a large population of about 200 million individuals which is projected to be above 400 million by 2050 (Olowe, 2020; World Bank, 2020), but also because the agriculture sector can be significantly impacted by climate change as a result of its high dependence on rain-fed conditions (Onyeneke et al., 2019, 2020). Depletion of water resources and unpredictable rainfall

patterns significantly impact production systems and places, leading to crop failures. Currently, Nigeria is a major food importer; it is one of the world's largest importers of rice and a significant net importer of wheat, dairy products, and horticultural crops.

Conversely, the AFOLU sector is the highest contributor to GHG emissions in Nigeria. The country's Third National Communication (FMEnv, 2020) estimated that the sector's 366,733.9GgCO₂-eq emissions in 2016 accounted for 60.1% of total net emissions among the IPCC's five priority sectors—Energy, AFOLU, Industrial Processes and Product Use (IPPU), Waste and Other Sectors (**Figure 1**).

Figure 1: Share of GHG emissions by IPCC sector in Nigeria Source: Nigeria's Third National Communication (FMEnv, 2020).



Agricultural GHG emission trends are also critical drivers of the business-as-usual (BAU) scenario in Nigeria's NDC. The data presented in the Third National Communication (FMEnv., 2020) showed that total net agricultural emissions increased from 289,476 Gg CO₂-eq in 2000 to 366,734 Gg CO₂-eq in 2016, an increase of 26.7%. The rapid growth in agricultural GHG emissions is mainly driven by emissions from land (forest land remaining forest land) and livestock (FMEnv, 2020). The primary emitter in the AFOLU sector is the Land category (forest land remaining forest land), which accounted for about 84% of gross emissions. Other AFOLU emission categories are aggregated sources, non-CO₂ pollution on soil (8.1%) and livestock (7.9%). When we look at AFOLU aggregated gas emissions, we can see that emissions grew between 2000 and 2016 for the

three (3) gasses covered by Nigeria's NDC; carbon dioxide CO₂ (21.8%), methane CH₄ (47.2%), and nitrous oxide N₂O (54.5%). In 2016, CO₂ was the largest contributor to emissions in the AFOLU sector, with 311,609Gg (or 84%), followed by CH₄ with 34,439Gg (or 9.3%) and CO₂-eq with 24,974 Gg (or 6.7%) (FMEnv, 2020).

Despite the challenges facing the agriculture sector, there are also economic development opportunities arising from its potential to be highly productive. There are areas where land and water resources are currently underutilized. Production can be expanded in an environmentally sustainable manner with a climate-smart approach, reducing GHG emissions by comparison to traditional agriculture.

3.0 Treatment of the agricultural sector under the current NDC

This section describes how the agricultural sector is treated in the current NDC. The current NDC identified agriculture as a critical sector for action in both mitigation and adaptation and outlined the potential co-benefits between these two areas. Climate change adaptation is about changes in processes, practices, and structures to moderate possible damage and maximise possible benefit from climate change. Climate change mitigation consists of actions to limit GHG emissions and promote activities that reduce GHG concentration in the atmosphere.

3.1 Adaptation

Under the UN climate change regime, the adaptation cycle involves responding to climate change by: assessing impacts, vulnerability, and risk; planning and implementing adaptation; making contingency arrangements for when impacts occur; addressing losses; and monitoring and evaluating adaptation. Nigeria's NDC identified key climatic changes, including temperature rise, extreme temperatures, precipitation changes, and sea-level rise. These changes trigger a number of climate impacts, including flooding, drought, saltwater intrusion, erosion, and landslides. The NDC also described how climate change impacts affect vulnerable areas in agriculture and other aspects of food security and livelihoods. Vulnerability in the sector is heightened by: dependence on rain-fed agricultural systems; vulnerable ecosystems; population location; and economic factors such as poverty. Under a BAU scenario, agricultural productivity could decline between 10 to 25% by 2080. In some parts of the north, the decline in yield in rain-fed agriculture could be as high as 50%. This, in turn, would impact GDP, reducing it by as much as 4.5% by 2050 (FMEnv., 2015). The current NDC identified climate-smart agriculture (CSA) as the primary strategy to ensure adaptation to climate change in the sector. CSA seeks to address the combined challenges of food security and climate change. It aims to sustainably increase agricultural productivity and support increases in farm incomes, enhancing food security and development. It also looks to adapt and build resilience to climate change into agricultural and food security systems, thereby reducing GHG emissions from crops, livestock, and fisheries (FMEnv, 2015).

The current NDC considered the National Adaptation Strategy and Plan of Action for Climate Change Nigeria (NASPA-CCN) (BNRCC, 2011) and the National Agricultural Resilience Framework (NARF) (FMARD, 2014) as the primary documents on which to base adaptation activities in the country. The NASPA-CCN describes Nigeria's adaptation priorities, bringing together existing initiatives and priorities for future action; strategies, policies,

programs, and measures specific to the agricultural sector were identified. The NARF sets policy options for the agricultural sector. **Table A1** in the Appendix lists the adaptation and mitigation activities identified in both the NASPA-CCN and the NARF.

3.2 Mitigation

GHG emissions are projected to grow 114% by 2030 to around 900 million tonnes – approximately 3.4 tonnes per capita. This scenario assumes an economic growth at 5%, with population growing at about 2.5% per year, access to electricity for all Nigerians (on-grid or off-grid), and industry tripling in size (Nigeria NDC, 2016). The GHG emissions covered include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The primary strategies identified for climate change mitigation in the agricultural sector in the current NDC include climate-smart agriculture, reforestation, and the elimination of charcoal in cooking and heating. These mitigation strategies were considered quantifiable and cost-effective. The current NDC also notes that these mitigation actions implement or enforce existing policies or strategies, and that additional legislation and regulatory changes will be required.

The CSA activities identified in the agricultural sector potentially offer multiple benefits. CSA practices can increase farmers' agricultural yields, for example. However, the benefits of improved practices go beyond improved yields. The current NDC identified adaptation actions that simultaneously provide mitigation benefits and synergies. For example, agroforestry (the practice of growing trees with crops and animals on the same land) offers carbon-fixing while also providing mulch material. The current NDC estimates that agroforestry may lead to reductions in total (lifetime) emissions in the range of 158 million tonnes to 712 million tonnes. As noted earlier, the current NDC committed to reducing GHG emissions in the agricultural sector by 74 million tonnes (or 15%) below BAU GHG emissions by 2030.

4.0 What are the NDC implementation mechanisms specific to the agricultural sector since the submission of the NDC?

4.1 The development of an NDC agricultural sectoral action plan, including assessments of the sector's governance environment and its policies

There were no clear guidelines on NDC implementation when Nigeria's INDC was submitted. However, in 2017, the country finalized its sectoral action plans for the IPCC's priority sectors, including the agricultural sector. For the agricultural sector, NDC implementation activities are

classified into five components: governance; mitigation; adaptation; Measurement, Reporting, and Verification (MRV); and finance. The NDC's agricultural sectoral plan is summarized in **Table 1** below:

Table 1: Agricultural sectoral action plan and link to the current NDC

Component	Content	Description	Link with sectoral NDC targets
Policy (Plans) Framework	<ul style="list-style-type: none"> Agriculture Promotion Policy (APP), 2016 	<ul style="list-style-type: none"> The APP aims to increase economic value-added by double growth (thereby contributing to food security) from between 3%-6% in the 2011-2015 period, to 6%-12% by 2020 The APP also emphasizes the importance of CSA in achieving sectoral objectives 	Neutral
	<ul style="list-style-type: none"> Nigerian Agricultural Resilience Framework (NARF), 2014 	<ul style="list-style-type: none"> The NARF articulates policy options, opportunities and interventions The NARF also emphasizes the principles of adaptive management and participatory engagement as central tenets of the implementation strategy 	Consistent
	<ul style="list-style-type: none"> National Adaptation and Strategic Plan of Action against Climate Change in Nigeria (NASPA-CCN), 2011 	<ul style="list-style-type: none"> The NASPA-CCN sets out actions to increase the sector's resilience and proposes savannah ecosystems at the frontline of climate hazards 	Consistent

Component	Content	Description	Link with sectoral NDC targets
Mitigation	<ul style="list-style-type: none"> BAU emissions projections 	<p>Absolute reductions in GHG emissions from agriculture are difficult to achieve and can adversely impact production if the implications of mitigation activity are not carefully considered</p> <ul style="list-style-type: none"> Emissions from agriculture could increase by a further 40% by 2030 under a BAU scenario Agricultural productivity could decline by between 10%-25% by 2080; decline in yield could be as much as 50% in some of the northern parts of the country where agriculture depends on rain-fed conditions 	Consistent
	<ul style="list-style-type: none"> Vision and targets 	<ul style="list-style-type: none"> To achieve productivity growth through a climate-smart approach, in order to ensure GHG efficiency and minimize GHG emissions To reduce emissions by 74 million tonnes below BAU by 2030 	Consistent
	<ul style="list-style-type: none"> Mitigation measures 	<ul style="list-style-type: none"> CSA: improved soils and nutrient management; agroforestry; improved management of burning of savannah and crop residue; use of alternative domestic fuel in rural areas; measures to reduce post-harvest losses in key crops; creation of fixed grazing systems or dedicated pastures; improved genetics in the dairy herd Stop using charcoal 	Consistent
Adaptation	<ul style="list-style-type: none"> Adaptation measures 	<ul style="list-style-type: none"> Adopt improved agricultural systems for both crops and livestock Implement strategies for improved resource management (e.g. water-efficient irrigation) Focus on agricultural impacts in the savannah zones, especially in the Sahel 	Consistent
Synergy	<ul style="list-style-type: none"> Mitigation and adaptation synergies and co-benefits of proposed measures 	<ul style="list-style-type: none"> Improved management of burning of savannah and crop residue, combined with both the use of alternative domestic fuel in rural areas, and the incorporation of trees into agricultural systems through agroforestry, can achieve multiple mitigation and adaptation benefits 	Consistent
MRV	<ul style="list-style-type: none"> Sectoral indicators for tracking progress 	<ul style="list-style-type: none"> There are currently limited data available on GHG emissions from the agriculture sector in Nigeria. Tier 1 and 2 indicators are presented, in addition to indicative Tier 3 indicators 	Neutral

Component	Content	Description	Link with sectoral NDC targets
Finance	<ul style="list-style-type: none"> Finance needs and sources 	<ul style="list-style-type: none"> Smallholder farmers (with high land fragmentation and mainly subsistence production) are hampered by limited access to the finance/capital necessary to implement CSA activities and boost productivity Finance is necessary to boost adoption of CSA technology adoption and meet infrastructure requirements (including storage facilities and transportation) There is currently no concise report on climate finance for the sector 	Consistent
Governance and institutions	<ul style="list-style-type: none"> Stakeholder mapping and institutional responsibilities 	<ul style="list-style-type: none"> The key players in implementing climate change response activities are the Federal Ministry of Agriculture and Rural Development (FMARD), the Federal Ministry of Water Resources, and the Federal Ministry of Environment (FME). The private sector and NGOs are also recognized as having roles in the food supply chain and can bring much-needed finance 	Consistent
		<ul style="list-style-type: none"> The Federal and State Legislatures also play an essential role in the development of agriculture through their budgetary appropriation and their responsibility for oversight of agriculture policy at both Federal and State levels 	Consistent
		<ul style="list-style-type: none"> Extension and advisory services are essential to the development of CSA 	Neutral

4.2 The progress of implementation

Existing implementation projects

Here, we present a selection of existing implementation projects that have recently begun or are scheduled to begin soon. We also assess their contribution to the pillars of CSA. Information about these projects was obtained from the Department of Climate Change's Climate Change Registry and Nigeria's NDC Sectoral Plan of Action. The projects analysed here embody both mitigation objectives through reduction of emissions and adaptation objectives through the provision of economic and social benefits in the agricultural sector. The agricultural sector's CSA

activities have been embedded into diverse multi-level agriculture-related programs implemented by the Federal Ministry of Agriculture and Rural Development (FMARD) and by other non-governmental stakeholders such as Best Green Concept. The specific CSA projects are presented in **Table 2** and include: proper management of farm run-off water and the setting up of water harvesting structures; sustainable aquaculture; the development of jatropha plantations; conservation agriculture; agroforestry; and improved soil and nutrient management.

Table 2: Lighthouse projects in the agricultural sector in line with NDC implementation

Component	Content	Description	Link with sectoral NDC targets	Status	Abatement
Construction of on-farm run-off water harvesting structures for 6,000 farmers	To construct and rehabilitate water harvest structures/ earth dams essential for ensuring adequate water availability and water resource management for farmers	FMARD	Productivity: The project led to improved farm productivity and economic performance Adaptation: The water harvesting and retention project fostered greater resilience to drought	Completed (June 2017- June 2018)	Unspecified
Establishment of widespread use of bio-fuel renewable energy and development of economic tree plantation	To provide cheap and renewable fuel to 30,000 rural households. To train 5,000 smallholder farmers on Train-the-Trainer bases To establish 5,000 ha of modern jatropha plantation with high-yielding seeds.	FMARD and FMEV	Productivity: 5,000 ha of modern jatropha plantation with high yielding seeds Adaptation: 0,000 households to benefit directly through undergoing job training Mitigation: The project will supply rural households with affordable clean energy	Completed (January 2017 – June 2018)	Unspecified
Rainwater Harvester for Adamawa community (Adamawa State)	To construct a 30,000-liter rainwater harvesting tank and treat and store the water therein	Best Green Concept	Productivity: Availability of water for crop and livestock production to improve yield Adaptation: Prevention of damage to agricultural land (including crops and livestock) resulting from annual flooding caused by high-intensity rainfall	Ongoing	10,000
Osara Dam project (Kogi State)	To construct a dam to facilitate climate change adaptation by providing drinking water and irrigation water for rural household	Best Green Concept	Productivity: Availability of water for crop and livestock production can improve yield Adaptation: Prevention of agricultural land damage (including crops and livestock) resulting from annual flooding caused by high-intensity rainfall. Availability of water for human consumption to improve human welfare	Planned	90,000

Component	Content	Description	Link with sectoral NDC targets	Status	Abatement
Kebbi Economical Tree Nursery (Kebbi State)	To establish a nursery for economic trees to prevent desertification in Northern Nigeria	Best Green Concept	Productivity: Increases production of economic trees Adaptation: Provides resilience to desert encroachment along with food and economic value for rural communities. Also expected to increase the role of women in adaptation	Planned	70,000
Kanko Rice Production Project (Niger State)	To promote sustainable rice production using machines, fertilizers, pesticides, conservation tillage, water-saving irrigation techniques, and soil amendments with biochar	Best Green Concept	Productivity: Enhances production per unit area Adaptation: Improves and conserves soil fertility and improves yield; minimizes soil erosion Mitigation: Will help to help reduce methane emission from rice paddies	Planned	9,000
Benue Cropland Management (Benue State)	To reduce emissions through minimal soil disturbance (minimum and zero tillage), improved grazing management, and integrated nutrient management.	Benue State University	Adaptation: Promotes soil structure conservation; integrates on-farm crop residue management past management and crop management practices Mitigation: Allows long-term reduction in nitrogen-based fertilizers and related GHG emissions. Maintains or improves soil carbon stocks and organic matter content	Planned	980,000
Oranmiyan Manure Management Project (Osun State)	To produce organic manure from animal dung	Best Green Concept	Adaptation: Eliminates environmental degradation and health hazards resulting from the dumping of animal waste into the lagoon Mitigation: Contributes to GHG emissions reduction, predominantly emission of methane from animal waste	Completed	60,000

Note: FMARD (Federal Ministry for Agriculture and Rural Development); FMEnv (Federal Ministry of Environment)

Source: Nigeria NDC Registry (Department of Climate Change, 2021); Sectoral Action Plans for Nigeria's Nationally Determined Contribution (FMEnv, 2017).

Reforestation

Nigeria's forests have reportedly dwindled rapidly over past decades; current estimates put the deforestation rate at 3.7%, one of the world's highest. However, with awareness of this issue growing in Nigeria, and an ambitious nationwide reforestation program has been launched to restore forest cover and improve community livelihoods across the country. Nigeria's reforestation activities are chiefly based on the United Nations Program on Reducing Emissions from Deforestation and Forest Degradation

Plus (UN-REDD+ Program), which focuses on reducing emissions from deforestation and forest degradation and on the role of conservation, the sustainable management of forests, and the enhancement of forest carbon stocks in developing countries. The program adopts a two-pronged approach – national and sub-national – and has been structured with four outcomes, two at the Federal (national) level and two focusing on Cross River State (sub-national), aligned to the four Warsaw Framework elements. **Table 3** provides details of the REDD+ program outcomes under the Warsaw Framework.

Table 3: Nigeria REDD+ program outcomes since the current NDC's submission

Warsaw Framework Element	Nigeria REDD+ program outcomes
National REDD+ Strategy or Action Plans	Nigeria developed a REDD+ National Structure Strategy and Cross River State REDD+ Strategy. The national framework strategy for REDD+ gives direction to states wishing to participate in REDD+ development by detailing the measures and considerations to be taken. As a pilot, the Cross River State REDD+ approach is intended to inform the national strategy and act as a blueprint for other states wishing to adopt REDD+.
Forest Reference Emission Levels/ Forest Reference Level (FREL/FRL)	Development of FREL/FRL began in 2016. FREL is an interim measure in Cross River State. It focuses on included activities, pools, and gases. In terms of activities, the new FREL/FRL contains only deforestation. The above-ground biomass, which forms the critical component/largest pool, is included in the FREL/FRL because of its magnitude and cost-effectiveness. Finally, for gasses, the current FREL/FRL includes only CO ₂ emissions.
National Forest Monitoring Systems (NFMS)	Nigeria's NFMS Action Plan has national and state-level administrative structures and was explicitly designed and developed with a strategy which would facilitate policies and laws for implementing NFMS in order to ensure continuity and transparency. Cross River State established a robust forest monitoring scheme with a Geographic Information System (GIS) laboratory and laboratories. These facilities have contributed to capacity-building by using remote sensing and GIS capability to monitor forest changes, to generate and evaluate activity data, and to perform multiple benefit mapping. In addition, the Forest Carbon Inventory (FCI) Standard Operating Manual was developed.
Safeguards Information System (SIS)	Nigeria adopted a national approach to REDD+ safeguards. From 2015 to 2016, the National Safeguards Working Group (NSWG) led consultations and technical work to prepare the critical components of Nigeria's national approach. The group has completed a final draft design framework and roadmap for developing Nigeria's REDD+ Safeguard Information System, based on Cross River State's work data.

Source: Nigerian UN-REDD Programme Final Report (UNDP, 2018).

Stop the use of charcoal

The NDC mitigation target to eliminate charcoal used for cooking and heating cuts across the energy and agricultural sectors. It is primarily supported by Nigerian stakeholders and other partners, by regional efforts, and by the Clean Development Mechanism (CDM). Projects under this

umbrella essentially involve deploying efficient fuel wood stoves across Nigeria as alternatives for charcoal use.

Table 4 presents a list of projects during the study period focused on providing efficient cooking/heating stoves, together with their estimated annual GHG emissions reduction potential (FMEnv., 2018).

Table 4: Efficient cooking technology projects and their GHG reduction potential in Nigeria

Objective	Status	Implementing entity(ies)	Annual GHG reduction gigagrams (Gg = 1,000 Mg)
<ul style="list-style-type: none"> To disseminate up to 12,500 efficient fuel wood stoves (SAVE80) and heat-retaining polypropylene boxes in the Guinea Savannah Zone of Nigeria 	<ul style="list-style-type: none"> Ongoing (October 2009 to 2019) 	<ul style="list-style-type: none"> Nigeria Developmental Association for Renewable Energies (DARE) German NGO – Lernen-HelfenLeben e.V German carbon offset organization Atmosfair gGmbH 	31
<ul style="list-style-type: none"> To promote, distribute and install fuel-efficient cook stoves in different countries in Africa 	<ul style="list-style-type: none"> Ongoing (April 2013 to 2040) 	<ul style="list-style-type: none"> C - Quest Capital Malaysia Global Stoves Limited 	39
<ul style="list-style-type: none"> To disseminate improved cooking stoves in the Federal Republic of Nigeria 	<ul style="list-style-type: none"> Ongoing (December 2012 to 2039) 	<ul style="list-style-type: none"> NM 	15
<ul style="list-style-type: none"> To promote, distribute and sell fuel-efficient improved cooking stoves in Nigeria 	<ul style="list-style-type: none"> Ongoing (November 2012 to 2040) 	<ul style="list-style-type: none"> C - Quest Capital LLC 	47
<ul style="list-style-type: none"> To enhance the dissemination of efficient cooking stoves by offering cost-effective, efficient stoves 	<ul style="list-style-type: none"> Ongoing (November 2011 to 2039) 	<ul style="list-style-type: none"> Atmosfair GmbH 	9

Note: NM denotes Name Missing

Source: Nigeria's First Biennial Update Report (FMEnv., 2018)

Institutionalization of data collection

Through the Department of Climate Change (DCC), the country has stepped up efforts toward developing Greenhouse Gas Inventory (GHGI) systems to track emissions across different sectors in Nigeria. The current NDC was prepared using data from several, often disparate, sources. These data were often siloed in different agencies and this presented challenges to the harmonization of data. In 2018 and 2020, Nigeria submitted both its First Biennial Update Report and its Third National Communication. The emissions data contained in the reports were obtained using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. This represented an improvement over the previous report cycles and a commitment to transparency in line with Nigeria's climate change obligations. Key stakeholders have also been identified and trained, with external support, to carry out GHG data inventory across sectors.

Promotion of public awareness and education material about climate-compatible and low emissions development in the agricultural sector

The Federal Ministry of Environment (FMEnv) organizes periodic regional sensitization workshops aimed at creating awareness about climate change at the sub-national level. It looks to build sub-national capacity for accessing climate funds along with ways to report climate change interventions, thereby enabling progress to be tracked while also creating avenues for continuous synergy with the states on the implementation of Nigeria's NDC. The DCC has also created a desk office in the various sectors, including agriculture, to help raise awareness, to educate stakeholders about low emissions development, and to obtain relevant data for climate change management across sectors.

Building institutional capacity

A range of capacities and skills will be needed to ensure effective governance and coordination of the agricultural sector's NDC implementation process. A good deal of capacity already exists in the DCC in the FMEnv, and they will play a key role in identifying capacity needs in the Federal Ministry of Agriculture and Rural Development (FMARD) and supporting it in building capacity. There may also be a need for specific capacity-building within the DCC, FMEnv, and FMARD to enable effective and efficient co-ordination in the implementation of the NDC. This could include expertise in bankable project development and management, especially for the Green Climate Fund (GCF), the Least Developed Countries Fund (LDCF), the Adaptation Fund, the Global Environment Facility (GEF), and other bilateral and multilateral agencies. Capacity building will also be valuable in the area of Monitoring, Reporting, and Verification (MRV). Capacity for GHG emissions assessment in different sectors will need to be developed, with particular attention paid to data generation system and management and to gender mainstreaming.

A review of the agricultural sector's current climate finance landscape, support needs, and international funding landscape

Nigeria issued its first Green Bond in the first half of 2017. In the AFOLU sector, the proceeds of the first Sovereign Green Bond were invested in the afforestation program that aimed to increase forest coverage through the plantation of seedlings to cover 131,000 hectares of land (Chapel Hill Denham, 2017). The sum of NGN600 million from Nigeria's second Green Bond was used to finance the climate-smart agriculture project.¹ The project's expected emissions reduction impact was 1,608tCO₂e (Moody's, 2019).

1. The financed project involves a pilot demonstration on Agroforestry Farmers' Managed Regeneration (FMNR) and Conservation Agriculture (CSA) practices for improved food security and livelihoods

5.0 What is missing in the current NDC?

This section briefly analyzes the gaps observed in the current NDC in the context of how ambitions in the revised NDC can best be scaled up.

Ambition gap

The AFOLU sector accounts for the largest share of GHG emissions. However, the sectoral GHG emissions reduction targets of 74 million tonnes below BAU by 2030 accounts for only 15% of the 476 million tonnes below BAU by 2030. This sectoral emission pales compared to the energy sector's 402 million tonnes below BAU by 2030. Furthermore, the current NDC did not specify targets for different agricultural sub-sectors, or set out the synergies and co-benefits of the measures within and across sub-sectors. The current NDC did not set reforestation ambitions for the country (i.e., specifying the area of deforested land or the intended area of land requiring reforestation activities by 2030). There is a need to specify a target area for reforestation activities and their potential emissions reduction. This will serve to scale up to a tangible mitigation agenda for the sector.

Furthermore, it is clear that climate change is a long-term phenomenon and requires long-term ambitions and mitigation visions. The current NDC, however, specifies a single target year – 2030, which is only a decade away. The current sectoral NDC did not specify long-term climate change mitigation visions and does not state whether it expects to attain climate neutrality, carbon neutrality, GHG neutrality, or net-zero emissions by 2050. Since climate change is a long-term phenomenon, the sectoral NDC target should reflect long-term ambitions and mitigation visions.

Conditionality

The old sectoral NDC is expected to contribute a 74 million tonnes per year reduction. Whether this 74 million tonnes will be conditional or unconditional reduction is not clearly stated in the current NDC. Furthermore, there is no indication of the share of conditional or unconditional commitments.

Scope of the GHG emissions and removals covered

The current NDC covered only three GHGs, namely carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The other GHGs and short-lived climate pollutants (SLCPs) were considered negligible. However, we note that the choice of gases covered in the current NDC emissions report was based on an outdated and potentially unreliable GHG inventory. Agricultural residue burning is a significant source of SLCPs such as black carbon, sulphur dioxide, particulates matter (PM_{2.5}), and non-methane volatile organic compounds, and this should be taken into account.

Accounting for different key stakeholders

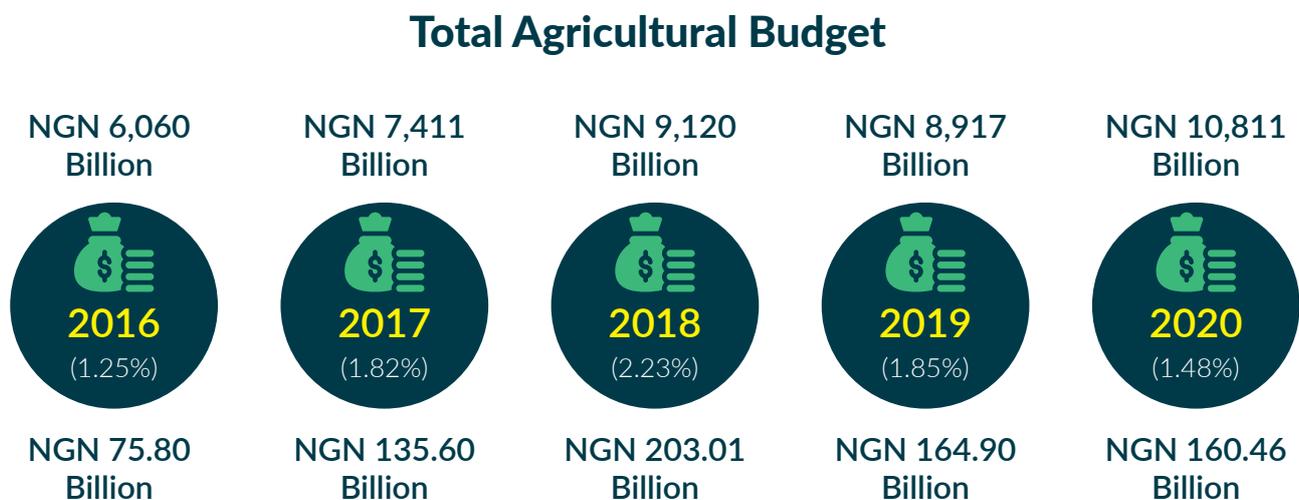
Stakeholder engagement is acknowledged as critical throughout the agricultural NDC implementation process. It is necessary to get broad buy-in for NDC implementation and the actions that it will entail and to help shape the process by taking advantage of the creativity and technical expertise on offer from a range of stakeholders. The current NDC was drafted without sufficient stakeholder engagement. Stakeholder engagement in agricultural sector NDC implementation will be coordinated by the Federal Ministry of Agriculture and Rural Development (FMARD), with State and Local Governments coordinating specific sector-specific stakeholder engagements at the state and local levels respectively. However, critical stakeholders like indigenous peoples and local communities were largely ignored. Indigenous peoples, for example, face specific climate-change vulnerabilities because of their intrinsic relationship to forests and ecosystems and their poverty situations. Top-down climate change actions that ignore the particular circumstances of such peoples are therefore more likely to fail and hinder the chance of achieving the CSA objectives of the NDC.

Climate financing

Neither the current NDC nor agriculture-based policies provide the detailed financial resources necessary to implement the agricultural sector's CSA activities (and those of its sub-sectors). No total implementation cost is given for unconditional or conditional actions. Finance is critical for implementing the mitigation and adaptation actions set out in the agricultural sector's NDC. Given the dearth of detailed financial data for financing CSA, we refer here to annual budgetary allocations for the agricultural sector in order to provide some insight into the potential funding provision for CSA activities. **Figure 2** presents Nigeria's total yearly budget and the agricultural sector's budgetary allocation from 2019 to 2020. We assume that increasing budgetary allocations imply higher potential funding for CSA activities.

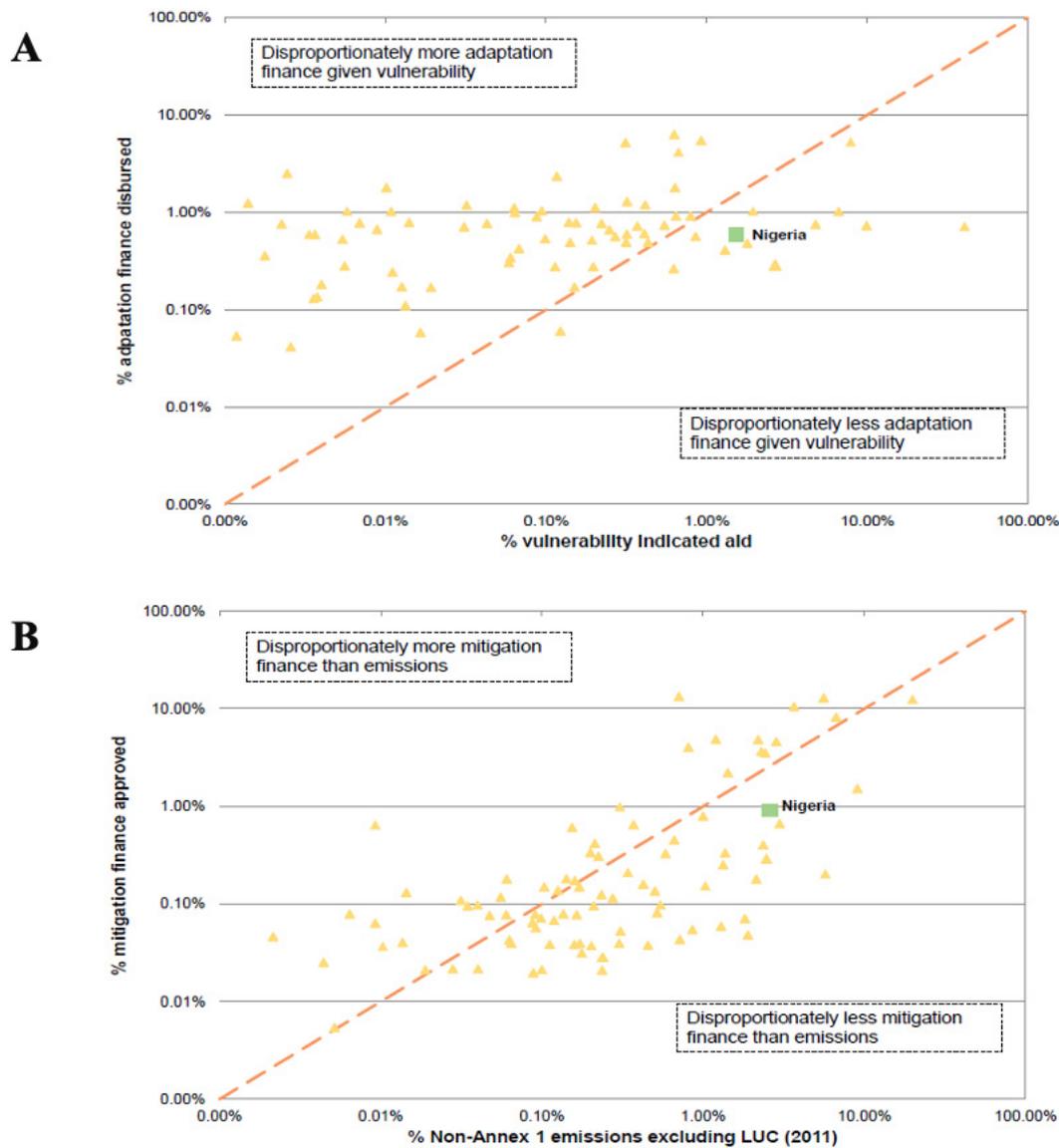
From **Figure 2**, we observe that the ratio of Nigeria's budget for agriculture to its annual total budget falls short of the prescribed standard set by the Maputo Declaration on Agriculture and Food Security. As part of the declaration, the African Union (AU) agreed to allocate at least 10% of its member countries' annual national budget to agriculture. Nigeria's budgetary allocation for agriculture of NGN160.46 billion accounts for only 1.48% of the proposed 2020 total budget of N10.81 trillion. In 2018, the agriculture budget of NGN203.01 billion represented 2.2% of the total budget of N9.12 trillion (Budget Office of the Federation, 2020). When we look at foreign climate finance, we see that Nigeria's access to climate finance has been low relative to its vulnerability and emissions profile. Consequently, it has received a disproportionately lower amount of adaptation finance relative to its vulnerability (see **Figure 3**, Panel A). It has also acquired disproportionately fewer mitigation funds compared to its emissions profile (see **Figure 3**, Panel B). In the agricultural sector (and overall), this low level of access to finance can be attributed to a dearth of NDC financing strategy.

Figure 2: Nigeria's total annual budget and budget allocation to the agricultural sector



Source: Budget Office of the Federation (2020)

Figure 3: Panel A: adaptation finance vs. vulnerability; Panel B: mitigation finance vs. emissions. Source: Nigeria NDC Sectoral Plan (FMEnv, 2017).



Measure of progress and GHG inventory across major agricultural sub-sectors

The current NDC did not offer a specific measure of progress for its agricultural sector target. Without a particular measure of progress, it is challenging to track alignment between the overall NDC target and sectoral targets. The current NDC also left emissions from livestock and major categories under land use (i.e., cropland, grassland, wetlands, and settlements)² largely unaccounted for, due to data constraints; both these factors are parameters in GHG inventory using the IPCC methodology

and form part of the agricultural sector’s activity data. Generally, little has been captured in the AFOLU sector except in the area of smart agriculture, and even here, MRV data about emissions reductions is not captured. These sub-sectors hold a significant carbon sink and produce large emissions because of their activities’ anthropogenic nature. Records for the number of livestock in the country exist; however, there is no emissions estimate for livestock. There is a need to account for emissions from all agricultural sub-sectors in the revised NDC for the agricultural sector.

2. Under land use, the current sectoral NDC considered only forest land and ignored crop land, grassland, wetlands, and settlements due to data constraints.

Extension and training

The current NDC does not address the role of extension in promoting climate-smart agriculture uptake in the country. The ratio of extension agents to farmers is an essential metric for measuring farmers' effective reach and training. The higher the number of farmers or farm households served by one extension agent, the lower the expected effectiveness of extension service, ceteris paribus. Nigeria's extension agent-farmer ratio is relatively high. According

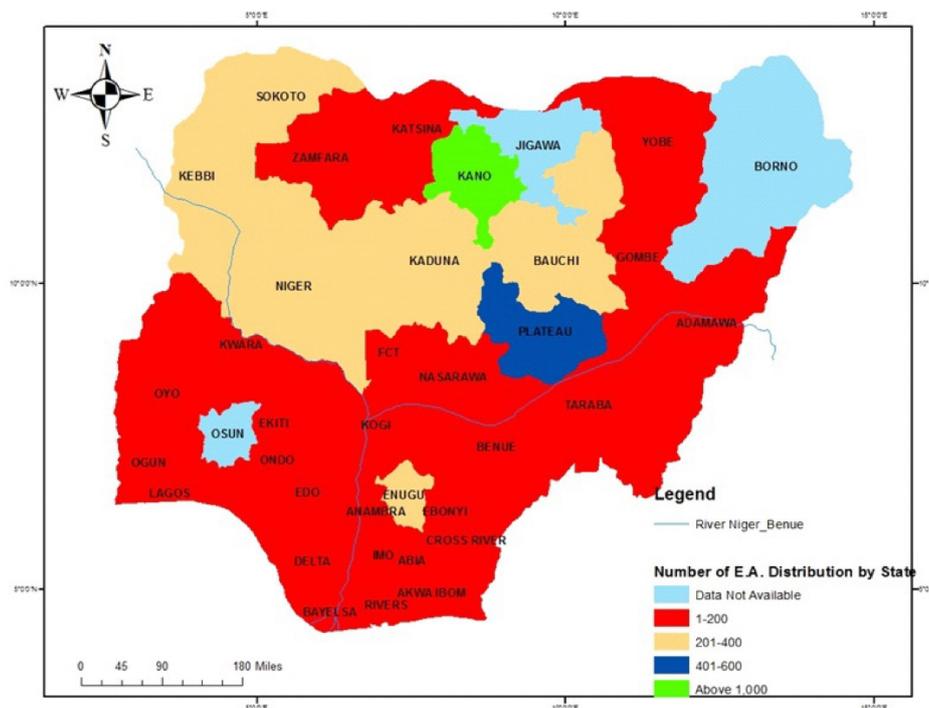
to the 2020 wet season agricultural performance survey in Nigeria, there has been a steady decline in village extension agents (VEAs). **Table 5** presents data on extension agent-farmer ratio across selected Nigeria states while also indicating their desirability status. **Figure 4** shows the number of extension agents employed/working in each state. With the high number of farm families in each state, the number of extension agents falls short of that needed to drive the adoption of agricultural innovations/ technologies.

Table 5: Extension agent-farmer ratio across selected states in Nigeria in 2019/2020

State	Extension-farmer ration	Status
Katsina	1:10,000	Undesirable
Edo	1:9,375	Undesirable
Ebonyi	1:8,723	Undesirable
Rivers	1:8,435	Undesirable
Kaduna	1:6500	Undesirable

Source: 2020 Wet Season Agricultural Performance in Nigeria (NAERLS & FMARD, 2020).

Figure 4: Distribution of extension agents across Nigeria



Source: 2018 Wet Season Agricultural Performance in Nigeria (NAERLS et al., 2018).

6.0 Recommendations

The NDC made vital pledges in the agricultural sector, which could increase resilience and limit GHG emissions. However, gaps exist in, current ambitions, climate financing, MRV, stakeholder engagement, institutional capacity building, and extension and training. It is, therefore, crucial

that the revised sectoral NDC reflects all the key options necessary to broadly integrate the agricultural sector within the country's new NDC. These key options are presented in **Table 6** below:

Table 6: Recommendation aimed at improving the new sectoral NDC

Theme	Recommendation
Ambition gap	<p>The AFOLU sector's GHG emissions reduction target in the year 2030 in the current NDC pales compared to that of the energy sector, despite the former constituting the largest share of GHG emissions in the country. Furthermore, ambition can be raised in the revised NDC by specifying sub-sectoral targets and potential accruable co-benefits. Setting reforestation targets for 2030 presents an opportunity to reduce sectoral GHG emissions and increase climate ambitions. Since climate change is a long-term phenomenon, the sectoral NDC target should reflect long-term ambitions and mitigation visions.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • Current sectoral GHG targets in the NDC are verified and, if necessary, strengthened to make them more ambitious, based on robust and accurate data; • The revised sectoral NDC should explicitly state emissions reduction targets and activities it recognizes as CSA for each agricultural sub-sector; • Potential mitigation co-benefits and synergies of adaptation actions should be set out in detail; • The enhanced sectoral NDC should specify the expected land area to be reforested by 2030 and also state the expected emission reduction potential of the reforestation activities; • The sectoral NDC target date should be extended to reflect long-term ambitions, for example, to 2050; and • The enhanced sectoral NDC should specify the long-term climate change mitigation visions (i.e., to attain climate neutrality, carbon neutrality, GHG neutrality, or net-zero emissions by 2050).
Conditionality	<p>A precise specification of which mitigation measures fall under unconditional contributions or conditional contributions presents an opportunity to track progress or deviations. It also offers an opportunity to attract external support to scale up emissions reduction.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • The enhanced sectoral NDC should indicate what share of GHG emission reduction is based on unconditionality and conditionality (external support).
Scope of the GHG emissions and removals covered	<p>The three GHGs covered in the current NDC are very important in the climate change debate. However, the emissions inventory used to develop the current NDC was inadequate, and as a result of this, many influential SLCP and GHGs were mistakenly considered negligible.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • The emissions covered in the enhanced sectoral NDC should be extended to cover SLCPs such as black carbon, sulphur dioxide, particulate matter (PM_{2.5}), and non-methane volatile organic compounds.

Theme	Recommendation
Governance and stakeholder engagement	<p>There is a need to specify who has responsibility or ownership of climate-change response in the sector in order to avoid duplication of duties and foster better coordination among key stakeholders. Also, more stakeholder engagement is required during drafting of the revised NDC to ensure buy-in and sustainability of planned activities in the sector.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • The revised sectoral NDC should specify which party is responsible for managing NDC activities (for example, by defining the roles of the DCC and FMARD); • The government should adopt a more robust decentralized approach in implementing the NDC as it relates to CSA; • Responsibilities should be spelled out and shared among the various agriculture sector stakeholders (federal, state, and local government; civil society groups; academia; communities; households; the private sector; and indigenous peoples); • Stakeholder engagement should be scaled up, especially for indigenous peoples and local communities, in order to determine which CSA practices work best for these groups.
Measure of progress; GHG inventory across major agricultural sub-sectors; and building institutional capacity	<p>Without quantitative or qualitative measures of progress, it is challenging to track alignment between overall NDC and sectoral targets. Furthermore, progress cannot be sufficiently tracked or measured when emissions from specific sub-sectors of AFOLU are largely unaccounted for. The current NDC considered CSA but left the emissions from livestock and from major categories under land use (e.g., cropland, grassland, wetlands, and settlements) largely unaccounted for, even though the latter sub-sectors hold significant carbon sink and produce large emissions.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • A measure is developed to track NDC target progress for the agricultural sector. For example, one measure of progress might be deviation from a level in the target year; • A detailed review of existing data is carried out in order to support agricultural sector MRV; • A stock-taking of current monitoring and reporting processes is undertaken to consider what can be used for MRV of NDC implementation; • Livestock emissions are accounted for; • Emissions reduction in cropland, grassland, wetlands, and settlements are accounted for; • Measures are established to ensure adequate stakeholder expertise in developing and managing bankable projects; • MRV capacity development is improved, including GHG emissions assessment in different sectors (especially including data generation systems and management); and • Capacity is built for gender mainstreaming.

Theme	Recommendation
Climate financing	<p>Having access to adequate financing is a necessary condition to implement the sectoral NDC. Although there is no robust MRV system on climate finance in Nigeria, the available information indicates low domestic and international climate finance flows to the agricultural sector. Reasons for this range from an absence of sectoral financing strategy, through a lack of bankable projects, to inadequate technical capacity among stakeholders.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • A sectoral NDC financing strategy is developed to estimate needs and possible sources, and to assess the requirements to close current gaps; • The mitigation and costs evidence base be comprehensively reviewed and updated; • Institutional arrangements for climate finance are put in place; • Domestic budgetary allocations to the agricultural sectors are increased, thereby potentially benefitting CSA activities; • A detailed review of funding options in the agricultural sector is carried out; and • The technical capacity of key stakeholders is improved in order to help develop bankable projects in the sector.
Extension and training	<p>Extension services are essential in driving agricultural policies in Nigeria. They are also expected to play a significant role in driving CSA policy programs. However, the current NDC does not address the role of extension in promoting CSA uptake in the country. The extension agent-farmer ratio is relatively low in the country and may hamper agents' effectiveness in driving CSA uptake among farmers.</p> <p>Thus, we recommend that:</p> <ul style="list-style-type: none"> • Efforts to mobilize and train more extension agents are scaled up to ensure onward training of farmers and dissemination of climate change adaptation and mitigation information; • Extension agents should serve between 800 and 1000 farmers each; and • Public extension should be complemented with private extension and digital extension should also be emphasized.

7.0 Conclusion

The Nigerian Government is preparing to submit its revised NDC document to the UNFCCC. The new NDC must be ambitious and comprehensive and contribute to the global goal of limiting temperature rise to below 2 Degrees Celsius (20C). Nigeria's agriculture, forestry, and other land-use sector plays a prominent role in its economic development and food security. The sector is highly vulnerable to climate change due to its significant dependence on rain-fed conditions and is dominated by smallholder farmers with limited adaptive capacity. Conversely, the sector contributes the most to GHG emissions in the country.

The NDC identified the agricultural sector as a critical sector in achieving emissions reduction targets, with a projected annual GHG emissions reduction potential of 74 million tonnes below BAU by 2030. This report has assessed how the old NDC treated agriculture and has highlighted its key assumptions and narratives. It has also reviewed events that have taken place since the NDC submission and explored the options, challenges and opportunities in scaling up Nigeria's ambition for its NDC in the agricultural sector.

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Appendix

Table A.1. Nigeria's agricultural sector policies with commitments related to climate change response actions

Policy	Target year	Adaptation / mitigation actions	Implementing entity	Emission reduction potential
NASPA-CCN& NARF	Continuous	<ul style="list-style-type: none"> • Adopt improved agricultural systems for both crops and livestock (e.g., diversify livestock and improve range management; increase access to drought-resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information) • Implement strategies for improved resource management (e.g., increase the use of water-efficient irrigation systems that use low amounts of water; increase rainwater & sustainable groundwater harvesting for use in agriculture; increase planting of native vegetation cover and promotion of re-greening efforts; intensify crop and livestock production in place of slash and burn) • Focus on agricultural impacts in areas most affected by climate change, such as the savannah zones, particularly the Sahel • Strengthen the implementation of the national Community-Based Forest Resources Management Program • Support review and implementation of the National Forest Policy • Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status, and initiate a research program on a range of climate change-related topics, including the long-term impacts of climatic shifts on closed forests • Provide extension services to Civil Society Organisations (CSOs), communities, and the private sector to help establish and restore community and private natural forests, plantations, and nurseries • Improve management of forest reserves and enforce low impact logging practices 	<ul style="list-style-type: none"> • Leading role for the Federal Government. Others include the State and Local Governments, civil society, private sector, communities, and individuals 	<ul style="list-style-type: none"> • Not specified

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