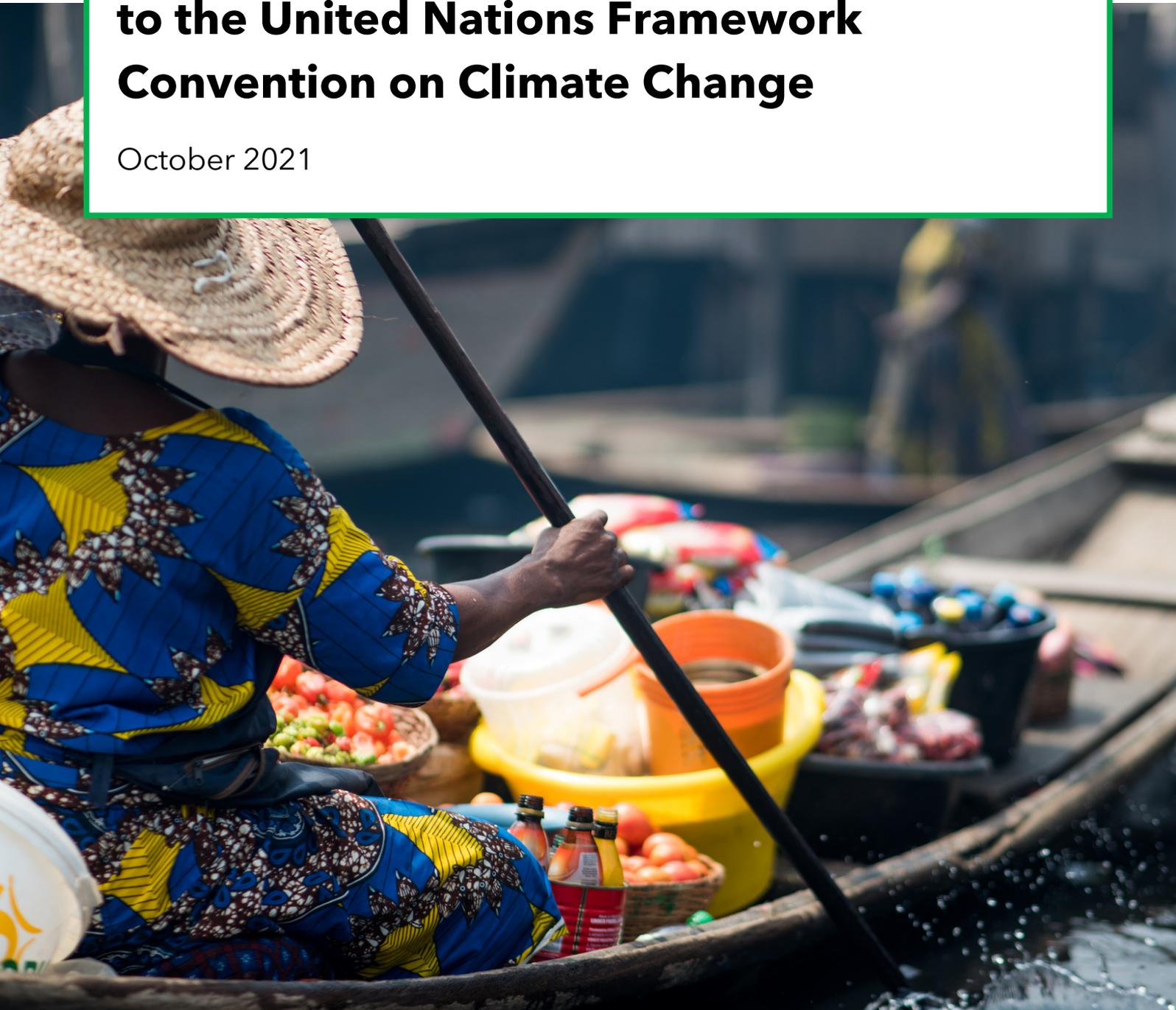




FEDERAL REPUBLIC OF NIGERIA

Nigeria's Adaptation Communication to the United Nations Framework Convention on Climate Change

October 2021



PREPARED BY

FEDERAL MINISTRY OF ENVIRONMENT



DEPARTMENT OF CLIMATE CHANGE

In partnership with



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Foreword



Sharon Ikeazor, Esq
Honourable Minister of
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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 increase in atmospheric temperature that results 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.

The Adaptation Communication (ADCOM), established by Article 7, paragraphs 10 and 11, of the Paris Agreement requires Parties to submit and update periodically its ADCOM. 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 & Agencies, Organized Private Sector, Academia, Civil Society Organizations, Non-Governmental Organizations (NGOs) among others were engaged 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 programmes that have been developed such as Nigeria's Revised NDC, Economic Recovery & Growth Plan (ERGP), National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (NASPA-CCN), Sustainable Development Goals (SDGs) among others.

Nigeria's ADCOM, which is the first ever to be prepared, has captured adaptation options and strategies already being deployed by MDAs. It identified gaps, adaptation priorities, needs and financial mechanism to deploy climate change adaptation. It also highlighted a number of 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, NAP Global Network and the International Institute for Sustainable Development (IISD) for their support towards the actualization of this document. I also want to appreciate the Federal Government of Nigeria for providing the platform for the actualization of this project.

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Table of Contents

Contents

Foreword.....	iii
Preface	Error! Bookmark not defined.
Acknowledgements.....	v
Table of Contents.....	vi
List of Tables	ix
List of Figures	x
Abbreviations and Acronyms.....	xi
African Centre for Climate Actions and Rural Development Initiative.....	xi
Executive Summary.....	xiii
National and/or Sub-National Policy Frameworks and Provisions on Climate Change	xiv
National Adaptation Strategies, Policies, and Action Plans.....	xvi
1 Introduction	1
1.1 Background	1
1.2 Objectives.....	1
1.3 Approach.....	2
1.4 Methodology.....	3
2.0 National Circumstances, Institutional Arrangements and Legal Frameworks.....	6
2.1 Geography and Ecosystems	6
2.2 Ecosystems:.....	8
2.3 Economy.....	10
2.4 Infrastructure	12
2.5 Social Characteristics	12
2.6 National and/or Sub-National Policy Frameworks and Provisions on Climate Change.....	13
2.7 Existing Policies, Legal Frameworks and Regulations on Climate change	14
2.7.1 Policy Framework.....	14
2.7.2 National Policy on the Environment	15
2.7.3 Nationally Determined Contribution	16
2.7.4 Long-term low-emission development strategy (LT-LEDS).....	17
2.7.5 Other Relevant Sectoral Policies	17
2.8 Legal framework	18
2.9 Institutional Arrangements and Governance	19

3.0 Impacts, risks and vulnerabilities	22
3.1 Observed (ecological, economic and social) impacts of climate change	26
3.1.1 Impacts on water resources.....	26
3.1.2 Impacts on forests resources	26
3.1.3 Impacts on coastal and marine environment	27
3.1.4 Impact on socio-economic and socio-cultural sectors.....	28
Energy:	28
Mining:	28
Industry:	28
Population and settlements:.....	29
Health:.....	29
Tourism:	29
Transport:.....	30
3.2 National, Sectoral Risk and Vulnerability Assessment.	30
3.2.1 Climate Risk.....	30
3.3 Sectors Particularly Vulnerable to a Specific Climate Risk or Climate Induced Disaster	31
3.3.1 Agriculture	31
3.3.2 Human Health	32
3.5 Methods that have been used for the climate Risk or Vulnerability Assessments	33
3.6 Regional Vulnerability to a Climate risk or Climate induced Disaster	33
3.5 Climate risk and vulnerability at national or sectoral level	34
3.5.1 Changes in temperature and rainfall	34
3.5.2 Increase in the occurrence of extreme weather events.....	35
3.5.3 Increasing pressure on ecology and ecosystems.....	36
3.5.4 Increasing vulnerability to soil erosion and flooding	37
4. National adaptation priorities, strategies, policies, plans, goals and actions.....	37
4.1 Adaptation priorities in the Climate change Policies.....	37
4.1.1 The National Adaptation Strategy and Plan of Action for Climate change in Nigeria (NASPA-CCN) (2011)	38
4.1.2 National Adaptation Plan (NAP) <i>Framework</i>	38
4.1.3 The Nigeria Climate Change Policy Response and Strategy (NCCPRS) 2021	39
4.2 National Adaptation Strategies, Policies, and Action Plans	40

4.2.1	Agriculture (crops and livestock)	40
4.2.2	Freshwater Resources, Coastal Water Resources and Fisheries	42
4.2.3	Forests and Biodiversity	42
4.2.4	Strategies for Health and Sanitation	43
4.2.5	Human Settlements and Housing	44
4.2.6	Energy	45
4.2.7	Transportation and Communications	45
4.2.8	Industry and Commerce.....	46
4.2.9	Disaster, Migration and Security.....	47
4.2.10	Adaptation Strategies for Livelihoods.....	48
4.2.11	Adaptation Strategies for Vulnerable Groups (from NASPA-CCN, 2011)	48
4.2.12	Adaptation Strategies for Education.....	49
4.3	Adaptation Strategies and Actions for Stakeholders	49
4.3.1	The Federal Government	49
4.3.2	State Governments	49
4.3.3	Local Governments	50
4.3.4	Private Sector	50
4.3.5	Civil Society Organizations	50
4.3.5	Households and individuals	51
4.3.6	International organizations and donors.....	51
4.4	Linkages of Adaptation Goals and Strategies in the different National Policy Frameworks	51
4.5	Linkages of Adaptation Goals. Strategies with other Global Agendas.....	52
4.6	Time-frame for Implementation of Adaptation Goals and Strategies.....	52
5.0	Implementation and support need of, and provision of support to, developing country Parties	53
5.1	Adaptation Support Needs	53
5.2	Existing types/source of finance for Nigeria's adaptation	54
5.3	Assessment of implementation of adaptation actions	55
5.4	Mainstreaming Climate Adaptation in National Planning	55
5.5	Capacity Building Support.....	55
5.6	Private Sector engagement in Adaptation actions	56
6.	Implementation of Adaptation Actions and Plans	57
6.1	Implementation of adaptation actions in line with the global goal on adaptation	57
6.2	Current status of adaptation actions	57

6.2	Adaptation Actions for Recognition in Sectors and by Stakeholders.....	58
6.2.1	Adaptation Actions (and achievements) for Recognition by Ministries, Departments and Agencies.....	58
6.2.2.	Sub-national Governments.....	61
6.2.3	Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs).....	62
	African Centre for Climate Actions and Rural Development (ACCARD) Initiative.....	63
6.2.4	Academic Institutions.....	65
6.2.5	The Private Sector.....	67
6.2.6	International Donors and Development Agencies.....	68
6.3	Challenges and Obstacles.....	70
6.4	Support needed.....	72
6.5	Conclusion.....	72
7	Information on gender-responsive adaptation action, traditional knowledge, knowledge of indigenous peoples and local knowledge.....	73
7.1	Climate Change as a Gender Issue.....	73
9.2	Gender and Climate Change Adaptation.....	73
7.2	Gender analysis of the Action Plans.....	74
7.3	Adaptation Actions and Indigenous Peoples and Local and Traditional knowledge.....	76
7.4	Institutional mechanisms for involvement of vulnerable and Indigenous peoples in the ongoing/planned adaptation actions.....	78
8.0	Problems and Challenges:.....	79
9.0	Conclusion.....	80
12.0	References.....	82
13.0	Appendices.....	88

List of Tables

Table 1:	Key Policies Relevant to Adaptation.....	14
Table 2:	Relevant Sectoral Policies to Adaptation in Nigeria.....	17
Table 3:	Projected Climate Trend for Nigeria's Ecological zones.....	24
Table 4:	Adaptation Actions by Stakeholders (MDAs, CSOs/NGOs, Academia, Private Sector).....	58
Table 5:	Adaptation Activities by some Sub-national Governments.....	61
Table 6:	Adaptation Actions by Some CSOs/NGOs in the Country.....	63
Table 7:	Some Adaptation Actions by Academic Institutions in the Country.....	65
Table 8:	Summary of Support Provided by International Donor Agencies.....	68
Table 9:	Challenges and Obstacles in Implementing Adaptation Actions by various Stakeholders.....	70

List of Figures

Table 1: Key Policies Relevant to Adaptation	14
Table 2: Relevant Sectoral Policies to Adaptation in Nigeria.....	17
Table 3: Projected Climate Trend for Nigeria’s Ecological zones.....	24
Table 4:Adaptation Actions by Stakeholders (MDAs, CSOs/NGOs, Academia, Private Sector).....	58
Table 5:Adaptation Activities by some Sub-national Governments	61
Table 6: Adaptation Actions by Some CSOs/NGOs in the Country	63
Table 7: Some Adaptation Actions by Academic Institutions in the Country	65
Table 8:Summary of Support Provided by International Donor Agencies.....	68
Table 9:Challenges and Obstacles in Implementing Adaptation Actions by various Stakeholders.....	70

Abbreviations and Acronyms

ACCREC	African Climate Research Center
ADCOM	Adaptation Communication
ACCARD	African Centre for Climate Actions and Rural Development Initiative
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
MDAs	Ministries, Departments and Agencies
MWASD	Ministry of Women Affairs and Social Development
MTNDP	Medium Term National Development Plan (MTNDP)
NAP	National Adaptation Plan
NARSDA	National Airspace Research and Development Agency
NBSAP	National Biodiversity Strategy and Action Plan
NCF	Nigerian Conservation Foundation
NEST	The Nigerian Environmental Study/Action Team
NASPA- CCN	National Adaptation Strategy and Action Plan on Climate Change for Nigeria
NCCPRS	National Climate Change Policy and Response Strategies
NDC	Nationally Determined Contribution
NEWMAP	Nigeria Erosion and Watershed Management Project
IISD	International Institute for Sustainable Development
INDC	Intended Nationally Determined Contribution
R&D	Research and Development

REDD	Reducing Emission from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SE4A	Sustainable Energy for All
OXFAM	Oxford Committee for Famine Relief
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 Environment Programme

Executive Summary

Introduction

Nigeria, as a Party to the Paris Agreement (having signed the agreement on 22nd September 2016 and ratified it on 16th May 2017), submits its 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 the adaptation communication.

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 the visibility and profile of their adaptation efforts and its balance with mitigation, strengthen adaptation action and support for developing countries, provide input to the global stocktake and enhance learning and understanding of adaptation needs and actions¹. The ADCOM provides information on the country's national circumstances concerning adaptation, its plans and priorities, implementation challenges, achievements as well as 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 sectors. This approach also ensured ownership of the report by all parties. The process involved rigorous stakeholder engagement. Following similar approach 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 exceptional roles of the civil society, the private sector, academia and donor agencies in achieving adaptation outcomes.

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

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 grass root – reflecting the three-tier (the Federal, the States and the Local Government) of government. The 36 States are grouped into Six Geopolitical entities known as 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 the Nigeria's economy due to loss and damage (to infrastructure, farmland, real estate, etc.) from extreme weather events that have been on a steady increase over the last decade. Adaptation measures are crucial, therefore in shielding the economy from further climatic vagaries.

National and/or 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 have been formulated.

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) that was established since 1999 to manage the natural environment of Nigeria and is responsible for the coordination and implementation of climate change-related policies and programmes. 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 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 of climate change issues between ministries and other stakeholders. The aim of the ICCC is to promote stakeholder engagement and is mandated to hold quarterly meetings.

Impacts, risks and vulnerabilities

Nigeria is classified as one of the ten most vulnerable countries according to 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 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. Rise in sea levels is likely to increase coastal inundation and flooding in low-lying regions while many state 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 the 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 Northeast and Northwest regions the most vulnerable, and has compounded aridity, drought and desertification, and have caused the shrinking of wetland, decrease in surface water and the reduction in fauna and flora in many ecosystems across the northern part.

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, action plans for each sector and for all the stakeholders in the country.

Through the NAPA-CCN (2015) and 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, and water resources, forestry and wildlife, education, health, security, and transportation. There are also cross-cutting issues such as gender, finance that affect each of the sectors. These adaptation strategies, policies and action plans are outlined in the ADCOM report.

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

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/meteorological forecasts and related information).

2. Freshwater Resources, Coastal Water Resources and Fisheries

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

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.

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.
- Establish early warning and health surveillance programmes.
- Strengthen the extant adaptation strategy for the health sector including aligning it with the National Adaptation Plan (NAP) Framework.

5. 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 both civil society and security forces have access to emergency energy supply.

6. Transportation and Communications

- Include increased protective margins in 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 provision 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, development of flood early warning systems, seasonal rainfall prediction, shoreline protection along coastal areas, the Great Green Wall initiative, among others. The CSOs/NGOs are actively involved in grassroot livelihood diversification projects that make people resilient to climatic shocks and stresses. The 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 is 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. For the health sector, USD 3.06 billion is required per year for 2020 which expected to reach about USD 5.50 billion by 2050. The transport sector 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 respectively³.

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

Problems and Challenges:

Despite its modest effort 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, lack of target setting, monitoring and evaluation have giving room to overlaps, duplication of efforts and greater cost-burden. Poor communication is another problem reducing the effectiveness of adaptation efforts in the country. The visible exclusion of the sub-national governments (states and local governments), CSOs, indigenous people, women, youths and the people living with disabilities constitute 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, analyse climate information and prioritise adaptation options
- lack of capacity of national stakeholders to interpret climate risk assessments;

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

- 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 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 active engagement and inclusion of these 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 reasons mentioned in section 8. The country therefore requires more support on funding, capacity building, linkages and collaboration, technology transfer, tools and technical skills to enable it 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 all adaptation actions, achievement and 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, has also highlighted the significant efforts made by the country and recommends areas it needs support.

1 Introduction

1.1 Background

Nigeria, as a Party to the Paris Agreement (having signed the agreement on 22nd September 2016 and ratified it on 16th May 2017), submits its 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 the adaptation communication.

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1.2 Objectives

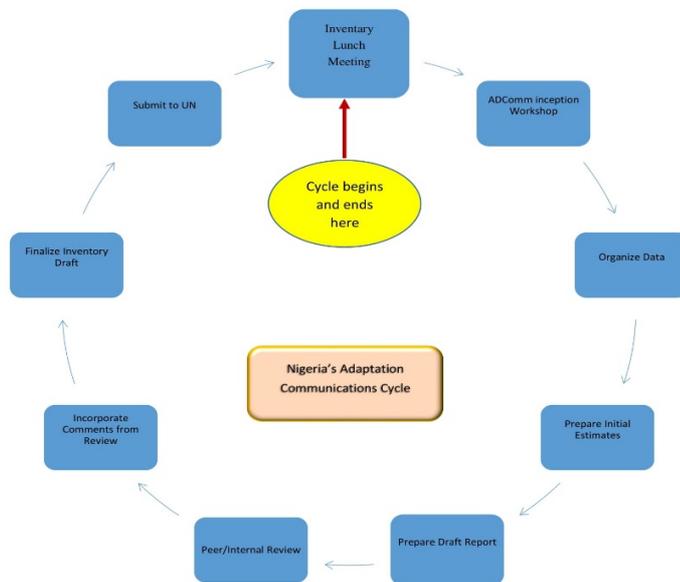
The objectives of the Nigeria's ADCOM are to provide information on the country's national circumstances concerning adaptation by communicating its plans and priorities; highlighting its implementation, support needs and showcasing its achievements domestically and internationally (by providing input to the global stocktake). The report also serves as an instrument of communicating Nigeria's adaptation efforts in sectors, across 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 a one coherent, implementable adaptation document. The ADCOM have identified existing gaps and challenges preventing the achievement of better adaptation outcomes and recommends how these gaps will be filled and challenges overcome.

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

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 sectors. This approach also ensures ownership of the report by all parties. The process involves rigorous stakeholder engagement. Following similar approach 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. A full list of the stakeholders that participated in the inception and consultation workshops is provided in Appendix 2 of this report. The preparation of the ADCOM followed the process cycle presented in Figure 1.

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 of the impact, vulnerabilities, and environmental situations of the rural areas. Indigenous and grassroots-based adaptation actions were identified, analysed, 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 (programmes, plans, projects, and resources) made available to the vulnerable groups (physically challenged, the children, and the aged in the society) in helping them adapt to climatic changes in the country are also considered in the report. The process also considered the exceptional roles of the civil society, the private sector, academia and donor agencies in achieving adaptation outcomes.



1.4 Methodology

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

The desk study involved review of international agreements, conventions and policies on climate action (specifically adaptation actions). Some of these include the Paris Agreement, the Paris Rule-book, the Cancun Adaptation Framework, the 2030 Agenda on Sustainable Development, The Sendai Framework for Disaster Risk Reduction, the Convention on Biological Diversity, the Convention to Combat Desertification among others. At the national level, extensive reviews of current policies and communications prepared by the country's designated authority on climate change was conducted. Some of these include: The third national communication of Nigeria to the UNFCCC (2020), National Adaptation Plan

Framework (2020), Nationally Determined Contribution (2021), First Biennial Update Report (2018), Nigeria Climate Change Policy and Response Strategies (2020), National Policy on the Environment (2020), Green Climate Fund Readiness for Adaptation in Nigeria, and similar documents and policies produced by relevant MDAs that relates to climate change.

Rigorous consultations and stakeholder engagements, with over 50 MDAs, was also carried out in series of workshop as part of the ADCOM preparation process. These include an inception workshop held on 3rd August 2021 to solicit the support and contributions of stakeholders in the ADCOM preparation, clarify their roles in NAP implementation and to 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 26th August 2021 to deepen the 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, to enhance cooperation and inter-agency collaboration among stakeholders in the implementation of adaptation action. Participants were given an opportunity to make presentations, 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 the 14th October 2021. The objectives were to present and elicit stakeholders input and critiques on the draft ADCOM report, verify the adequacy of the report in satisfying the ADCOM requirements stipulated in decision 9/CMA.1, its consistency with Nigeria's existing instruments and communications, and to collaboratively work towards developing a comprehensive final draft that will reflect the adaptation realities in the country

Some photographs taken during these sessions are shown in Figure 2.



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

Figure 2: The ADCOM preparation process in pictures

2.0 National Circumstances, Institutional Arrangements and Legal Frameworks

Nigeria – a brief overview

The Federal Republic of Nigeria (referred herein 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-tier (the Federal, the States and the Local Government) of government. The 36 States are grouped into Six Geopolitical entities known as North-west, North-east, North-central, South-west, South-east and South-south zones.

Nigeria's over 200 Million population occupies a landmass of 923,768 Square Kilometers. As 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 per cent 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.

2.1 Geography and Ecosystems

Geography

Nigeria is located between latitude of 9.0820° N and a longitude of 8.6753° E with a land mass of 923,768 km.² It shares land borders with Republics of Benin, Niger, Chad and Cameroon (to the west, north, east respectively) and the Gulf of Guinea in its southern fringes. It has 800km 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 hectares⁵. Agriculture accounts for about 24 percent 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.

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

Nigeria measures about 1,200km 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 and numerous other productive rivers. River Niger enters the country from the northwest while the Benue River 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.

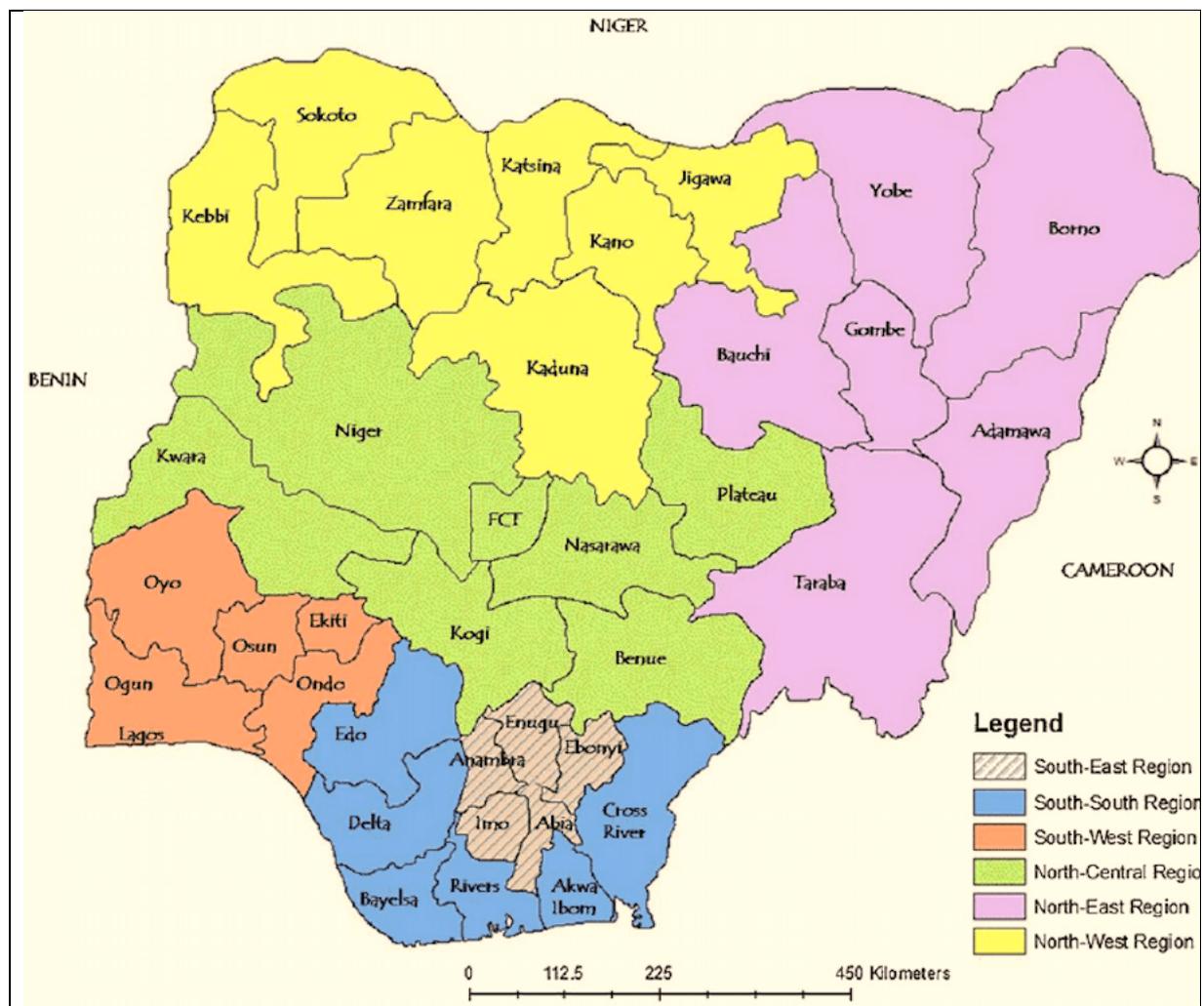


Figure 3: Map of Nigeria showing 36 states and the 6 Geo-political zones

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/>

Large portion of Nigeria's surface is made up of the ancient crystalline rocks that are typical of the African Shield⁶. Prolonged weathering and erosion have led to the formation of major landscape 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) 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

2.2 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, Ghana**, and Angola. The mangroves are mainly found in humid tropical climates, and they grow up to heights of over 150 feet. They are essential in holding river-banks in place, filtering the waters and creating build-ups of nutrient-rich soil on the banks. The ecoregion consists of five types of mangroves and a palm that was introduced from Asia. Crabs, oysters, and other invertebrates inhabiting 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 above 2,700 feet above the sea level. The

⁶ <http://countrystudies.us/nigeria/32.htm>

vegetation varies with altitude. The lower elevations (between 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 some endemic animal and bird species. There are many endangered primate species in the area including the Cross River Gorilla, red Columbus, and the Preuss's monkey.

The Guinea savanna (or savanna woodland/wooded savanna) is the most extensive vegetation in the middle belt of Nigeria, and consist of a mixture of trees and grasses. It receives annual rainfall between 1000 - 1500 mm that falls over a 6-8 months 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 Sokoto, Kaduna, Kano and Borno States of Nigeria, comprising an area over a quarter of the country. Rainfall ranges from about 600-1000 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 of about 4-6 months.

The Sahel savanna, is found to the extreme Northwest and Northeast of the country, where the annual rainfall is less than 600 mm and with dry seasons exceeding 8 months. The typical vegetation in the area consists of grasses, open thorn shrub savanna with scattered trees of 4-9m in height most of them are thorny, and extensive sparse grasses. 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*; while the grasses include *Aristida stipoides*, *Schoenefeldia gracilis* and *Chloris priean*.

Due to its diverse landscapes, Nigeria has a wide array of life wildlife comprising an estimated 290 species of mammals and 940 species of bird among others. Some of the prominent wildlife species include: Lions, African Elephant, Buffaloes and Hippopotamuses. The birds include: Heron, Egrets, Bush petronia among others.

2.3 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 reasonably skilled and potential workforce for the efficient and effective management of investment projects within the country. Nigeria's income per capita stood at USD2,097.09 in 2020 to rank 17th on the list of African countries, representing a 6% decline compared to USD2,229.86 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 recognizes that the country was likely to remain on a path of steady decline if nothing was 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. Recognising the environmental challenges facing Nigeria and how that affects the economy, the ERGP prioritized environmental management and chose to take sustainable path to development. Specifically, the plan sought to do that by tackling climate change and promoting sustainable management of natural resources. On adaptation, the plan supported the implementation of the Great Green Wall initiative to address land degradation and desertification, and 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 of the ERGP developed in 2021⁷. 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 encourage emission reduction, 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, boosts community awareness on the importance of environmental sustainability through public education campaigns. It also canvasses 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.

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 poor⁸. Although the main focus of the plan is on the economy, however, it also complements existing environmental policies by seeking to develop a solar power strategy that is expected to create 250,000 jobs and power 5 million households by 2023, at an estimated cost of N 240,000,000,000.00. 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 the Nigeria's economy due to loss and damage (to infrastructure, farmland, real estate, etc.) from extreme weather events that have been on a steady increase over the last decade (FGN, 2013)⁹. Adaptation measures are crucial, therefore in shielding the economy from further climatic vagaries. To this extent, Nigeria, has chosen to take the sustainability path in growing and diversifying its economy.

⁷ <https://nationalplanning.gov.ng/wp-content/uploads/2021/03/Nigeria-MTNP-2021-2025-Overview-of-Draft-Plan.1.pdf>

⁸ <https://www.iea.org/policies/13924-nigerian-economic-sustainability-plan>

⁹

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

2.4 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 percent 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 in disrepair and 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, 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 (southwest) 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 suffered a progressive decline because of inadequate funding, poor maintenance, and declining profit. In the first 5 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.

2.5 Social Characteristics

Nigeria is shaped by multiple ethnic groups. The country has 527 languages, seven of which are extinct. Nigeria also has over 1150 dialects and ethnic groups. The three largest ethnic groups are the Hausas that are predominantly in the north, the Yorubas who are predominantly 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. The Kanuri people are located in the northeast part of Nigeria, the Tiv people of north central and the Efik-Ibibio are 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 or 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 over-dependence of majority of the population on natural resources, which are threatened by climate change, the homogeneity, pattern of interaction and livelihoods of these social groups are constantly changing. Communities are continually evolving adaptation measures to cope with shocks and stresses caused by climate change.

2.6 National and/or Sub-National Policy Frameworks and Provisions on Climate Change

In recognition of the multi-sectoral nature of climate change governance, the need for effective policy, legal and institutional frameworks have become necessary for such a complex country as Nigeria. A number of policies, strategies, plans and actions to respond to climate change mitigation and adaptation have been formulated.

Nigeria has been an active participant in all international climate agreements since the Earth Summit (in Rio de Janeiro) of 1992. 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 has also been a Party to the Convention on Biological Diversity (UNCBD) since November 1994 and the United Nations Convention to Combat Desertification (UNCDD) since August 1997. Nigeria have 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.

2.7 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. Improvements to legislative and regulatory frameworks, and capacity building and transfer of technology in certain priority areas will further support these efforts. The country is also committed to implementing mitigation measures that will promote low carbon as well as sustainable and high economic growth and to increase climate change related science, technology and R&D to enable the country 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.

2.7.1 Policy Framework

Nigeria's adaptation priorities, strategies and plans are comprehensively covered in key policies on the environment, climate change and adaptation, formulated over the years. Apart from climate change and adaptation focused policies, several other sectoral policies have also addressed adaptation. Some of these policies are listed in Table 1. Some of these policies are briefly explained in Chapter 4.

Table 1: Key Policies Relevant to Adaptation

S/N	Key Policies relevant to adaptation	Links
1	Updated Nationally Determined Contribution (2021)	https://climatechange.gov.ng/wp-content/uploads/2021/08/NDC_File-Amended-11222.pdf
2	National Adaptation Plan Framework (2020)	https://napglobalnetwork.org/wp-content/uploads/2021/06/napgn-en-2020-Nigeria-National-Adaptation-Plan-NAP-Framework.pdf
3	Third National Communication (2020)	https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/187563_Nigeria-NC3-1-TNC%20NIGERIA%20-%2018-04-2020%20-%20FINAL.pdf
4	National Climate Change Policy for Nigeria (2021-2030)	https://climatechange.gov.ng/wp-content/uploads/2021/08/NCCP_NIGERIA_REVISIED_2-JUNE-2021.pdf
5	Climate Change and Gender Action Plan (2020)	https://climatechange.gov.ng/wp-content/uploads/2020/09/climate-change-and-gender-action-plan.pdf
6	Second Biennial Update Report (BUR2) to the UNFCCC (2021)	https://unfccc.int/sites/default/files/resource/NIGERIA%20BUR%202%20-%20Second%20Biennial%20Update%20Report%20%28BUR2%29.pdf

7	First Biennial Report (2018)	https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/218354_Nigeria-BUR1-1-Nigeria%20BUR1_Final%20(2).pdf
8	National Policy on the Environment (2016)	file:///C:/Users/uesr/Desktop/Google%20Drive/Active/Governmental/National-Policy-on-Environment-revised%202016.pdf
9	Intended Nationally Determined Contribution (INDC) (2016)	https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Nigeria%20First/Approved%20Nigeria's%20INDC_271115.pdf
10	Second National Communication (2014)	https://unfccc.int/resource/docs/natc/nganc2.pdf
11	Nigeria Climate Change Policy Response and Strategy (NCCPRS) (2012)	
12	Post-Disaster Needs Assessment, 2012 Floods (2013)	https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/assessments/23052013_nra_post_disaster_needs_assessment_2012_floods.pdf
13	National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (2011)	https://csdevnet.org/wp-content/uploads/NATIONAL-ADAPTATION-STRATEGY-AND-PLAN-OF-ACTION.pdf
14	National Disaster Framework (2010)	
15	First National Communication (2003)	

2.7.2 National Policy on the Environment

To address the country's critical environmental challenges, cutting across land degradation (deforestation, desertification and erosion drought), water and air pollution, waste, urban decay, and coastal surges, the Nigerian Government developed a National Policy on Environment first in 1989. The Government revised it in 1999 and in 2016 to accommodate the emerging environmental challenges and realities.

The policy's goal is to ensure environmental protection and the conservation of natural resources for sustainable development.

The strategic objectives include:

- securing quality of environment adequate for good health and well-being;
- promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems;

- promoting an understanding of the essential linkages between the environment, social and economic development issues;
- encouraging individual and community participation in environmental improvement initiatives;
- raising public awareness and engendering a national culture of environmental preservation;
- building partnership among all stakeholders, including Government at all levels, international institutions and governments, non-governmental agencies and communities on environmental matters.

Nigeria has enacted several specific policies and action plans that, if properly implemented, could support national climate change adaptation response. A few of these policies/plans include:

- Drought and desertification (National Policy on Drought and Desertification; Drought Preparedness Plan, 2007);
- Erosion, flood control and coastal zone management (National Policy on Erosion, Flood Control and Coastal Zone Management, 2005);
- forestry (Draft National Forest Policy, 2006);
- Biodiversity protection (National Biodiversity Strategy and Action Plan, 2004);

2.7.3 Nationally Determined Contribution

Nigeria submitted its first version of the Intended Nationally Determined Contribution (INDC) to the UNFCCC in 2015. This document focuses on mitigation contributions that are either unconditional or conditional on international support, such as financial investment or capacity building. The identification of adaptation contributions is limited in the INDC, with only adaptation strategies for the main priority identified. Nigeria has just revised its NDC in July 2021. The amended NDC contains an analysis of nature-based solutions for sectors with significant adaptation and mitigation co-benefits as well as assessment of green jobs in Nigeria (NDC, 2021)

2.7.4 Long-term low-emission development strategy (LT-LEDS)

In accordance with Article 4. Paragraph 19, of the Paris Agreement, Nigeria is currently preparing its Long-term low-emission development strategy (LT-LEDS)¹⁰. The LT-LEDS being prepared, consolidates the strategies and aspirations of Nigeria's Climate Change Response Strategies (NCCPRS) published in 202011.

2.7.5 Other Relevant Sectoral Policies

Apart from environment and climate change specific policies, Nigeria has formulated policies in other relevant sectors. These sectoral policies have identified climate change as a potential 'show-stopper' for development, prescribed mitigation actions to curb emission of greenhouse gases to the atmosphere and recommended adaptive measures to make people and systems withstand the impacts. Some of these sectoral policies that are relevant to adaptation are listed in Table 2

Table 2: Relevant Sectoral Policies to Adaptation in Nigeria

S/N	Sectoral Policies
A	Environment (others apart from climate change)
1	National Policy on Environmental (2016)
2	National Biodiversity Strategy and Action Plan (2016)
3	National Forest Policy (2010)
4	National Forestry Action Plan (1996)
5	REDD+ Strategy (2019)
6	Great Green Wall for the Sahara and Sahel Initiative National Strategic Action Plan (2012)
7	National Policy on Drought and Desertification (NPDD) (2007)
8	National Drought Plan (2018)
9	National Gender Policy (2006)
10	Land Degradation Neutrality Target Setting Programme (2018)
B	Agriculture
1	Nigeria Agricultural Policy 2001;

¹⁰ <https://ecopital.com/insights/nigeria-moves-to-develop-long-term-low-emissions-plan-to-curb-climate-change/>

¹¹ https://climatechange.gov.ng/wp-content/uploads/2021/08/NDC_File-Amended-_11222.pdf

2	National Program for Food Security
3	National Agricultural Resilience Framework (NARF)
4	Agricultural Promotion Policy (APP)
5	Nigeria Communication on Climate Smart Agriculture (2015)
C	Water
	National Water Policy (2012)
D	Health
	National Health Policy (2016)
E	Energy
1	National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015;
2	National Gas Policy (2017)
F	Transport
	National Transport Policy (2016)
G	Industry
	Nigeria Industrial Revolution Plan (2014)

2.8 Legal framework

The national policies can only have the desired impacts if properly implemented in an inclusive and gender-responsive ways. This can only be achieved if the policy framework is backed with 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 roles and responsibilities of the different tiers of governance, fosters inter-sectoral collaboration, provide laws and regulations to ensure compliance and enforcement and enable the legislature make the budgetary provisions for climate action (NCCP, 2021). In addition, the legal framework facilitates coordination and alignment of climate change response goals with other relevant development agenda such as the Sustainable Development Goals (SDGs), Agenda 2063 and the Sendai Framework on Disaster Risks Reduction. This makes the mainstreaming of climate change into national development agenda possible.

The legal provision for tackling climate change and its impacts comprises the country's constitution (1999 as amended), Environmental Impact Assessment (EIA) Act – CAP. E12 L.F.N. 2004, National Environmental Standards and Regulation Enforcement Agency (NESREA) Act 2007, National Oil Spill Detection and Response Agency (Establishment) Act, 2006 NO 15 2006, 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. Others include the Child Rights Act, The Violence Against Persons Prohibition Act and Discrimination Against Persons with Disabilities (Prohibition) Act, among others.

2.9 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 since 1999 to manage the natural environment of Nigeria and is responsible for the coordination and implementation of climate change-related policies and programmes. 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 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, as illustrated in Figure 2. 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 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 in Nigeria. Other National NGOs such as the Nigerian Environmental Study/Action Team (NEST) are also members of the ICCC. Academic institutions such as the Centre for Climate Change and Freshwater Resources (CCCFR) of the Federal University of Technology Minna (FUT Minna) are also members of the ICCC.

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 some are yet to establish such.

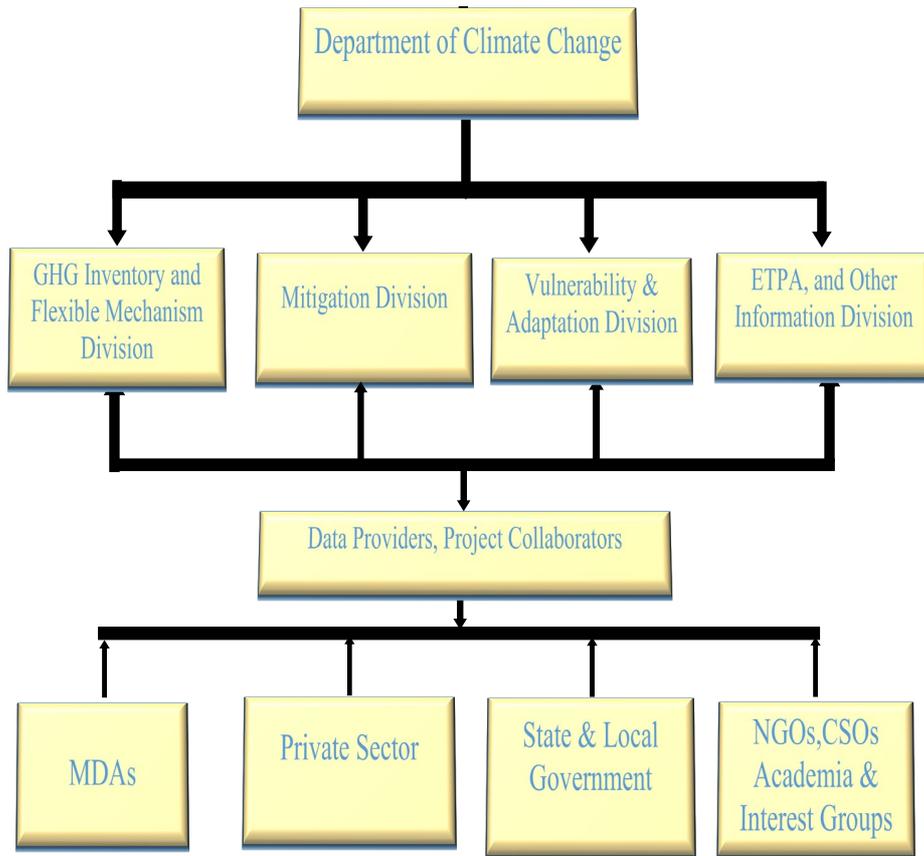


Figure 4: Structure of the Department of Climate Change (DCC)

The Institutional process for adaptation, excerpted from the NAP Framework (2020) is shown in Figure 4.

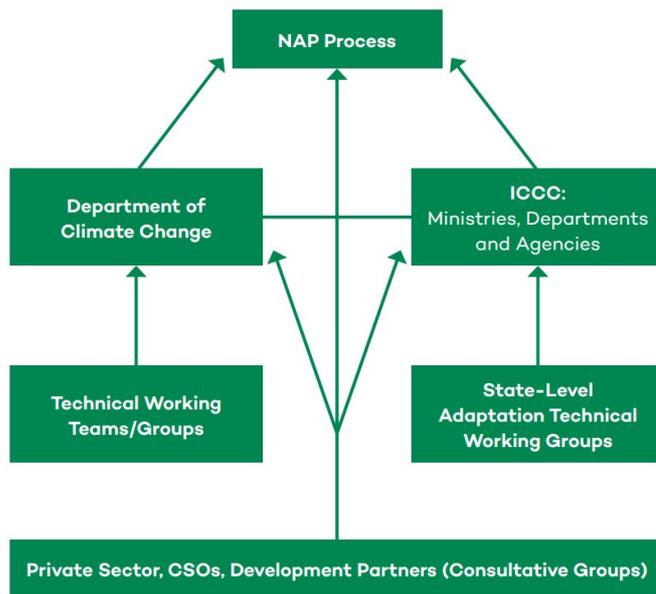


Figure 5: Institutional Framework for the NAP Process in Nigeria

Source: NAP Framework (2020)

3.0 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 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*¹² and 160 of 181 countries (the lower being more vulnerable) based on Notre Dame's Global Adaptation Initiative Index.¹³ Figure 6 illustrates pattern of vulnerability in Nigeria (based on Madu, 2012)

Due to its salient impacts that 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

¹² (https://germanwatch.org/sites/germanwatch.org/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_14.pdf);

¹³ (<https://gain.nd.edu/our-work/country-index/rankings/>).

based on geography and vulnerability as well as the mitigation and adaptation measures deployed by nations (Madu, 2012; Sayne, 2011).

In Nigeria (a country characterized by two distinct seasons - the wet and dry), all its three climatic zones (the southern tropical wet climate, the central tropical savannah and the Sahelian hot and Semi-arid 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 into 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. 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 degree 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 Northeast and Northwest regions the most vulnerable, and has compounded aridity, drought and desertification, and have caused the shrinking of wetland, decrease in surface water and the reduction in fauna and flora in many ecosystems across the northern part (Ebele & Emodi, 2016; Haider, 2019). The high number of rural communities (and their over-reliance on agriculture and forest resources) in the north further complicates the vulnerability of the region (Madu, 2012, 2016). In the relatively less vulnerable south, increase in rainfall, rise in sea levels, coastal erosions and flooding have made the Niger-Delta region of the South-south the most vulnerable - resulting to the displacement of several coastal communities (Federal Ministry of Environment, 2014; Haider, 2019; Sayne, 2011).

Nigeria's physical vulnerability is exacerbated by economic vulnerability. Despite recording tremendous progress in both social and economic fronts recently, its Human Capital Development is still weak and under-developed due to under-investment, the nation's Human Capital Index rating remains low. Although there are ongoing efforts 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 North and South. The most vulnerable group of people to the impacts of Climate Change are the farmers, fishermen, elderly, women, children and poor people living in urban centers (Federal Ministry of Environment, 2014). Nigeria's third national communication (TNC, 2020), National Climate Change Policy (2021) have given a detailed account of Nigeria's vulnerability to climate change, Table 3 shows projected climate trend for Nigeria's ecological zones

Table 3: Projected Climate Trend for Nigeria's Ecological zones

Climate Variables	Mangrove Zone	Rain Forest	Savanna (Tall grasses)	Sahel (Short grasses)
Temperature	↑	↑	↑	↑
Rainfall (amount receive)	↑	↑	↓	↓
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 large percentage of the populace depend 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 to the top ten nations¹⁴. Climate Change is known to have impacts on some major sectors in Nigeria as outlined below:

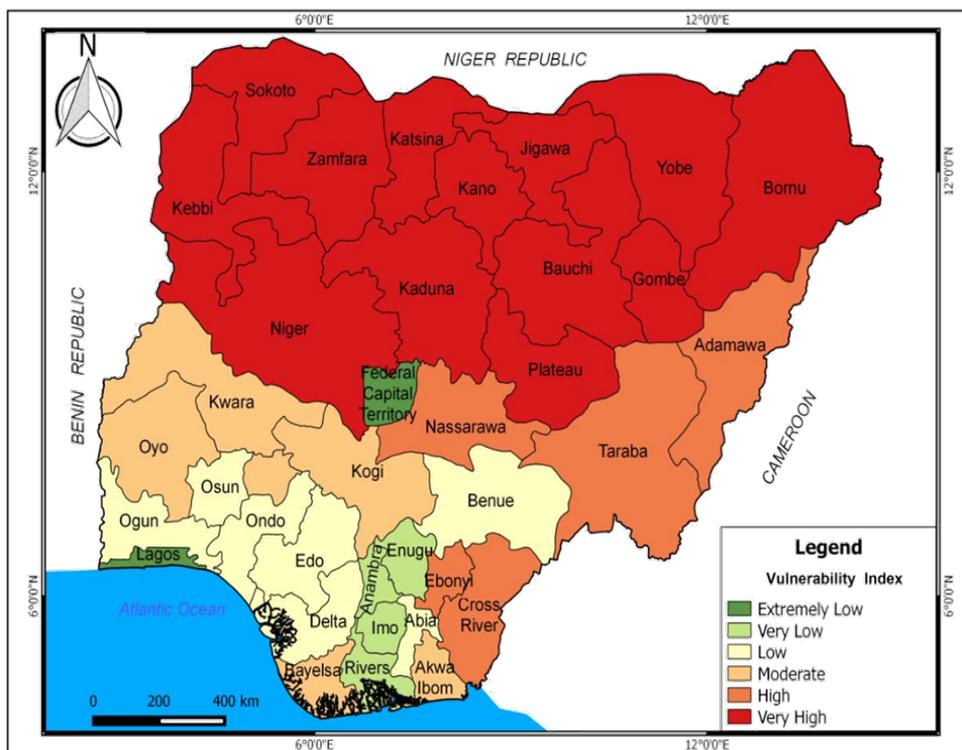


Figure 6: Pattern of vulnerability in Nigeria

Source: Madu (2012)¹⁵

¹⁴ <https://www.worldbank.org/en/results/2019/04/18/building-climate-resilience-experience-from-nigeria>.

¹⁵ Madu (2012) *Rurality 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

3.1 Observed (ecological, economic and social) impacts of climate change

3.1.1 Impacts on water resources

Climate change would result in increased variability in rainfall, predictably resulting in floods in some humid areas of the country and decrease in precipitation resulting in droughts in the north. Thus, the characteristics of the component of the hydro-climatological systems of the different ecological zones in the country would 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 would further compound the inability of the zone to meet people's demand 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 the water stress and problems of environmental sustainability and water resources management in the future. Reduced rainfall, especially in the northern parts of the country may lead drought and subsequently food shortages and malnutrition. This situation will have profound impacts on women and children being 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 demand for water. Of particular significance is the fact that reduced river flow will reduce hydro-electric power (HEP) production. Already, there is increased concern that marked fluctuations in the level of the waters in Kainji, Jebba and Shiroro Dams due to changes in climate is disrupting electricity generation from the hydro power stations. In addition, increased flooding may destroy water infrastructure including dams.

3.1.2 Impacts on forests resources

Across the country, many of the forest products are consumed directly by the households collecting them. The direct values of forests come from harvesting of fuel wood and poles for construction of houses and fences and the consumption of other forest products like plant products for craft production, food, medicine,

cosmetics and timber in particular. Although there are no quantitative estimates for the country, forest use can contribute 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 likely to experience no 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, potential benefits from climate change might be offset by increases in tree damage from fire.

3.1.3 Impacts on coastal and marine environment

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 (i) haphazard construction of ill-designed jetties, (ii) sand mining, (iii) unplanned and accelerated infrastructural development, (iv) pollution and (v) general land degradation. The anticipated accelerated sea level rise (ASLR) of 0.5 - 1m would worsen these problems.

In general, sea level rise impact in general will include (i) inundation and flooding, (ii) exacerbation of coastal erosion, (iii) increased frequency of ocean storm surges, (iv) changes in ocean dynamics, which could have effects on fishery resources, and (v) migration and nutrient distribution patterns, 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 threat as a result of ill-designed jetties which could cause alterations in current directions with the result that erosion could shift to other places as 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. 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 0.5m, 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 measure and development is carried out, would be 0.9 million, 2.10 million and 4.50 million with ASLR of about 0.2 m., 0.5 m., and 1.0 m respectively, resulting in massive

environmental refugees. With the projected climate change and sea level rise, the capital values at risk would be about \$8.05 billion and \$17.5 billion respectively with ASLR of 0.2 m and 1.0 m. if no development and no mitigation/adaptation measures are undertaken.

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 variation in humidity, wind patterns and the number of sunny days per year, could affect both consumption and 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 need for irrigation and residential, commercial, and municipal water use to offset temperature increases. This will be very critical in this era of energy deficiency in the country.

Mining:

Mining is a major socio-economic sector in Nigeria. In the Niger Delta alone, total investment in oil mining amount 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 developments of 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 many infrastructure and social amenities.

Industry:

In general, 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, and gas drilling and fisheries that dominate the coastal zones of Nigeria. Some industries are also dependent on availability of raw materials, which may be affected by changes in the climate. Variations in the production costs of crops, domestic

animals, fish, wood, water and mineral resources due to climate change and sea level rise, would affect, for instance, industries processing agricultural products, hydroelectricity generation and aluminum industry. 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 population and human settlements in Nigeria. In general, about 15% of the country's population is presently affected by climatic variation and sea level changes. With climate change, between 50% and 60% of the population would be affected. Global warming-related extreme events such as floods (resulting landslides in some areas) strong winds, droughts and tidal waves could cause massive relocation of people. They could contribute to increased population movement via (a) declining agricultural productivity (b) managed and unmanaged retreat from land which is vulnerable to sea level rise and (c) temporary displacement. Declining agricultural productivity that 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 and because of the poor health status of many citizens, the 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, illnesses, shocks and injuries due to increased exposure to heat waves and effects on respiratory systems. Indirect effects of climate change and sea level rise include altered spread and transmission of vector-borne diseases (including malaria etc.) and altered transmission of contagious diseases (including cholera, influenza etc).

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- that range from modern architecture through traditional relics to recreational areas like 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 touristic appeal of wildlife tourism, facilitated by the National Parks, are expected to decline due to habitat loss and fragmentation leading 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 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 and coastal roads and railways as the current means of communications along the coast may be covered by the intruding sea water or washed away by erosion. Changes in lake and river levels would also affect inland navigation. More frequent storms would affect shipping and other forms of transport. Also increased temperatures will exacerbate the problems of road and railways, as for example, the roads will become very hot for vehicle tyres. Increased temperatures may also expose these vehicles to increased hazards of road accidents. Also, increased hot weather could cause increased rail length and consequently potential hazards of rail.

3.2 National, Sectoral Risk and Vulnerability Assessment.

3.2.1 Climate Risk

According to USAID Template on climate risk (2013)¹⁶, climate change has the greatest impact on four key sectors in the country. These include water resources, agriculture, human health and energy. Nigeria is Africa's largest economy and home to significant natural resources, including oil and natural gas reserves. However,

¹⁶ (https://www.climatelinks.org/sites/default/files/asset/document/nigeria_climate_vulnerability_profile_jan2013.pdf)

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 coastal populations, and oil and gas production with increased risk of flooding, infrastructure loss, and 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 percent of rural poor and contributes more than 20 percent to 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 percent, and higher temperatures and variability in rainfall will 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 percent 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 percent by 2070, especially in rainfed rice areas. Agricultural losses by 2100 could reach 2–4 percent of GDP in West Africa. Livestock

production, mainly cattle, sheep, and goats, is a significant contributor to Nigeria's agriculture; 60 percent 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 percent), 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, ranging from loss of life resulting from extreme weather events, to disruptions to food production, water contamination, and increased risk of vector- and/or 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 percent of people have good sanitation and 39 percent access to potable water. The proportion of diarrheal deaths attributable to climate change is projected to rise to 14 percent by 2050. Climate change will likely exacerbate health issues related to respiratory infections (already responsible for 19 percent 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 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, or fires) and chemicals like carbon monoxide or sulfur dioxide to reduce air quality, especially in urban areas. Malaria, the number one cause of death for children under the age of 5 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).

3.5 Methods that have been used for the climate risk or vulnerability assessments

Ayotodun et. al., (2019) used the integrated vulnerability assessment method to analyze the vulnerability of West African countries to climate change¹⁷. Vulnerability is analysed 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 adaptive capacity of the system is less than the sensitivity and exposure, the system becomes more vulnerable to climate change impacts and the reverse is also true, the higher 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 average for the selected indicators (USAID 2013).

3.6 Regional Vulnerability to a climate risk or climate induced disaster

Nigeria is at risk to numerous natural hazards and prone to floods, storms, ocean surges, droughts and wildfires. Nigeria's coastal states face extensive risks from storm surge along the entire coast, and inland flooding and wildfires in the Niger Delta region, and negative rainfall anomalies in the southeast. The northern areas of the country face chronic aridity and riverine flooding along the Sokoto River in the northwest and the Komadugu River system in the northeast, as well as transboundary flooding along Niger and Benue rivers. The middle areas of the country are at risk to high exposure from aridity, which is compounded by high-tensions between farmers and pastoralists concerning land rights as well as water access. Climate change, deforestation, watershed degradation, land use, urbanization and widespread settlements into flood-prone areas have exacerbated issues and 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, disposal of waste, pasture management, animal tracking and hunting. The majority of damaging fires are observed from January onwards, due to high temperature (above 35°C) and also

¹⁷ <https://www.scirp.org/journal/paperinformation.aspx?paperid=93085>

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 hill areas and can also trigger landslides and mudslides and consequently gully erosion in sedimentary terrains. Additionally, water stress during dry periods is likely to be further exacerbated with competing demands from household, industrial consumption and agriculture. Increased heat will further strain existing water resources and impacts from changing rainfall patterns. A breakdown of States and Geo-political zones vulnerable to a specific climate risk or climate induced disaster by Benson and Kolawole (2017) is provided in Appendix 2.

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 addressed, 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 social inclusion, cultural and political economy aspects – including agreeing on the types of transitions needed (economic, social, etc.) and identifying opportunities to address social inequality in these processes.

3.5 Climate risk and vulnerability at national or sectoral level

Main climate risks

3.5.1 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 7 months (October to April)¹⁸.

¹⁸ World Bank Climate Knowledge Portal. <https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-historical>. Accessed: 15th April 2021

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

Evidence suggests that from 1941 to 2000, the temperature in the country has increased from 1.4 to 1.9 °C¹⁹. The annual rainfall has also decreased from 1941 to 2000 by 2-8 mm across most of the country, but increased by 2-4 mm in a few places²⁰.

The mean annual temperature is projected to rise by 1.81°C (1.25°C to 2.76°C) in 2040-2059²¹ (based on the CMIP5, RCP 8.5, Ensemble22). This will further increase to 3 °C (1.4 °C to 4.6 °C) by the 2090s

A temperature increases of about 0.20 °C - 0.30 °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 - 3% for each degree of global warming may be expected. Thus, it is reasonable to expect that the precipitation would probably increase by approximately 5 - 20% in the very humid areas of the forest regions and southern savanna areas.

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

3.5.2 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;

¹⁹ 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.

²⁰ <https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-projections>

²¹ <https://climateknowledgeportal.worldbank.org/country/nigeria/climate-data-projections>

²² 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.

- Warm spells / heat waves - Frequency increases over most land areas;
- Warmer and more frequent hot days and nights over most land areas;
- Heavy precipitation events - Frequency (or proportion of total rainfall from heavy-falls) increases over most areas;
- Area affected by droughts increases.

As a result, the frequency and intensity of extreme weather events will be on the increase. In the high rainfall receiving south, 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 many states outside the eleven known frontline states are facing the threat of the desert sprawl²³. Desertification is the process of extreme land degradation such that they become 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.” Desertification in northern Nigeria is a complex process with many underlying drivers which constitute an enormous ecological threat to the socio-economic development and peaceful co-existence of people in the country.

3.5.3 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 the 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 depletion of water availability through destruction of catchments and aquifers. Persistent flooding and water logging could render forest regeneration more difficult.

The savanna biome of northern Nigeria would be very vulnerable to any climate-change-related dramatic reduction in rainfall in the region. This could result in widespread degradation of habitats. Thus, climate change and sea level rise could

²³ Kebbi, Sokoto, Zamfara, Katsina, Kano, Jigawa, Bauchi, Gombe, Yobe, Adamawa and Borno

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.

3.5.4 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 dry conditions which underlie accelerated wind erosion. These are extremely serious situations given that soil erosion is already of catastrophic proportions in Nigeria while floods annually ravage many parts of the country during the rainy season. For example, it is estimated that in Abia, Anambra and Imo States, 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 either in terms of removal of soil by wind and rain or deposition of same in low-lying and down-wind locations.

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 serve as adaptive as well as mitigative climate change measures. Most of the policy frameworks cover both mitigation and adaptation strategies and plans. In this section, the adaptation priorities, strategies and plans in the policies are discussed.

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, 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 was 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) (2011)

The Nigerian Government has established several policies and institutional arrangements in response to climate change and other environmental challenges. The Federal Government underscores the importance of adaptation as key to adequately preparing and responding to climate change impacts. Accordingly, in collaboration with several civil society organizations, the Government in 2011 developed a 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 elaborately enunciated the potentials of adaptation as a channel for managing the several 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. The NASPA-CCN should have been reviewed in 2015, but the review did not take place.

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 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, roles and responsibilities among 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., Economic Recovery & Growth Plan (ERGP), NASPA-CCN, National Climate Change Policy Response and Strategy (NCCP-RS), strategies, and adaptation research.
- Focus on specific themes that are particularly relevant and/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 to address that. The purpose of the revised NCCPRS, therefore, is to define a new holistic framework to guide the country's response to the development challenge of 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 pursue low carbon, high-growth, and climate resilient sustainable development trajectory. The policy outlines the need for promotion of low carbon and sustainable economy, enhancing national capacity to adapt to climate change, 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 emphasized the need for strengthening of public institutions and functional framework for climate change governance. Increased public awareness and 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 development planning, financing and monitoring of climate change initiatives and programmes and articulates the goals and objectives for climate change management in Nigeria.

The Nigerian government recognises the need for developing 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 vulnerabilities of the people 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) and on increasing the country's resilience capabilities, and strengthen the country's social and economic structures against vulnerability. The following section reproduce the adaptation strategies and policies for thirteen (13) 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/meteorological forecasts and related information).
- Implement strategies for improved resource management (for example, increase use of irrigation systems that use low amounts of water; increase rainwater & sustainable ground water harvesting for use in agriculture; increase planting of native vegetation cover & promotion of greening efforts; and intensify crop and livestock production in place of slash and burn).
- Focus on agricultural impacts in the savanna zones, particularly the Sahel, the 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, fishery and livestock development practices.
- Promote and support effective research and knowledge development and management to connect farmers, policy-makers, businesses and researchers to adapt 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 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 programme for integrated water resource management at the watershed level
- Intensify programmes to survey water quality and quantity for both ground and surface water
- Implement programmes to sustainably extend and improve water supply and water management infrastructure
- Explore water efficiency and management of water demand, particularly in 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, social inclusive and resilient water and sanitation infrastructure
- Invest in small-scale earth dams for multi-purpose use.
- Promotes 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 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 capacity for smart water management
- Promote investment in the sector including through enhanced public and private sector participation.
- Deployment of 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 monitoring of forest status; and initiate a research programme on a range

of climate change-related topics, including 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 management of forest reserves and enforce low impact logging practice.
- Support the active implementation of the National Biodiversity Strategy and Action Plan (NBSAP), particularly those strategic actions that address climate change impacts.
- Support recommended climate change adaptation policies and programmes in sectors that affect biodiversity conservation, including agriculture, forestry, energy and livelihoods.
- Support and implement programmes 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 also reducing exposure of the ecosystems 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 programmes 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 programmes.
- Strengthen the extant adaptation strategy for the health sector including aligning it with the National Adaptation Plan (NAP) Framework.
- Strengthen surveillance programmes 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 that will enhance health sector resilience
- Create a functional, effective and transparent programme 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 & housing.
- Discourage building/urban encroachment into vulnerable areas, high risk zones & 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 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 construction and placement of energy infrastructure (i.e. higher standards and specifications).
- Undertake risk assessment & risk reduction measures to increase 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 both civil society and security forces have access to emergency energy supply.
- Expand sustainable energy sources and decentralize transmission in order to reduce 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 de-centralised energy systems to increase resilience, with 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 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 both civil society and security forces have access to emergency communication methods.

- Make provision for diverse transportation options such as pedestrian, bicycle, and transit routes
- Ensure a functional, socially-inclusive, gender-responsive, cultural 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 comprehensive evaluation of the vulnerability of transport networks and identification of 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 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 relocation of high-risk industries, facilities and markets
- Promote and market emerging opportunities from climate change
- Encourage informal savings and insurance schemes, and arrange for the availability of medium-term credit (especially for industries in crisis).
- Promote value chain-based approach for climate resilient industry
- Harness the potential of clean technologies for climate resilient industrial development
- Fostering 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 in national and regional security strategy
- Strengthen the capacities of security agencies and institutions to mainstream gender 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 development of effective policy responses and strategies on climate change-security issues
- Institutionalise 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 better management of and lessen the impact of climate variability on livelihoods and agricultural production to enhance security.
- Strengthen rural infrastructure and promote sustainable rural livelihoods ix. 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/model that uses intermediate NGOs, community members and radio to diffuse 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 livelihoods issues, where these NGOs support a number of communities in high-risk states.
- Animate communities with appropriate engagement methods, in order to elicit and document valid climate change and livelihood related needs/vulnerabilities.
- 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 programmes, including emergency response plans and programmes 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 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 programmes and other support to address the climate change-induced needs of vulnerable groups.

4.2.12 Adaptation Strategies for Education

- Provide evidence-based information to raise awareness and trigger climate change adaptation actions that will protect present and future generations in Nigeria.
- Develop skills-based curriculum in subjects like 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

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 follows:

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, evaluation.

4.3.2 State Governments

- Have a focal Ministry, Department or Agency mandated to lead and provide strong coordination for all the 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 programmes.

- 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, 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 its strategies and operations.
- Buy into opportunities presented by climate change adaptation 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 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/local climate change adaptation strategies.
- Run training programmes 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.

4.3.5 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.

4.3.6 International organizations and donors

- Provide technical and financial support for capacity building, reducing barriers to adaptation, and implementation of climate change adaptation policies, programmes, and other measures.
- Provide technical support for research, monitoring and evaluation of the mainstreaming process in order to develop 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 programmes, which cost-effectively address climate change vulnerability.

4.4 Linkages of adaptation goals and strategies in the different national policy frameworks

It is evident that 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 are not linked with each other in a coherent manner. For instance, the country's NDC, national adaptation plan, third national communication are not well-aligned to each 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 not linked to the main climate change mitigation and adaptation pronouncements of the DCC.

There is a need therefore for integrating the adaptation vision, goals and strategies, enunciated in the different policies and communications in a coherent manner. This is to enable seamless implementation and avoid duplications and overlaps. The ADCOM report provides a platform for integrating these adaptation policies and strategies in the country 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, 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 draw-back 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 time frame for achieving adaptation actions in the country. This timeframe should be aligned with the NDC, other national communications, relevant sectoral policies and internationally with the Global Stocktake, GGAs as well as other global agendas.

5.0 Implementation and support need of, and provision of support to, developing country Parties

5.1 Adaptation Support Needs

Nigeria has estimated the cost of implication of climate change impact for all sectors. The findings projected a loss of about 6 – 30% (USD 100 – 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 is yet to be assessed. However, estimates for Nigeria's priority sectors (that are 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 will rise to about USD 5.50 billion in 2050. For the health sector, USD 3.06 billion required per year for 2020 will reach about USD 5.50 billion by 2050. The transport sector 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)²⁴.

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 need. Several Steps and documents to that effect have been developed and submitted²⁵.

Key lesson from the NEEDS point to the fact that the Nigeria's climate change adaptation will be costly. Therefore, there is the need to leverage funding for adaptation. Though the country has identified its technical needs, financial needs, technological needs and sectoral needs (Bosello, Campagnolo, & Eboli, 2013; Mbanasor, Nwachukwu, Agwu, & Onwusiribe, 2012), budgetary allocations in the past decade have shown more commitment to mitigation – very meager funds were

²⁴ Details of the NEEDS can be accessed <https://unfccc.int/files/adaptation/application/pdf/nigerianeeds.pdf>.

²⁵ <https://www.ctc-n.org/technical-assistance/projects/technical-guidance-and-support-conducting-technology-needs-assessment>

dedicated to adaptation (Onyimadu, Uche, Ogbonna, & Alugbuo, 2020). Currently, Nigeria's adaptation support needs comes from two sources: the international and the national source.

5.2 Existing types/source of finance for Nigeria's adaptation

- a) **International funding:** this involves multilateral, bilateral and donor agencies/organization from outside the country. Between 2005 - 2008, 84 adaptation projects were executed across Nigeria totaling around USD 696 million. AidData identified almost 17 donors comprising countries and International agencies. The countries include the United Kingdom, United States, Canada, (South) Korea, Germany, Greece, Ireland, Spain and Norway. The agencies include the World Bank Carbon offset/World Bank Managed Trust Fund, GEF, IDA and EC. Details of the funds and adaptation intervention can be seen on the appendix C (Page 19) <https://www.files.ethz.ch/isn/133060/2011-03.pdf>.

Recently, Nigeria's existing adaptation finance largely come from the multilateral climate fund. The major funders are the Green Climate Fund (GCF), Adaptation Fund (AF), Global Environment Facility (GEF) and the World Bank. Others are the Special Climate Change Fund (SCCF), Clean Investment Fund (CIF) and the Fast Start Finance (Fatoki & Sasona, 2015). Details of both international and national sources of finance can be found on <https://www.greenclimate.fund/sites/default/files/document/readiness-proposals-nigeria-unep-adaptation-planning.pdf>; and <https://open.unido.org/api/documents/17352896/download/GCF%20Readiness%20Proposal%20-%20Nigeria,%20UNIDO-CTCN.pdf>.

Other sources of foreign funding for specific adaptation intervention include the European Union and FAO funds for the Great Green Wall (GGW) supporting implementation of 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 adaptation drive via the Strengthening Integrated Development of HIV/AIDS Services (SIDHAS) and in conflict recovery in the northeast Nigeria.

- b) **National Climate Adaptation Finance:** national efforts to raise funding for climate change adaptation such as the Development of Natural Resources

Fund (DNRF), Ecological Fund Office (EFO), Great Green Wall funding and the Clean Technology Investment Fund (CTF) https://www.climateinvestmentfunds.org/sites/cif_enc/files/nigeria_ctf_ip_july_2014_revision_0.pdf. Nigeria's Sovereign Green Bond is equally another source of climate finance where a target of USD 284 million is placed for seven critical sectors. More information on this can be found in: https://climatechange.gov.ng/wpcontent/uploads/2021/08/NCCP_NIGERIA_REVISIED_2-JUNE-2021.pdf . Efforts to see the emergence of the National Strategic Climate Change Trust Fund has transformed into a bill seeking for national climate change council and agency which has passed reading in the lower chamber of national assembly.

5.3 Assessment of implementation of adaptation actions

There is no formalized or systematic approach to assessing, monitoring, reviewing or reporting of ongoing adaptation efforts at all government levels (Federal, states 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 mainstream in national planning (NEST, 2011; Orie, 2021), However, more political commitment is required in filling the financing gaps, integrating adaptation in EIA, engaging private sector, raising awareness and strengthening political will, speeding the passage of climate change response laws, supporting grass root participation and overcoming 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 and not all countries have the capacity – the knowledge, the tools, the public support, the scientific expertise and the political know-how – to do so. 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:

1. Individual level
2. Institutional level
3. Strategic level²⁶

Even before its ratification of the United Nations Framework Convention on Climate Change and the Kyoto Protocol, Nigeria has developed its domestic structure for building technical capacity for 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/units in State Ministries of environment and relevant MDAs²⁷.

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 has been a good Public-private partnership outing in the areas of mitigation to climate change, however, in the areas of adaptation, a lot needs to be done to strengthen the Public-private engagement (Itua & Esambe, 2021; Oladipo, 2010). Despite Nigeria's private sector lagging behind compared with other African Countries in climate financing, it nevertheless gradually improving as witnessed in the preparation of the country's NDC²⁸ recently. This is partly due to opportunities created by international finance organizations for the private sector to leverage funds for climate action ²⁹

²⁶ <https://climatechange.gov.ng/2020/09/21/capacity-building-for-climate-action/>

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 climate change is real and its impacts are felt across the country, developing a coherent, effective and sustainable ways of adapting to its consequences has become necessary. Nigeria is highly vulnerable to climate change due to its large natural resources' dependent population, its 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, 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 discharge its international and national obligations in tackling climate change and fostering adaptation. The challenge has always been on implementation. The following sections briefly highlights how the adaptation strategies, policies and plans are being implemented by the various sectors and stakeholder groups in the country.

6.1.1 Current status of adaptation actions

Through the NASPA-CCN (2011) and NAP Framework (2020), 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. There are also cross-cutting issues such as gender, finance that 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 programmes and projects. Through the activities of

the ICCC many MDAs have established climate desks to coordinate sectoral climate actions.

6.2 Adaptation Actions for Recognition in Sectors and by Stakeholders

The strategic guidance provided by the Policy, legal and institutional frameworks have enabled stakeholders implement adaptation actions with some level of success. However, these achievements are not without challenges.

6.2.1 Adaptation Actions (and Achievements) for Recognition by Ministries, Departments and Agencies

Although the greatest achievement of MDAs in adaptation is in policy formulation, however, a number of project level adaptation actions have been achieved by a number of them. Similarly, other stakeholders such as the CSOs/NGOs, the Academia, and the Private Sector have been actively involved in conceiving, planning, financing and implementing adaptation actions with different degrees of successes. Some of the broad adaptation actions and measures already implemented and ongoing in the country identified through the ADCOM preparation process are summarized in Table 4. However, a more detailed account of these activities will require a dedicated study. The table also indicates the actors implementing these actions and relevant links for getting more information on these activities. Some of these actions are mitigation actions but are at the same time fostering adaptation.

Table 4: Adaptation Actions by Stakeholders (MDAs, CSOs/NGOs, Academia, Private Sector)

S/N	Sector	Actors (MDAs)	Relevant Links
1.	Environment <ul style="list-style-type: none"> ▪ The Great Green Wall Project ▪ Action Against Desertification Project ▪ Sovereign Green Bond which provides much needed financing for several adaptation projects ▪ Coastal zone management: Shoreline protection projects ▪ Adaptive water harvesting programme. ▪ Flood Early Warning Systems (FEWS) ▪ Afforestation projects ▪ Creation of green jobs: 	<ul style="list-style-type: none"> – Min. of Environment. – Min. of Industry, Trade and Investment. – National Agency for the Great Green Wall. – National Emergency Management Agency. – National Oil Spill Detection and Response Agency (NOSDRA). – National Orientation Agency (NOA). 	<p>https://doi.org/10.1080/1523908X.2020.1832883</p> <p>https://www.ncfnigeria.org/programmes/climate-change</p> <p>https://www.fidelitybank.ng/documents/Sustainable%20Banking%20Report%202018.pdf</p> <p>https://sterling.ng/wp-content/uploads/2020/02/2017-Stand-Alone-</p>

	<p>(Sand) dune fixation, Establishment of trees nurseries</p> <ul style="list-style-type: none"> ▪ Training and capacity building on climate change adaptation ▪ Ecosystem Restoration Project. ▪ Advocacy campaign ▪ Provision of funding and support for adaptation actions. ▪ Climate resilience building activities ▪ Managing atmospheric pollution ▪ Flood and erosion control: Construction of Climate-smart Drainage systems, land/gully reclamation across all the States of the Federation ▪ Space Programme and 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 	<ul style="list-style-type: none"> – Nigerian Conservation Foundation (NCF). – Bank industry. – NIMASA – NARSDA 	<p>Sustainability-Report.pdf</p> <p>https://www.vanguardngr.com/2010/01/nimasa-partners-oau-on-climate-observation/</p> <p>https://www.researchgate.net/publication/330559390_Climate_Change_Space_Technology_and_Climate-Resilient_Development_in_Nigeria</p>
2.	<p>Agriculture</p> <ul style="list-style-type: none"> ▪ Establishment of Automatic Weather Stations. ▪ Run-off Water Harvesting Structures. ▪ Climate Change Adaptation and Agric. Business Support Programme. ▪ CSA related programme in livestock, crop and fisheries. ▪ CSA related NEWMAP activities. 	<ul style="list-style-type: none"> – Min. of Agriculture. – Nigerian Meteorological Agency. – Gender and Environmental Risk Reduction Initiative (GERI) – Women Environment Programme (WEP). – OXFAM. 	<p>https://www.adaptation-undp.org/sites/default/files/resources/17_nimet_sabubakar.pdf</p> <p>https://wepnigeria.net/index.php/brief-about-wep/</p> <p>https://docs.google.com/document/d/1wkCh</p>

	<ul style="list-style-type: none"> ▪ Capacity building ▪ Forecasting on drought and desertification. ▪ Sustainable and innovative farming and forestry practices. ▪ Promotion of Organic Farming. ▪ Provision of support and funding to small-scale farmers. ▪ Building resilient livelihood 	<ul style="list-style-type: none"> – UK Embassy/UKAID (DFID)/British Council – 	<p>Oo1Qnhp9NTD-d1jyfg6mSkc_6W8I/edit?usp=drivesdk&oid=104389650528718855020&rtpof=true&sd=true</p> <p>https://nigeria.oxfam.org/policy-paper/climate-change-on-small-scale-farmers</p> <p>https://nigeria.oxfam.org/what-we-do/sustainable-livelihood</p> <p>https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/14761/675_Climate_Change_in_Nigeria.pdf?sequence=1&isAllowed=y</p>
3.	<p>Water</p> <ul style="list-style-type: none"> ▪ Meteorological services in operational hydrology and water resource activities. ▪ Capacity building on sustainable water management. ▪ Advocacy campaign ▪ Flood early warning and vulnerability assessment. ▪ Seasonal Rainfall Prediction 	<ul style="list-style-type: none"> – Min. of water Resources – Nigerian Meteorological Agency. – NOA – Nigerian Hydrological Service Agency 	<p>https://www.adaptation-undp.org/sites/default/files/resources/17_nimet_sabubakar.pdf</p> <p>https://nihsa.gov.ng/functions-of-the-agency/</p>
4.	<p>Health</p> <ul style="list-style-type: none"> ▪ Training of staff on climate change adaptation. ▪ Waste reduction and generation. ▪ Use of clean cook stove 	Ministry of Health	
5.	<p>Energy and Transport</p> <ul style="list-style-type: none"> ▪ Policy on renewable energy in the manufacturing sector. ▪ Low carbon technology/carbon capture technology 	<ul style="list-style-type: none"> – Ministry of Industry, Trade and Investment. – NOSDRA. – Rural Electrification Agency 	<p>https://rea.gov.ng/wp-content/uploads/2021/06/SPOTLIGHT-ON-REA.pdf</p>

	<ul style="list-style-type: none"> ▪ Carbon disclosure/energy transition project ▪ Investment in solar power ▪ Energizing Education Programme (EEP) 	– NIMASA	https://www.vanguardngr.com/2010/01/nimasa-partners-oau-on-climate-observation/
		–	
7.	<p>Human settlement and tourism Works and housing</p> <ul style="list-style-type: none"> ▪ Urban resilience and sustainability ▪ Plans and policy for physical and urban development. ▪ Urban renewal and slum upgrading projects 	Min. of Works & Housing	

6.2.2. Sub-national Governments

There are 36 states in Nigeria constituting the second tier of government. These states are closest to the grass root where climate change impacts are felt directly by people. It is also the theater for implementation of climate action (including adaptation). Although, there is lack of coordination of adaptation activities being executed at the state level and that at the Federal level, however, many states are undertaking significant number of adaptation activities. Some adaptation activities by sub-national governments are summarized in Table 5

Table 5: Adaptation Activities by some Sub-national Governments

S/N	Adaptation Actions	Actors (State Governments)	Relevant links
	<ul style="list-style-type: none"> ▪ Development and execution of land restoration projects including afforestation ▪ Flood and erosion control projects ▪ Promotion of irrigation farming (especially drip irrigation) ▪ Promotion of the adoption of renewable energy such as solar and wind 	State Government: Ebonyi, Kaduna, Gombe, Bauchi, Delta, Lagos	<p>https://gombenewmap.org/2018/05/20/desilting-storm-drains-to-save-lives/</p> <p>https://csdevnet.org/wp-content/uploads/Towards-aLagos-Adaptation-Strategy.pdf</p>

	<ul style="list-style-type: none"> ▪ 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 		
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6.2.3 Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs)

CSOs and NGOs are actively participating in implementing adaptation actions in different sectors across the country. While most of these groups are grassroots based and target local communities, others operate at strategic level constituting a think tank on environmental policy advocacy, research and capacity building. CSOs use own funds or leverage donor support to conduct their activities with different degrees of successes. Despite their active involvement in adaptation actions in the country, their efforts are not sufficiently documented and tracked by the designated national authority. These groups can be the bridge between the government and local people by cascading international commitments and national policy priorities into local actions. Most of the CSOs/NGOs in the country are driven by young people. They therefore constitute the youthful segment of the society. There are hundreds of CSOs in the country, the adaptation actions by of these are summarized in Table 6

Table 6: Adaptation Actions by Some CSOs/NGOs in the Country

S/N	Adaptation Actions	CSOs/NGOs	Relevant links
	<ul style="list-style-type: none"> • Development and launch of National Action Plan on Gender and Climate Change • Promotion of Organic Farming • Establishment of Mini ranches • 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 	<p>Women Environment Programme (WEP) The Nigerian Environmental Study/Action Team (NEST) Nigerian Conservation Foundation (NCF)</p> <p>African Climate Research Center (ACCREC)</p> <p>Climate Change Network of Nigeria (CCN)</p> <p>Climate Action Network (CAN) African Centre for Climate Actions and Rural Development (ACCARD) Initiative</p>	<p>https://wepnigeria.net/ https://ncfnigeria.org/index.html https://www.nestinteractive.org/ http://www.ccnigeria.org/ https://climatenetwork.org/ http://accard.org/</p>

	<ul style="list-style-type: none"> • 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 		
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	<ul style="list-style-type: none"> Research on regional climate downscaling activities 		

6.2.4 Academic Institutions

Academic institutions are actively engaged in capacity building, research, innovations and development on climate actions. There are 170 in Nigeria. In 2021, 43 are owned by the Federal Government, 48 by the State Governments and 79 by the private sector³⁰. Most of these institutions are involved in research aimed at finding sustainable and adaptable solutions to climate change (including adaptation). Some of these activities are summarized in Table 7

Table 7: Some Adaptation Actions by Academic Institutions in the Country

S/N	Research and Innovations Adaptations	Actors (Federal, State and Private Universities)	Relevant links
6.	<ul style="list-style-type: none"> Climate change, agriculture and environment interactions Fast Tracking Climate Change Mitigation Strategies. Desert research, monitoring and control project Deep Decarbonization Pathways Project. Sustainable Development of Farm Agro-forestry and Fuel Wood Conservation in North-West Katsina sponsored by the European Union. Establishment of Tree Nurseries Training on Non-Wood Tree Product processing techniques Efficient cook stove/meat roaster and Bread Oven. 	<ul style="list-style-type: none"> University of Nigeria Nsukka. University of Lagos. Obafemi Awolowo University. University of Ibadan University of Port Harcourt Nigerian Environmental Study Action Team (NEST). ABU Zaria Yobe State University Alex Ekwueme Federal University 	<p>(http://www.nestinteractive.org/index.php).</p> <p>https://naerls.gov.ng/programmes/</p> <p>https://yobestateuniversity.academia.edu/</p> <p>https://cccd.funai.edu.ng/nigerian-deep-decarbonization-pathways-project/)</p> <p>https://www.isscerer-umyu-euproject.org/</p> <p>https://ace.aau.org/ace-1-centers/cda/</p>

³⁰ <https://www.statista.com/statistics/1130701/number-of-universities-in-nigeria/>

<ul style="list-style-type: none"> ▪ 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 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 	<ul style="list-style-type: none"> – Umaru Musa Yaraduwa University. – Bayero University Kano. – University of Maiduguri – Abubakar Tafawa Balewa University. – Modibbo Adama University – Nasarawa State University. 	<p>http://www.ijrhss.org/papers/v7-i8/1.pdf</p> <p>https://www.atbu.edu.ng/zeri-center</p> <p>https://mautech.edu.ng/new/index.php/en/component/content/article/2-uncategorised/287-cetres</p> <p>https://nsuk.edu.ng/center/centre-environmental-studies-ces</p> <p>https://www.unn.edu.ng/climate-change-policies/</p> <p>https://unilag.edu.ng/?p=8716</p> <p>https://oauife.edu.ng/component/k2/itemlist/tag/climate%20change</p> <p>https://cpeel.ui.edu.ng/course/energy-and-climate-change-law-policy-ii</p> <p>https://www.uniport.edu.ng/news/featured/1841-stakeholders-gather-for-change-adaptation-gender-inclusion-in-climate.html</p>
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	<ul style="list-style-type: none"> ▪ Research on enhancing adaptive capacities to climate change impacts by smallholder farmers through climate-smart agriculture. 		
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6.2.5 The Private Sector

A study conducted across private companies in Nigeria shows that almost half of the manufacturing companies have adopted climate change adaptation strategies and nearly half of these companies have implemented formal strategy. Most of the companies see climate change as hurting their businesses, and also 97% of the subjects perceive that climate change harms health. In addition, 46% of companies adopted proactive strategies, while 65% employed reactive approach. About 52% of companies have only recently seen the need to adapt to climate change (less than five years). Only a few of the companies implemented climate change strategies for the past 16 years and above. This shows that Nigerian companies have only recently begun to appreciate the climate change effect in their company strategy³¹.

Private sector led climate change adaptation investment in agriculture leveraging climate smart- technology open up avenues for de-risking green investment in agricultural ventures, utilizing field mapping, satellite imaging and improved seed to build agri-business integrated value chains and achieve higher yields³².

Private Sector Challenges

Nigeria's private sector is susceptible to fluctuations in the international price for crude oil – a commodity that accounts or 90% of exports and foreign exchange earnings. Inadequate information on market activity deals, limited number of scalable enterprises caused by a proliferation of Micro/Small Enterprises. Weak corporate governance, limited exit opportunities; lack of depth in green investment fundraising environment; and shortage of qualified human capital³³.

³¹ <https://www.ligsuniversity.com/en/blogpost/climate-change-adaptation-strategies-among-manufacturing-firms-in-nigeria>

³² https://www.afdb.org/sites/default/files/2020/06/24/factsheet_nigeria_en.pdf

³³ <https://www.ligsuniversity.com/en/blogpost/climate-change-adaptation-strategies-among-manufacturing-firms-in-nigeria>

6.2.6 International Donors and Development Agencies

International donors and development agencies have been at the forefront of financing climate action initiatives in Nigeria. The support is being rendered to all sectors and stakeholder groups (Federal MDAs, Sub-national governments, CSOs, Academia and the Private sector). Some of these interventions are summarized in Table 8

Table 8: Summary of Support Provided by International Donor Agencies

S/N	Sector	Donor Agencies	Relevant Links
	<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 	<ul style="list-style-type: none"> UK Embassy/UKAID (DFID)/British Council USAID French embassy. World Bank. NAP Global Network/International Institute for Sustainable Development UN Agencies (UNDP/UNEP/UNESCO). 	<p>https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/14761/675_Climate_Change_in_Nigeria.pdf?sequence=1&isAllowed=y/</p> <p>https://www.usaid.gov/sites/default/files/documents/Climate_Change_Fact_Sheet_-_NIGERIA_FINAL_FORMAT2.pdf</p> <p>https://thechronicleofeducation.net/2019/10/31/france-pledges-700000-euros-on-climate-change-adaptation-in-nigeria/</p> <p>https://www.worldbank.org/en/results/2019/04/18/building-</p>

	<ul style="list-style-type: none"> • 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 		<p>climate-resilience-experience-from-nigeria</p> <p>https://www.adaptation-undp.org/explore/af-rica/nigeria</p>
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Despite achievements in diverse areas, there seems to be limited coordination, monitoring and evaluation of these adaptation actions to enable the country give a comprehensive account of adaptation actions for international recognition. The ADCOM is the first step in providing a platform for comprehensive inventory of adaptation actions in sectors and by the various stakeholders in the country.

6.3 Challenges and Obstacles

The achievement of the above adaptation actions and measures across sectors and by various actors are not without challenges and obstacles. A lot 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

Table 9: Challenges and Obstacles in Implementing Adaptation Actions by various Stakeholders

S/N	Sector	Actors (MDAs, CSOs, Academia, Private Sector)
1.	Environment <ul style="list-style-type: none"> ▪ 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 	<ul style="list-style-type: none"> – Ministry of Environment. – National Agency for the Great Green Wall. – NOA
2.	Agriculture <ul style="list-style-type: none"> ▪ Lack of better CSA management. ▪ 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. 	Ministry of Agriculture
3.	Water <ul style="list-style-type: none"> • Lack of funding 	<ul style="list-style-type: none"> – Ministry of Water Resources.

	<ul style="list-style-type: none"> • Low level of capacity on climate change mitigation and adaptation • Poor synergy with related MDAs 	
4.	Health Lack of adequate funding Lack of capacity building	– Ministry of Health
5.	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	– Ministry of Industry, Trade and Investment – NOSDRA – REA – NIMASA
6.	Research and Innovations Adaptations <ul style="list-style-type: none"> • Lack of funding • Lack of tools and equipment • Lack of technology transfer opportunities • Poor linkages and synergy 	Academic Institutions
7.	Human settlement and tourism Works and housing <ul style="list-style-type: none"> • Lack of adequate funding 	Min. of Works & Housing
8.	Sub-nationals <ul style="list-style-type: none"> ▪ 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 	State and Local Governments
9	CSOs/NGOs <ul style="list-style-type: none"> • Poor funding opportunities • Poor networking opportunities • Poor recognition of roles by the 3 tiers of government • Poor community buy-in 	CSOs and NGOs

6.4 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 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

6.5 Conclusion

In Nigeria, there are various stakeholders that are deeply involved in climate change adaptation efforts. These stakeholders work at various scales, in different sectors and use diverse approaches. However, there are a lot of problems constraining better results and greater impact. Lack of synergy, coordination, target setting, monitoring and evaluation have giving room to overlaps, duplication of efforts and greater cost-burden. Poor communication is another problem reducing the effectiveness of adaptation efforts in the country. The ADCOM will go a long way in 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 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 poor. A report by Women Watch (2009) and FAO (2011) revealed that about 70 per cent of the people who live on less than US \$1 per day and are highly dependent for their livelihood on natural resources are women and therefore more threatened by climate change. Furthermore, they face social, economic and political barriers that limit their coping capacity. Nigerian Environmental Study Action Team (NEST) report (2011) revealed that women experience and/or 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, limiting their educational opportunities and reducing 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

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 active agents of change. Furthermore, they possess the knowledge and skills that relevant authorities can utilize for climate change adaption 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). For example, in the context of climate change, gender analysis examines the different impacts climate change has on men and women and the different ways men and women respond to and can cope with the changes and differences in how they can shift from short-term coping mechanisms to resilience.

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, recognized 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 on natural resources threatened by climate change for their livelihood.

The document further declared that gender was mainstreamed into the NASPA-CNN document by considering the specific dimensions of impacts and vulnerability of men and women to climate change and the adaptation options in various sectors. However, the report did not provide the sex-disaggregated data or the other methods used for gender mainstreaming.

Nigeria's NAP Framework also examined 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 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 recognised the need for gender considerations for the successful planning, implementation and evaluation of effective climate change mitigation and adaptation measures. Thus, appropriate and effective gender considerations should be taken into cognizance in implementing the response strategy to facilitate informed mitigation and adaptation to climate change. Based on the foregoing, it is evident that there will be a continuous implementation of the national gender policy for climate change adaptation.

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

- Ensure gender is mainstreamed into environmental concerns at all times
- Promote review of related environmental policies and acts to include gender concerns
- Provide incentives for environmental programmes and initiatives that target underrepresented gender and other vulnerable groups.
- Facilitate full participation of women, men, girls and boys and other vulnerable groups in decision-making processes in 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 the Nigerian society were not generated before the formulation of such policies/frameworks. Although, there were some levels of consultations with a wide array of other stakeholders, especially Civil Society

Organisations (CSOs), however, the documents did not give specifications on women's roles and how they will participate in implementing the strategies.

Convincing evidence on sex-disaggregated data that depicts who has access to productive resources and assets such as land, forests, water supplies, equipment, labour, capital, credit, new technology and training among men and women 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 formerly, was 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, division of labour, 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, provision of enough budgetary allocation for gender-related activities; building the capacities of women, revision of recruitment policies and a clear monitoring plan using verifiable gender indicators to ascertain the success or otherwise of any gender-related programme on 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 the 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 climate change (IUCN, 2008).

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

Hence 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, 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 the Indigenous and traditional peoples for effective climate change adaptation. Thus, section 4.11 of NAP Framework realized that many indigenous practices ignored in the past had become solutions for today's challenges. Agroforestry, for example, is by no means alien to the African farmer; it has been practised 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 a reality.

The NASPA-CCN underscore the need to consider the socially marginalized groups, including the 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 resource and poverty. The Indigenous and traditional people and other socially marginalized groups (such as the poor, children, women, and elderly) tend to bear the brunt of climate change. The major shortcoming of the policy in respect of the Indigenous and traditional people is that it merely viewed 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, 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/planned adaptation actions

Institutional mechanisms exist in the DCC, 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). In recent times the DCC has engaged the youth in most of their activities. The DCC has a database for all the environment-related CSOs across the six geopolitical zones of the countries. Such CSOs, including women 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 (Plate 2)



Figure 7: 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 documentation on 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 the adaptation funds peculiar to the Indigenous people.

8.0 Problems and Challenges:

Despite its modest effort 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, lack of target setting, monitoring and evaluation have giving room to overlaps, duplication of efforts and greater cost-

burden. Poor communication is another problem reducing the effectiveness of adaptation efforts in the country. The visible exclusion of the sub-national governments (states and local governments), CSOs, indigenous people, women, youths and the people living with disabilities constitute 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, analyse climate information and prioritise 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 or 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 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 active engagement and inclusion of these 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 reasons mentioned in section 8. The country therefore requires more support on funding, capacity building, linkages and collaboration, technology transfer, tools and technical skills to enable it 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 all adaptation actions, achievement and 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, has also highlighted the significant efforts made by the country and recommends areas it needs support.

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13.0 Appendices

Appendix 1: Participants List for ADCOM Inception Workshop

S/N	ORGANIZATIONS	NO OF PARTICIPANTS
	MDAs	
1	Federal Ministry of Science & Technology	1
2	Federal Ministry of Health	1
3	Federal Ministry of Agriculture & Rural Development	1
4	Federal Ministry of Finance, Budget & National Planning	1
5	Federal Ministry of Water Resources	1
6	Federal Ministry of Industry, Trade & Investment	1
7	Federal Ministry of Women Affairs & Social Development	1
8	Federal Ministry of Power	1
9	Federal Ministry of Works & Housing	1
10	Senate Committee on Ecology & Climate Change	1
11	House Committee on Climate Change	1
12	National Emergency Management Agency	1
13	Energy Commission of Nigeria	1
14	National Environmental Standards and Regulations Enforcement Agency	1
15	Nigeria Erosion and Watershed Management Project	1
16	National Agency for Great Green wall	1
17	Department of Drought & Desertification Amelioration	1
18	Department of Pollution Control & Environmental Health	1
19	Department of Erosion, Flood & Coastal Zone Management	1
20	Department of Forestry	1
21	REDD+	1
22	Nigeria Meteorological Agency	1
23	Nigeria Incentive-Based Risk Sharing System for Agricultural Lending	1
24	Nigeria Maritime Administrative and safety Agency	1
25	National biosafety Development Agency	1
26	Federal Ministry Foreign Affairs	1
27	Federal ministry of Labour and Productivity	1
28	Federal Ministry of Justice	1
29	National Bureau of Statistics	1
30	Federal Ministry of Transport	1
31	Green Bonds Programme	1
32	Agricultural Research Council Of Nigeria	1
33	Federal Ministry of Humanitarian Affairs,	1
34	Federal Ministry of Education,	1

35	North East Development Commission	1
36	Nigeria Hydrological Services Agency	1
37	Chad Basin Development Authority	1
38	Standard Organization of Nigeria	1
39	Nigeria Investment Promotion Council	1
40	Federal Ministry of Justice	1
	FMENV participation	
41	Permanent Secretary	1
42-43	Education, Awareness & Outreach Division	2
44-45	Mitigation Division	2
46-56	Vulnerability and Adaptation Division	10
57-58	Green House gas Inventory Division	2
59-66	FMENV Headquarters	7
	NGOs	
67	Women Environment Programme	1
68	OXFAM Nigeria	1
69	Global Green restoring initiative	1
70	Nigeria Forum for Agricultural Advisory Services	1
71	Natural Eco capital	1
72	Grassroot Environmental & Health Initiative (GEHIO)	1
	Academia	
73	Prof Haruna Ayuba	1
74	Huzi Mshelia	1
75	Prof. Nasiru M. Madugu	1
76	Dr. Mohammed Y. Adana	1
77	Dr. Salamatu Abraham Ekpo	
78-80	Consultant Team	3
81-117	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, Trans boundary Flooding, Deforestation, Farmer-Harder conflicts, Windstorm
2	Kebbi	North west	Aridity, Trans boundary Flooding, Deforestation , Farmer-Harder conflicts, Windstorm
3	Bauchi	North east	Aridity, Trans boundary Flooding, Deforestation
4	Kaduna	North west	Aridity, Flooding, Deforestation, Farmer-Harder conflicts
5	Gombe	North east	Aridity, Flooding, Deforestation
6	Kano	North west	Aridity, Flooding, Deforestation, Urban heat wave
7	Jigawa	North west	Aridity, Trans boundary Flooding, Deforestation, Windstorm
8	Yobe	North east	Aridity, Trans boundary, Windstorm, Flooding, Deforestation,
9	Katsina	North west	Aridity, Flooding, Deforestation, Farmer-Harder conflicts, Windstorm Trans boundary Flooding,

10	Borno	North east	Aridity, Flooding, Deforestation, Windstorm, Farmer-Harder conflicts, Trans boundary Flooding, Urban heat wave
11	Zamfara	North west	Aridity, Flooding, Deforestation, Farmer-Harder conflicts, Trans boundary Flooding, Windstorm
12	Plateau	North central	Aridity, Watershed degradation, Deforestation, Farmer-Harder conflicts, Flood
13	Niger	North central	Aridity, Watershed degradation, Flood, Deforestation, Farmer-Harder conflicts,
14	Taraba	North east	Aridity, Watershed degradation, Deforestation, Farmer-Harder conflicts, Trans boundary Flooding,
15	Adamawa	North east	Aridity, Watershed degradation, Deforestation, Farmer-Harder conflicts, Trans boundary Flooding,
16	Ebonyi	South east	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
17	Nassarawa	North central	Aridity, Watershed degradation, Deforestation, Farmer-Harder conflicts,
18	Cross river	South-south	Rainfall anomalies, Storm surge, Flood, Farmer-Harder

			conflicts, Trans boundary Flooding
19	Kwara	North central	Aridity, Watershed degradation, Deforestation, Farmer-Harder conflicts, Flood
20	Akwa Ibom	South-south	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
21	Kogi	North central	Aridity, Watershed degradation, Deforestation, Farmer-Harder conflicts,
22	Ekiti	South west	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
23	Bayelsa	south-south	Rainfall anomalies, Storm surge, Flood,
24	Delta	South- south	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
25	Edo	South south	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
26	Benue	North central	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
27	Osun	South west	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
28	Ogun	South west	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
29	Ondo	South west	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts

30	Abia	South east	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
31	Oyo	South west	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
32	Imo	South east	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
33	Anambra	South east	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
34	Rivers	South south	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts, Urban Heat wave
35	Enugu	South east	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts
36	FCT	North central	Rainfall anomalies, Aridity, Flood, Farmer-Harder conflicts, Urban Heat wave
37	Lagos	South west	Rainfall anomalies, Storm surge, Flood, Farmer-Harder conflicts, Urban Heat wave

Source: Benson & Kolawole (2017)