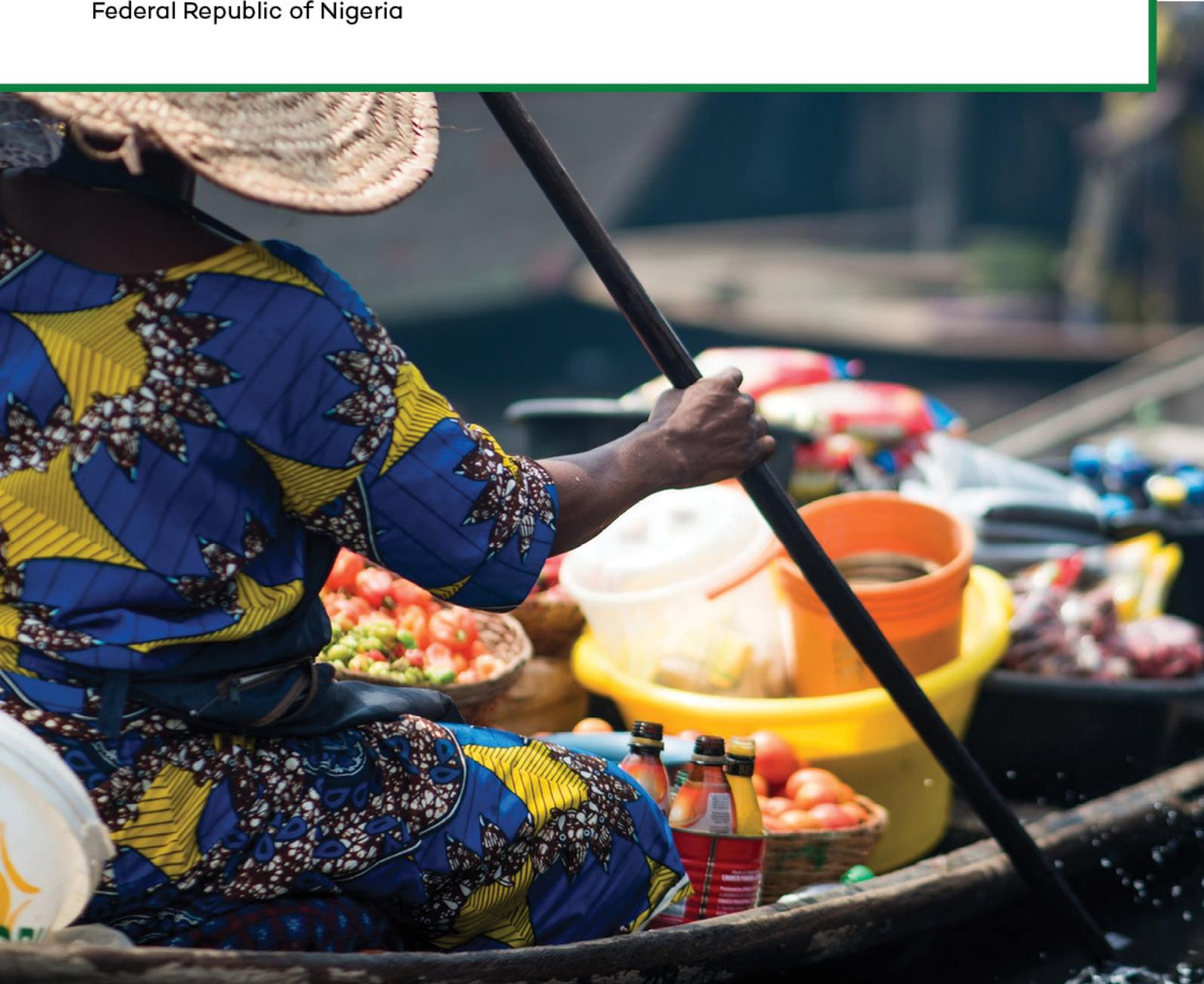




Adaptation Communication to the United Nations Framework Convention on Climate Change

Federal Republic of Nigeria



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Federal Republic of Nigeria
Adaptation Communication to the United Nations
Framework Convention on Climate Change (UNFCCC)

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Sharon Ikeazor, Esq
Honorable Minister of State,
Federal Ministry of
Environment

Foreword

Climate Change has become a critical issue of our time and we are at a defining moment in its history. From changing weather patterns that threaten food security to rising sea levels that increase the risk of catastrophic flooding, as well as increases in atmospheric temperature that result in global warming, the impacts of climate change are global in scope and unprecedented in scale. The United Nations Framework Convention on Climate Change (UNFCCC) recognizes adaptation as a critical option that countries should pursue to reduce the impacts of the change. This adaptation option also needs to be communicated in an effective and efficient manner.

Article 7 of the Paris Agreement, paragraphs 10 and 11, requires Parties to submit an adaptation communication (ADCOM) and update it periodically. This will enable the increase in visibility and profile of adaptation alongside its balance with mitigation, strengthen adaptation action and support for developing countries, provide input to the global stock-take, assess progress made in achieving the Global Goal on Adaptation (GGA) and enhance learning and understanding of adaptation needs and actions.

The development of Nigeria's ADCOM has been done using an inclusive and participatory approach. Relevant stakeholders cutting across ministries, departments and agencies, the organized private sector, academia, civil society organizations, non-governmental organizations (NGOs) and others took part in rigorous sessions, following similar approaches deployed in the development of other policies. Nigeria's ADCOM is also in synergy with other policies, plans and programs that have been developed, such as Nigeria's Revised NDC, Economic Recovery & Growth Plan (ERGP), the National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (NASPA-CCN) and the UN's Sustainable Development Goals (SDGs), among others.

Nigeria's ADCOM, which is the first ever to be prepared, has captured adaption options and strategies already being deployed by MDAs. It identifies gaps, adaptation priorities, needs and financial mechanisms to deploy climate change adaptation. It also highlights the traditional knowledge and technology being used to address climate change while making a case for the involvement of vulnerable groups and Indigenous people in climate action.

I appreciate the UK Government, the NAP Global Network and the International Institute for Sustainable Development (IISD) for their support towards the actualization of this document. I also want to thank the Federal Government of Nigeria for providing the platform for the actualization of this project.

Thank you.

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Abbreviations and Acronyms

ACCARD	African Centre for Climate Actions and Rural Development Initiative
ACCREC	African Climate Research Center
ADCOM	adaptation communication
ASL	above sea level
CAF	Cancun Adaptation Framework
CAN	Climate Action Network
CBA	community-based adaptation
CBOs	community-based organizations
CCN	Climate Change Network of Nigeria
COP	Conference of the Parties
CORDEX	Coordinated Regional Climate Downscaling Experiment
CSA	climate-smart agriculture
DCC	Department of Climate Change
DFID	Department of International Development
EBA	ecosystem-based adaptation
ERGP	Economic Recovery and Growth Plan
FME _{Env}	Federal Ministry of Environment
GCF	Green Climate Fund
GERI	Gender and Environmental Risk Reduction Initiative
GGA	Global Goals on Adaptation
GGW	Great Green Wall
IISD	International Institute for Sustainable Development
INDC	Intended Nationally Determined Contribution
MDAs	ministries, departments and agencies
MTNDP	Medium-Term National Development Plan
MWASD	Ministry of Women Affairs and Social Development
NAP	National Adaptation Plan
NARSDA	National Space Research and Development Agency
NASPA CCN	National Adaptation Strategy and Action Plan on Climate Change for Nigeria
NBSAP	National Biodiversity Strategy and Action Plan
NCCPRS	National Climate Change Policy and Response Strategies
NCF	Nigerian Conservation Foundation
NDC	Nationally Determined Contribution
NEEDS	National Economic Emancipation and Development Strategy

Federal Republic of Nigeria Adaptation Communication to the UNFCCC

NEST	Nigerian Environmental Study/Action Team
NEWMAP	Nigeria Erosion and Watershed Management Project
OXFAM	Oxford Committee for Famine Relief
R&D	research and development
REDD	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SE4A	Sustainable Energy for All
UKAID	United Kingdom Agency for International Development
UNCBD	United Nations Convention on Biological Diversity
UNCDD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WEP	Women Environmental Programme

Executive Summary

Introduction

Nigeria, as a Party to the Paris Agreement (having signed the agreement on September 22, 2016, and ratified it on May 16, 2017), is submitting this first adaptation communication (ADCOM) in line with Article 7, paragraphs 10 and 11 of the agreement. This is also in accordance with decision 9/CMA.1 of the UNFCCC, which gives further guidance in relation to adaptation communications.

National adaptation communications are prepared to provide information on a country's national circumstances concerning adaptation by communicating its plans and priorities, highlighting its implementation and support needs, and showcasing its achievements. Adaptation communications prepared by parties describe the visibility and profile of their adaptation efforts and their balance with mitigation efforts, strengthen adaptation action and support for developing countries, provide input to the global stock-take, and enhance the public's understanding of adaptation needs and actions.¹ The ADCOM provides information on the country's national circumstances concerning adaptation, as well as its plans and priorities, implementation challenges, achievements, and support needs.

Approach and Methodology

Nigeria's ADCOM has been prepared using a participatory and inclusive approach to ensure comprehensive coverage of the achievements, challenges, and support needed in various sectors. This approach also ensured ownership of the report by all parties. The process involved rigorous stakeholder engagement. Following a similar approach to that used in the preparation of the country's National Adaptation Plan Framework, Nationally Determined Contribution, and National Climate Change Policy and Response Strategies, the ADCOM preparation consulted all the relevant stakeholders involved in delivering the climate change targets. The process was also gender-responsive, recognizing that women tend to bear the greater burden when it comes to the impacts of climate change and that women and girls can act often as agents of change in accelerating climate adaptation. Efforts were made to integrate gender considerations in a structured and systematic manner. The process also considered the roles of civil society, the private sector, academia, and donor agencies in achieving adaptation outcomes.

Nigeria: A brief overview

The Federal Republic of Nigeria consists of 36 states and the Federal Capital Territory. It has 774 Local Government Councils that provide governance at the grassroots level, reflecting the three tiers of government (federal, state and local). The 36 states are grouped into six geopolitical entities known as the North-West, North-East, North-Central, South-West, South-East, and South-South zones.

The diversity of Nigeria's natural ecosystems ranges from the arid and semi-arid savanna to mountain forests, rich seasonal floodplain environments, rainforests, vast freshwater swamp forests, and diverse coastal vegetation.

Climate change is expected to affect Nigeria's economy due to loss and damage (to infrastructure, farmland, real estate, and more) from extreme weather events, which have been on a steady increase over the last decade. Adaptation measures are crucial, therefore, in shielding the economy from further climatic vagaries.

¹ <https://unfccc.int/topics/adaptation-and-resilience/workstreams/adaptation-communications>

National and Sub-National Policy Frameworks and Provisions on Climate Change

Nigeria has been an active participant in all the international climate agreements. It became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, and a signatory to both the Kyoto Protocol and the Paris Agreement. Nigeria is also a party to the Sendai Framework for Disaster Risk Reduction (UNDRR, 2015) and the United Nations Sustainable Development Goals (SDGs).

In recognition of the multi-sectoral and multi-level nature of climate change governance, Nigeria has developed a number of policies, strategies, plans, and actions to respond to climate change mitigation and adaptation.

Institutional Framework

To implement the above policies and plans, Nigeria has established several institutions to address climate adaptation issues. At the top of the institutional structure is the Federal Ministry of Environment (FMEnv), which was established in 1999 to manage the natural environment of Nigeria and is responsible for the coordination and implementation of climate-change-related policies and programs. Following a restructuring of the FMEnv in 2003, a special unit on climate change was created. This unit was upgraded to a full Department of Climate Change (DCC) in 2011.

The DCC is mandated to coordinate the national implementation of the UNFCCC protocols and is one of the eight technical directorates within the FMEnv. The DCC has four divisions intended to enhance Nigeria's response to climate change, as illustrated in Figure 2.

An Inter-Ministerial Committee on Climate Change (ICCC) was established by the FMEnv to facilitate cross-sector coordination on climate change issues between ministries and other stakeholders. The aim of the ICCC is to promote stakeholder engagement and it is mandated to hold quarterly meetings.

Impacts, Risks, and Vulnerabilities

Nigeria is classified as one of the ten most vulnerable countries according to the 2014 World Climate Change Vulnerability Index (Maplecroft, 2014), ranked 18 of 135 countries (the higher being more vulnerable) according to German Watch's Climate Risk Index,² and listed as number 160 of 181 countries (the lower being more vulnerable) based on Notre Dame's Global Adaptation Initiative Index.

The frequency and intensity of severe weather events are expected to surge due to climate change. The rise in sea levels is likely to increase coastal inundation and flooding in low-lying regions, and many states lack the capacity (in terms of infrastructure and resources) to adequately respond to the impacts of climate change. A rise in temperature has been recorded over the past three decades, and projections have shown an obvious increase in the temperature across all the ecological regions in the country. The decline in precipitation 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, a decrease in surface water, and the reduction in fauna and flora in many ecosystems across the northern part of the country.

² https://germanwatch.org/sites/germanwatch.org/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_14.pdf

National Adaptation Strategies, Policies, and Action Plans

The various policy instruments developed to tackle climate change in the country over the years have comprehensively outlined the adaptation strategies, policies, and action plans for each sector and for all the stakeholders in the country.

Through the National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (NASPA-CCN) (2015) and the NAP Framework (2020), Nigeria has developed the right policies, strategies, and action plans to achieve its adaptation priorities. Adaptation issues are addressed using a sectoral approach. The key sectors given prominence include energy, agriculture, water resources, forestry and wildlife, education, health, security, and transportation. There are also cross-cutting issues, such as gender and finance, that affect each of the sectors. These adaptation strategies, policies, and action plans are outlined in this ADCOM report.

Some of the adaptation strategies and policies the country has adopted include:

Agriculture

- Adopt improved agricultural systems for both crops and livestock (for example, diversify livestock and improve range management).
- Increase access to drought-resistant crops and livestock feeds, adopt better soil management practices, and provide early warnings, meteorological forecasts and related information.

Freshwater Resources, Coastal Water Resources, and Fisheries

- Initiate a national program for integrated water resource management at the watershed level.
- Intensify programs to survey water quality and quantity for both ground and surface water.

Forests and Biodiversity

- Strengthen the implementation of the national Community-Based Forest Resources Management Programme.
- Support the review and implementation of the National Forest Policy.

Strategies for Health and Sanitation

- Undertake research to better understand the health impacts of climate change in Nigeria.
- Strengthen disease prevention and treatment for those diseases expected to increase as a result of climate change.
- Establish early warning and health surveillance programs.
- Strengthen the adaptation strategy for the health sector, including aligning it with the National Adaptation Plan (NAP) Framework.

Energy

- Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible "no regrets" actions.
- Develop and diversify secure energy backup systems to ensure that both civil society and security forces have access to emergency energy supply.

Transportation and Communications

- Include increased protective margins in the construction and placement of transportation and communications infrastructure.
- Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors.
- Make provisions for diverse transportation options, such as pedestrian, bicycle, and transit routes.

Good Practices

Some specific adaptation actions implemented in the country include flood control, erosion control, the development of flood early warning systems, seasonal rainfall prediction, shoreline protection along coastal areas, and the Great Green Wall initiative, among others. The CSOs/NGOs are actively involved in grassroots livelihood diversification projects that make people resilient to climatic shocks and stresses. Academic institutions help in assessing the impacts, risks and vulnerabilities of people and systems to climate change through their research and development activities. The private sector also supports communities by funding local adaptation projects through their corporate social responsibility initiatives. Donor agencies have also been supporting all the stakeholders with much-needed financing for climate action.

Adaptation Support Needs

The overall estimate for Nigeria's adaptation costs has yet to be assessed. However, estimates for Nigeria's priority sectors (agriculture, water resources, health, and transport) are estimated at USD 3.06 billion per year from 2020, which is expected to rise to about USD 5.50 billion in 2050. The transport sector's incremental cost for adaptation is equally estimated to rise from USD 5.33 billion per year in 2020 to USD 9.69 billion per year in 2050.³

Given these figures, there is a need to leverage funding for adaptation. The country has identified its technical, financial, technological, and sectoral needs. Currently, Nigeria's adaptation support needs are met by both international and national sources. The international sources include multilateral and bilateral donors while the national sources include, among others, the Development of Natural Resources Fund (DNRF), the Ecological Funds, the Clean Technology Investment Fund (CTF), and the Sovereign Green Bond.

Problems and Challenges

Despite its modest efforts to mainstream climate change adaptation into its developmental agenda and policies, Nigeria is still grappling with challenges in achieving the desired results. These challenges include funding and capacity-building needs, and poor technical skills. There is also a lack of synergy, coordination, and collaboration on the part of stakeholders. As well, the lack of target-setting, monitoring, and evaluation have giving rise to overlaps, duplication of efforts and a greater cost burden. Poor communication is another problem reducing the effectiveness of adaptation efforts in the country. The exclusion of the sub-national governments (states and local governments), CSOs, Indigenous people, women, youths, and people living with disabilities constitutes a major barrier to effective and inclusive NAP implementation in the country.

³ <https://unfccc.int/files/adaptation/application/pdf/nigerianeeds.pdf>

In addition, as mentioned in the country's Green Climate Fund (GCF) readiness report, other challenges include:

- limited capacity to implement the NAP framework, analyze climate information and prioritize adaptation options
- national stakeholders' lack of capacity to interpret climate risk assessments
- lack of comprehensive climate risk assessments for priority sectors and vulnerable states;
- limited capacity of policy- and decision-makers to mainstream climate change into national and sectoral plans and policies
- limited funding mechanisms for adequately planning and implementing adaptation actions
- limited monitoring, reviewing or reporting on adaptation planning at the federal, state and local levels.

Conclusion

Nigeria is an active global participant in addressing climate change, being a highly vulnerable country with a very high population. The country has developed all the necessary instruments (strategies, policies, and action plans) as well as the right legal and institutional frameworks to enable it meet its international obligations on climate actions (including adaptation actions). The country has assigned roles for all the relevant stakeholders through policy pronouncements, but a lot needs to be done to foster the active engagement and inclusion of these stakeholders for its climate actions to have greater impact and be sustainable. The implementation of adaptation strategies and action plans still remains a challenge in the country for the reasons mentioned in Section 8. The country therefore requires more support with regard to funding, capacity-building, linkages and collaboration, technology transfer, tools, and technical skills to enable it to achieve greater adaptation success. On its own, the country needs to keep a database of all stakeholders and develop a monitoring and evaluation mechanism to ensure that all adaptation actions, achievements, challenges, and support needed in the different sectors and by the various stakeholders are documented and tracked in real time.

This ADCOM report, apart from meeting the requirement of decision 9/CMA.1, also highlights the significant efforts made by the country and recommends areas in which it needs support.

1. Introduction

1.1 Background

Nigeria, as a Party to the Paris Agreement (having signed the agreement on September 22, 2016, and ratified it on May 16, 2017), is submitting this first adaptation communication (ADCOM) in line with Article 7, paragraphs 10 and 11 of the agreement. This is also in accordance with decision 9/CMA.1 of the UNFCCC, which gives further guidance in relation to adaptation communications.

National adaptation communications are prepared to provide information on a country's national circumstances concerning adaptation by communicating its plans and priorities, highlighting its implementation and support needs, and showcasing its achievements. Adaptation communications prepared by parties increase the visibility and profile of their adaptation efforts and their balance with mitigation, strengthen adaptation action and support for developing countries, provide input to the global stock-take, and enhance the public's understanding of adaptation needs and actions.⁴ The ADCOM provides information on the country's national circumstances concerning adaptation, and its plans, priorities, implementation challenges, achievements and support needs.

1.2 Objectives

The objectives of the Nigeria's ADCOM are to provide information on the country's national circumstances concerning adaptation by communicating its plans and priorities, highlight its implementation work, detail its support needs, and showcase its achievements domestically and internationally by providing input to the global stock-take. The report also serves as an instrument for communicating information about Nigeria's adaptation efforts in its various sectors, across different scales and by various actors. As a stand-alone document, the ADCOM streamlines the country's adaptation strategies, policies, and actions reported in previous communications into one coherent, implementable adaptation document. This ADCOM identifies existing gaps and challenges preventing the achievement of better adaptation outcomes and recommends how these gaps will be filled and challenges overcome.

1.3 Approach

In preparing Nigeria's ADCOM, a participatory and inclusive approach was used to ensure comprehensive coverage of the achievements, challenges, and support needed in various sectors. This approach also ensures ownership of the report by all parties. The process involved rigorous stakeholder engagement. Following a similar approach to that used in the preparation of the country's National Adaptation Plan Framework, Nationally Determined Contribution, and National Climate Change Policy and Response Strategies, the ADCOM preparation consulted all the relevant stakeholders involved in delivering on the climate change targets. A full list of the stakeholders that participated in the inception and consultation workshops is provided in Appendix 2 of this report.

The ADCOM preparation process was also gender-responsive. Recognizing that women tend to bear the greater burden when it comes to the impacts of climate change, efforts were made to integrate gender considerations in a structured and systematic manner. The ADCOM preparation process also prioritized reporting on the impact, vulnerabilities, and environmental situations of rural areas. Indigenous and grassroots-based adaptation actions were identified, analyzed, and reported. The environmental sensitivity of adaptation action was given attention to highlight the unintended environmental costs of implementing adaptation actions by the different stakeholders. The provisions

⁴ <https://unfccc.int/topics/adaptation-and-resilience/workstreams/adaptation-communications>

(programs, plans, projects, and resources) made available to vulnerable groups (people with disabilities, children, and elderly people) in helping them adapt to climatic changes in the country were considered in the report. The process also considered the roles of civil society, the private sector, academia, and donor agencies in achieving adaptation outcomes.

1.4 Methodology

The ADCOM report was prepared by collecting and analyzing data from multiple sources. These include a review of literature, consultations and deep engagement with stakeholders, key informant interviews, and surveys. The latest research on climate change in the country was used as a foundation for reporting current vulnerabilities and the impacts of climatic changes in the country.

The literature review looked at international agreements, conventions, and policies on climate action, specifically adaptation actions. Some of these include the Paris Agreement, the Cancun Adaptation Framework, the 2030 Agenda on Sustainable Development, the Sendai Framework for Disaster Risk Reduction, the Convention on Biological Diversity, and the Convention to Combat Desertification, among others. At the national level, extensive reviews of current policies and communications were prepared by the country's designated authority on climate change. These include the third national communication of Nigeria to the UNFCCC (2020), the National Adaptation Plan Framework (2020), the Nationally Determined Contribution (2021), the First Biennial Update Report (2018), the Nigeria Climate Change Policy and Response Strategies (2020), the National Policy on the Environment (2020), the Green Climate Fund Readiness for Adaptation in Nigeria report, and similar documents and policies produced by relevant MDAs that relate to climate change.

Rigorous consultations and stakeholder engagements were carried out with over 50 MDAs in a series of workshops. These include an inception workshop held on August 3, 2021, to solicit the support and contributions of stakeholders in the ADCOM preparation, clarify their roles in NAP implementation, and validate the approach and methodology to be used in developing the ADCOM report. Based on the guidance and views expressed by the participants during the inception workshop, a consultation workshop was held on the August 26, 2021, to deepen engagement with critical stakeholders towards having an inclusive ADCOM for Nigeria, create a platform for government agencies and stakeholders involved in the NAP process to exchange ideas, and discuss existing adaptation efforts in the country as an input to the development of the ADCOM. The aim was to enhance cooperation and inter-agency collaboration among stakeholders in the implementation of adaptation action. Participants were given an opportunity to make presentations and to provide supporting documents on their mandates, adaptation actions, achievements, constraints, and support needed.

The last workshop in the series was a validation workshop held on October 14, 2021. The objectives were to present the draft ADCOM report and elicit stakeholders' input and critiques, to verify the adequacy of the report in satisfying the ADCOM requirements stipulated in decision 9/CMA.1 as well as its consistency with Nigeria's existing instruments and communications, and to collaboratively work towards developing a comprehensive final draft that would reflect the adaptation realities in the country.

Some photographs taken during these sessions are shown in Figure 1.

Figure 1. The ADCOM preparation process in pictures



Participants at the ADCOM inception workshop



Officials of the DCC and the consultants at the stakeholders' workshop



Participants at the ADCOM validation workshop



Participants reviewing the draft ADCOM report during the validation workshop

2. National Circumstances, Institutional Arrangements, and Legal Frameworks

2.1 Nigeria: A brief overview

The Federal Republic of Nigeria (referred to herein as Nigeria) consists of 36 states and the Federal Capital Territory. It has 774 Local Government Councils that provide governance at the grassroots level, reflecting the three tiers of government: federal, state and local. The 36 states are grouped into six geopolitical entities known as the North-West, North-East, North-Central, South-West, South-East and South-South zones.

Nigeria's population of over 200 million occupies a landmass of 923,768 square kilometers. As a multi-ethnic and culturally diverse country, it has over 500 ethnic groups, with Islam, Christianity and traditional beliefs as the three dominant religions. The most prominent ethnic groups are Hausa, Ibo, and Yoruba, constituting over 40% of the population, and the other large ethnic groups include Tiv, Ibibio, Ijaw, Kanuri, Nupe, Gwari, Igala, Jukun, Idoma, Fulani, Edo, Urhobo, and Ijaw. The gender divide of Nigeria's population is 51% male and 49% female.

2.2 Geography

Nigeria is located between a latitude of 9.0820° N and a longitude of 8.6753° E with a land mass of 923,768 km². It shares land borders with the republics of Benin, Niger, Chad, and Cameroon (to the west, north, and east respectively) and the Gulf of Guinea in its southern fringes. It has 800 km of coastline which bestows on it enormous maritime commercial potentials. However, the vast coastline and the communities inhabiting the area are vulnerable to coastal erosion and flooding as a result of rising sea level.

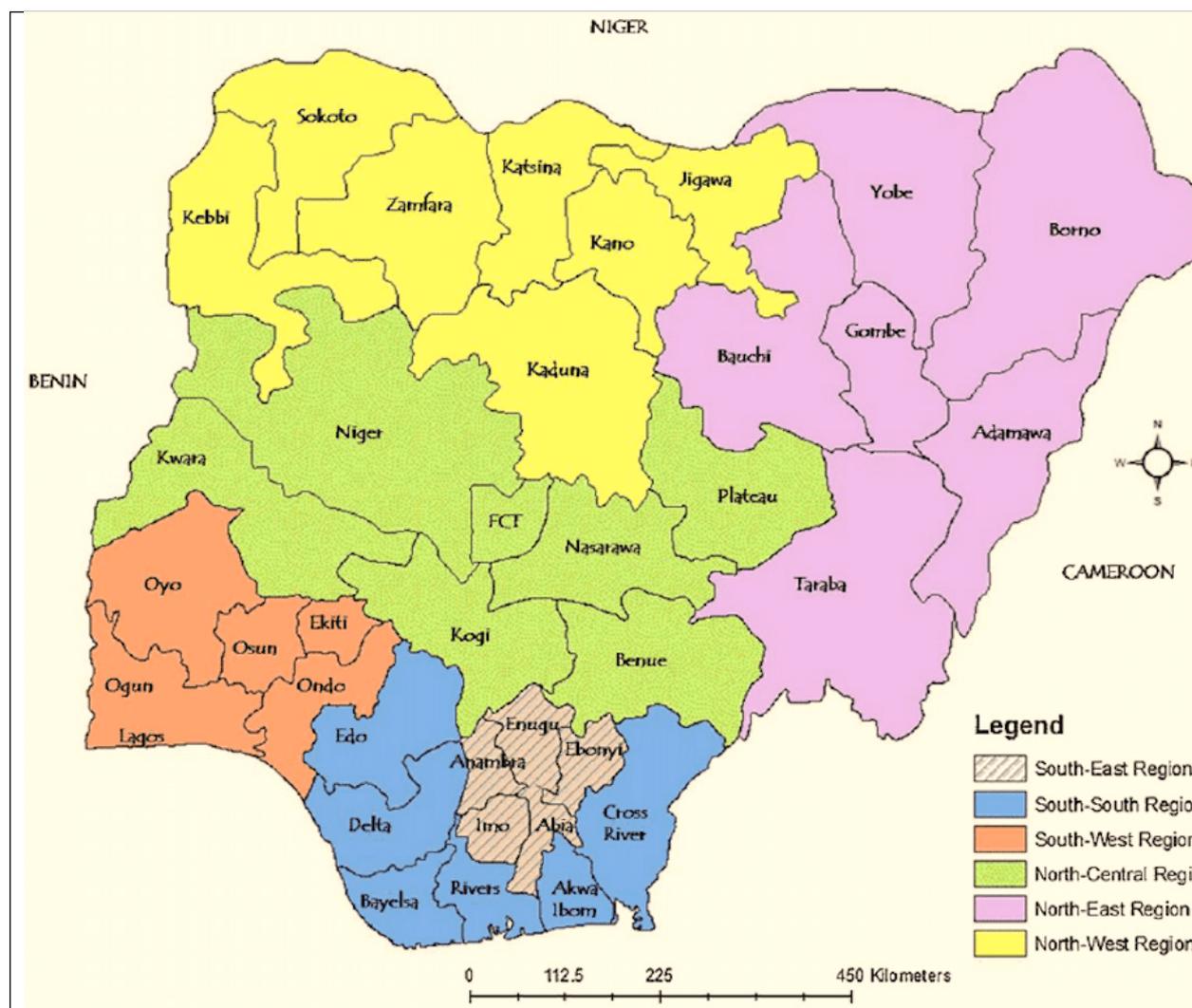
Land is in abundance in Nigeria for agricultural, industrial, and commercial activities. Nigeria has a vast arable land area estimated at 34 million hectares.⁵ Agriculture accounts for about 24% of Nigeria's GDP. The country is the largest producer of sorghum in the world and the fifth in the production of palm oil and cocoa.

Nigeria measures about 1,200 km from east to west and about 1,050 km from north to south. The topography of Nigeria ranges from lowlands along the coast and in the lower Niger Valley to high plateaus in the north and mountains along the eastern border. Nigeria's vegetation varies from tropical forest in the south to dry savanna in the far north, yielding a diverse mix of plants and animal life.

The country is traversed by two major rivers, River Niger and River Benue, as well as numerous other productive rivers. River Niger enters the country from the northwest while the Benue River enters from the northeast; the two rivers join in Lokoja in the North-Central region and continue south, where they empty into the Atlantic at the Niger Delta. The map of Nigeria showing the 36 states and 6 geopolitical zones is presented in Figure 2.]

⁵ <https://www.statista.com/topics/6729/agriculture-in-nigeria/>

Figure 2. Map of Nigeria showing 36 states and the six geo-political zones



Source: <https://opinion.premiumtimesng.com/2019/10/03/nigeria-59-time-to-review-the-quota-system-by-olabisi-deji-folutile/map-of-nigeria-showing-the-six-6-geopolitical-zones-for-interpretation-of-the/>

A large portion of Nigeria’s surface is made up of the ancient crystalline rocks that are typical of the African Shield. Prolonged weathering and erosion have led to the formation of major landscapes in the country, with characteristic features consisting of extensive level plains interrupted by granitic hills and mountains. Smaller areas dominated by younger granites are present around the Jos Plateau. Nigeria’s topography is characterized by a gradual rise from the coastal plains to the northern savanna regions, generally reaching 600 to 700 m. Higher elevations with altitudes exceeding 1,200 m are common around the central Jos Plateau and in some parts of the Eastern Highlands along the Cameroon border. The coastal plain extends inland for about 10 km and rises to elevations of up to 50 m above sea level at its northern boundary. The eastern and western sections of the coastal plain are separated by the Niger Delta, which extends over an area of about 10,000 km². Much of this is swampland, separated by numerous islands. The coastal plain region penetrates inland about 75 km in the west but extends further in the east. This region is gently undulating, the elevation increasing northward with a mean of about 150 m above sea level.

2.3 Ecosystems

The diversity of Nigeria's natural ecosystems ranges from the arid and semi-arid savanna to mountain forests, rich seasonal floodplain environments, rainforests, vast freshwater swamp forests, and diverse coastal vegetation. The Mangrove Swamp ecological region extends to other countries including Cameroon, Equatorial Guinea, Gabon, Guinea, Ghana and Angola. Mangroves are mainly found in humid tropical climates, and they grow up to heights of over 150 feet. They are essential in holding riverbanks in place, filtering the water, and creating build-ups of nutrient-rich soil on the banks. The ecoregion consists of five types of mangroves and a palm species that was introduced from Asia. Crabs, oysters, and other invertebrates inhabit the region. A rich variety of fish species also uses the mangroves for shelter and spawning. Other animals in the region include monkeys, turtles, and birds.

The montane forest ecoregion in the mountain ranges of Nigeria runs from the Gulf of Guinea into the western parts of Cameroon. It is characterized by a chain of extinct volcanoes with an elevation of more than 2,700 feet above sea level. The vegetation varies with altitude. The lower elevations (3,000 feet to 6,000 feet) are covered by montane forests while the higher elevations consist of patches of grassland, bamboo forest, and shrublands. The region is inhabited by many endemic animal and bird species. There are many endangered primate species in the area, including the Cross River Gorilla, Red Columbus, and the Preuss' monkey.

The Guinea savanna (also known as savanna woodland or wooded savanna) is the most extensive vegetation in the middle belt of Nigeria, and consists of a mixture of trees and grasses. It receives an annual rainfall of between 1,000 and 1,500 mm that falls over a six- to eight-month period. It contains parkland savanna, gallery forests, and derived savanna. The typical vegetation is an open woodland with tall grasses.

The Sudan savanna belt is found to the Northern parts of Nigeria. It stretches from Sokoto Plains through the Northern section of the High Plains of Nigeria to the Chad Basin. It includes areas around the Nigerian states of Sokoto, Kaduna, Kano, and Borno, covering over a quarter of the country. Rainfall ranges from about 600 to 1,000 mm and the relative humidity is generally below 40%, except for the few rainy months when this can rise to 60% and above. The zone experiences a dry season lasting about four to six months.

The Sahel savanna is found to the extreme north-west and north-east of the country, where the annual rainfall is less than 600 mm with dry seasons exceeding eight months. The typical vegetation in the area consists of extensive sparse grasses and open thorn-shrub savanna, with scattered trees of 4 to 9 m in height, most of them thorny. The main tree species include *Acacia raddianna*, *A. Senegal*, *A. laeta* and *Commiphora africana*; the shrubs are *Salvadora persica*, *Leptadenia pyrotechnica*, and four species of *Grewia*; and the grasses include *Aristida stipoides*, *Schoenefeldia gracilis* and *Chloris priesan*.

Due to its diverse landscapes, Nigeria has a wide array of life wildlife comprising an estimated 290 mammal species and 940 bird species, among others. Some of the prominent wildlife species include lions, African elephants, buffaloes, and hippopotamuses. The birds include herons, egrets, and bush petronia, among others.

2.5 Economy

Despite a middle-income rating by the World Bank, Nigeria is Africa's largest economy, with crude oil as the main revenue source, and with coal, natural gas, and telecommunications contributing to the economy. The nation recorded a Gross Domestic Product (GDP) of USD 432.29 billion (in 2020) on a fluctuating growth rate of 2.2–0.18% in 2019 and 2020 respectively. With a human growth rate of

2.5%, Nigeria's population is projected to reach 400 million by 2050, and the urban population is also expected to rise from 50% to 70% by 2050. Nigeria's economic growth hardly matches its population growth (World Bank Group, 2021; Jalam, Sharaai, Ariffin, Zainudin, & Musa, 2020). With a current population of over 200 million people, Nigeria is the largest market in Sub-Saharan Africa with a reasonably skilled potential workforce for the efficient and effective management of investment projects within the country. Nigeria's income per capita stood at USD 2,097.09 in 2020, ranking 17th on the list of African countries; this represented a 6% decline compared to USD 2,229.86 recorded in the previous year.

The Economic Recovery and Growth Plan (ERGP) is a medium-term plan for 2017 to 2020 developed to restore Nigeria's economic growth while leveraging the resilience and ingenuity of the Nigerian citizens. This plan was a reaction to the negative growth recorded by the country in 2016, as the government recognized that the country was likely to remain on a path of steady decline if nothing were done to change the negative trajectory. The ERGP was aimed at restoring growth by stabilizing and diversifying the economy, investing in infrastructure, and improving human capital.

Environmental sustainability is a cardinal pillar of the ERGP. Recognizing the environmental challenges facing Nigeria and how they affect the economy, the ERGP prioritized environmental management and chose to take a sustainable path to development. Specifically, the plan sought to do that by tackling climate change and promoting the sustainable management of natural resources. With regard to adaptation, the plan supported the implementation of the Great Green Wall initiative to address land degradation and desertification, along with community-based adaptation initiatives such as tree planting and climate-smart agriculture.

The Medium-term National Development Plan (MTNDP) 2021–2025 is the successor plan to the ERGP, and was developed in 2021.⁶ Apart from providing a roadmap for economic recovery and poverty reduction by taking 100 million Nigerians out of poverty, the plan also contains significant environmental sustainability aspirations. The MTNDP encourages emissions reduction as well as increased access to finance and technical support for businesses and projects in environmentally sustainable sectors. In addition, the plan also advocates for incentives for MSMEs operating in biodiversity conservation areas to support entrepreneurs committed to building an environmentally sustainable society, and boosts community awareness on the importance of environmental sustainability through public education campaigns. It also advocates for more public enlightenment on the importance of climate change mitigation, adaptation, and impact reduction. These all will help towards building adaptive capacity in the country.

2.6 The Nigeria Economic Sustainability Plan

This plan was part of strategies developed to recover from the COVID-19 pandemic in 2020. It aims to stimulate and diversify the economy, retain and create jobs, and extend more protections to the poor.⁷ Although the plan's main focus is the economy, it also complements existing environmental policies by seeking to develop a solar power strategy that is expected to create 250,000 jobs and power five million households by 2023, at an estimated cost of N 240 billion. It encourages private sector financing. The plan incentivizes investment in sustainable projects, such as solar powered mini-grids and similar technologies, which will reduce people's vulnerability and build their adaptive capacities.

Climate change is expected to affect Nigeria's economy due to loss and damage (to infrastructure, farmland, real estate, and so on) from extreme weather events, which have been on a steady increase

⁶ <https://nationalplanning.gov.ng/wp-content/uploads/2021/03/Nigeria-MTNP-2021-2025-Overview-of-Draft-Plan.1.pdf>

⁷ <https://www.iea.org/policies/13924-nigerian-economic-sustainability-plan>

over the last decade (FGN, 2013).⁸ Adaptation measures are crucial, therefore, in shielding the economy from further climatic vagaries. For this reason, Nigeria, has chosen to take the sustainability path in growing and diversifying its economy.

2.7 Infrastructure

Nigeria has a fairly extensive infrastructure of roads, railroads, airports, and communication networks. The road system is by far the most important element in the country's transportation network, carrying about 95% of all the nation's goods and passengers. Currently, many of the roads are in disrepair because of poor maintenance and years of heavy traffic. Much of the road system is barely useable. Massive traffic jams are very common in the large cities. There are also long delays in the movement of goods. Highway accidents and deaths are frequent, and number more than 30,000 and 8,000 per year, respectively.

Railroads provide Nigeria's second means of transportation. Two main lines of the single-track railroad system connect the coast with the interior. One line runs from Lagos (south-west) to Kano (north). The other line runs from Port Harcourt (south-east) to Kaduna (north). A branch line runs from Zaria to Kaura Namoda, an important agricultural area in the northwest. The rail system is operated by the Nigeria Railway Corporation. The system has suffered a progressive decline because of inadequate funding, poor maintenance, and declining profit. In the first five years of the reviewed National Integrated Infrastructure Master Plan (NIIMP), investments in energy, transport, social infrastructure, and housing were accorded priority due to their current relative level of under-investment.

2.8 Social Characteristics

Nigeria is shaped by multiple ethnic groups. The country has 527 languages, seven of which are extinct. Nigeria also has over 1,150 dialects spoken by several ethnic groups. The three largest ethnic groups are the Hausas, living predominantly in the north; the Yorubas, who are predominantly located in the southwest; and the Igbos in the southeast. There are many other ethnic groups with sizeable populations across the different parts of the country—for instance, the Kanuri people in the North-East region of Nigeria, the Tiv people in the North-Central region, and the Efik-Ibibio in the South-South.

The Fulani and the Hausa are predominantly Muslims, while the Igbo are predominantly Christians and so are the Bini and the Efik. The Yoruba population is made up of a balance of Christian and Muslim. Indigenous religious practices remain important to all of Nigeria's ethnic groups, however, and frequently these beliefs are blended with Christian or Muslim beliefs.

Due to the majority of the population's overdependence on natural resources, which are threatened by climate change, the homogeneity, pattern of interactions, and livelihoods of these social groups are constantly changing. Communities are continually evolving adaptation measures to cope with the shocks and stresses caused by climate change.

2.9 National and Sub-National Policy Frameworks and Provisions on Climate Change

In recognition of the multi-sectoral nature of climate change governance, effective policy, legal, and institutional frameworks have become necessary for such a complex country as

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https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/assessments/23052013_nga_post_disaster_needs_assessment_2012_floods.pdf

Nigeria. A number of policies, strategies, plans, and actions have been formulated to meet the need for climate change mitigation and adaptation.

Nigeria has been an active participant in all international climate agreements since the Earth Summit of 1992 in Rio de Janeiro. The country became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, and a signatory to both the Kyoto Protocol and the Paris Agreement. Nigeria has also been a Party to the Convention on Biological Diversity (UNCBD) since November 1994 and the United Nations Convention to Combat Desertification (UNCCD) since August 1997. Nigeria has also adopted the 2030 Agenda for Sustainable Development in 2015 and the 2015 Sendai Framework for Disaster Risk Reduction (UNDRR, 2015).

The First National Communication to the UNFCCC was produced in November 2003, the second in February 2014, and the third in March 2020.

2.10 Existing Policies, Legal Frameworks, and Regulations on Climate Change

To achieve its adaptation goals, Nigeria is working towards an integrated approach to supporting cross-cutting national policies and strategies in mainstreaming environmental sustainability and climate change adaptation efforts. Financial support to improve legislative and regulatory frameworks, capacity-building and the transfer of technology in certain priority areas, will further strengthen these efforts. The country is also committed to implementing mitigation measures that will promote low-carbon, sustainable and high economic growth. Nigeria is also committed to increasing climate-change-related science, technology, and R&D efforts to enable the country to participate in international scientific and technological cooperation on climate change. Commitments are also focused on strengthening national institutions and mechanisms (policy, legislative, and economic) to establish a suitable and functional framework for climate change governance.

2.10.1 Policy Frameworks

Nigeria’s adaptation priorities, strategies, and plans are comprehensively covered in its key policies on the environment, climate change, and adaptation. Apart from the environment sector, several other sectors also addressed adaptation in their policies. Some of these policies are listed in Table 1. A detailed account on how some of these policies addressed adaptation is provided in chapter 4.

Table 1. Key policies relevant to adaptation in Nigeria

No.	Policy	Sector	Year
1	Updated Nationally Determined Contribution	Environment	2021
2	National Adaptation Plan Framework	Environment	2020
3	Third National Communication	Environment	2020
4	National Climate Change Policy for Nigeria	Environment	2021
5	Climate Change and Gender Action Plan	Environment	2020
6	Second Biennial Update Report (BUR2) to the UNFCCC	Environment	2021
7	Reducing Deforestation and Forest Degradation + (REDD+) Strategy	Environment	2019

Federal Republic of Nigeria Adaptation Communication to the UNFCCC

No.	Policy	Sector	Year
8	First Biennial Report	Environment	2018
9	National Drought Plan	Environment	2018
10	Land Degradation Neutrality Target Setting Programme	Environment	2018
11	National Policy on the Environment (2016)	Environment	2016
12	Intended Nationally Determined Contribution (INDC)	Environment	2016
13	National Policy on the Environment	Environment	2016
14	National Biodiversity Strategy and Action Plan	Environment	2016
15	Second National Communication	Environment	2014
16	First National Communication	Environment	2003
17	Nigeria Climate Change Policy Response and Strategy (NCCPRS)	Environment	2012
18	Great Green Wall for the Sahara and Sahel Initiative National Strategic Action Plan	Environment	2012
19	National Adaptation Strategy and Plan of Action for Climate Change in Nigeria	Environment	2011
20	National Forest Policy	Environment	2010
21	National Policy on Drought and Desertification; Drought Preparedness Plan	Environment	2007
22	National Policy on Erosion, Flood Control and Coastal Zone Management	Environment	2005
23	Draft National Forest Policy	Environment	2006
24	National Biodiversity Strategy and Action Plan	Environment	2004
25	National Forestry Action Plan	Environment	1996
26	Post-Disaster Needs Assessment, 2012 Floods	Disaster Management	2013
27	National Disaster Framework	Disaster Management	2010
28	National Agricultural Promotion Policy	Agriculture	2016
29	Nigeria Communication on Climate Smart Agriculture	Agriculture	2015
30	National Agricultural Resilience Framework (NARF)	Agriculture	2014
31	Nigeria Agricultural Policy	Agriculture	2001
32	National Program for Food Security	Agriculture	2002
33	National Water Policy	Water	2012
34	National Health Policy	Health	2016
35	National Renewable Energy and Energy Efficiency Policy (NREEEP)	Energy	2015

No.	Policy	Sector	Year
36	National Gas Policy	Energy	2017
37	National Transport Policy	Transport	2016

2.10.2 Legal Framework

The national policies can only have the desired impacts if they are properly implemented in inclusive and gender-responsive ways. This can only be achieved if these policies are backed by legal and institutional frameworks.

The legal framework provides a mechanism for achieving the objectives of the policies by providing the necessary legal backing. The legal framework also clarifies the roles and responsibilities of the different tiers of governance, fosters inter-sectoral collaboration, provides laws and regulations to ensure compliance and enforcement, and enables the legislature make the budgetary provisions for climate action (NCCP, 2021). In addition, the legal framework facilitates the coordination and alignment of climate change response goals with other relevant development agendas, such as the Sustainable Development Goals (SDGs), Agenda 2063, and the Sendai Framework on Disaster Risks Reduction. This makes it possible to mainstream climate change into the national development agenda.

The legal provisions for tackling climate change and its impacts include the country's constitution (1999 as amended), the Environmental Impact Assessment (EIA) Act – CAP. E12 L.F.N. 2004, the National Environmental Standards and Regulation Enforcement Agency (NESREA) Act 2007, the National Oil Spill Detection and Response Agency (Establishment) Act, 2006 NO 15 2006, and the international human rights laws (including the African Charter on Human and People's Rights), environmental statutes, and international conventions to which Nigeria is a signatory.

2.10.3 Institutional Arrangements and Governance

Nigeria has 36 states and 774 local governments. The constitution has assigned responsibilities to these entities on handling the environment. The institutional framework aligns and strengthens the capacity of relevant institutions to manage climate-related challenges, encourage the implementation of mitigation and adaptation initiatives at all levels of governance, and promote the roles of states and local governments in climate change governance.

To achieve these goals, Nigeria has established several institutions to address climate adaptation issues. At the top of the institutional structure is the Federal Ministry of Environment (FMEnv) that was established in 1999 to manage the natural environment of Nigeria and is responsible for the coordination and implementation of climate change-related policies and programs. Following a re-structuring of the FMEnv in 2003, a special unit on climate change was created. This unit was upgraded to a full Department of Climate Change (DCC) in 2011.

The Department of Climate Change (DCC) was created to implement the Climate Convention and protocol activities established under the UNFCCC. The DCC has four divisions intended to enhance Nigeria's response to climate change. The Department also coordinates the activities of the Inter-ministerial Committee on Climate Change.

The Inter-Ministerial Committee on Climate Change (ICCC) was established by the FMEnv to facilitate cross-sector coordination of climate change issues between ministries and other stakeholders. The

aim of the ICCC is to promote stakeholder engagement and it is mandated to hold quarterly meetings. The membership of the ICCC is drawn from over ten different MDAs.

The Civil Society Organizations (CSOs) are represented in the ICCC by the Climate Change Network Nigeria (CNN Nigeria), a coalition of over 150 diverse CSOs that was established in 2007 to develop a more inclusive approach to climate change- related stakeholder engagements. Other national NGOs, such as the Nigerian Environmental Study/Action Team (NEST), are also members of the ICCC, along with academic institutions, such as the Centre for Climate Change and Freshwater Resources (CCCFR) of the Federal University of Technology Minna (FUT Minna).

However, despite comprising several federal ministries, NGOs, CSOs, and research institutions, the ICCC does not have local and state government representatives, thereby limiting its applicability to local contexts. At the sub-national level, climate change is coordinated by the States' Ministries of Environment. Some states have climate change departments or desks under their Ministries of Environment while others have yet to establish such entities.

3. Impacts, Risks, and Vulnerabilities

Nigeria's vulnerability to climate change is not in doubt. The country is classified as one of the ten most vulnerable countries according to the 2014 World Climate Change Vulnerability Index (Maplecroft, 2014), ranked 18 of 135 countries (the higher being the more vulnerable) according to German Watch's Climate Risk Index,⁹ and listed as number 160 of 181 countries (the lower being the more vulnerable) based on Notre Dame's Global Adaptation Initiative Index.¹⁰ Figure 6 illustrates the pattern of vulnerability in Nigeria (based on Madu, 2012).

Due to the impacts that have spared no region over the past decades, climate change has been recognized as a major threat to development and livelihood across the world (Ogbo et al., 2017). These impacts vary from one country to the other based on geography and vulnerability as well as the mitigation and adaptation measures deployed (Madu, 2012; Sayne, 2011).

Nigeria is a country characterized by two distinct seasons, wet and dry. All three of its climatic zones—the southern tropical wet climate, the central tropical savannah, and the Sahelian hot and semi-arid zone in the far north—are affected by climate change due to decline in precipitation from south to north (Greenwalt et al., 2021; World Bank Group, 2021). Data on tropical climate shows that the high precipitation in the south will result in increased flooding and erosion, while its decline up north leads to aridity, drought, and desertification.

The frequency and intensity of severe weather events are expected to surge due to climate change. The rise in sea levels is likely to increase coastal inundation and flooding in low-lying regions (Haider, 2019), while many states lack the capacity, in terms of infrastructure and resources, to adequately respond to the impacts of climate change (Federal Ministry of Environment, 2014). A rise in temperature has been recorded over the past three decades, and the projections have shown an obvious increase in the temperature across all the ecological regions in the country (Akpodioyaga-a & Odjugo, 2010; Haider, 2019).

The impacts of climate change are not the same for all ecological zones in Nigeria due to varying degrees of vulnerability. Analysis of susceptibility demonstrates that the states in the northern region are more vulnerable to climate change than their southern counterparts (Federal Ministry of Environment, 2014; Madu, 2016). The decline in precipitation and rising heat have rendered the North-East and North-West regions the most vulnerable. This has compounded aridity, drought, and desertification, and caused the shrinking of wetlands, a decrease in surface water, and the reduction of fauna and flora in many ecosystems across the northern part of the country (Ebele & Emodi, 2016; Haider, 2019). The high number of rural communities in the north, and their over-reliance on agriculture and forest resources, further complicates the vulnerability of the region (Madu, 2012, 2016). In the relatively less vulnerable south, an increase in rainfall, a rise in sea levels, coastal erosions, and flooding have made the Niger-Delta region of the South-South the most vulnerable, resulting in the displacement of several coastal communities (Federal Ministry of Environment, 2014; Haider, 2019; Sayne, 2011).

⁹ https://germanwatch.org/sites/germanwatch.org/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_14.pdf

¹⁰ <https://gain.nd.edu/our-work/country-index/rankings/>

Nigeria’s physical vulnerability is exacerbated by economic vulnerability. Despite recording tremendous progress on both social and economic fronts recently, its human capital development is still weak due to under- investment, and the nation’s Human Capital Index rating remains low. Although ongoing efforts are being made to diversify the economy, there are huge challenges in development and infrastructure because of the nation’s dependency on crude oil. Moreover, the impacts of COVID-19 have further increased Nigeria’s economic vulnerability to climate change. The regions worst hit by climate change in Nigeria are the coastal regions, the desertification-prone areas and the wetlands in both the North and the South. The most vulnerable group of people to the impacts of climate change are farmers, fishermen, the elderly, women, children, and poor people living in urban centers (Federal Ministry of Environment, 2014). Nigeria’s third national communication (TNC, 2020) and the National Climate Change Policy (2021) have given a detailed account of Nigeria’s vulnerability to climate change. Table 3 shows projected climate trends for Nigeria’s ecological zones.

Table 2. Projected climate trends for Nigeria’s ecological zones

Climate variables	Mangrove zone	Rainforest	Savanna (tall grasses)	Sahel (short grasses)
Temperature	↑	↑	↑	↑
Rainfall (amount received)	↑	↑	↓	↓
Rainfall variability	↑	↑	↑	↑
Extreme rainfall event—drought	Likely	Likely	↑	↑
Extreme rainfall event—flooding	↑	↑	Likely	Likely
Sea level rise	↑	NV	NE	NE

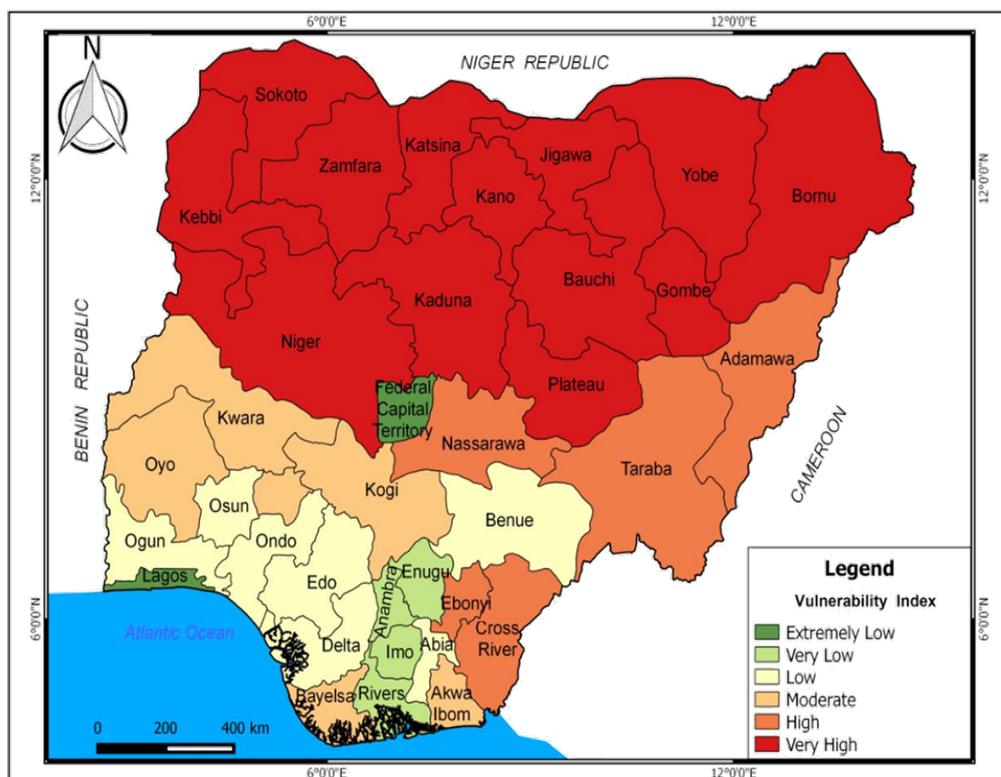
Key: ↑ = Increase or rise; ↓ = Decrease or fall; NE = not exposed

Source: Adapted from Haidar, 2019

The impact of climate change is expected to further affect biodiversity by increasing the threat of extinction of certain species. Changes in the pattern of rainfall may worsen incidences of drought and affect agricultural yield in a country where a large percentage of the populace depends on agriculture for survival. This situation will in turn pose significant threat to food security and water supplies. Nigeria’s vulnerability to climate change remains high, with the country still falling among the top ten at-risk nations.¹¹ Climate change is known to have impacts on some major sectors in Nigeria as outlined in section 3.1 below. The pattern of vulnerability in Nigeria is depicted in Figure 3.

¹¹ <https://www.worldbank.org/en/results/2019/04/18/building-climate-resilience-experience-from-nigeria>

Figure 3. Pattern of vulnerability in Nigeria



Source: Madu (2012)¹²

3.1 Observed Ecological, Economic, and Social Impacts of Climate Change

3.1.1 Impacts on Water Resources

Climate change will result in increased variability in rainfall, predictably resulting in floods in some humid areas of the country and a decrease in precipitation resulting in droughts in the north. Thus, the characteristics of the hydro-climatological systems of the country's different ecological zones will be altered, which will affect water availability.

Higher temperatures and increased water variability will affect the amount of runoff, surface water (in rivers and lakes), and groundwater recharge. Similarly, reduced rainfall, particularly in the northern part of the country, will further compound the zone's inability to meet people's needs for water. The northern part of the country may increase its dependence on underground water sources. But decreased rainfall would lead to lower water tables and this could increase water stress and problems with environmental sustainability and water resources management in the future. Reduced rainfall, especially in the northern parts of the country, may lead drought and subsequently to food shortages and malnutrition. This situation will have profound impacts on women and children, who are the most vulnerable to water stress. Women will have to travel longer distances in search of water, exposing themselves to harm.

Climate change will affect water use in all socio-economic sectors and consequently will affect demand for water. Of particular significance is the fact that reduced river flow will reduce hydro-electric power

¹² Madu (2012) Rurality and climate change vulnerability in Nigeria: Assessment towards evidence based even rural development policy. Being a paper presented at the 2016 Berlin Conference on Global Environmental Change Held from 23-24 May 2016 at Freie Universität Berlin

(HEP) production. Already, there is increased concern that marked fluctuations in the level of the waters in the Kainji, Jebba, and Shiroro Dams due to changes in climate are disrupting electricity generation from the hydro power stations. In addition, increased flooding may destroy water infrastructure, including dams.

3.1.2 Impacts on Forest Resources

Across the country, many forest products are consumed directly by the households collecting them. The direct values of forests come from the harvesting of fuel wood and poles for the construction of houses and fences and the consumption of other forest products, such as plant products, for craft production, food, medicine, cosmetics, and timber in particular. Although there are no quantitative estimates for the country, forest use contributes significantly to the GDP.

In accordance with the study by Reid et. al., (2007), the areas with broadleaf woodlands in the southern part of the country are not likely to experience particular losses due to climate change. Indeed, it is thought that the potential to use forest products here could increase. However, in the more arid zones to the north, the potential benefits from climate change might be offset by increases in tree damage from fire.

3.1.3 Impacts on Coastal and Marine Environments

The coastline of Nigeria is already undergoing pronounced morphological changes as a result of natural and anthropogenic activities. The natural phenomena include occasional sea surges and tidal waves, while human activities include the haphazard construction of ill-designed jetties, sand mining, unplanned and accelerated infrastructure development, pollution, and general land degradation. The anticipated accelerated sea level rise (ASLR) of 0.5 to 1 meter would worsen these problems.

In general, sea level rise impact in general will include inundation and flooding, the exacerbation of coastal erosion, the increased frequency of ocean storm surges, changes in ocean dynamics, which could have effects on fishery resources, and changes in migration and nutrient distribution patterns. Many low-lying areas will be affected by ASLR and increased flooding from storm surges due to global warming. Beach erosion could pose more threats as a result of ill-designed jetties which could cause alterations in current directions, with the result that erosion could shift to other places; this is currently being witnessed on the Bar Beach on Victoria Island, Lagos. The filling up of some mangrove wetlands for development is already causing flooding in many areas and could be worsened by climate-change induced ASLR. The increased frequency of shipwrecks, particularly in the Lagos axis, will exacerbate erosion along the coast.

With specific reference to the Niger Delta, it is estimated that with an ASLR of about 0.5 m, about 35% of the delta could be lost. With ASLR of about 1.0 m, about 75% of the delta could be lost. The number of people at risk, assuming no adaptation and development measures are carried out, would be 0.9 million, 2.1 million and 4.5 million with ASLR of about 0.2 m, 0.5 m, and 1 m respectively, resulting in massive numbers of environmental refugees. With the projected climate change and sea level rise, if no mitigation or adaptation measures are undertaken, and with ASLR of 0.2 m and 1.0 m, the capital values at risk would be about USD 8.05 billion and USD 17.5 billion respectively.

3.1.4 Impact on Socio-Economic and Socio-Cultural Sectors

Energy

Climate change will have significant effects on the energy sector in Nigeria. In particular, rising temperatures, changes in the amount of precipitation, and variations in humidity, wind patterns, and the number of sunny days per year could affect both the consumption and the production of energy. These impacts would be profound, although the nature and magnitude of the impacts may not be easy

to predict.

In general, both energy supply and demand would be affected by climate change and sea level rise. Obviously, increased temperatures would result in increased energy demand for air conditioning, refrigeration, and other household uses. Water pumping requirements may increase significantly in response to increased water needs for irrigation and residential, commercial, and municipal water use to offset temperature increases.

Mining

Mining is a major socio-economic sector in Nigeria. In the Niger Delta alone, total investment in oil mining amounts to over US \$13 billion, most of which is under threat from climate-change-related sea level rise. Considerable losses will thus be incurred in terms of investments and development in the Niger Delta, particularly with respect to government revenue in oil and oil-based industries, such as oil refineries in coastal cities (e.g. Port Harcourt and Warri) and damage to infrastructure and social amenities.

Industry

Some industrial products (e.g. food and drinks) are weather-dependent and many industries are vulnerable to extreme weather conditions. For example, severe storms are detrimental to many industries, including offshore oil as well as the gas drilling operations and fisheries that dominate the coastal zones of Nigeria. Some industries are also dependent on the availability of raw materials, which may be affected by changes in the climate. Changes in biological diversity which may result from climate change could also hamper the availability and development of agricultural and pharmaceutical products. The loss of coastal zones, mangroves forests, and wetlands would affect fisheries and many other economic activities based on the species in these habitats. Such vulnerability could result in forced relocation, loss of revenue, and inability to continue operations.

Population and Settlements

Climate change would also directly or indirectly affect the population and human settlements in Nigeria. Currently, about 15% of the country's population is affected by climatic variation and sea level changes. With increased climate change, between 50% and 60% of the population will be affected. Global-warming-related extreme events such as floods (resulting in landslides in some areas), strong winds, droughts, and tidal waves could cause massive relocation of people. These events could also contribute to increased population movement via managed and unmanaged retreat from land that is vulnerable to sea level rise, as well as temporary displacement. In addition, declining agricultural productivity, which has been a major trigger for population movement in the country, could be worsened, especially in the semi-arid and arid zones of northern Nigeria.

Health

The human health impacts of climate change in Nigeria would occur in various ways. Because of the poor health status of many citizens, these impacts could be devastating. The impacts could either be direct or indirect. Some of the direct impacts of climate change on health in Nigeria would include loss of lives, as well as illnesses, shocks, and injuries due to increased exposure to heat waves and their effects on respiratory systems. The indirect effects of climate change and sea level rise include the altered spread and transmission of vector-borne diseases (including malaria) and the altered transmission of contagious diseases (including cholera, influenza, and more).

Tourism

Tourism, one of Nigeria's fastest-growing industries, is based on wildlife, natural reserves, coastal resorts, and an abundant water supply for recreation. Many tourist attractions are located along the

coastal zone of the country. Thus, any significant sea level rise due to global warming and climate change would have an impact on these attractions, which range from modern architecture through traditional relics to recreational areas such as beaches. Many beaches (e.g. the Victoria Island beach) in Nigeria will be lost. Deltas and wetlands are also potentially endangered, while the existence of coastal settlements, including large cities, is threatened. With the destruction of a lot of these features, most of the cultural artifacts and monuments (e.g., the first Christian church in Badagry, near Lagos) will be threatened.

The appeal of wildlife tourism, facilitated by the National Parks, is expected to decline due to habitat loss and fragmentation, which will lead to less patronage. The tourist-attracting traditional festivals (such as the Argungu fishing festival on river Argungu in Kebbi State) may decline to the extent that climate change induces the shrinkage of such rivers.

Transport

Nigeria's transport systems will not escape the effects of global warming and climate change. For example, higher sea level rise may require costly changes to ports. Coastal roads and railways, which are the current means of transportation along the coast, may be covered by the intruding sea water or washed away by erosion. Changes in lake and river levels will also affect inland navigation. More frequent storms will affect shipping and other forms of transport. Also, increased temperatures will exacerbate problems with roads and railways; for example, the roads will become very hot for vehicle tires. Increased temperatures may also expose these vehicles to increased hazards of road accidents. Hotter weather could cause increased rail length and consequently increase the potential hazards of rail transportation.

3.2 National, Sectoral Risk, and Vulnerability Assessment

Climate change has the greatest impact on four key sectors in the country. These include water resources, agriculture, human health, and energy (USAID, 2013)¹³. Nigeria is Africa's largest economy and home to significant natural resources, including oil and natural gas reserves. However, over half of Nigeria's population still lives below the poverty line. Sectors key to diversified and broader growth, including agriculture and hydropower, are particularly vulnerable to increased temperatures and more variable rainfall which can disrupt crop and livestock production and reduce the predictability of water flow volumes. While rising temperatures are expected to alter the area of endemic malaria, extreme heat events will create additional health risks for urban populations and for vulnerable populations in other areas. Rising sea levels threaten both coastal populations and oil and gas production due to the increased risk of flooding, infrastructure loss, and the salinization of surface and coastal aquifers.

3.3 Sectors Particularly Vulnerable to a Specific Climate Risk or Climate-Induced Disaster

3.3.1 Agriculture

Agriculture is key to Nigeria's economy; it is the main source of income for 80% of rural poor people and contributes more than 20% to the national gross domestic product (GDP). Despite growing a wide range of crops, Nigeria is a major importer of food and struggles with malnutrition and food insecurity due to low productivity. Nigeria is one of the largest consumers and producers of rice in Africa and the largest producer of cassava in the world. Studies show that increased levels of atmospheric CO₂ will lead to nutrient declines in rice of up to 17%, and higher temperatures and variability in rainfall will

¹³ https://www.climatelinks.org/sites/default/files/asset/document/nigeria_climate_vulnerability_profile_jan2013.pdf

reduce rice yields. Cassava, while adapted to hot, dry conditions compared with other crops, is susceptible to waterlogging and may be sensitive to increased levels of CO₂, which could increase cyanide concentrations. The majority of agricultural production is rainfed (less than 1% is irrigated) and done by smallholder farmers using traditional methods. Floods, erosion, and soil loss are key concerns in the south. These same hazards, in addition to declines in precipitation and increased temperatures, threaten crops and livestock in the north. Crop failures are already occurring due to intense rain storms, flooding, and a shifting exposure to pests, all issues that will intensify with climate change (Benson & Kolawole 2017).

A shortened growing season due to higher temperatures will negatively impact rice yields on average across Africa by 24% by 2070, especially in rainfed rice-growing areas. Agricultural losses by 2100 could reach 2% to 4% of the GDP in West Africa. Livestock production, mainly cattle, sheep, and goats, is a significant contributor to Nigeria's agriculture; 60% is managed on semi-arid lands. Yields are low in part due to lack of feed and grazing lands, which are under pressure from climate-change-related desertification in the semi-arid region.

3.3.2 Human Health

Since 2005, Nigeria's human health indicators have been improving (its Human Development Index value increased 13.1%), but challenges remain, and a changing climate could reverse recent gains. By 2070, projections suggest that approximately 550,000 people could be affected by flooding each year due to sea level rise. Inland river floods are also likely to increase, placing an additional 800,000 people at risk each year by 2030. Flooding has both direct and indirect effects on health, including loss of life resulting from extreme weather events, disruptions to food production, water contamination, and increased risk of vector-borne and waterborne diseases. In 2017, a cholera outbreak in Lagos was linked to floodwaters contaminated by septic overflows entering water supplies. Nigeria's water and sanitation infrastructure is not well prepared to handle the projected increase in intense precipitation; in rural areas only 44% of people have good sanitation and 39% have access to potable water. The proportion of diarrheal deaths attributable to climate change is projected to rise to 14% by 2050. Climate change will likely exacerbate health issues related to respiratory infections (already responsible for 19% of deaths in Nigeria), as air pollution is expected to worsen with rising temperatures. Almost 130,000 deaths per year are attributed to household air pollution from the indoor burning of cooking fuel (National Human Development Report 2015). Extreme heat intensifies ground-level ozone, which combines with fine particulate pollutants (soot and dirt from coal combustion, diesel engines, and fires) and chemicals such as carbon monoxide and sulfur dioxide to reduce air quality, especially in urban areas.

However, on a more positive note, malaria deaths may decrease. Malaria, the number one cause of death for children under the age of five in Nigeria, is spread by the *Anopheles* mosquito, which is sensitive to changes in temperature and rainfall. As with much of West Africa, areas of endemic malaria are projected to contract, as the disease-carrying mosquito is unable to survive in higher temperatures (National Human Development Report 2015).

3.4 Methods Used for the Climate Risk and Vulnerability Assessments

Ayotodun et. al. (2019) used the integrated vulnerability assessment method to analyze the vulnerability of West African countries to climate change.¹⁴ Vulnerability is analyzed as a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. When a system's adaptive capacity is lower than its sensitivity and exposure, the system becomes more vulnerable to climate change impacts. The reverse is also true: the higher

¹⁴ <https://www.scirp.org/journal/paperinformation.aspx?paperid=93085>

the adaptive capacity, the less vulnerable the system is to climate change impact. This method uses a combination of indicators to measure vulnerability by computing indices and weighted averages for the selected indicators (USAID 2013).

3.5 Regional Vulnerability to a Climate Risk or Climate-Induced Disaster

Nigeria is at risk of numerous natural hazards; the country is prone to floods, storms, ocean surges, droughts, and wildfires. Nigeria's coastal states face extensive risks from storm surges along the entire coast. There are also risks of inland flooding and wildfires in the Niger Delta region, and of negative rainfall anomalies in the South-East. The northern areas of the country face chronic aridity and riverine flooding along the Sokoto River in the North-West and the Komadugu River system in the North-East, as well as transboundary flooding along the Niger and Benue rivers. The middle areas of the country are at risk of high exposure to aridity, which is compounded by high tensions between farmers and pastoralists concerning land rights and water access. Climate change, deforestation, watershed degradation, land use, urbanization, and widespread settlements in flood-prone areas have exacerbated these issues and the impacts from flooding and droughts, and have also increased the risk of wildfires. Bush fires in Nigeria are generally caused by human activities and serve as a land-clearing approach for agricultural purposes, waste disposal, pasture management, animal tracking, and hunting. The majority of damaging fires are observed from January onwards due to high temperature (above 35°C) and are also influenced by the hot and dry harmattan winds flowing from north to south between December and March. Heavy rainfall can also trigger riverine and flash floods; these are common in the country's hilly areas and can also trigger landslides and mudslides, which lead to gully erosion in sedimentary terrains. Additionally, water stress during dry periods is likely to be further exacerbated due to competing demands from household use, industrial consumption, and agriculture. Increased heat will further strain existing water resources and impacts from changing rainfall patterns.

In the absence of well-designed and inclusive policies in Nigeria, climate change and its adaptive measures can place a higher financial burden on poor households; for example, policies that expand public transport or carbon pricing may lead to higher public transport fares, which can impact poorer households more. Similarly, if not carefully done, limiting forestry activities to certain times of the year could impact Indigenous communities that depend on forests year-round for their livelihoods. In addition to addressing the distributional impacts of decarbonizing economies, there is also a need to understand and address the aspects related to social inclusion and to cultural and political economy, including agreeing on the types of transitions needed (economic, social, and so on) and identifying opportunities to address social inequality in these processes.

3.6 Climate Risk and Vulnerability at National and Sectoral Levels

3.6.1 Changes in Temperature and Rainfall

The mean annual rainfall in the south is about 3,000 mm per year, falling mostly from March to September. In the north, the mean annual rainfall ranges from 500 mm to 1,000 mm, with a long dry season that lasts up to seven months (October to April).¹⁵

The country is already experiencing climate variability in the form of increased temperatures, rainfall variability and higher rainfall intensity, droughts, floods, and heatwaves. Most of the northern states faces extreme aridity while others are exposed to seasonal riverine flooding.

¹⁵ World Bank Climate Knowledge Portal <https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-historical>.

Evidence suggests that from 1941 to 2000, the average temperature in the country has increased by 1.4 to 1.9°C.¹⁶ The annual rainfall has also decreased by 2 to 8 mm across most of the country in that same time period, but increased by 2 to 4 mm in a few places.¹⁷

The mean annual temperature is projected to rise by 1.81°C (from 1.25°C to 2.76°C) in 2040–2059¹⁸ (based on the CMIP5, RCP 8.5, Ensemble¹⁹). This will further increase to 3°C (1.4°C to 4.6°C) by the 2090s.

Temperature increases of about 0.2°C to 0.3°C per decade have been observed already across the various ecological regions of the country; at the same time, drought persistence has become a defining feature for the Sudan-Sahel regions since the late 1960s. For the humid zones of Nigeria, precipitation increases of about 2% to 3% for each degree of global warming may be expected. Thus, it is reasonable to expect that precipitation will probably increase by approximately 5% to 20% in the very humid areas of the forest regions and southern savanna areas.

In contrast, the savanna areas of northern Nigeria will probably have less rainfall, which, coupled with the temperature increases, will reduce soil moisture availability. This situation may be worsened by the expected decrease in rainfall, with greater drought probabilities and larger inter-annual variability.

3.6.2 Increase in the Occurrence of Extreme Weather Events

Based on the IPCC 2007 report, it is observed that Nigeria falls in the category of countries that are likely to experience:

- Warmer and more frequent hot days and nights over most land areas
- Warm spells and heat waves at an increased frequency over most land areas
- Warmer and more frequent hot days and nights over most land areas
- Heavy precipitation events at an increased frequency over most areas, or a higher proportion of total rainfall from heavy rainfalls
- Increased area affected by droughts.

In short, the frequency and intensity of extreme weather events will be on the increase. In the south, which receives high rainfall, climate change will intensify the severity of disasters, especially flooding, while in the low-precipitation northern ends, drought and aridity might worsen. It has been established that desertification is increasing and that many states outside the eleven known frontline states are facing the threat of the desert sprawl.²⁰ Desertification is the process of extreme land degradation such that the land becomes incapable of supporting plant growth, thereby becoming less suitable to support human populations. The United Nations Convention to Combat Desertification (UNCCD) defined it as

the degradation of land in arid, semi-arid, and dry sub-humid areas. It is a gradual process of soil productivity loss and the thinning out of the vegetative cover because of human activities and climatic variations such as prolonged droughts and floods.

¹⁶ BNRCC (Building Nigeria's Response to Climate Change). (2011). National adaptation strategy and plan of action on climate change for Nigeria (NASPA-CCN). Prepared for the Federal Ministry of Environment Special Climate Change Unit.

¹⁷ <https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-projections>

¹⁸ <https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-projections>

¹⁹ Future climate projections for Nigeria were based on the 5th Phase GCM Models of the Coupled Model Inter-comparison Project (CMIP5), which is a multi-model ensemble used by the IPCC in its 5th Assessment Report, also supported by the World Bank because they represent the most plausible projected outcomes of expected climatic changes.

²⁰ Kebbi, Sokoto, Zamfara, Katsina, Kano, Jigawa, Bauchi, Gombe, Yobe, Adamawa and Borno

Desertification in northern Nigeria is a complex process with many underlying drivers. It constitutes an enormous ecological threat to the socio-economic development and peaceful co-existence of people in the country.

3.6.3 Increasing Pressure on Ecology and Ecosystems

The severity of climate change impacts on the ecosystems depends, to a large extent, on the status of the flora and fauna. In particular, the forest ecology and ecosystems that are already under significant human pressure would be adversely affected. Significant climate change and sea level rise would result in loss of biodiversity, rapid deterioration in land cover, and the depletion of water availability through the destruction of catchments and aquifers. Persistent flooding and waterlogging could render forest regeneration more difficult.

The savanna biome of northern Nigeria would be very vulnerable to any dramatic reduction in rainfall in the region resulting from climate change. This could result in widespread degradation of habitats. Thus, climate change and sea level rise could affect the boundaries of the ecosystems and the mix of the species that compose them, such that the distribution of new patterns of plant and animal communities would be a reflection of how the different ecosystems have been able to adapt to the expected climates.

3.6.4 Increasing Vulnerability to Soil Erosion and Flooding

Due to climate change, some areas will start receiving heavier and steadier rainfall, and such areas will inevitably begin to experience increased rainfall-induced erosion. As a corollary, in the arid northern parts of Nigeria, higher temperatures will contribute to the dry conditions that underlie accelerated wind erosion. These are extremely serious situations given that soil erosion is already reaching catastrophic proportions in some parts of Nigeria, while floods annually ravage many parts of the country during the rainy season. For example, it is estimated that in the states of Abia, Anambra and Imo, there are no fewer than 600 gully erosion sites.

As a result of widespread reduction of vegetation cover, all parts of the country are vulnerable to soil erosion resulting from climate change, in terms of either the removal of soil by wind and rain.

4. National Adaptation Priorities, Strategies, Policies, Plans, Goals, and Actions

As highlighted in Chapter 2, Nigeria has developed several policies and strategic initiatives which, if properly implemented, can drive adaptive as well as mitigative climate change measures. Most of the policy frameworks cover both mitigation and adaptation strategies and plans. While chapter 2 lists the policies, in this chapter, the adaptation priorities, strategies, and plans enshrined in the policies are discussed in a little more detail.

4.1 Adaptation Priorities in the Climate Change Policies

On the domestic front, the country has developed several policy instruments on climate change and adaptation in particular. Apart from the three national communications and the national policy on climate change, there are also adaptation specific instruments. These include the National Adaptation Strategy and Action Plan on Climate Change for Nigeria (NASPA-CCN) developed in 2011, the National Adaptation Plan Framework developed in 2020, and the Nigeria Climate Change and Response Strategy, developed in 2012 and recently reviewed in 2021.

4.1.1 The National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (NASPA-CCN)

The federal government underscores the importance of adaptation as key to adequately preparing for and responding to climate change impacts. Accordingly, in collaboration with several civil society organizations, in 2011, the government developed the National Adaptation Strategy Action Plan for Climate Change in Nigeria (NASPA-CCN). The NASPA-CCN document contains an analysis of the current and future scenarios of climate change in the country, as well as a wide range of strategies to address specific adaptation challenges in the different sectors of the country's economy, including agriculture (crops and livestock), freshwater resources, water resources and fisheries, coastal ecosystems, forests, and biodiversity. In addition, the document elaborates on the potentials of adaptation as a channel for managing the critical challenges of climate change in the different sectors of the country's economy. The strategy contained in the NASPA-CCN document seeks to minimize risks, improve local and national adaptive capacity and resilience, leverage new opportunities, and facilitate collaboration with the global community, all to reduce Nigeria's vulnerability to the negative impacts of climate change.

4.1.2 National Adaptation Plan (NAP) Framework

Another effort made by the Nigerian Government on climate change adaptation was developing the National Adaptation Plan (NAP) Framework to manage the country's medium- and long-term adaptation needs in a coherent and coordinated manner.

The document provides a broad-based framework for Nigeria to address its NAP effectively. The NAP Global Network supported it as a step toward adopting the Cancun Adaptation Framework (CAF) in Nigeria to enhance actions on adaptation, reduce vulnerabilities, and build resilience in developing countries. The NAP Framework aims to manage Nigeria's medium- and long-term adaptation needs in a coherent and coordinated manner. Its purpose is to guide the government and lawmakers in developing, coordinating, and implementing the various policies, plans, strategies, and pieces of legislation to enable Nigeria to address its adaptation needs.

Specifically, the objectives of the NAP Framework are to:

- Clarify the country's approach to its NAP process, which includes articulating the country's vision of climate change adaptation, its adaptation objectives, the principles that will guide adaptation actions, and the roles and responsibilities of relevant stakeholders. It is also a reference point for bringing together various adaptation planning efforts from different sectors and scales of decision-making (i.e., national, state, and local governments).
- Align the NAP process with existing policies (e.g., the Economic Recovery and Growth Plan (ERGP), NASPA-CCN, the National Climate Change Policy Response and Strategy (NCCP-RS), strategies, and adaptation research.
- Focus on specific themes that are particularly relevant or unique to Nigeria's context.

4.1.3 The Nigeria Climate Change Policy Response and Strategy (NCCPRS) 2021

Due to recent changes in global discourse and emergence of newer initiatives aimed at tackling climate change, the need for a review of the 2012 NCCPRS became necessary. The NCCPRS was therefore reviewed in 2021. The purpose of the revised NCCPRS, therefore, is to define a new holistic framework to guide the country's response to the development challenge posed by climate change. The policy prescribes sectoral and cross-sectoral strategic policy statements and actions for the management of climate change (including adaptation) to enable the country to pursue a low-carbon, high-growth, and climate-resilient sustainable development trajectory. The policy outlines the need to promote a low-carbon and sustainable economy; enhance national capacity to adapt to climate change; and raise climate-change-related science, technology, and research and development (R&D) to a new level that will enable the country to better participate in international scientific and technological cooperation on climate change. The policy also emphasizes the need to strengthen public institutions and create a functional framework for climate change governance. Increased public awareness and the involvement of the private sector are also necessary for achieving the policy's objectives.

The NCCPRS will help the country reduce greenhouse gas emissions and strengthen adaptation of people and systems to the risks posed by changing climate. In the medium term, the policy is expected to assist the country achieve a resilient socio-economic environment that promotes sustainable development; act as a mechanism for coordinating the development planning, financing and monitoring of climate change initiatives and programs; and articulate the goals and objectives for climate change management in Nigeria.

The Nigerian government recognizes the need to develop effective adaptation initiatives to reduce vulnerabilities to climate change. To achieve that, all opportunities for building climate resilience by strengthening coping and adaptive capacities are being explored. The main policy thrust on adaptation in the country is to reduce the population's vulnerabilities and promote community and ecosystem resilience to the impact of climate change, while ensuring that women, girls, and other vulnerable groups are engaged and involved in planning and implementing long-term climate change adaptation interventions.

4.2 National Adaptation Strategies, Policies, and Action Plans

Continued adaptation efforts are focused on the country's most vulnerable sectors: agriculture and food security, forests and biodiversity, water resources, energy and infrastructure, health, human settlement, industry and commerce, transportation and communication. These efforts aim to increase the country's resilience capabilities and strengthen its social and economic structures against vulnerability. The following section lists the adaptation strategies and policies for thirteen priority sectors captured in the NASPA-CCN (2011), the NAP Framework (2020), and the NCCPRS (2021).

4.2.1 Agriculture: Crops and livestock

- Adopt improved agricultural systems for both crops and livestock (for example, diversify livestock and improve range management).
- Increase access to drought-resistant crops and livestock feeds, adopt better soil management practices, and provide early warning and meteorological forecasts and related information.
- Implement strategies for improved resource management. This includes, for example, increasing the use of irrigation systems that use low amounts of water, increasing rainwater and sustainable groundwater harvesting for use in agriculture, increasing the planting of native vegetation cover and the promotion of greening efforts, and intensifying crop and livestock production in place of slash-and-burn approaches.
- Focus on agricultural impacts in the savanna zones, particularly the Sahel, and other areas that are likely to be most affected by the impacts of climate change.
- Promote efficient, gender-responsive, socially inclusive, and climate-smart crop production and fishery and livestock development practices.
- Promote and support effective research and knowledge development and management to connect farmers, policy-makers, businesses, and researchers to work on adapting to dynamic current and future climates scenarios.
- Develop and apply improved production and risk management technologies in agriculture.
- Increase the uptake of adaptation measures at the farm and community levels.
- Reinvigorate extension services, capacity-building, and technology transfer approaches to provide support to a wider group of farmers, including women and youth.
- Strengthen 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.
- Strengthen regulatory and institutional capacity to implement and disseminate technical solutions in adaptation to agriculture.

4.2.2 Freshwater Resources, Coastal Water Resources, and Fisheries

- Initiate a national program for integrated water resource management at the watershed level.
- Intensify programs to survey water quality and quantity for both ground and surface water.
- Implement programs to sustainably extend and improve water supply and water management infrastructure.
- Explore water efficiency and the management of water demand, particularly in the Sahel and Sudan savanna areas.
- Enhance artisanal fisheries and encourage sustainable aquaculture as adaptation options for fishing communities.
- Strengthen integrated water resources management (IWRM) for multilayered development of the nation's water resources infrastructure.
- Develop gender-responsive, socially inclusive, and resilient water and sanitation infrastructure.
- Invest in small-scale earth dams for multi-purpose use.
- Promote alternative water supplies, including inter- and intra-basin water transfer.
- Strengthen river basin governance and scale up regional cooperation, particularly along the

major river basins and catchment areas.

- Increase the network density of hydrometric network for early warning forecasting.
- Strengthen appropriate policy, regulatory, and institutional reforms and provide economic instruments for water supply and demand management.
- Strengthen the capacity for smart water management.
- Promote investment in the sector, including through enhanced public and private-sector participation.
- Deploy renewable energy sources for water infrastructure.

4.2.3 Forests and Biodiversity

- Strengthen the implementation of the national Community-Based Forest Resources Management Programme.
- Support review and implementation of the National Forest Policy.
- Develop and maintain a frequent forest inventory system to facilitate the 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 CSOs, communities, and the private sector to help establish and restore community and private natural forests, plantations, and nurseries.
- Improve the management of forest reserves and enforce low-impact logging practices.
- Support the active implementation of the National Biodiversity Strategy and Action Plan (NBSAP), particularly those strategic actions that address climate change impacts.
- Support the recommended climate change adaptation policies and programs in sectors that affect biodiversity conservation, including agriculture, forestry, energy, and livelihoods.
- Support and implement programs for alternative livelihoods in order to reduce unsustainable resource use that contributes to loss of biodiversity.
- Treat forests as resources that must be properly accounted for.
- Strengthen the management of forests and expand tree cover through gender-responsive socially and environmentally responsible reforestation and restoration initiatives
- Facilitate sustainable regulatory frameworks and incentives, as well as financial mechanisms, for the implementation of the REDD+ Strategy and the Great Green Wall Initiative.
- Mainstream climate change adaptation into forest management.
- Enhance forest capacity for adaptation by reducing ecosystem vulnerability and reducing ecosystems' exposure to extreme events.

4.2.4 Strategies for Health and Sanitation

- Undertake research to better understand the health impacts of climate change in Nigeria.
- Strengthen disease prevention and treatment for those diseases expected to increase as a result of climate change.
- Reinforce programs to build and maintain wastewater and solid waste management facilities.
- Promote and facilitate the adoption of practices and technologies that reduce exposure and health impacts from extreme heat.
- Establish early warning and health surveillance programs.
- Strengthen the adaptation strategy for the health sector and align it with the National Adaptation

Plan (NAP) Framework.

- Strengthen surveillance programs for monitoring human health under a changing climate.
- Promote climate-resilient infrastructural development and maintenance in the health sector.
- Promote policies that will retain qualified health personnel to enhance health sector resilience. Create a functional, effective, and transparent program for their retention.
- Promote community hygiene and general cleanliness in all sectors.
- Promote preparedness in all areas of primary healthcare delivery and response to climate-induced diseases and pandemics.

4.2.5 Human Settlements and Housing

- Develop climate change adaptation action plans for urban areas, particularly those at greatest risk.
- Assist communities to reduce vulnerability through participatory planning of land use and housing.
- Discourage building and urban encroachment into vulnerable areas, high-risk zones and low-lying areas.
- Discourage housing and settlement practices that are maladaptive in the face of climate change.
- Strengthen rural settlements in order to reduce migration.
- Support main settlements to develop and undertake ambitious climate change adaptation actions.
- Strengthen institutional capacity for urban development and for the promotion of climate-resilient cities.
- Strengthen socially inclusive and gender-responsive land use planning and promote urban renewal.
- Strengthen regulatory and institutional frameworks to ensure resilient settlements.

4.2.6 Energy

- Include increased protective margins in the construction and placement of energy infrastructure (i.e. higher standards and specifications).
- Undertake risk assessment and risk reduction measures to increase the resilience of the energy sector.
- Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible no-regrets actions.
- Develop and diversify secure energy backup systems to ensure that both civil society and security forces have access to emergency energy supply.
- Expand sustainable energy sources and decentralize transmission in order to reduce the vulnerability of energy infrastructure to climate impacts.
- Climate-proof the energy sector for resilience.
- Invest in protective energy infrastructure to reduce loss and damage caused by climate-related extreme events.
- Promote decentralized energy systems to increase resilience, with an emphasis on mini-grids and stand-alone systems.
- Improve access to energy, particularly in rural areas.

- Improve energy efficiency, water efficiency and demand-side management to alleviate supply constraints.
- Invest in early warning systems, including reliable and timely weather and hydrometeorological observations combined with forecast models.

4.2.7 Transportation and Communications

- Include increased protective margins in the construction and placement of transportation and communications infrastructure (i.e., higher standards and specifications).
- Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors.
- Strengthen existing transportation and communications infrastructure, in part through early efforts to identify and implement all possible no-regrets actions.
- Develop and diversify secure communication backup systems to ensure that both civil society and security forces have access to emergency communication methods.
- Make provisions for diverse transportation options, such as pedestrian, bicycle, and transit routes.
- Ensure a functional, socially inclusive, gender-responsive, culturally appropriate and adaptable transport system.
- Revise and adapt standards and guidelines for transport infrastructure construction, maintenance, and exploitation under different climatic scenarios.
- Promote and support research on the impacts of climate change on transport demand and supply.
- Undertake a comprehensive evaluation of the vulnerability of transport networks and identify response strategies.
- Mainstream adaptation into transport planning, decision-making and implementation.
- Promote public and private-sector investment in climate-proofed and climate-resilient transport infrastructure.
- Ensure the diversification of transport modes with appropriate adaptive capacities.

4.2.8 Industry and Commerce

- Increase knowledge and awareness of climate change risks and opportunities.
- Undertake and implement risk assessments and risk reduction measures.
- Incorporate climate change into ongoing business planning.
- Review and enforce land use plans in industrial areas in light of climate change.
- Encourage the relocation of high-risk industries, facilities and markets.
- Promote and market opportunities emerging from climate change.
- Encourage informal savings and insurance schemes, and arrange for the availability of medium-term credit (especially for industries in crisis).
- Promote a value-chain-based approach for climate-resilient industry.
- Harness the potential of clean technologies for climate-resilient industrial development.
- Foster innovation and strengthen entrepreneurship to develop new capacity for wealth creation whilst safeguarding the environment and promoting sustainable climate-resilient industrial development.

- Facilitate international partnerships to reinforce cooperation for climate resilience in the sector.

4.2.9 Disaster, Migration, and Security

- Strengthen capacity to anticipate disasters and impacts on internal migration and security.
- Strengthen capacity to respond through information and awareness, training, equipment, plans and scenarios, and communication.
- Strengthen individual and community-based emergency preparedness and response capacity in high-risk areas.
- Strengthen rural infrastructure and the availability of jobs to discourage out- migration.
- Integrate climate change into the national and regional security strategies.
- Strengthen the capacities of security agencies and institutions to mainstream gender-based perspectives and climate risk considerations in security planning and operations.
- Strengthen capacity to anticipate and respond to disasters and impacts on internal migration and security.
- Develop robust projections in terms of climate change impacts for the formulation of appropriate policies towards reducing vulnerability.
- Promote open and constructive dialogue for coordinated multilateral mechanisms to address climate risks and the development of effective policy responses and strategies on climate-change-related security issues.
- Institutionalize inclusive, participatory decision-making process to reflect the voices of women, girls, and youth as ecosystem managers under increasing insecurity.
- Develop and implement strategies that allow for the better management of climate variability and lessen its impact on livelihoods and agricultural production in order to enhance security.
- Strengthen rural infrastructure and promote sustainable rural livelihoods.
- Minimize the existence of ungoverned spaces.
- Integrate migration and human displacement issues in national climate change planning.

4.2.10 Adaptation Strategies for Livelihoods

- Develop a replicable approach or model that uses intermediate NGOs, community members, and radio to disseminate climate change adaptation approaches and information and to gather feedback on adaptation actions focused on livelihoods.
- Build a network of intermediate NGOs capable of working on climate change and livelihood issues, where these NGOs support a number of communities in high-risk states.
- Reach communities with appropriate engagement methods in order to elicit and document needs and vulnerabilities related to climate change and livelihood.
- Use or reinforce available (endogenous) community resources to reduce vulnerability and build livelihood-linked capacity to adapt to climate change.
- Encourage community participation and active roles by both genders in all livelihood development initiatives.

4.2.11 Adaptation Strategies for Vulnerable Groups (from NASPA-CCN, 2011)

- Create awareness among government staff, including disaster and emergency management

personnel, about climate change impacts and how these impacts affect vulnerable groups.

- Provide basic training for government staff on gender awareness tools to enhance implementation capacities.
- Adapt government programs, including emergency response plans and programs directed at vulnerable groups, to better address the impacts of climate change on these groups.
- Adapt public service facilities, including school buildings, to withstand storms and excess heat.
- Intensify the immunization of children and youth to provide protection against diseases that are expected to become more prevalent with climate change.
- Retrain health workers to appreciate emerging climate change challenges within the context of immunization delivery and other comprehensive healthcare delivery.
- Encourage faith-based and civil society organizations to provide social welfare programs and other support to address the climate-change- induced needs of vulnerable groups.

4.2.13 Adaptation Strategies for Education

- Provide evidence-based information to raise awareness and trigger climate change adaptation actions that will protect present and future generations.
- Develop skills-based curriculum in subjects such as science, geography, social studies, language arts, environmental education, and technology that will empower children to better respond to the threats of climate change.
- Train teachers on climate change adaptation teaching strategies and techniques at pre-primary, primary, secondary, and tertiary levels of education.

4.3 Adaptation Strategies and Actions for Stakeholders

Nigeria's policy documents and action plans on climate change have also recommended specific adaptation strategies and actions for various stakeholders as set out in the following sections.

4.3.1 The Federal Government

- Enact a comprehensive law or body of laws to provide a mechanism for achieving Nigeria's adaptation policy objectives.
- Mainstream climate change adaptation into all existing and new national development plans and official vision statements.
- Respond actively and effectively to global and regional initiatives on climate change adaptation.
- Mandate the authority responsible for climate change to carry out the following functions: planning and setting priorities (including support for information and data collection), implementation, mobilization of resources, and evaluation.

4.3.2 State Governments

- Have a focal ministry, department, or agency mandated to lead and provide strong coordination for all climate change adaptation activities.
- Mainstream climate change adaptation into all existing and new development plans and official vision statements, and into all existing and new policies and programs.
- Ensure that climate change adaptation is taken into account when drawing up the state's annual budget.

- Actively and consistently strengthen inter-ministerial and inter-agency coordination and cooperation in climate change adaptation in the state.
- Create an enabling environment for the organized private sector to invest in climate change adaptation, including business opportunities presented by climate change adaptation options.

4.3.3 Local Governments

- Strengthen the adaptive capacity of communities by providing information and technical know-how and by facilitating access to micro-credit and other measures.
- Put in place a climate change adaptation communication and outreach strategy with the objective of enabling a level of understanding that will allow all stakeholders to participate actively in climate change adaptation.

4.3.4 Private Sector

- Analyze the impacts of climate change and assess the vulnerability of the sector.
- Build climate change adaptation considerations into strategies and operations.
- Buy into opportunities presented by climate change adaptation, such as, for example, in the area of developing or commercializing new technologies.
- Work with other stakeholders, especially CSOs and community-based organizations (CBOs), to engender grassroots adaptation as part of corporate social responsibility.
- Sponsor needed research into climate change impacts, vulnerability, and adaptation.

4.3.5 Civil Society Organizations

- Engage in outreach activities to raise people's awareness of climate change and adaptation measures.
- Carry out gender-sensitive research that will deepen our understanding of communities' awareness and vulnerability, and of the status of community adaptation to climate change.
- Work with the three levels of government and international partners to deliver targeted support to people impacted by climate change, particularly the most vulnerable groups.
- Work with communities on pilot projects to introduce new and improved adaptation options and to replicate Indigenous and local climate change adaptation strategies.
- Run training programs on climate change adaptation for communities.
- Provide independent monitoring of progress towards effective adaptation in Nigeria.
- Enhance informed participation in decision-making regarding climate change.

4.3.6 Households and Individuals

- Learn how they can adapt to climate change.
- Be willing to share information with other stakeholders on their experiences in climate change impacts and adaptation.
- Prepare to make attitudinal changes in order to build capacity for adaptation.
- Recognize that adaptation to climate change can be informed by, and build on, what they are already doing.

4.3.7 International Organizations and Donors

- Provide technical and financial support for capacity-building, reducing barriers to adaptation, and the implementation of climate change adaptation policies, programs, and other measures.
- Provide technical support for research, monitoring, and evaluation of the mainstreaming process in order to develop an understanding of what contributes to its success.
- Provide technical support in identifying disaster risk reduction initiatives, as well as poverty reduction and natural resource management programs, which address climate change vulnerability in a cost-effective way.

4.4 Linkages of Adaptation Goals and Strategies in the Different National Policy Frameworks

Nigeria has unambiguously formulated a number of policies, strategies and action plans on climate change in general and adaptation in particular. However, these are not linked with each other in a coherent manner. For instance, the country's NDC, national adaptation plan, and third national communication are not well aligned with one other. Similarly, other sectoral policies (e.g., agriculture, water resources, and energy, among others) also contain adaptation strategies and action plans that stand alone and are not linked to the main climate change mitigation and adaptation pronouncements of the DCC.

As such, there is a need to integrate the adaptation vision, goals, and strategies enunciated in the different policies and communications in a coherent manner. This is to enable seamless implementation and prevent duplications and overlaps. The ADCOM report provides a platform for integrating these adaptation policies and strategies for greater impact.

4.5 Linkages of Adaptation Goals and Strategies with Other Global Agendas

Nigeria's vision, goals, and strategies on adaptation are similar with GGAs and other global agendas such as the Agenda 2030 for Sustainable Development, the Sendai Framework for Disaster Risk Reduction, and the Convention on Biological Diversity (CBD). However, they are not expressly interlinked. The national goals and strategies need to be reviewed alongside these global agendas.

4.6 Timeframe for Implementation of Adaptation Goals and Strategies

Another drawback of the national policy frameworks for climate change adaptation, with the exception of the NDC, is the lack of specific timeframe for achieving adaptation goals and strategies. There is a need, therefore, to set a timeframe for achieving adaptation actions in the country. This timeframe should be aligned with the NDC, other national communications, and relevant sectoral policies, as well as internationally with the Global Stocktake, GGAs, and other global agendas.

5. Implementation and Support Needs of to Developing Country Parties and Provision of Support

5.1 Adaptation Support Needs

Nigeria has estimated the cost implications of climate change impacts for all sectors. The findings projected a loss of about 6% to 30% (USD 100 to 400 billion) GDP for the nation by 2050 (Abraham & Fonta, 2018; Okon et al., 2021; Oladipo, 2010; Ukoha, 2020).

The overall estimate for Nigeria's adaptation cost has yet to be assessed. However, estimates for Nigeria's priority sectors (agriculture, water resources, health, and transport) are available. It shows an incremental cost for agriculture and water resources estimated at USD 3.06 billion per year from 2020 and rising to about USD 5.50 billion in 2050. The transport sector's incremental cost for adaptation is equally estimated to rise from USD 5.33 billion to USD 9.69 billion per year for 2020 and 2050 respectively (Federal Ministry of Environment, 2010; Okon et al., 2021).²¹

For the Technology Need Assessment (TNA) in Nigeria, support has been gained from the Climate Technology Center and Network (CTCN) for the development of Nigeria's capacity to assess its technology needs.²²

Key lessons from the National Economic Emancipation and Development Strategy (NEEDS) point to the fact that Nigeria's climate change adaptation will be costly. Therefore, there is a need to leverage funding for adaptation. Though the country has identified its technical, financial, technological, and sectoral needs (Bosello, Campagnolo, & Eboli, 2013; Mbanasor, Nwachukwu, Agwu, & Onwusiribe, 2012), budgetary allocations in the past decade have shown more commitment to mitigation, and very meagre funds have been dedicated to adaptation (Onyimadu, Uche, Ogbonna, & Alugbuo, 2020). Currently, Nigeria's adaptation support comes from two types of sources: international and national.

5.2 Existing Types and Sources of Finance for Nigeria's Adaptation

International funding involves multilateral, bilateral, and donor agencies and organizations from outside the country. Between 2005 and 2008, 84 adaptation projects were executed across Nigeria totaling around USD 696 million. AidData identified several bilateral and multilateral donors. The bilateral donors include the United Kingdom, the United States, Canada, South Korea, Germany, Greece, Ireland, Spain, and Norway. The multilateral agencies include the World Bank Carbon offset/World Bank Managed Trust Fund, GEF, IDA, and EC.²³

Recently, Nigeria's existing adaptation finance has largely come from the multilateral climate funding sources. The major funders are the Green Climate Fund (GCF), the Adaptation Fund (AF), the Global Environment Facility (GEF), and the World Bank. Others include the Special Climate Change Fund

²¹ Details of the NEEDS can be accessed <https://unfccc.int/files/adaptation/application/pdf/nigerianneeds.pdf>.

²² <https://www.ctc-n.org/technical-assistance/projects/technical-guidance-and-support-conducting-technology-needs-assessment>

²³Details of the funds and adaptation intervention can be seen in Appendix C (page 19) <https://www.files.ethz.ch/isn/133060/2011-03.pdf>.

(SCCF), the Clean Investment Fund (CIF), and the Fast Start Finance (Fatoki & Sasona, 2015)²⁴.

Other sources of foreign funding for specific adaptation intervention include the European Union and FAO funds for the Great Green Wall (GGW) supporting the implementation of the Action Against Desertification (AAD) project, the African Development Bank, and New Partnership for Africa's Development (NEPAD). In the health sector, FHI 360 has supported the drive to adaptation via the Strengthening Integrated Development of HIV/AIDS Services (SIDHAS) plan and by aiding in conflict recovery in the northeast Nigeria.

National efforts to raise funding for climate change adaptation are another source of climate finance. These include the Development of Natural Resources Fund (DNRF), the Ecological Fund Office (EFO), Great Green Wall funding and the Clean Technology Investment Fund (CTF)²⁵. Nigeria's Sovereign Green Bond is another source of climate finance, where a target of USD 284 million has been set for seven critical sectors²⁶. Efforts to see the emergence of the National Strategic Climate Change Trust Fund have transformed into a bill seeking the creation of a national climate change council and agency. The bill has passed a reading in the lower chamber of the national assembly.

5.3 Assessment of Implementation of Adaptation Actions

There is no formalized or systematic approach to assessing, monitoring, reviewing, or reporting on ongoing adaptation efforts at all government levels (federal, state, or local) in Nigeria (Federal Ministry of Environment, 2014; Green Climate Fund, 2017).

5.4 Mainstreaming Climate Adaptation in National Planning

Adaptation actions have been mainstreamed within national planning (NEST, 2011; Orie, 2021). However, more political commitment is required in order to fill the financing gaps, integrate adaptation into EIA, engage the private sector, raise awareness, strengthen political will, speed the passage of climate change response laws, support grassroots participation, and overcome institutional barriers, among other things (Matemilola, Adedeji, Elegbede, & Kies, 2019; Okon et al., 2021; Sola, Mensah, Albrecht, & Ibrahim, 2020).

5.5 Capacity-Building Support

Climate change is adding a new challenge to Nigeria's development efforts. Overcoming the development challenge of climate change requires addressing climate change in a sustainable way. Unfortunately, not all countries have the capacity to do so, meaning the knowledge, tools, public support, scientific expertise, and political know-how. A country cannot mitigate or adapt to climate change without first having the capacity to do so. Capacity-building is about enhancing the ability of individuals, organizations, and institutions in developing countries and in countries with economies in transition to identify, plan, and implement ways to mitigate and adapt to climate change. Capacity-building under the Convention and its Kyoto Protocol takes place on three levels: individual, institutional, and strategic.

Even before its ratification of the United Nations Framework Convention on Climate Change and the

²⁴<https://www.greenclimate.fund/sites/default/files/document/readiness-proposals-nigeria-uneq-adaptation-planning.pdf>; and <https://open.unido.org/api/documents/17352896/download/GCF%20Readiness%20Proposal%20-%20Nigeria,%20UNIDO-CTCN.pdf>.

²⁵ https://www.climateinvestmentfunds.org/sites/cif_enc/files/nigeria_ctf_ip_july_2014_revision_0.pdf

²⁶ More information on this can be found in: https://climatechange.gov.ng/wpcontent/uploads/2021/08/NCCP_NIGERIA_REVISIED_2-JUNE-2021.pdf

Kyoto Protocol, Nigeria had developed a domestic structure for building technical capacity for the planning and implementation of adaptation efforts. At the strategic level, currently, Nigeria is developing a toolkit for the establishment and capacity development of climate change desks or units in state ministries of the environment and relevant MDAs.²⁷

5.6 Private Sector Engagement in Adaptation Actions

The private sector in many developing nations is increasingly being involved in financing, planning, and implementing adaptation actions (Paun and Pegel, 2013). In Nigeria, there are several public-private partnership initiatives in the area of mitigation to climate change. However, in the area of adaptation, a lot still needs to be done to strengthen public-private engagement (Itua & Esambe, 2021; Oladipo, 2010). Despite Nigeria's private sector lagging behind with regard to climate financing compared with other African countries, it is nevertheless gradually improving, as witnessed in the preparation of the country's NDC recently.²⁸ This is partly due to opportunities created by international finance organizations for the private sector to leverage funds for climate action.²⁹

²⁷ [Workshop on: Toolkit for the establishment/capacity development of climate change. Department of Climate Change](#)

²⁸ <https://cccd.funai.edu.ng/wp-content/uploads/dae-uploads/Private-Sector-in-Nigeria-NDC-FINAL.pdf>

²⁹ https://www.afdb.org/sites/default/files/2020/06/24/factsheet_nigeria_en.pdf

6. Implementation of Adaptation Actions and Plans

6.1 Implementation of Adaptation Actions in Line with the Global Goal on Adaptation

Because the impacts of climate change are felt across the country, it has become necessary to develop coherent, effective, and sustainable ways of adapting to its consequences. Nigeria is highly vulnerable to climate change because a large proportion of its population is dependent on natural resources, as well as because of the country's extensive coastline, different agro-climatic zones, and weak socio-economic status.

This vulnerability has exposed the country and its people to various climate-change-induced hazards, risks, and impacts over the last decade. In order to protect the environment, as well as the people and their well-being, the country has been responding to these climatic challenges by reducing its vulnerability, strengthening its resilience, and enhancing its adaptive capacity in line with the Global Goals on Adaptation (GGA).

Nigeria has done an excellent job of formulating the right policies, establishing the right institutions, and setting up the necessary structures to enable it to discharge its international and national obligations in tackling climate change and fostering adaptation. The challenge has always been with regard to implementation. The following sections briefly highlight how the adaptation strategies, policies, and plans are being implemented by the various sectors and stakeholder groups in the country.

6.2 Current Status of Adaptation Actions

Through the NASPA-CCN (2011), the NAP Framework (2020), and the NCCP (2021), Nigeria has developed the right policies, strategies, and action plans to achieve its adaptation priorities. Adaptation issues are addressed using a sectoral approach. The key sectors given prominence include agriculture, energy, water resources, forestry and wildlife, education, health, security, and transportation. Cross-cutting issues, such as gender and finance, also affect each of the sectors.

All adaptation activities are coordinated by the designated national authority, which is the Department of Climate Change of the Federal Ministry of Environment. The DCC has been actively engaging other sectoral stakeholders through the Inter-ministerial Committee on Climate Change (ICCC). The ICCC has so far coordinated the implementation of several programs and projects. Through the activities of the ICCC, many MDAs have established climate desks to coordinate sectoral climate actions.

6.3 Adaptation Actions for Recognition in Sectors and by Stakeholders

The strategic guidance provided by the policy, legal, and institutional frameworks have enabled stakeholders to implement adaptation actions with some level of success. However, these achievements are not without challenges. These adaptation actions are summarized in Table 3.

Table 3. Adaptation Actions by Federal Ministries

No.	Federal Ministries	Adaptation actions
1.	Federal Ministry of Environment	<ul style="list-style-type: none"> • The Great Green Wall Project • Action Against Desertification Project • Sovereign Green Bond • Coastal zone management: Shoreline protection • Adaptive water harvesting programme. • Flood Early Warning Systems (FEWS) • Various afforestation projects • Creation of green jobs • Sand dune fixation • Establishment of trees nurseries • Training on climate change adaptation • Ecosystem Restoration Projects • Advocacy campaign • Funding and support for adaptation actions. • Climate resilience building activities • Pollution control projects • Flood and erosion control • Climate-smart drainage systems • Land/gully reclamation projects • Space Programme on Climate Resilience • Solid Waste Management projects • Hospital Waste Intervention Scheme. • Material Recovery facilities. • Integrated Waste Management Facilities. • Briquetting Plants. • Scrap Metal Recycling Plants. • National Plastic Recycling programme
2	Federal Ministry of Agriculture	<ul style="list-style-type: none"> • Agriculture and Rural Institutions Support Projects • Development of climate-smart crop varieties • Improving access to climate-smart technology • West Africa Agricultural Productivity Program (WAAPP) • Innovate, generate, disseminate, adopt improved technology • Build human and institutional capacity across the sub-region • Create youth employment, engage women and adapt to climate change. • Climate Smart Agricultural Programmes • Improved drought-tolerant seeds • Developed efficient irrigation systems • Developed agroforestry systems • Developed sustainable livestock programme

No.	Federal Ministries	Adaptation actions
		<ul style="list-style-type: none"> • Establishment of Automatic Weather Stations. • Run-off Water Harvesting Structures. • Climate Change Adaptation and Agricultural Business Support Programme. • Agricultural risks profile in Nigeria • Collaboration with Federal Ministry of Environment on Capacity Development on relevant areas of GHG Emission (Reporting, Calculation, funding etc.) • FMARD is also working with NEPAD Coordinating Agency through TerrAfrica on the Review/Update of Nigeria Country Investment Framework (CSIF – SLM), Cross River pilot • Review of National Agricultural Resilience Framework (2014) document. • Production of NARF Implementation manual. • MOU with Nigerian Meteorological Agency (Nimet)
3	Federal Ministry of Water Resources	<ul style="list-style-type: none"> • Capacity building on sustainable water management. • Advocacy campaigns on water conservation and management
4	Federal Ministry of Works	<ul style="list-style-type: none"> • Preparation of Urban Resilience and Sustainability Plan to mitigate climate change effect in selected Towns and Cities in Nigeria as a technical assistance to States Governments. • Preparation of The National Physical Development Plan, Strategic Regional Development Plans and Development plans for settlements to ensure physical developments are planned and coordinated. • The Review of the National Urban Development Policy. • Urban Renewal and Slum Upgrading Programmes and Projects. • Urban Sector Multilateral Programmes and Projects of Collaboration with International Organizations to imbibe international best practices. • Sensitization, enlightenment and collaborations through forums such as the National Council on Housing and Urban Development and Conference of Head of Town Planning Organizations
5	Federal Ministry of Health	<ul style="list-style-type: none"> • Training of staff on climate change adaptation. • Waste reduction and generation. • Use of clean cook stove
6	Federal Ministry of Industry, Trade and Investment	<ul style="list-style-type: none"> • Mainstreaming of climate change into existing policies, programmes, plans and projects (including FEC approved policies in automotive, sugar, cement, and textiles, tomato, MSMEs Masterplan etc) • Developed policy on renewable energy in the manufacturing sector • Reviewed waste management policies/practices and recommended ways of reducing, reusing and recycling waste • Raised awareness and built capacity on climate change risks

No.	Federal Ministries	Adaptation actions
		<p>and opportunities of industry associations and key stakeholders</p> <ul style="list-style-type: none"> • Identified climate resilient, low-carbon technology to replace fossil fuel/inefficient/high emitting and polluting technologies (e.g., fertilizer, pesticide, and/or cement plants) • Strengthened data collection, analysis and use of emissions data. • Ensuring appropriate attention to emissions from informal sector. • Exploring carbon capture technology for industrial utilization • Reviewing existing industrial parks/zones/clusters and plans for new ones for climate change risks and opportunities • Collaborating with relevant stakeholders to determine greenhouse gas emissions in the industrial sector. The stakeholders include FMS&T, FMP, EC, SON, SMEDAN, BOI, MAN, NACCIMA, Development Partners like the GIZ etc
7	Federal Ministry of Labour and Productivity	<ul style="list-style-type: none"> • Planning workforce participation on green economy • Being a part of the Inter-Ministerial Committee on Climate Change • Successfully conducted COP26 Training • Successfully carried out disaster management and emergency preparedness training • Carried out afforestation exercises
8	Federal Ministry of Energy and Transport	<ul style="list-style-type: none"> • Policy on renewable energy in the manufacturing sector. • Low carbon technology/carbon capture technology Carbon disclosure/energy transition project • Investment in solar power • Energizing Education Programme (EEP)

Table 4. Adaptation Actions by Departments, Agencies and Parastatals)

No.	Departments, Agencies and Parastatals	Adaptation actions
1.	National Agency for the Great Green Wall (NAGGW)	<ul style="list-style-type: none"> • Afforestation • Creation of green jobs • Provision of water supply • Capacity building in small jobs for women and youth through skill acquisition centers • Improved farming and Off-farming techniques • Sand dune fixation
2	National Emergency Management Agency (NEMA)	<ul style="list-style-type: none"> • Disaster prevention, preparedness, mitigation and response in Nigeria • Policies formulation and implementation on disaster prevention • Early Warning System in collaboration with NIMET • Capacity building: NEMA has been collaborating with six Nigerian universities for capacity development in disaster risk management, mainstreaming DRR/Climate Change Adaptation into basic and post basic education curricula • Provision of emergency relief to climate disaster victims.
3	Nigerian Meteorological Agency (NIMET)	<ul style="list-style-type: none"> • Issues climatological and meteorological advisory services in the country • Issues weather forecasts for the aviation and other sectors • Provides meteorological services in agricultural, drought and desertification activities e.g: Annual issuance of Seasonal Rainfall Prediction. • Provides meteorological services in operational hydrology and water resource activities • Provides weather services in marine, environmental pollution and biometeorology for climatic and human health activities. • Generates, processes and disseminates all meteorological data and information within and outside Nigeria • Conducts training on research particularly in the field of tropical, agricultural, hydro and marine meteorology and other related areas of meteorology • installed 1000 Automatic Weather Observation Stations (AWOS) in Nigeria that have enhanced hydro-meteorological monitoring and densification of observation network. • Installed 8 lightening detection system (LDS) across Nigeria for the provision of weather services and products to end-users.
4	Nigerian Hydrological Service Agency	<ul style="list-style-type: none"> • Provision of hydrological data for management of the country's water resources • Flood early warning and vulnerability assessment.

No.	Departments, Agencies and Parastatals	Adaptation actions
5	National Oil Spill Detection and Response Agency (NOSDRA)	<ul style="list-style-type: none"> • Ecosystem Restoration Project • Research and Development initiatives on vulnerability and adaptation to oil spills impact • Ogoni Clean-up and Remediation Project • Assessing risks and opportunities in the oil and gas sector • Approaches to adaptation: Carbon Disclosure Project, Energy Transition • Building climate resilience in the oil and gas industry: New Job opportunities • Developed A Gas Flare Tracker (GFT) Tool • Initiatives enforcing operators to submit: • Technology Need Assessment (Plan for climate change adaptation/mitigation on emission reduction from Oil Gas activities). • Technology Action Plan (for incremental implementation for emission reduction from Oil Gas activities (e.g emission reduction and ending gas flare/tracking methane)
5	National Orientation Agency (NOA)	<ul style="list-style-type: none"> • Has been carrying out public enlightenment promoting environmental awareness in FCT and all the 36 states and 774 L.G.A of Nigeria. • Established climate change unit in the Agency for creating awareness on climate change/ environmental issues in the country. • Has been partnering with Nimet, NIHSA & NEMA on sensitizing Nigerians on flood warnings and weather-related information. • Carried out several awareness on environmental sustainability in schools market places and villages. Etc. • NOA has solid structure in all the states in Nigeria including FCT, and in all the 774 L.G.A, Sensitizing Nigerians on climate change issues using indigenous dialect and language.

Table 5. Adaptation Actions by Sub-National Governments (States)

No.	MDA	Adaptation actions
1.	Sub-National Governments (States)	<ul style="list-style-type: none"> • Development and execution of land restoration projects including afforestation • Establishment of tree seedlings nurseries • Afforestation, reforestation projects • Flood and erosion control projects • Promotion of irrigation farming (especially drip irrigation) • Promotion of the adoption of renewable energy such as solar and wind • Advocacy and sensitization on climate change mitigation and adaptation. • Review of environmental laws • Agricultural diversification initiatives to reduce shocks and stresses from climate change • Provision of energy efficient stoves • Methane harvest and bio- gas production. • Establishment of drainage systems to reduce people vulnerability to flooding

Table 6. Adaptation Actions by Civil Society Organizations (CBOs), Non-Governmental Organizations (NGOs)

No.	CSOs and NGOs	Adaptation actions
1.	Various CSOs and NGOs across the country	<ul style="list-style-type: none"> • Development and launch of National Action Plan on Gender and Climate Change • Training of local women in sustainable farming and agricultural practices • Training on coping mechanisms to climate change induced shocks and stresses • Training on raising of tree seedlings for tree planting activities • Training on animal feed production • Training on compost production • Training on production of fuel-efficient stoves • Skills acquisition training to diversify livelihood of rural communities (e.g. production of soaps, beads etc) • Public awareness campaigns on the impacts of climate change and community adaptation actions across the country • Research and policy advocacy • Production of sensitization materials on climate change • Establishment and support of schools environmental conservation clubs • Livelihood diversification projects • Promotion of organic Farming • Establishment of Mini ranches

Table 7. Adaptation Actions by Academic Institutions

No.	Academic Institutions	Adaptation actions
1	Various Universities and Research Centers spread all over the country	<ul style="list-style-type: none"> • Research on climate change, agriculture and environment interactions • Research on fast tracking climate change mitigation strategies. • Desert research, monitoring and control project • Sustainable Development of Farm Agro-forestry and Fuel Wood Conservation • Establishment of Tree Nurseries • Training on Non-Wood Tree Product processing techniques • Efficient cook stove/meat roaster and Bread Oven. • Development of framework for controlled harvest of fuel wood • Training on climate change adaptation • Research on energy and carbon sequestration. • Research on green technology and clean energy • Conference, symposiums and workshops on climate change adaptation • Research on Arid Zone Ecology, Agroforestry, Hydrology, and Geomorphology • Research on carbon sequestration in soils • Research on sustainable fuelwood and charcoal production and utilization • Research on climate change adaptation strategies in the policies of different countries of the world • Research on development of strategies of combating climate change by fostering adaptation in Nigeria • Research and Project on Building Nigeria’s Response to Climate Change • Symposium on Climate Change Adaptation in Africa • Research Project on Mainstreaming Gender Concerns into Climate Change Adaptation • Research on Adapting Agricultural Practices to Climate Change • Development of localized ‘clean energy’ models for off-grid applications in rural communities • Research on enhancing adaptive capacities to climate change impacts by smallholder farmers through climate-smart agriculture.

Table 8. Adaptation Actions by International Donor Agencies

No.	Private Sector Organizations	Adaptation actions
1	Various International Donor Agencies	<ul style="list-style-type: none"> • Funding for policy formulation and reviews, preparation of action plans and national communications (including Nigeria' Adaptation Plans). E.g. ADCOM preparation funded by UK Government in collaboration with NAP Global Network/IISD • Climate Smart Agriculture • Providing adaptation strategies through various agricultural initiatives, insurance and other financial tools, infrastructure, skills and knowledge, information and awareness, and building institution capacity • Provision of improved seeds to 1 million smallholder farmers • Support for improved management in over 21,000 hectares of farmland • Rural Resilience Activity: Promotion of inclusive and sustainable agriculturally-led economic growth • Water for Agriculture • Activity project • Funding of high-level research and training on climate change mitigation and adaptation. • Funding of Nigeria • Erosion and Watershed Management Project (NEWMAP). The project seeks to control gully erosion, develop catchment management plans, diversify and improve livelihoods

Table 9. Adaptation actions by the Private Sector

No.	The Private sector	Adaptation actions
1	The Private sector renders support to governmental and non-governmental bodies to help them implement adaptation actions	<p>A study conducted across private companies in Nigeria shows that almost half of manufacturing companies have adopted climate change adaptation strategies and nearly half of these companies have implemented formal strategies. Most of the companies see climate change as hurting their business, and 97% of the subjects perceive that climate change harms health. In addition, 46% of companies adopted proactive strategies, while 65% employed a reactive approach. About 52% of companies have only recently seen the need to adapt to climate change (within the last five years or less). Only a few of the companies had implemented climate change strategies for the past 16 years and above. This shows that Nigerian companies have only recently begun to appreciate the effects of climate change on their company strategy.³⁰</p> <p>Private-sector-led climate change adaptation investment in agriculture that leverages climate-smart technology opens up avenues for de-risking green investment in agricultural ventures, and for utilizing field mapping, satellite imaging, and improved seed to build agri-business integrated value chains and achieve higher yields.³¹</p>

6.4 Challenges and Obstacles

The achievement of the above adaptation actions and measures across sectors and by various actors are not without challenges and obstacles. Many of these stakeholders are implementing these actions under exceptionally difficult circumstances, without which they would have achieved much more. Some of these challenges and obstacles are summarized in Table 9.

Environment

- Lack of opportunities for training and capacity building on various aspects of climate change adaptation
- Lack of facilities, tools and equipment
- Conflicting roles/overlapping mandates among MDAs
- Poor synergy across sectors and actors
- Increasing level of insecurity in the country which makes some vulnerable locations and people inaccessible
- Vandalization of facilities meant for fostering adaptation
- Difficulty in project monitoring due to paucity of funds

Agriculture

- Lack of better CSA management.

³⁰ <https://www.ligsuniversity.com/en/blogpost/climate-change-adaptation-strategies-among-manufacturing-firms-in-nigeria>

³¹ https://www.afdb.org/sites/default/files/2020/06/24/factsheet_nigeria_en.pdf

- Lack of accessibility to market and capital to local farmers.
- Lack of capacity building on CSA innovative tools and techniques.
- Lack of funding on CSA programme and projects.
- Lack of awareness on CSA by farmers.

Water

- Lack of funding
- Low level of capacity on climate change mitigation and adaptation
- Poor synergy with related MDAs

Health

- Lack of adequate funding Lack of capacity building

Energy/transport

- Lack of funds
- High cost of renewable energy facilities Lack of modern tools and equipment Lack of technology transfer opportunities
- Poor linkages and synergy

Research and Innovations Adaptations

- Lack of funding
- Lack of tools and equipment
- Lack of technology transfer opportunities
- Poor linkages and synergy

Human settlement and tourism Works and housing

- Lack of adequate funding

Sub-nationals

- Lack of Funding
- Poor Capacity building of staff
- Poor collaboration with the Federal MDAs
- Policy inconsistency
- Lack of domestication national policies and priorities
- Lack of technology transfer opportunities

CSOs/NGOs

- Poor funding opportunities
- Poor networking opportunities
- Poor recognition of roles by the 3 tiers of government
- Poor community buy-in

6.5 Support Needed

For Nigeria to achieve more adaptation outcomes and build resilience to climate change, the country will need support in several areas. The support will be required by the different stakeholders to ensure that their activities achieve greater impact. The support needed can generally be summarized as follows:

- Funding
- Capacity-building
- Technology transfer
- Networking opportunities
- Linkages and collaboration (internally and externally)
- Research, innovation, and development

6.6 Summary of adaptation actions

In Nigeria, various stakeholders are deeply involved in climate change adaptation efforts. These stakeholders work at various scales and in different sectors and they take diverse approaches. However, many problems constrain their ability to achieve better results and make greater impacts. Lack of synergy, coordination, target-setting, monitoring, and evaluation have given rise to overlaps, duplication of efforts, and a greater cost burden. Poor communication is another problem reducing the effectiveness of adaptation efforts in the country. The ADCOM will go a long way toward filling these gaps.

7. Information on Gender-responsive Adaptation Action, Traditional Knowledge, Knowledge of Indigenous Peoples and Local Knowledge

7.1 Climate Change as a Gender Issue

It has been recognized that women and men are disproportionately affected by climate change, and that usually, women are more impacted than men. Women are more vulnerable to the effects of climate change than men, primarily as they constitute the majority of the world's poor. A report by Women Watch (2009) and FAO (2011) revealed that about 70% of the people who live on less than USD 1 per day and are highly dependent on natural resources for their livelihood are women and therefore more threatened by climate change. Furthermore, they face social, economic, and political barriers that limit their coping capacity. The Nigerian Environmental Study Action Team (NEST) report (2011) revealed that women experience and react to climate change differently from men. Increased pests and diseases due to climate change can increase women's workload, as they have more responsibility for caring for their families and the sick. Women also have the burden of fetching wood and water, which limits their educational opportunities and reduces their income-generating activities. With the responsibility of work on women, they have less time to care for their health. Thus, women are more vulnerable to climate change because of their susceptibility to adverse impacts. The extent of their vulnerability to climate change calls for more attention to women to reduce their exposure to the risks and human security challenges arising from climate disasters (Onwutuebe, 2019).

7.2 Gender and Climate Change Adaptation

The gender element in climate change and adaptation refers to how climate change affects men and women in different ways, how men and women respond to and cope with the changing climate, and the differences in shifting from short-term coping strategies to resilience. It is a known fact that climate change worsens the existing gender inequality, making women face higher negative impacts than men. However, women are not just mere victims, but are active agents of change. Furthermore, they possess the knowledge and skills that relevant authorities can utilize for climate change adaptation and the development of resilience.

7.3 Gender Analysis of the Action Plans

Gender analysis is a systematic analytical process used to identify, understand, and describe gender differences and the relevance of gender in a specific context. Such analysis typically involves examining the differential impact of development policies and programs on women and men, and may include collecting sex-disaggregated or gender-sensitive data (USAID, 2010).

A detailed analysis of the various adaptation action plans by the Nigerian Government revealed that the Government had made some efforts to mainstream gender into its adaptation actions. The NASPA-CCN, 2011, for example, recognizes the importance of gender mainstreaming in climate action and affirmed the importance of gender consideration during community analysis and needs assessment, where all members of the community are involved in planning. Furthermore, the policy document admitted that in Nigeria, women are more vulnerable to climate change than men, primarily as they constitute the majority of the country's poor and are more dependent for their livelihood on natural

resources that are threatened by climate change.

The document further declares that gender was mainstreamed into the NASPA-CNN document by considering the specific dimensions of impacts on men and women, and on their different levels of vulnerability to climate change. However, the report does not provide the sex-disaggregated data or detail the other methods used for gender mainstreaming.

Nigeria's NAP Framework also examines the gender dimension of the policy implementation process. Thus, the policy objectives include addressing issues of gender equity, especially those associated with access to critical resources. Accordingly, Section 2 of the NAP's Guiding Principles encourages gender responsiveness and provides that the NAP process shall "follow a country-driven, gender-sensitive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystem."

As part of its action plan and implementation strategies, the National Policy on Climate Change recognizes the need for gender considerations in order to successfully plan, implement and evaluate effective climate change mitigation and adaptation measures. Thus, appropriate and effective gender considerations should be employed in implementing the response strategy to facilitate informed mitigation and adaptation to climate change. Based on this, it is evident that there will be a continuous implementation of the national gender policy for climate change adaptation.

The National Policy on Environment recognizes that gender is an essential component of human development. As such, gender roles, responsibilities, expectations, norms, and the gendered division of labor shape all human relationships to the environment. To this end, therefore, the Nigerian Government intends to:

- Ensure that gender is mainstreamed into environmental concerns at all times
- Promote the review of related environmental policies and acts to include gender concerns
- Provide incentives for environmental programs and initiatives that target underrepresented genders and other vulnerable groups
- Facilitate the full participation of women, men, girls, boys, and other vulnerable groups in decision-making processes in regard to environmental governance and management
- Ensure the participation of women and other vulnerable groups across all sections of society in environmental training, public awareness, and sensitization campaigns.

The process and content analysis carried out on the relevant climate change documents revealed that sex-disaggregated data on men and women across different segments of Nigerian society were not generated before the formulation of such policies and frameworks. Although some level of consultation was carried out with a wide array of other stakeholders, especially civil society organizations (CSOs), the documents do not give specifications on women's roles and how they will participate in implementing the strategies.

Convincing evidence on sex-disaggregated data that details, from a gender perspective, who has access to productive resources and assets such as land, forests, water supplies, equipment, labor, capital, credit, new technology, and training were not generated before the formulation of the adaptation action documents. Also, information on who has control over these resources and assets and who has the decision-making power, either traditionally or formally, is not provided.

However, the recently developed NDC document stands out among other policy documents, as gender was properly mainstreamed into the document. Section 6.1 of the NDC document revealed that in preparing the 2021 NDC update, the Federal Ministry of Environment, through the Department of

Climate Change, conducted a detailed gender analysis to determine gender differences in contributions to national development, the division of labor, employment, access to resources, and participation in decision-making in the seven priority sectors of the NDC. The analysis revealed a general lack of access to and control of resources by women compared to men in all seven priority sectors. In addition, except for Agriculture and Rural Development, gender inclusion is still mostly lacking in sectoral policies. This highlights the need for policy review for gender mainstreaming, proper institutional coordination, the provision of enough budgetary allocation for gender-related activities, building the capacities of women, the revision of recruitment policies, and a clear monitoring plan using verifiable gender indicators in order to ascertain the success or failure of any gender-related program targeting the priority sectors. Once integrated, these recommendations will make the 2021 NDC update and the existing 2017 NDC Sectoral Action Plans gender-responsive, thereby enhancing gender integration into climate change policies and actions (FMEnv, 2021).

7.4 Adaptation Actions and Indigenous Peoples and Local and Traditional Knowledge

Traditional communities, in many cases, have built up knowledge over long periods about changes in the environment and have developed elaborate strategies to cope with these changes. However, traditional knowledge systems in mitigation and adaptation have been neglected in climate change policy formulation and implementation for a long time. They have only recently been taken up into the climate change discourse. Nevertheless, traditional and Indigenous peoples, who have survived many kinds of environmental changes over long periods, including climate change, may have valuable lessons to offer about successful and unsuccessful adaptations, which could be vital in mitigating and adapting to climate change (IUCN, 2008).

The vulnerability of traditional and Indigenous peoples to global environmental change is mainly determined by their low degree of social and biophysical security driven by poverty and marginalization; their lack of entitlement to resources, power, and decision making; their exposure to future hazards; and other external stressors, such as violent conflicts and epidemics.

Institutions and policy-makers play a crucial role in empowering Indigenous and traditional peoples by securing and enhancing their entitlement to resources, including land, water, and biodiversity, as well as health care, technology, education, information, and power to improve their capacity to adapt to climate change and decrease their social and biophysical vulnerability. Conversely, where institutions fail to secure these entitlements, the resilience of Indigenous and traditional peoples may decrease, and the threshold beyond which a system may not be able to adapt to environmental change may be exceeded (Adger, 2006).

The Federal Government has recognized the importance of incorporating knowledge from Indigenous and traditional peoples for effective climate change adaptation. Thus, section 4.11 of NAP Framework recognizes that many Indigenous practices ignored in the past have become solutions for today's challenges. Agroforestry, for example, is by no means alien to the African farmer; it has been practiced over the millennia for various types of crops. Therefore, in the implementation of the NAP process, deliberate efforts should be made to adopt viable Indigenous practices and knowledge. Their major advantages are their affordability, amenability to the local environment, capacity to enhance ecological balance, and sustainability.

The NAP Framework, therefore, recommends the establishment of a unit responsible for adaptation and Indigenous knowledge at the state and national levels. The unit should be empowered to support research in available and lost Indigenous practices that can assist in adaptation across sectors. However, the policy document fails to provide a detailed action plan on how this lofty idea could be translated into reality.

The NASPA-CCN underscores the need to consider socially marginalized groups, including locals and Indigenous and traditional peoples. As mentioned in the policy document, climate change will significantly affect them because of their low adaptive capacity, limited resources, and poverty. Indigenous and traditional people and other socially marginalized groups (such as the poor, children, women, and the elderly) tend to bear the brunt of climate change. The major shortcoming of the policy in respect of Indigenous and traditional people is that it merely views them as vulnerable, with low adaptive capacities. The policy fails to recognize that based on their Indigenous practices and knowledge over a long period of time within different environmental circumstances, including climate change, they could have vital contributions to offer in the context of adaptation to climate change.

7.5 Institutional Mechanisms for Involvement of Vulnerable and Indigenous Peoples in the Ongoing and Planned Adaptation Actions

Institutional mechanisms exist in the DCC and Federal Ministry of Environment for the involvement of women and youth in the consultation process for the development of adaptation actions in the country. For example, the DCC has a gender unit which oversees all gender and youth-related activities in the Department. There is also a good relationship between the DCC and the Ministry of Women Affairs and Social Development (MWASD).

Youths are actively engaged and supported by the DCC in the implementation of climate actions in the country. Some of these youth engagement initiatives include: development of Climate Change Youth Action Manual, establishment of National Youth Climate Innovation Hubs, and sponsorship of youth groups in International climate events such as the UNFCCC COP conferences.

Civil Society Organizations (CSOs) are also actively engaged in climate action in the country. The DCC has a database for all the environment-related CSOs across the country's six geopolitical zones. Such CSOs, including women's groups, were invited for consultations to get their inputs for inclusion in the development of climate-related actions. A good example is the stakeholders' workshop organized by DCC on the NDC revision process for CSOs to seek their inputs into the document (see Figure 4).

Figure 4. The staff of DCC, Federal Ministry of Environment, gender consultant and CSOs during a stakeholder workshop on the NDC revision process held at Statement Hotel Abuja



However, as there is currently little evidence available in the documentation on the engagement of Indigenous and traditional groups in the formulation of climate change adaptation planning, this is an area that could use greater support. This scenario further gives evidence of the long-term neglect suffered by this vulnerable group. Their exclusion from the adaptation documentation process undermines a vital source of information that could ordinarily enrich a national communication or National Adaptation Programme of Action (NAPA). Their neglect also reduces the country's chances to qualify for adaptation funds particular to Indigenous people.

8. Problems and Challenges

Despite substantial efforts to mainstream climate change adaptation into its developmental agenda and policies, Nigeria is still grappling with challenges in achieving the desired results. Some of these challenges include funding, capacity-building, and poor technical skills. Other challenges include lack of synergy, coordination, and collaboration by stakeholders; and a lack of target-setting, monitoring, and evaluation, which has giving room to overlaps, duplication of efforts and a greater cost burden. Poor communication is another problem reducing the effectiveness of adaptation efforts in the country. The lack of active involvement of the sub-national governments (especially the local governments) and Indigenous people constitutes a major barrier to effective and inclusive NAP implementation in the country.

In addition, and as mentioned in the country's Green Climate Fund (GCF) readiness report, other challenges include:

- limited capacity to implement the NAP framework, analyze climate information and prioritize adaptation options
- lack of capacity of national stakeholders to interpret climate risk assessments
- lack of comprehensive climate risk assessments for priority sectors and vulnerable states
- limited capacity of policy- and decision-makers to mainstream climate change into national and sectoral plans and policies
- limited funding mechanisms for adequately planning and implementing adaptation actions
- limited monitoring, reviewing, and reporting on adaptation planning at the federal, state, and local levels.

9.0 Conclusion

Nigeria is an active global participant in addressing climate change, being a highly vulnerable country with a very high population. The country has developed all the necessary instruments (strategies, policies, and action plans) as well as the right legal and institutional frameworks to enable it to meet its international obligations on climate actions (including adaptation actions). The country has assigned roles for all the relevant stakeholders through policy pronouncements, but a lot needs to be done to foster the active engagement and inclusion of some of the stakeholders for greater impact and sustainability of its climate actions. Implementation of adaptation strategies and action plans still remains a challenge in the country for the reasons mentioned in chapter 8. The country therefore requires more support on funding, capacity-building, linkages and collaboration, technology transfer, tools, and technical skills to enable it to achieve more adaptation success. On its own, the country needs to keep a database of all stakeholders and develop a monitoring and evaluation mechanism to ensure that all adaptation actions, achievements, challenges, and support needed in the different sectors and by the various stakeholders are documented and tracked in real time.

This ADCOM report, apart from meeting the requirement of decision 9/CMA.1, also highlights the substantial efforts made by the country and recommends areas in which it needs support.

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11. Appendices

Appendix 1. Participants List for ADCOM Inception Workshop

Organization=	Number of participants
MDAs	
Federal Ministry of Science & Technology	1
Federal Ministry of Health	1
Federal Ministry of Agriculture & Rural Development	1
Federal Ministry of Finance, Budget & National Planning	1
Federal Ministry of Water Resources	1
Federal Ministry of Industry, Trade & Investment	1
Federal Ministry of Women Affairs & Social Development	1
Federal Ministry of Power	1
Federal Ministry of Works & Housing	1
Senate Committee on Ecology & Climate Change	1
House Committee on Climate Change	1
National Emergency Management Agency	1
Energy Commission of Nigeria	1
National Environmental Standards and Regulations Enforcement Agency	1
Nigeria Erosion and Watershed Management Project	1
National Agency for Great Green wall	1
Department of Drought & Desertification Amelioration	1
Department of Pollution Control & Environmental Health	1
Department of Erosion, Flood & Coastal Zone Management	1
Department of Forestry	1
REDD+	1
Nigeria Meteorological Agency	1
Nigeria Incentive-Based Risk Sharing System for Agricultural Lending	1
Nigeria Maritime Administrative and safety Agency	1
National biosafety Development Agency	1

Federal Republic of Nigeria Adaptation Communication to the UNFCCC

Organization=	Number of participants
Federal Ministry Foreign Affairs	1
Federal ministry of Labour and Productivity	1
Federal Ministry of Justice	1
National Bureau of Statistics	1
Federal Ministry of Transport	1
Green Bonds Programme	1
Agricultural Research Council of Nigeria	1
Federal Ministry of Humanitarian Affairs,	1
Federal Ministry of Education,	1
North East Development Commission	1
Nigeria Hydrological Services Agency	1
Chad Basin Development Authority	1
Standard Organization of Nigeria	1
Nigeria Investment Promotion Council	1
Federal Ministry of Justice	1
FMENV participation	
Permanent Secretary	1
Education, Awareness & Outreach Division	2
Mitigation Division	2
Vulnerability and Adaptation Division	10
Green House gas Inventory Division	2
FMENV Headquarters	7
NGOs	
Women Environment Programme	1
OXFAM Nigeria	1
Global Green restoring initiative	1
Nigeria Forum for Agricultural Advisory Services	1
Natural Eco capital	1
Grassroot Environmental & Health Initiative (GEHIO	1

Organization=	Number of participants
Academia	
Prof Haruna Ayuba	1
Huzi Mshelia	1
Prof. Nasiru M. Madugu	1
Dr. Mohammed Y. Adana	1
Dr. Salamatu Abraham Ekpo	
Consultant Team	3
State Ministries of Environment and FCT Climate Change Desk Officers (Virtual Participation)	37

Appendix 2. Vulnerability of States and Geo-Political Zones to Climate Change

S/No	State	Geo-political zone	Climate risk or climate-induced disaster
1	Sokoto	North-West	Aridity, transboundary flooding, deforestation, farmer-herder conflicts, windstorms
2	Kebbi	North-West	Aridity, transboundary flooding, deforestation, farmer-herder conflicts, windstorms
3	Bauchi	North-East	Aridity, transboundary flooding, deforestation
4	Kaduna	North-West	Aridity, flooding, deforestation, farmer-herder conflicts
5	Gombe	North-East	Aridity, flooding, deforestation
6	Kano	North-West	Aridity, flooding, deforestation, urban heat waves
7	Jigawa	North-West	Aridity, transboundary flooding, deforestation, windstorms
8	Yobe	North-East	Aridity, transboundary flooding, windstorms, flooding, deforestation
9	Katsina	North-West	Aridity, flooding, deforestation, farmer-herder conflicts, windstorms, transboundary flooding
10	Borno	North-East	Aridity, flooding, deforestation, windstorms, farmer-herder conflicts, transboundary flooding, urban heat waves
11	Zamfara	North-West	Aridity, flooding, deforestation, farmer-herder conflicts, transboundary flooding, windstorms
12	Plateau	North Central	Aridity, watershed degradation, deforestation, farmer-herder conflicts, flooding
13	Niger	North Central	Aridity, watershed degradation, flooding, deforestation, farmer-herder conflicts
14	Taraba	North-East	Aridity, watershed degradation, deforestation, farmer-herder conflicts, transboundary flooding
15	Adamawa	North-East	Aridity, watershed degradation, deforestation, farmer-herder conflicts, transboundary flooding
16	Ebonyi	South east	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
17	Nassarawa	North Central	Aridity, watershed degradation, deforestation, farmer-herder conflicts
18	Cross river	South-South	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts, transboundary flooding

S/No	State	Geo-political zone	Climate risk or climate-induced disaster
19	Kwara	North Central	Aridity, watershed degradation, deforestation, farmer-herder conflicts, flooding
20	Akwa Ibom	South-South	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
21	Kogi	North Central	Aridity, watershed degradation, deforestation, farmer-herder conflicts
22	Ekiti	South-West	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
23	Bayelsa	South-South	Rainfall anomalies, storm surges, flooding
24	Delta	South-South	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
25	Edo	South-South	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
26	Benue	North Central	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
27	Osun	South-West	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
28	Ogun	South-West	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
29	Ondo	South-West	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
30	Abia	South-East	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
31	Oyo	South-West	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
32	Imo	South-East	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
33	Anambra	South-East	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
34	Rivers	South-South	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts, urban heat waves
35	Enugu	South-East	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts
36	FCT	North Central	Rainfall anomalies, aridity, flooding, farmer-herder conflicts, urban heat waves
37	Lagos	South-West	Rainfall anomalies, storm surges, flooding, farmer-herder conflicts, urban heat waves

Source: Benson & Kolawole (2017)

