



UNLOCKING ADAPTATION POTENTIAL:

Insights into Nigeria's climate change policies, initiatives and local actions



**DEPARTMENT OF
CLIMATE CHANGE**
GATEWAY TO NATIONAL
ACTION ON CLIMATE CHANGE



CcCd CENTRE FOR CLIMATE
AL-FUNAI CHANGE & DEVELOPMENT

Acknowledgements and citation

This study was produced by the Africa Policy Research Institute (APRI) – a Berlin-based independent, non-partisan African think tank researching key policy issues affecting the continent – in close collaboration with the Centre for Climate Change and Development at Alex Ekwueme Federal University Ndufu-Alike Nigeria (CCCD-AEFUNAI) and the Department of Climate Change (DCC) under the Federal Ministry of Environment, Nigeria.

The boundaries, colours, denominations and other information shown on any map in this work do not imply any judgement on the part of APRI, CCCD-AEFUNAI or DCC concerning the legal status of any territory or the endorsement or acceptance of such boundaries. APRI does not take institutional positions on public policy issues. The views expressed in this publication are those of the authors and do not necessarily reflect the views of APRI, its staff or its board.

The authors gratefully thank Prof. Chukwumerije Okereke (Director, CCCD-AEFUNAI) for his support and review of the various drafts of this report. We are thankful to Dr Iniobong Abiola-Awe (Director, Department of Climate Change, Federal Ministry of Environment, Nigeria) for her partnership and support in this project. We also acknowledge Dr Hemen Mark Butu (Former Senior Climate Change Fellow – APRI) for his initial contribution to the project.

We also acknowledge the immense contributions and support of the local communities and research institutions during field data collection: Case study I – Owode town, in Yewa South Local Government Area (LGA) of Ogun State; Case Study II – Abesan and Shagari estates, in Alimosho LGA, Lagos State; and Case Study III – Abatete town, in Idemili-North LGA, Anambra State.

We further acknowledge the following organisations for their support and engagement in policy and stakeholder dialogues: Department of Erosion, Flood and Coastal Zone Management (FMENV); Federal Ministry of Women Affairs; Federal Ministry of Finance, Budget and National Planning; Federal Ministry of Power; Nigerian Meteorological Agency (NiMet); Federal Ministry of Health; Federal Ministry of Transportation; UNDP; UNESCO; UNICEF; Nigeria Climate Change Response Programme (NCCRP); Climate Conservation Initiative (GECCI); Niger State Ministry of Environment; Women Environmental Programme (WEP); Nigerian Young Generation in Nuclear (NYGN); Sustainable Development Network of Nigeria (CSDevNet); Development Impact Pathfinders Initiative (Devimpath); Global Initiative for Food Security & Ecosystem Preservation (GIFSEP); Surge Africa; Suavers Lead Initiative; Anchor University Lagos; Covenant University, Ota; Alex Ekwueme Federal University, Ndufu-Alike, Ikwo (AE-FUNAI); and Chiwis Biogas Engineering, Lagos, among others.

We also thank Prof. Yacob Mulugetta (Professor of Energy and Development Policy, University College London) for gracefully peer-reviewing the report and offering valuable improvements to the document. We thank Dr Olumide Abimbola (Executive Director, APRI), Dr Grace Mbungu (Senior Fellow and Head of Climate Change Program, APRI) and Isabella Roberts (Junior Fellow and Project Coordinator, APRI) for their invaluable leadership and peer-review of the report and offering management and administrative support to the project.

This work is available under the Creative Commons Attribution license 4.0 (CC BY-NC 4.0) <https://creativecommons.org/licenses/by-nc/4.0>. This license allows reusers to distribute, remix, adapt and build upon the material in any medium or format for non-commercial purposes only, and only so long as attribution is given to the creator.

Rights and Permissions



Attribution — Please cite the work as follows:

Okeke, Chukwueloka U., Ogunji, Chinwe V., and Anieze, Ethelbert E. (2023). Unlocking Adaptation Potential: Insights into Nigeria's Climate Change Policies, Initiatives, and Local Actions. Africa Policy Research Institute, Berlin, Germany. <https://doi.org/10.59184/ca023.002>

Creative Commons Attribution CC BY 3.0 IGO

Contents

<i>Tables, figures and boxes</i>	v
<i>Acronyms</i>	vii
Executive summary	1
Introduction	1
Research objectives	2
Approach and methodology	2
Key findings	3
Structure of report	4
Section 1: Introduction	5
Country context	6
Climate change trends, status and needs in Nigeria	6
Conceptual narratives on climate action and LLA	8
Project aims and objectives	9
Research approach and methodology	9
Strengths and limitations of the study	10
Section 2: Mapping the climate action landscape	12
Background	13
Methodology	13
Results	14
The NDCs: Focus on adaptation	14
National policies, strategies, initiatives and actions	14
Local actions, strategies and practices	15
Climate finance flows	16
Stakeholder mapping	17
Analysis and summary of key findings	20
Section 3: Case studies	21
Background	22
Case study selection criteria, approach and data collection	22
Approach and methodology	23
Data documentation, analysis and reporting	24
Results	24

Case 1 – Biogas production for forest conservation in Nigeria: Narratives and voices from Owode smallholder farming communities	24
Introduction and case context	24
Key findings	27
Motivations	27
Practices and strategies	27
Main outcomes of actions	28
Co-benefits of the action/project	29
Connection/alignment to NDCs/national policies, strategies and actions	30
Lessons learned and best practices	30
Limitations and challenges	31
Entry points and opportunities	32
Case 2 – Climate change adaptation strategies in the fisheries and aquaculture sector of Nigeria: Introduction and case context	32
Key findings	35
Motivations	35
Practices and strategies	35
Main outcomes of action	37
Co-benefits of the action/project	37
Connection/alignment to NDCs/national policies, strategies and actions	38
Lessons learned and best practices	39
Limitations and challenges	40
Entry points and opportunities	41
Case 3 – Adaptation practices of rural communities to land degradation in south-eastern Nigeria: Lessons learned and opportunities for scale-up	42
Introduction and case context	42
Key findings	45
Motivations	45
Practices and strategies	45
Main outcomes of action	46
Co-benefits of the action/project	46
Connection/alignment to NDCs/national policies, strategies and actions	46
Lessons learned and best practices	47
Limitations and challenges	47
Entry points and opportunities	47
Synthesis, analysis and summary of the key message	49
Section 4: General analysis and discussion	51
What constitutes LLA strategies?	52
Importance of LLA to national and international climate actions	53
Gaps, challenges and barriers	54
Opportunities and entry points	54
Importance of the project	55
Section 5: Conclusion and main message	56
<i>Endnotes</i>	58

Tables, figures and boxes

Tables

Table 1:	Key stakeholders in the climate adaptation landscape	17
Table 2:	Land use change dynamics of Yewa South LGA for 2002 and 2022	25
Table 3:	Land use change dynamics of Lagos State for 2002 and 2022	35
Table 4:	Land use change dynamics of Idemili North LGA of Anambra State for 2002 and 2022	44

Figures

Figure 1:	Physical map of Nigeria	7
Figure 2:	Location map of Owode in Yewa South Local Government Area of Ogun State	25
Figure 3:	Land use maps of Yewa South LGA for 2002 and 2022	26
Figure 4:	a) Participants during the focus group discussion on biogas production for forest conservation; (b-c) Processing of cassava (peeling and washing stages) for the production of garri; (d) Earthen stove that depends solely on firewood for garri processing	28
Figure 5:	Relationship between Case I (biogas production) and national policies and strategies	31
Figure 6:	Location map of Alimosho LGA in Lagos State, Nigeria	34
Figure 7:	Land use maps of Lagos State (Nigeria) for 2002 and 2022	34
Figure 8:	A typical fish farm at Abesan estate in Alimosho LGA of Lagos State	37
Figure 9:	Relationship between Case II (fish farming and aquaculture) and national policies and strategies	39
Figure 10:	Location map of Abatete town in Idemili North LGA, south-eastern Nigeria	43
Figure 11:	Land use maps of Idemili North LGA of Anambra State (Nigeria) for 2002 and 2022	44
Figure 12:	(a-b) Condition of farm roads and localities within the community as a result of soil/gully erosion; (c) Planting of vegetables using raised-bed cultivation system to minimise soil erosion and flood inundation on the farms; (d) Collection of primary data via a recorded interview session with a member of the community	46
Figure 13:	Relationship between Case III (land degradation) and national policies and strategies	48

Boxes

Box 1:	Narratives of key informants from Owode community on the major ways in which climate change is affecting their livelihoods	29
Box 2:	Narratives of key informants on the importance of biogas energy for the livelihoods of the Owode community	29
Box 3:	Narrative of a fish farmer on the impacts of climate change in the production of hatchlings (juveniles)	33
Box 4:	Adaptation strategies of fish farmers against the impacts of climate change in Lagos, Nigeria: A discussion with a key informant	37
Box 5:	The impacts of climate change on the livelihoods of smallholder farmers in the Abatete community	43
Box 6:	Motivations behind the adaptation actions	45

Acronyms

AfDB	African Development Bank
APFs	Adaptation Policy Frameworks
CbA	Community-based Adaptation
CCA	Climate Change Act
CCCD- AEFUNAI	Centre for Climate Change and Development at Alex Ekwueme Federal University Ndufu-Alike Nigeria
CSO	Civil Society Organisation
DRR	Disaster Risk Reduction
ERGP	Economic Recovery and Growth Plan
FGD	Focus Group Discussion
FGN	Federal Government of Nigeria
GBAG	Green Bond Advisory Group
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
IDO	International Development Organisation
LGA	Local Government Area
LLA	Locally Led Adaptation
LTV	Long-Term Vision
LULC	Land use/land cover
MDAs	Ministries, Departments and Agencies
MDB	Multilateral Development Bank
MFIs	Multilateral Finance Institutions
MTCO_{2e}	Metric tons of carbon dioxide equivalent
MTNDP	Medium-Term National Development Plan
NAP	National Adaptation Plan
NAPF	National Adaptation Plan Framework
NAPGCC	Nation Action Plan on Gender and Climate Change
NASPA-CCN	National Strategy and Plan of Action on Climate Change in Nigeria
NbSs	Nature-based Solutions
NCCP	National Climate Change Policy for Nigeria

NCCPRS	Nigeria Climate Change Policy Response and Strategy
NDCs	Nationally Determined Contributions
NESP	Nigeria Economic Sustainability Plan
NGO	Non-Governmental Organisation
NIRSAL	Nigeria Incentive-Based Risk Sharing System for Agricultural Lending
NREEEP	National Renewable Energy and Energy Efficiency Policy
OLI	Operational Land Imager
REDD	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

Executive summary

Introduction

With its multiple adverse impacts on human and ecological systems, climate change has become an issue of great concern globally. Nigeria is ranked as one of the most climate vulnerable countries in the world, despite the fact that it accounts for the least amount of global greenhouse gas (GHG) emissions. This vulnerability has been attributed to the country's complex agroecological zones, burgeoning urban and rural populations, extensive coastline vulnerable to sea level rise and storm surges, as well as underlying economic challenges and a weak governance system. The systemic risks posed by the burgeoning climate crisis in Nigeria have triggered more frequent outbreaks of infectious diseases, communal conflicts, farmer–herder crises, loss of livelihoods, loss of aquatic and terrestrial biota, decreasing food security and rising economic crises. These issues have been exacerbated by a lack of climate finance, especially for sustainable adaptation initiatives, coupled with lack of basic amenities, inadequate infrastructure and inequality.

To mitigate these challenges, the Nigerian government has developed several climate change adaptation and mitigation plans and frameworks, such as the Nationally Determined Contribution (NDC), the National Adaptation Plan Framework (NAPF), the National Strategy and Plan of Action on Climate Change in Nigeria (NASPA-CCN), the Climate Change Act (CCA) and the Medium-Term National Development Plan, to name a few. However, despite establishing several adaptation priority sectors in its NDC, NAPF and NASPA-CCN, Nigeria does not have a clear idea of the status of adaptation activities on the ground, and so there is no clear evaluation of implementation gaps and locally led processes.

Furthermore, Nigeria's current climate adaptation plan utilises a 'top-down' approach without including frontline communities and stakeholders – with their traditional knowledge, cultures, norms and values – in the decision-making process. Therefore, the Nigerian government needs to mainstream locally led adaptation (LLA) in its adaptation plans, to ensure effective, efficient and equitable delivery of adaptation actions. This will give local communities agency over the designing, monitoring and evaluating phases of the adaptation actions. In view of this, the current research project 'Unlocking Adaptation Potential: Insights into Nigeria's climate change policies, initiatives and local actions' was initiated by the Africa Policy Research Institute (APRI) with particular focus on the adaptation components of Nigeria's NDC and other national frameworks. The project seeks to evaluate the challenges and opportunities in Nigeria's adaptation policies as well as any implementation gaps, especially as they relate to LLA. The project also seeks to assess the barriers, challenges, entry points and opportunities of climate adaptation strategies at the local level through a deep dive into three case studies in rural communities.

Research objectives

The specific objectives of this research are to:

- understand the status and trends of climate actions, including the financial implications, policies, strategies and implementation frameworks for addressing climate change;
- evaluate the adaptation needs, priorities, knowledge gaps and implementation gaps at the community level;
- examine the experiences and contextual narratives of climate impacts and the strategies, adaptation actions and practices employed by local communities;
- understand the challenges and barriers faced by frontline communities;
- learn and document the potential opportunities and entry points for effective adaptation actions with the potential for scale-up at the local and regional levels;
- assess the adaptive capacities of local communities in Nigeria with global best practices for broader adaptation actions and environmental sustainability.

Approach and methodology

The research approach and methodology included mapping Nigeria's climate policy landscape, implementation strategies, practices and actions at the local and national levels. It draws on the policy landscape mapping and deep dives into adaptation strategies, initiatives and practices at the local level. The national mapping of Nigeria's NDC consists of three key tasks that assess policy frameworks for climate action, the capacity of stakeholders to take into account local adaptation strategies and the coherence or inconsistency of local adaptation policies with the country's needs, priorities and international development goals and commitments. Two stakeholder engagement meetings were held with diverse national, regional and local stakeholders operating in the field of climate change, with a view to situating the research objectives in the context, needs and priorities of Nigeria policy makers and broader society. Finally, the team conducted three deep dives which fell within the three priority sectors of Nigeria's NDC.

Case 1: Biogas production for forest conservation in Nigeria

This case study assesses the LLA initiatives and practices of smallholder farming communities in Owode, Ogun State, south-west Nigeria. The research sought to understand how the rural community is adapting to the impacts of climate change by converting organic waste generated from crops, livestock and poultry farming into a clean energy source (biogas), thus conserving the nearly depleted forest resources and restoring biodiversity.

Case 2: Climate change adaptation strategies in the fisheries and aquaculture sector of Nigeria

This case study evaluates the narratives and adaptation strategies of fish farmers against the impacts of climate change in Abesan and Shagari estates, Lagos. Due to the collapse by 60% of Nigeria's

fisheries and aquaculture sector, and the associated socio-economic challenges, the fish farmers are integrating a lot of LLA strategies into their farms, such as drilling deeper boreholes, installing water treatment plants, introducing locally sourced feeds and performing hybridisation to produce a more rugged and disease-resistant fish. These initiatives and practices have helped fish farmers to sustain their livelihoods.

Case 3: Adaptation practices of rural communities to land degradation in south-eastern Nigeria

This case study examines the actions, barriers, challenges and opportunities behind the adaptation practices of a rural community against land degradation in Abatete, Anambra State, south-eastern Nigeria. The findings revealed that community members have devised traditional methods to curb the effects of soil/gully erosion and landslides on roads and vegetable/crop farms. These include planting erosion-resistant trees at soil/gully erosion sites, placing sandbags at active gully erosion hotspots and making high ridges/mounds around vegetable beds to control soil erosion. The actions taken by the community members have led to a significant reduction in the evolution of sheet and rill erosion into ephemeral and permanent gullies, as they identify potential gully erosion hotspots in time and apply the necessary preventive measures to avert potential disaster and property damage.

Key findings

The study provides extensive insight into the LLA strategies as adopted by different communities in order to address the impacts of climate change on their livelihoods. The key findings are summarised below:

- Despite the limited access to climate finance and technical capacity, community-led adaptation is a reality of climate action in Nigeria and is well aligned with the priority options of the NDC as well as other national and regional climate action and social and economic development policies. The major challenge facing the delivery of climate change adaptation in Nigeria is that the topic has yet to feature in mainstream national discourse.
- While Nigeria has developed adaptation policies and implementation strategies, the adequacy and efficiency of those policies and strategies are yet to be evaluated in a way that provides evidence for improvement and broader climate action, including the recognition, documentation and inclusion of local voices and ongoing adaptation strategies and practices. The other pervasive concern connected with climate adaptation in Nigeria is the limited political will to confront it as a critical national issue and the consequent limited financing of such endeavours.
- The impact climate change is having on the Nigerian economy, and the projected increase in the intensity of negative impacts on lives and livelihoods, means that LLA holds the most promise for far-reaching and sustained solutions. Both public and private sector funding for adaptation falls very short of the total amounts needed to tackle the ever-increasing risk of an unfolding climate emergency. In the absence of a generally accepted, if not ubiquitous, adaptation process, adaptation practice is characterised by independent endeavours from local communities, international organisations and government agencies. Collaboration is limited between ministries and government agencies with different roles in the climate change administration, and science-based targets are yet to become mainstream enough to inform planning and legislation.

- LLA strategies are led by local stakeholders and adopt bottom-up, community-driven initiatives which are tailored to the local needs, resources and capacities of community members. They build the capacity of local actors to plan and implement adaptation activities and to link local and global resources to support adaptation initiatives. This bottom-up approach could unlock the potential and benefits of climate action in Nigeria, especially at the local level, where such actions are urgently needed.

The results presented in this report provide impulses for local, regional, national and global policy makers and implementers on the inherent value and importance of LLA adaptation approaches for broader climate action and the socio-economic development and well-being of local communities.

Structure of report

The rest of the report is organised into five sections.

Section 1 provides a general introduction to the project, and outlines the climate change status, trends and needs in Nigeria.

Section 2 presents a scoping review of key policy documents on climate adaptation in Nigeria with an emphasis on the adaptation component of Nigeria's NDC; Nigeria's climate adaptation strategies, national policies and actions, and local strategies and practices; and the country's climate finance flows. The final section of this chapter maps the key stakeholders in Nigeria's climate adaptation landscape and highlights the challenges, gaps and opportunities.

Section 3 presents the findings of the deep dive case studies undertaken across different parts of Nigeria to explore some of the local adaptation practices employed in response to deforestation and energy poverty, food security and land degradation (environmental sustainability).

Section 4 presents a general analysis and discussion of the project results while Section 5 presents the conclusions and main messages.

SECTION ONE

Introduction

Country context

Nigeria is a multicultural and multi-ethnic nation with over 200 spoken languages. In fact, Nigeria is Africa's most populous nation, with an estimated population of 213.4 million, a total land area of 923,768 square kilometres and an extensive coastline of about 853 km.¹ This West African country shares borders with Niger to the north, Benin to the west, the Gulf of Guinea to the south, and Chad and Cameroon to the east (Figure 1). Nigeria is divided into six geopolitical zones: north-east, north-west, north-central, south-east, south-west and south-south and is made up of 36 states and Abuja, the Federal Capital Territory (FCT). Nigeria is Africa's largest economy and can be classified as a lower-middle-income country with a gross domestic product (GDP) of USD 441.54 billion in 2021.² The country is characterised by three distinct climate zones: a Sahelian hot and semi-arid climate in the north, a tropical wet climate in the south and a tropical savannah climate in major parts of north-central.

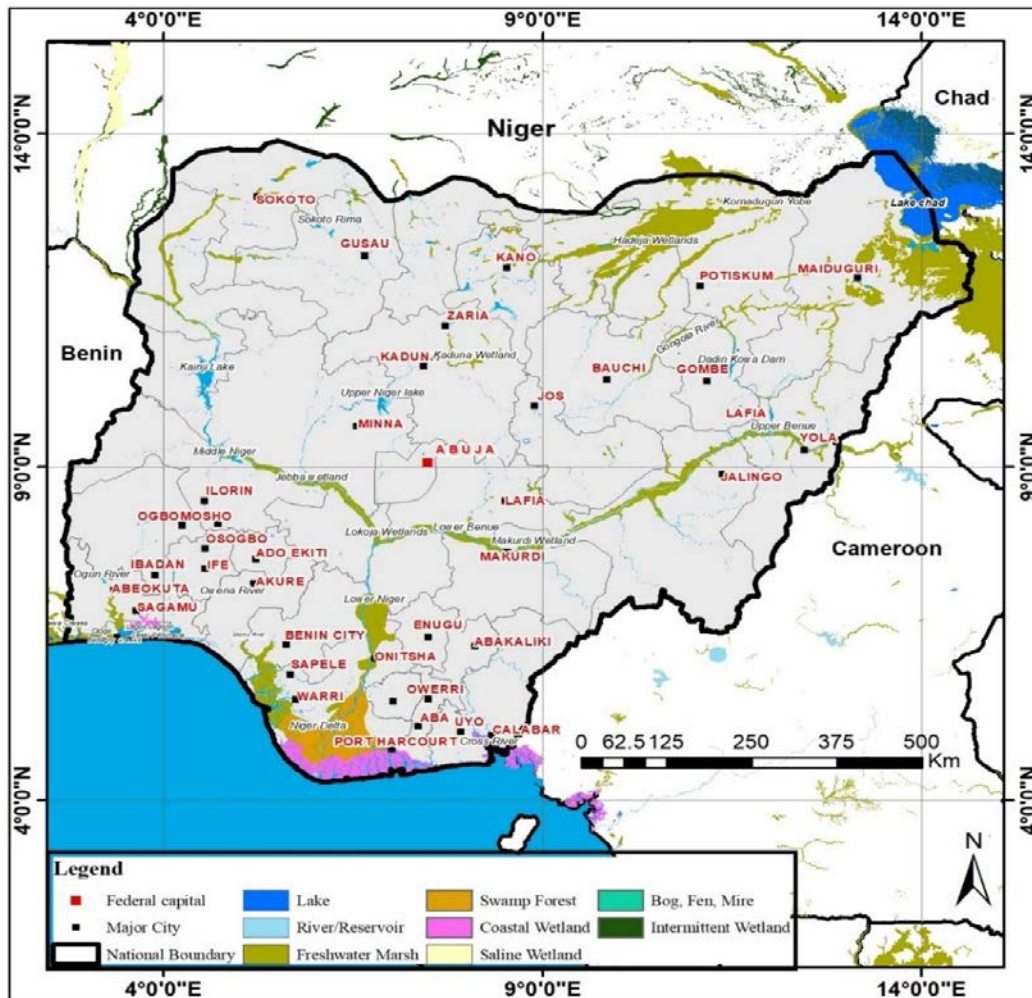
Nigeria is an oil-producing country with crude oil accounting for over 80% of exports, a third of the banking sector credit and half of the government revenue. Poverty is rife with approximately 40% of Nigerians living in poverty and another 25% vulnerable to poverty.³ It is also plagued with a high debt-to-GDP ratio of 23.27% and a 'B' risk rating from Fitch Ratings, which affects its ability to attract much needed foreign investment – a critical contributor to Gross National Income (GNI).⁴ Economic growth has fluctuated between 0.8% and 3.6% in the last five years and has sometimes dipped below zero.⁵ In 2020, Nigeria experienced its worst recession in two decades following the outbreak of the COVID-19 pandemic, which led to the disruption of global trade and falling oil prices.⁶ GDP is valued at USD 440 billion (EUR 440 billion) or USD 2,085 (EUR 2,085) per capita for 2021. The rate of unemployment is estimated to be 33.3% and the inflation rate is double digits at 20.5%.⁷ Electricity access covers approximately 54% of total population, meaning that over 97 million people are without access to electricity.⁸

Climate change trends, status and needs in Nigeria

Climate change is widely agreed to disproportionately affect Africa, with the rate of temperature rise and its attendant impacts such as desertification, coastal erosion, loss of biodiversity and saltwater intrusion increasing at a faster rate than the global average.⁹ Nigeria's natural disaster vulnerability is very high, despite the fact that it is a signatory to the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) – a programme with the sole objective to significantly reduce disaster risks and loss of lives, improve livelihoods and health of communities and countries, and build resilience to disasters through the implementation of its priorities and targets.¹⁰ This seems to indicate a gap between signed agreements and the sufficiency of projects designed and implemented across the country.

In 2016, Verisk Maplecroft ranked Nigeria as the 7th country most vulnerable to climate change in the world.¹¹ Similarly, in 2021, Nigeria ranked 161 out of 182 countries assessed by the Notre Dame Global Adaptation Initiative (ND-GAIN) on the basis of vulnerability to climate disasters and adaptive capacities.¹² Nigeria is particularly exposed to climate impacts because of its large population, extensive coastline, limited resources to adequate climate finance from both public and private sector entities and an adaptation knowledge gap. Additionally, Nigeria faces several challenges in the form of complex, indirect externalities such as food insecurity, forced displacement, conflict, negative health outcomes and others which together constitute incredibly complex barriers to climate action and economic growth.¹³ Specifically, drought, desertification and increasing temperatures in the arid and semi-arid regions of northern Nigeria have disproportionately affected

Figure 1: Physical map of Nigeria



Source: Authors

local communities that practise rainfed agriculture. On the other hand, erratic weather patterns and high-intensity rainfall events in the southern region of Nigeria have led to perennial flood disasters with total losses and damages of about USD 16.9 billion in 2012 alone.¹⁴

The occurrence of droughts and desertification has led to nomadic animal-rearing communities moving from north to south and clashing with indigenous crop-farming communities over increasingly scarce resources. These nomadic cattle herders also bring with them zoonotic diseases that can be exacerbated by climate change. Floods and other related disasters in the country also lead to an increase in the incidence of mostly vector-borne diseases like malaria, which caused 200,000 deaths in 2021 (amounting to 32% of total global malaria deaths) and affected a total of 60 million Nigerians. There is also an increasing risk of waterborne diseases like cholera.¹⁵

Meanwhile, in other parts of the country a combination of droughts, saltwater intrusion and sea level rise will adversely affect crop yields and urban infrastructure, leading to rising food prices, cost of development and other linked effects. Crop yields are particularly sensitive to changes in climate as

agriculture is largely rainfed. Bearing in mind that 70% of the population engages in subsistence agriculture, accounting for nearly 23% of GDP, this stands to be one of the areas where climate change will exert the most pressure.

Conceptual narratives on climate action and LLA

Climate change is emerging as a hot topic in Nigeria, increasingly featuring in national discussions and political debates. The Nigerian government is committed to achieving net zero by 2060 and has initiated some projects at different levels to facilitate the process. The National Adaptation Plan Framework (NAPF), which is the precursor to Nigeria's principal adaptation policy document, describes climate change as a 'critical issue of grave concern'. The same serious consideration is given to climate change by other national documents including those on economic growth and recovery.

In Nigeria, climate change adaptation is belatedly emerging as an important frontier for action with the potential to improve livelihoods and health and to build resilient communities. The federal government's adaptation policies, frameworks and strategies include Nigeria's Updated Nationally Determined Contributions 2021 (NDCs), the 2021 Climate Change Act (CCA), the National Climate Change Policy (NCCP), the National Adaptation Plan (NAP), the Long-Term Vision (LTV), the Medium-Term National Development Plan (MTNDP), the Biennial Update Report and other national and sub-national plans. The NAPF is a precursor to the government's main adaptation agenda and outlines its goals to align the country's adaptation activities with the Cancun Adaptation Framework. The framework also provides a guide for building adaptation practice in coherence with the economic goals and context of Nigeria. Key considerations in the framework include community-based adaptation, ecosystem-based adaptation and a gender-responsive NAP process as well as the recognition of climate change as a cross-cutting issue with likely trade-offs and multiple ensuing co-benefits.

However, while the Nigerian government has formulated an NAPF, its utilisation and implementation into adaptation to reduce vulnerability at the community level has not been recorded. Efficient delivery of adaptation is of utmost importance to Nigeria because of the already stated exposure to climate extremes; its marginal greenhouse gas (GHG) emissions implies that mitigation, although important, ranks lower than adaptation as a national priority.

Moreover, despite the existence of several locally led initiatives in Nigeria and the general agreement for climate adaptation actions to be inclusive, coherent, context-specific and straightforward,¹⁶ there is still a lack of funding to carry out local adaptation actions. Furthermore, stakeholders from frontline communities are not included in the decision-making process during the design and implementation of climate adaptation plans. Presently, almost all the processes leading to the conceptualisation, planning and implementation of climate adaptation projects in Nigeria are carried out at the national and sub-national levels, with stakeholders from frontline communities participating as beneficiaries rather than important actors in the decision-making process. However, for climate adaptation actions to be effective, they must be locally led so that stakeholders from frontline communities are able to exercise agency over the actions.

According to the Global Center on Adaptation (GCA), locally led adaptation (LLA) unlocks, supports and leverages the high potentials and innovative capabilities of communities to develop and implement solutions.¹⁷ LLA has been judged as effective, equitable and transparent because it transfers authority to local stakeholders without expecting them to bear the burden of adaptation.¹⁸ The LLA approach integrates the knowledge, traditions, cultures and experiences of local

communities, thereby shifting the existing condition from the current top-down strategies to an effective framework that is more inclusive and sustainable.⁴⁹ Overall, LLA is an important approach to addressing the impacts of climate change and can help to create more effective and equitable adaptation measures, as well as to build community resilience. However, effective and sustained use of LLA requires an understanding of the needs, priorities and contextual realities as well as the removal of barriers, constraints and challenges in terms of skills, funding and the leadership of local governments to effectively contribute to the implementation of climate action. It is in this context that the research project 'Climate Adaptation Strategies, Initiatives and Practices: Issues and Pathways in Nigeria' was initiated by the Africa Policy Research Institute (APRI) in close collaboration with the Centre for Climate Change and Development at Alex Ekwueme Federal University Ndufu-Alike Nigeria (CCCD-AEFUNAI), and with the support of the Department of Climate Change (DCC), Federal Ministry of Environment, Nigeria.

Project aims and objectives

The overall aim of this research is to assess and preview the stories, drivers and barriers of climate change adaptation actions within selected communities of Nigeria, and to understand how Nigeria's NDCs and other key policy documents could be effectively implemented through local stakeholders for improved livelihoods and environmental sustainability. The main objectives of this study are to:

- develop a local context of climate impacts and how local communities are coping with these impacts;
- evaluate adaptation needs, knowledge gaps and implementation gaps at the community level, and assess the alignment of the LLA actions with existing Adaptation Policy Frameworks (APFs) and other economic development plans;
- examine the experiences and contextual narratives of climate impacts and the strategies, adaptation actions and practices employed by local communities for sustainability;
- understand the challenges and barriers faced by frontline communities as well as the potential opportunities and entry points for effective adaptation actions that will improve livelihoods and sustainability;
- compare the adaptive capacities of local communities in Nigeria with global best practices for broader adaptation actions and environmental sustainability.

Research approach and methodology

The approach and methodology comprised stepwise processes such as desk study and literature review; mapping of national and sub-national climate adaptation strategies, local actions and supporting policies; stakeholder engagement meetings and workshops; case study analysis of select local communities; and policy development.

The **desk study and literature review** involved a comprehensive review of key policy frameworks in a bid to: identify gaps, challenges and opportunities of LLA actions; evaluate the effectiveness of LLA practices in Nigeria and how they can be improved; assess the alignment of LLA actions with existing APFs and economic development plans; and proffer solutions that will enable stakeholders

to close the gaps, improve alignment with national economic goals and make adaptation more locally led.

Mapping of national and sub-national climate adaptation strategies involved a scoping review of key policy documents on adaptation in Nigeria and the mapping of climate adaptation policies, actions and strategies at the national, state and local levels. The different levels of stakeholders working on climate adaptation in Nigeria were also mapped. Some of the documents reviewed included the National Strategy and Plan of Action on Climate Change in Nigeria (NASPA-CCN), NAPF, Nigeria's updated NDC and Nigeria's CCA, among others. The mapping exercise provided an in-depth understanding of Nigeria's evolving climate change landscape, including the distribution of stakeholders in the country's climate adaptation space and their specific roles.

A **stakeholder engagement meeting** was held on 5 November 2022 with the sole purpose of achieving the following objectives: to understand the gaps and opportunities of climate adaptation in Nigeria; to evaluate the level of LLA in Nigeria and how it can be improved; to assess the degree of alignment between adaptation practices and economic activities within Nigeria; and to understand what stakeholders are doing to close the gaps, improve alignment with national economic goals and make adaptation more locally led.

Three case studies were selected for an in-depth study and analysis following a series of consultations with stakeholders and climate actors on LLA in Nigeria. The project adopted a collaborative approach involving the engagement of several stakeholders, including the Federal Ministry of Environment (Department of Climate Change), Climate Change Desk Officers at various Ministries, Departments and Agencies (MDAs), civil society organisations (CSOs), non-governmental organisations (NGOs), local climate actors and international/local funding agencies.

Following the data obtained during the first stakeholder engagement meeting, deep dives were carried out on the three selected case studies, where significant climate adaptation initiatives have been observed. The deep dives led to the collection of primary data from field observations, focus groups, key informants and relevant stakeholders using several data collecting tools specifically developed for each case study. The primary data were analysed using the conventional qualitative content analysis method. The results obtained from the research were presented to multiple stakeholders during the **second stakeholder engagement meeting**, which was held in Abuja on 20 January 2023, with a view to eliciting information that would contribute to improving Nigeria's climate adaptation landscape.

Based on the insights obtained from the research and the information elicited from stakeholders during the second stakeholder engagement meeting, further **policy analysis** was conducted on Nigeria's climate change adaptation landscape to close the gaps, create more opportunities and remove the barriers to adaptation actions.

Strengths and limitations of the study

Interest in localising LLA strategies and practices is growing across the globe. This research report provides valuable insights into the different adaptation strategies being employed at community levels to respond to the impacts of climate change which can inform policy decisions and future interventions. The research report is valuable because it captures the main motivations, different practices, outcomes, challenges and opportunities for fostering LLA across different agroecological

zones in Nigeria. However, as a product of case study research, the results presented in the report are limited in their scope and generalisability, as the study focused on specific communities. The research was further constrained by limited resources, including funding, to enable engagement with more communities and other stakeholders. Nevertheless, the key messages suggested in this report can support efforts to deepen LLA as a component of the implementation of the NDCs.

SECTION TWO

Mapping the climate
action landscape

Background

The 'Climate Adaptation Strategies, Initiatives and Practices: Issues and Pathways in Nigeria' project is aimed at evaluating the adaptation needs, knowledge gaps and implementation gaps as well as understanding the challenges and barriers faced by frontline communities in Nigeria. The focus on LLA helps to analyse adaptation from the perspective of local communities and individuals in the lowest strata of decision making possible. The principles of LLA also highlight the need for predictable funding, addressing structural inequalities, investing in training, and building an understanding of risk and uncertainty, transparency and collaboration.

This mapping thus looks at the stakeholders engaged in adaptation activities and the policy landscape including the NDCs and other national climate and socio-economic policy documents. It highlights the actions taking place within the space, the gaps and the barriers. The goal is to inform other practitioners of gaps to look out for and financiers of the opportunities. It also aims to inform stakeholders engaged in the different adaptation activities, and to help them improve their existing adaptation practices.

The need for understanding policy alignment depicts the level of preparedness from government. Alignment between policy documents shows the support the provisions received from the multiple facets that constitute government and the level of agreement there is on what needs to be done. This mapping highlights these areas of alignment and showcases the aspects where agreement is almost total across adaptation provisions and plans, and areas where plans are stated in only one document with little to no evidence of support in other related provisions.

Mapping adaptation at the local level in Nigeria also presents an opportunity to capture the innovations, new tools and particular perceptions of local and indigenous approaches as well as the emerging challenges and limitations at play in these localities. The adaptation space in Nigeria is growing in parallel with interest in adaptation and climate action in Nigeria and globally. It is therefore in the best interest of the country and indeed the larger global climate regime that adaptation in Nigeria is informed by in-country realities, local contexts and a comprehensive understanding of the adaptation landscape.

Methodology

This mapping undertook a scoping review of the key policy documents on adaptation in Nigeria. These documents were identified following their stated importance in the adaptation framework and from interviewing experts in the field. The documents were then obtained in electronic copy from verified sources. Where these were not publicly available, access was solicited by sending a request to the relevant custodians, typically a government agency. The documents were reviewed to identify their core elements, gaps and linkages within themselves, key adaptation provisions and other relevant documents. Stakeholder surveys, interviews and a national stakeholder engagement event were also used to build the narrative on adaptation in Nigeria's national context. Stakeholders were identified following interviews of officers from key ministries at the national and sub-national levels. A national stakeholder event was convened in Abuja to engage with stakeholders leading action in several communities across Nigeria. This event featured presentations of these activities by key resource persons, panel discussions of the objectives of local communities, their adaptation needs, barriers experienced and sector-wide gaps limiting adaptation action across the country. A desk review and content analysis were used to identify gaps, alignment and opportunities within the policy documents that populate the space.

Results

The NDCs: Focus on adaptation

The NDC was established by ratifying Article 4.2 of the Paris Agreement. It provides a high-level and strategic vision for climate action in Nigeria, outlining the country's commitment to support mitigation and adaptation plans under the United Nations Framework Convention on Climate Change (UNFCCC). The focus of the updated NDC is heavy on mitigation. It aims to enhance the availability of clean energy for all Nigerians, create green jobs, institute sustainable waste management, provide clean cooking solutions and incorporate gender in all sectors of Nigerian economic development. The NDC has a stated 2050 target of achieving a climate-resilient Nigeria in alignment with the SFDRR, the Sustainable Development Goals (SDGs) and the Nigeria Economic Sustainability Plan (NESP). The updated NDC takes a collaborative and inclusive 'whole-of-society' approach, involving a wide range of stakeholders such as relevant MDAs, states, the private sector and CSOs, as well as United Nations Development Programme (UNDP) support. The government has determined vulnerability throughout Nigeria on a regional scale. This is a critical step in successfully implementing the NDC adaptation policies and plan in the NDC's five key priority sectors of agriculture, forestry and land use; food security and health; energy and transportation; waste management; and water and sanitation.

While the Nigerian adaptation landscape has several instruments for administering adaptation, the NDC is scant in specific regard to adaptation. It proposes the following actions to cover its five priority sectors:

- Capacity development trainings for federal and state MDAs on gender mainstreaming in policies and programmes should be prioritised.
- The provision of agroprocessing and storage facilities to smallholder farmer groups, especially women.
- Training women community nurses to address climate change related diseases.
- Developing affordable clean cooking options for rural communities and schools.
- Mobilisation of women groups to establish nurseries and plant trees upstream to minimise soil erosion and improve water quality.
- Training women in community-based quality monitoring systems and service provisions at state and rural levels should be based on valid scientific data.

Following the listed outlines, the NDC's proposed adaptation strategies offer insightful domain-specific adaptation plans, broad paths to take, and policies and activities to guide responsible entities.

National policies, strategies, initiatives and actions

In addition to the NDCs, Nigeria has developed several APFs for climate change over the last decade. The majority of these APFs highlight Nigeria's bold and ambitious plans, actions, goals and strategies for mainstreaming adaptation across all spheres of governance. Some of these policy documents

include the updated NAPF, NASPA-CCN, the Nigeria Climate Change Policy Response and Strategy (NCCPRS), the Nigeria CCA of 2021, the NCCP for Nigeria 2021–2030, the National Action Plan on Gender and Climate Change (NAPGCC) for Nigeria, and other national policy frameworks which have components of adaptation and economic development plans.

An analysis of these policy frameworks shows that the Nigerian government has made concerted efforts to increase adaptation actions in 13 priority sectors, including: agriculture; freshwater resources, coastal water resources and fisheries; forests; biodiversity; health and sanitation; human settlement and housing; energy; transportation and communication; industry and commerce; disaster, migration and security; livelihoods; vulnerable groups; and education. Nigeria's Adaptation Communication to the UNFCCC, NASPA-CCN, NAPF and the NCCPRS have well-structured adaptation strategies, policies and action plans that cover these 13 priority areas. Furthermore, a review of the APFs shows that relevant stakeholders were integrated into the adaptation planning process. Some of these stakeholders include federal, state and local governments; the private sector; CSOs; households and individuals; and international organisations and donor agencies. The major adaptation strategies employed by the Nigerian government are outlined below.

Training: The Federal Government of Nigeria (FGN), through the Ministry of Agriculture and Rural Development, plays a leadership role by setting up and supporting several institutions and agencies which interface with the state and local governments in building capacity and delivering knowledge and relevant skills at the community level. The FGN and many local and international CSOs 'train the trainers' via extension workers.

Early warning systems: The FGN has strengthened its adaptive capacity to climate change through the World Bank-supported Nigeria Erosion and Watershed Management Project (NEWMAP), which has completed the installation of automated flood early warning systems (AFEWSs) and other hydro-meteorological monitoring devices in their effort to minimise flood-related disasters in over ten states.

Climate-smart agriculture: Nigeria's climate-smart agriculture (CSA) approach is an integrated path that leads to sustainable increases in productivity and resilience (adaptation). This typically targets seed improvement and hybridisation.

Finance: Nigeria acknowledges the importance of equitable finance for climate change adaptation and mitigation. According to Nigeria's NDC, the Federal Ministry of Environment reported that Nigeria would require about USD 142 billion (EUR 133 billion) in the next decade to be able to implement its NDC. Consequently, the Nigerian government has begun issuing Green Bonds as an innovative means and alternative way of raising climate finance.

Gender responsiveness: In its efforts to mainstream gender, the Nigerian government has become a signatory to several UN treaties and conventions, including the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). It also developed the NAPGCC and established the National Gender Policy (NGP) to address issues of imbalance in the opportunities available to women.

Local actions, strategies and practices

Local communities in Nigeria approach adaptation in an organised manner and use several traditional methods specific to their environment to increase their adaptive capacities and build resilience

against climate change. While national adaptation strategies feature a great deal of high-level planning and policy making, adaptation at the local level is usually fast-paced and iterative. Adaptation practices and initiatives of these communities are primarily controlled by different agroecological zones, indigenous/traditional knowledge systems and cultural values. These adaptation practices have been under way for decades, albeit at a small scale. However, there has been a surge in the number and frequency of adaptation practices and initiatives in all Nigeria's agroecological zones due to the increasing impacts of climate change.

Climate finance flows

Financing adaptation is a huge issue globally. Nigeria is no different. Climate adaptation projects in Nigeria have mostly been funded by international organisations, even if they are implemented at national and sub-national levels. Nigeria, just like most nations in sub-Saharan Africa, relies on foreign aid and grants to finance more than 50% of its climate adaptation and mitigation activities. A significant percentage of the project costs are borne by multilateral development banks (MDBs), mostly the World Bank and to a lesser extent the African Development Bank (AfDB). Other notable international donors to adaptation efforts in Nigeria include the German Agency for International Cooperation (GIZ), the Foreign, Commonwealth and Development Office (FCDO) and the United States Agency for International Development (USAID). Adaptation finance from the government and the private financial sector in Nigeria is yet to match the level of effort required to fill the funding gap and build resilience.

As mentioned above, Nigeria is already losing about 5% of its GDP per capita to climate impacts – a figure which could reach 30% by 2050. The federal government therefore acknowledges the importance of equitable finance for climate change adaptation and mitigation. The government also notes the critical importance of increasing its capacities to attract local and international finance for low-carbon and climate-resilient projects. Furthermore, the federal government, through its NCCP 2021–2030, stressed that Nigeria's economic and environmental sustainability depends solely on the availability of adequate, timely and sustained funding for climate change adaptation and disaster risk mitigation. Therefore, Nigeria is currently in need of significant financial resources to effectively fund numerous climate change adaptation and mitigation projects in various priority sectors of its economy. According to Nigeria's NDC report, the Federal Ministry of Environment reported that Nigeria would require about USD 142 billion in the next decade to be able to implement its NDCs.

Consequently, the FGN has begun issuing Green Bonds as an innovative means of raising climate finance. It has also issued recommendations for Green Bonds to target about USD 248 million in climate finance, in order to support national projects in priority areas that include energy efficiency, clean transportation, sustainable land use, agriculture, renewable energy, conservation, and sustainable water. The Nigeria Sovereign Green Bond will also help the country to seek a low-carbon pathway for socio-economic recovery in line with the Economic Recovery and Growth Plan (ERGP). Since it issued its first and second Sovereign Green Bonds in 2017 and 2019, Nigeria has increased the outline of its green projects, thereby giving the government the avenue to continue to mobilise local, regional and global climate finance resources to service national climate actions.

In furtherance to this, Nigeria has also set up the Green Bond Advisory Group (GBAG). This is made up of public and private sector institutions and provides high-level oversight to the Green Bond process. The GBAG is made up of development partners (AfDB, the International Finance Corporation [IFC], the United Nations Environment Programme – Climate Bond Initiative [UNEP-CBI] and the

World Bank Group), capital market operators (Capital Assets, Chapel Hill Denham, Rand Merchant Bank, and Stanbic IBTC bank) and regulators (the Nigerian Stock Exchange [NSE], the National Pension Commission [PENCOM] and the Securities Exchange Commission).

Stakeholder mapping

Table 1 shows a non-exhaustive list of stakeholders working within the adaptation space. It also shows their type and scale of operation. While this list contains a diverse listing of stakeholders, other stakeholders, such as media organisations and government MDAs that have an interest in climate change, are not listed even though they may play critical roles.

Table 1: Key stakeholders in the climate adaptation landscape

Organisation name	Type	Scale of operation
Abuja Environment Protection Board	Government	Sub-national
ACI Environment and Resources Limited	Private	National
Africa Finance Corporation	MFI	International
African Climate Reporters	Private	International
Afrihealth	NGO	International
AOA Foundation	NGO	National
Banner Centre for Community Transformation	NGO	National
Bridge That Gap Initiative	NGO	National
Canadian International Development Agency	IDO	International
Carbon Limits Limited	Private	National
Central Bank of Nigeria	Government	National
CCCD-AEFUNAI	Academia	International
Centre for Climate Renaissance	Government	National
Centre for Promotion of Private Sector	Private	National
Centre for the Study of the Economies of Africa	Think tank	International
Clean Energy	NGO	National
Clean Technology Hub, Abuja	NGO	National
Climate and Clean Air Coalition	NGO	National
Climate Tack Podcast	Private	National
Climfinance Consulting	Private	National
Creative Youth Community Development Initiative	NGO	
Crutech Renewable Energy Centre	Think tank	National
Department of Climate Change, Federal Ministry of Environment	Government	National
DevTrain Community and Entrepreneurship Development Initiative	NGO	National

Organisation name	Type	Scale of operation
Economic Community of West African States	IDO	International
Energy Transition Office	Government	National
Environment and Climate Change Amelioration Initiative	NGO	National
Environmental Sustainability Research Group	Government	National
European Union	IDO	International
Evidence Use in Environmental Policymaking in Nigeria (EUEPiN) Project	NGO	National
Federal Institute of Industrial Research	Government	National
Federal Ministry of Agriculture and Rural Development	Government	National
Federal Ministry of Agriculture, Abuja	Government	National
Federal Ministry of Health	Government	National
Federal Ministry of Power	Government	National
Federal Ministry of Power, Works and Housing	Government	National
Federal Ministry of Science and Technology	Government	National
Federal Ministry of Transport	Government	National
Food and Agriculture Organisation (FAO)	MFI	International
Foreign, Commonwealth and Development Office	IDO	International
Forest Citizens	NGO	National
German Agency for International Cooperation (GIZ)	IDO	International
GIVO Africa	NGO	International
Global Environment	IDO	International
Global Environmental and Weather Solutions	NGO	International
Green Matters International Limited	NGO	International
Health of Mother Earth Foundation (HOMEF)	NGO	National
Heinrich Boll Foundation	NGO	International
Institute for Public Policy Analysis and Management (IPPAM)	Government	National
Institute of Ecology and Environmental studies	Government	National
Institute of Food Security, Environmental Resources	Government	National
Integrated Institute of Environment and Development, FUPRE	Academia	National
International Climate Change Development Initiative	NGO	National
International Fund for Agricultural Development (IFAD)	MFI	International
NASENI Solar Energy Ltd	Private	National
National Automotive Design and Development Council	Government	National
National Centre for Energy Research and Development, University of Nigeria Nsukka	Academia	National

Organisation name	Type	Scale of operation
National Environmental Regulations Enforcement Agency (NESREA)	Government	National
National Space Research and Development Agency	Government	National
Natural Eco Capital	NGO	National
Nextier SPD	Private	International
Nigeria Climate Innovation Centre	Government	National
Nigeria Incentive-Based Risk Sharing system for Agricultural Lending (NIRSAL)	Government	National
Nigeria Television Authority	Government	National
Nigerian Economic Summit Group	Government	National
Nigerian Environmental Study Action Team (NEST)	Government	National
Policy Alert	NGO	National
Red Stack Advisory	Private	National
Rocky Mountain Institute	Think tank	International
Rural Electrification Agency	Government	National
Society for Planet and Prosperity	NGO	National
Sustainable Development Solution Network	Think tank	National
Sustainable Energy Practitioners Association of Nigeria	Think tank	National
The Centre for Research and Development, Federal University of Technology, Akure	Government	National
The Green Institute	NGO	International
The West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL)	Academia	International
UNDP	IDO	International
United States Agency for International Development	IDO	International
Voice of Nigeria	Government	National
Women Environment Program	NGO	International
World Bank	MFI	International
World Food Programme (WFP)	IDO	International

Source: Compiled by authors

Notes: Think tank/Academia – an organisation comprising experts that engage in research or provide advice or ideas to shape policy or the discourse on specific topics; Private – a privately run organisation that may or may not be a non-profit; NGO – defined as a non-profit organisation operating outside of the confines of government and funded in large part by donations and grants; Government – a core government agency, funded strictly by government finance appropriation from the relevant legislative body; IDO – typically an NGO with an international reach. These are typically funded by governments of developed countries and offer development finance and financial aid to developing countries; MFI – an institution that has the mandate by agreements between several countries to distribute official development assistance (ODA) from developed nations to developing nations.

Analysis and summary of key findings

The policy framework for adaptation in Nigeria is relatively comprehensive and expanding by the day. These policies have several exemplary attributes, including the need for adaptation to be iterative, inclusive, flexible and cross-cutting. These are critical in preventing unintended consequences and promoting the likelihood of acceptance by a wide section of stakeholders. Collaboration between relevant agencies in preparing national documents has been observed in the preparation of all national adaptation policy documents, which is commendable. If the same level of collaboration is maintained during implementation, it could very easily close the implementation gap and be a best practice.

The alignment of policies shows that stakeholders agree on what is to be done. However, this is not translating into action on the ground. There is a good reason why implementing adaptation policies is difficult: the cost of implementation is substantial and climate action still has to compete for scarce public funds. Furthermore, human skills are not always readily available to allow for the smooth implementation of plans. Apart from the mention of REDD (Reducing Emissions from Deforestation and Forest Degradation) implementation, there is no other sufficient evidence for the inclusion of local communities in adaptation within the NAP and in most adaptation activities around the country. While there are several instances of the recognised need to include local and indigenous communities in policy making, there is little evidence that the voices of these communities feature in key climate adaptation decision making.

Moreover, plans and frameworks are often surface level, stating the obvious like definitions and benefits without specific, clear-cut plans for implementation and dealing with barriers along the way. A good example is the gender component of the NAPF, which defines gender responsiveness and the benefits of inclusion of vulnerable groups. Meanwhile, internally displaced persons still often live in dire conditions, and face the brunt of hunger, sexual abuse and other crimes, with few to no safeguards provided for them. Mere statements of intent – no matter how profound – should be taken with a grain of salt, especially with Nigeria's history of renegeing on policies.

Despite these gaps and challenges, local stakeholders have shown considerable resilience in their continued pursuit and promotion of climate action. In many cases, local communities have noticed changes in the climate and have been making do by adopting simple practices that buffer the effect of climate change. There are also emerging opportunities and tenable paths, such as the NASPA-CCN proposed grounded solutions, to improving resilience.

SECTION THREE

Case studies

Background

This research conducted three case studies to understand the status, challenges, barriers and opportunities of locally led initiatives as well as their alignment with Nigeria's NDC, APFs and other national policies. The three case studies fall within the 13 adaptation priority sectors of Nigeria as highlighted in the NASPA-CCN (2011), the NAPF (2020) and the NCCPRS (2021). This was done following the review and analysis of key policy documents on adaptation practices in Nigeria, coupled with engagements and interactions with local stakeholders on adaptation needs and implementation gaps. The overall aim of the deep dives was to evaluate the drivers of and barriers to climate change adaptation actions within selected communities in Nigeria and understand how Nigeria's NDC and other key policy documents could be effectively implemented through local stakeholders for improved livelihoods and environmental sustainability. More specifically, the deep dives sought to:

- develop a local context of climate impacts and how local communities are coping with these impacts;
- evaluate the adaptation needs, knowledge gaps and implementation gaps at the community level;
- examine the experiences and contextual narratives of climate impacts and the strategies, adaptation actions and practices employed by local communities for sustainability;
- understand the challenges and barriers faced by frontline communities as well as the potential opportunities and entry points for effective adaptation actions that will improve livelihoods and sustainability;
- compare the adaptive capacities of local communities in Nigeria with global best practices for broader adaptation actions and environmental sustainability.

Case study selection criteria, approach and data collection

Before selecting the three case studies for the deep dives, a stakeholder engagement meeting was held in Abuja on 5 November 2022. This was an opportunity to interact with local stakeholders working with frontline communities to implement various adaptation projects. Following the information obtained from the discussants, in addition to a series of presentations on LLA projects in the various communities, three cases were selected for the deep dives by considering the 13 priority sectors highlighted in the NASPA-CCN (2011), the NAPF (2020) and the NCCPRS (2021). The priority sectors include: agriculture (crops and livestock); freshwater resources, coastal water resources and fisheries; forests; biodiversity; health and sanitation; human settlements and housing; energy; transportation and communication; industry and commerce; disaster, migration and security; livelihoods; vulnerable groups; and education. The locations of the case studies were carefully chosen to cover the three most densely populated regions of Nigeria, which fall within the mangrove/freshwater swamp and rainforest belts of Nigeria's agroecological zones. The locations were further chosen because they represent the areas with the most prevalent climate-induced hazards/disasters in Nigeria. The specific criteria used for selecting the three adaptation case studies and study areas include:

- importance and significance of the adaptation methods for effective climate change adaptation and their impacts on rural communities' livelihoods and the environmental sustainability of people within the selected communities;
- sectors of relevance to climate adaptation action;
- relevance to local social and cultural needs, values and aspirations;
- relevance to national, regional or local climate action policies and development strategies;
- relevance to global goals on climate action and development;
- actions and activities with potential to generate greater value beyond economic value, especially in support of life, livelihood and well-being needs for local communities;
- application of local strategies and practices for adaptation.

Approach and methodology

The approach and methodology employed in the case studies included the integration of several qualitative techniques and data collection processes, such as the review of grey literature, focus group discussions (FGDs), interviews with key informants, systematic observations and data analysis. The FGD and qualitative interviews comprised four primary stages: i) research design and conceptualisation, ii) data collection, iii) data analysis, and iv) presentation and reporting of results. The research scope included climate change adaptation projects led by the local community and beneficiaries of the project.

The FGD was carried out by carefully recruiting ten participants for each case study who have been directly involved in the selected LLA initiative for a minimum period of three years. The participant selection process ensured equal representation of men and women, with ages ranging from 20 to 65 years. The FGD team consisted of a lead researcher, two research assistants responsible for note-taking and recording of the discussions, a photographer, and a facilitator with excellent knowledge of the community, its local language and culture, and the climate adaptation initiative. Qualitative data was collected via note-taking, digital (audio) recording, and direct observation of participants during the discussion sessions. Each FGD session lasted between 120 and 150 minutes, during which all participants were allowed to make equal contributions to the discussion.

Qualitative interviews were administered via telephone conversations and face-to-face interviews, using a combination of structured and semi-structured interview guides to obtain a high level of focus from each participant. For each case study, six to nine key informants of different genders and occupations, each of whom had lived within the community for a minimum period of three years, were randomly recruited for the face-to-face interview. For Case I, seven key informants were interviewed, while six and nine key informants were interviewed for Cases II and II, respectively. The key informants comprised community leaders, project initiators and managers, local stakeholders, government representatives and community members, with representatives of women, elders, youths, indigenous people, religious leaders and people living with disabilities. Each interview session lasted from 25 to 45 minutes.

Primary data were generated and collected from key stakeholders for each case study within a targeted community, with interviews, focus groups, observations, photo documentations and document review being the primary tools for data collection. The generation and collection of primary data were carried out with the aid of two semi-structured questionnaires designed to suit the project/local actions being implemented in each of the three case studies. Furthermore, primary data collection was carried out with the use of a digital camera, a portable digital recorder and a smart (android) phone.

Data documentation, analysis and reporting

As noted, the main purpose of generating the primary data was to understand the barriers, gaps, drivers, challenges and opportunities of LLA in Nigeria. All the audio recordings collected were initially stored in an Advanced Audio Coding (AAC) format before they were converted into either MPEG-1 Audio Layer 3 (MP3) format or MPED-V AVC (MP4) format. Thereafter, the audio files were transcribed into Microsoft (MS) Word documents using Microsoft Office 365 software (<https://www.microsoft.com/en/microsoft-365/>). The transcribed files were subjected to a series of quality checks and quality assurance in addition to performing data cleaning to improve the accuracy of the obtained data. The raw data were analysed by subjecting them to the conventional qualitative content analysis (QCA), which involves coding several groups of data that were derived from the raw data. Based on the QCA, the results were synthesised and grouped into several themes such as motivation, practices and strategies, limitations and challenges, best practices, co-benefits of action and project outcomes, among others.

Results

Case 1 – Biogas production for forest conservation in Nigeria: Narratives and voices from Owode smallholder farming communities

Introduction and case context

Nigeria has an abundance of forest cover which contains about 1,085 million tons of carbon in forest biomass.²⁰ In 2010, Nigeria's forest cover was approximately nine million hectares, 3.7% of which were made up of primary forest. According to Global Forest Watch, Nigeria lost about 1.14 million hectares of forest cover from 2001 to 2021, which is equivalent to an 11% decrease in forest cover since 2000 and equal to 58.5MtCO₂e.²¹ The highest deforestation rates in Nigeria were recorded from 2005 to 2010 with a rate of 410,100 hectares per annum.

Deforestation in Nigeria is mainly driven by agricultural intensification, urbanisation, infrastructural development, logging and mining.²² Solid biomass and waste are important sources of energy in Nigeria. These alternative energy sources account for more than 80% of total energy consumed. About 70% of Nigeria's rural communities rely heavily on biomass as a source of fuelwood with most of these communities depending on fuelwood for about 90–98% of their energy.²³ Consequently, more than half of the country's primary forests²⁴ have been destroyed in the last two decades. This has caused an increase in heat stress and drought in addition to minimising the ability of frontline communities²⁵ to adapt to the increasing cases of flooding, landslides and soil/gully erosion.²⁶

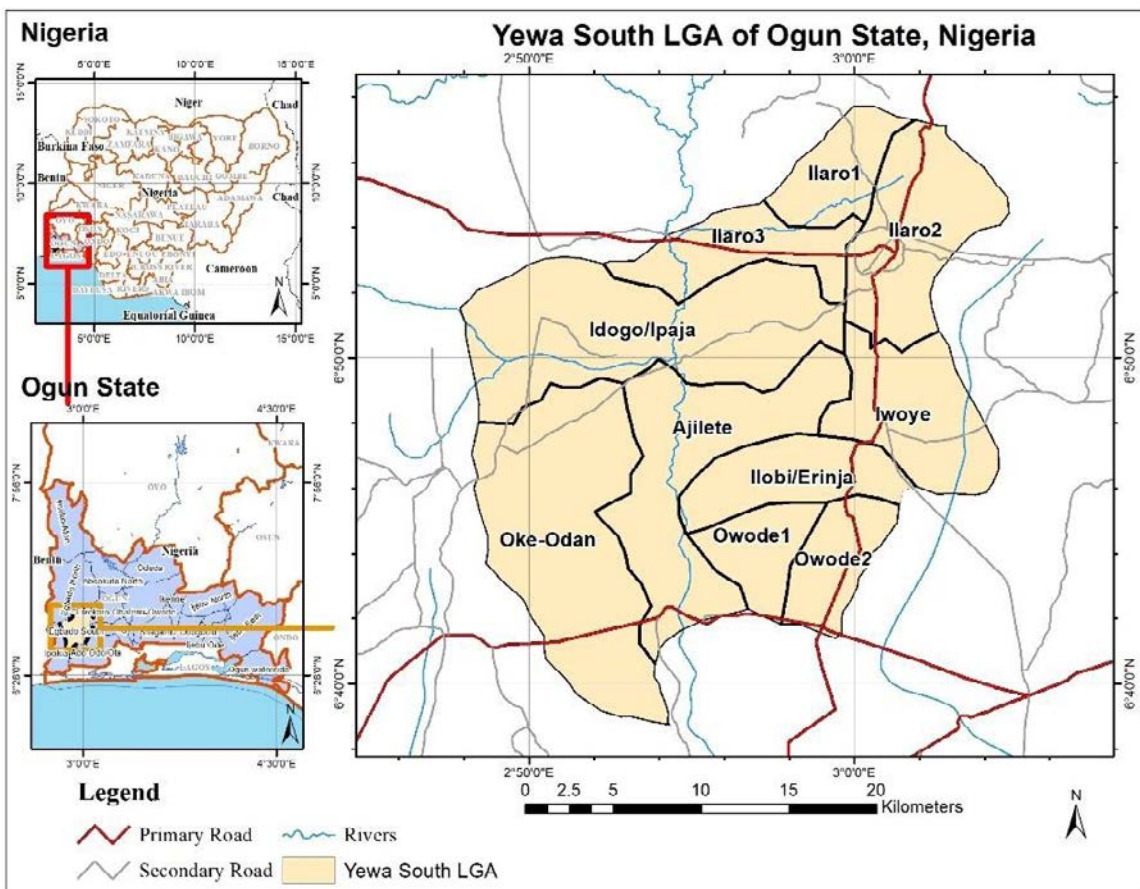
The Nigerian government has proposed alternative sources of renewable energy to help local communities adapt to climate change. Biogas is a renewable source of energy which utilises organic

waste from crops, livestock and poultry, and waste from municipal landfills. The focus on this community was to understand how rural communities are adapting to climate change by converting organic waste generated from crops, livestock and poultry farming into clean energy sources in a bid to conserve the nearly depleted forest resources and restore biodiversity.

The study area is located in Owode Town, in Yewa South Local Government Area (LGA) of Ogun State, south-west Nigeria (Figure 2). The study area is located within the tropical rainforest zone of Nigeria and receives a mean annual rainfall of about 1,500 mm. The major sources of livelihoods for men and women are farming, logging, food processing and petty trading.

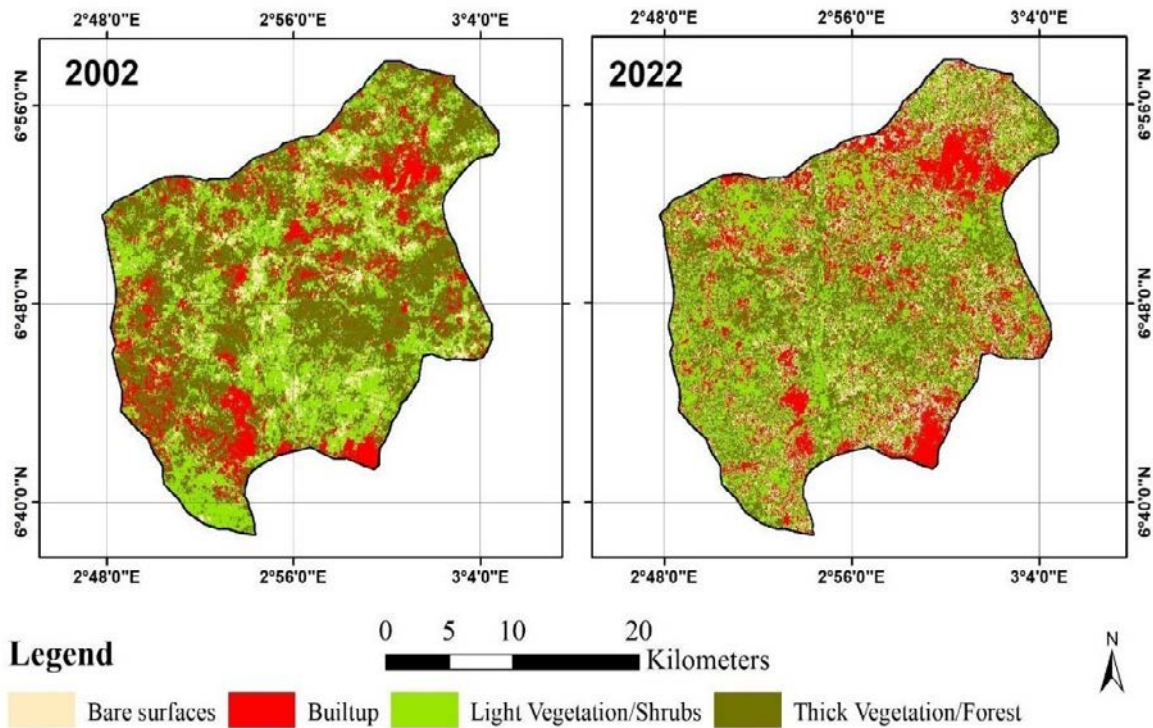
The major land use types in Yewa South LGA are forests/thick vegetation, shrubs/light vegetation, bare surfaces and built-up areas (Figure 3). A land use/land cover (LULC) analysis of Yewa South LGA carried out using two different Landsat imagery (Landsat-7 ETM and Landsat-8 OLI) shows that the total area occupied by vegetation decreased by 35% from 2002 to 2022. In contrast, the total areas occupied by built-up and bare surfaces increased by 19% and 55%, respectively (Table 2). The land use classification results align well with the results obtained from FGDs, face-to-face interviews and field preliminary observations, all of which support the fact that logging and tree felling for fuelwood, and urban and rural developments are the major drivers of climate change within the community.

Figure 2: Location map of Owode in Yewa South LGA of Ogun State



Source: Authors

Figure 3: Land use maps of Yewa South LGA for 2002 and 2022



Source: Authors

Table 2: Land use change dynamics of Yewa South LGA for 2002 and 2022

LULC class	2002		2022		Changes from 2002 to 2022		Annual increase/decrease		Increase/Decrease
	Area (km ²)	%	Area (km ²)	%	Area (km ²)	%	Area (km ²)	%	
Bare surfaces	45.31234	6.90	100.5787	15.32	55.27	54.95	2.76	2.75	Increase
Built-up areas	108.1038	16.47	133.1865	20.29	25.08	18.83	1.25	0.94	Increase
Light vegetation/shrubs	238.2706	36.29	226.227	34.46	-12.04	-5.32	-0.60	-0.27	Decrease
Thick vegetation/forest	264.8358	40.34	196.5304	29.94	-68.31	-34.76	-3.42	-1.74	Decrease
	656.52	100.00	656.52	100.00	0.00	0.00			

Source: Authors

Key findings

Motivations

The results obtained from the research show that despite the relative lack of government support to tackle the impacts of climate change and implement several adaptation actions, farmers, artisans and members of the Owode community and environs are already taking necessary steps toward addressing issues related to energy poverty and environmental degradation. The community is motivated by the need to:

- sustain their means of livelihoods given the high rate of poverty and unemployment in the country and their desire to have access to affordable, efficient, cleaner and sustainable energy sources in line with SDGs 1 and 7;
- avert the increasing incidence of climate impacts, especially flooding, environmental pollution and urban heat islands;
- improve their health and well-being by reducing the negative health outcomes that result from constant exposure to heat from fuelwood use, which adversely affects their eyesight and general well-being, as advocated in SDGs 3 and 8.

Practices and strategies

A detailed analysis of the data collected from the deep dive case study in Owode town shows that the community has adopted several initiatives, practices and strategies as adaptation actions against the impacts of climate change on their livelihoods. The initiatives, practices and strategies employed by the farmers, labourers and artisans living in the community can be summarised as follows:

- use of all kinds of waste agricultural biomass and residues, such as sun-dried seed/nut shells, cassava peels, corn stover, leaves, roots, crop stalks and forest litter as substitutes for fuelwood to reduce the cost of firewood used in processing the cassava into *garri*;
- use of agricultural waste to make charcoal briquettes;
- use of agricultural waste (cassava peal, livestock and poultry waste) for biogas production (Figure 4);
- during the rainy (wet) season when fuelwood is usually scarce, wet and expensive, the local farmers use other sources of fuel to sustain their business by burning plastic waste or a mixture of plastic waste and firewood. However, the women cannot process *garri* when firewood is scarce and expensive to purchase, hence they become redundant and cannot earn their basic wages;
- use of residue generated from biogas production as a green manure to replenish the soil nutrients and control soil/gully erosion;
- use of agricultural biomass (e.g. palm kernel shells, palm oil fibre, palm oil bunch and other waste generated during crop harvesting and processing) during rainy seasons as substitutes for fuelwood when demand is high.

Figure 4: (a) Participants during the FGD on biogas production for forest conservation; (b-c) Processing of cassava (peeling and washing stages) for the production of *garri*; (d) Earthen stove depending solely on firewood for *garri* processing



Photographs source:APRI

Main outcomes of actions

The main outcomes of the actions taken by the local farmers and labourers, in addition to the beneficial outcomes of using biogas as an alternative source of energy, are described below:

- It offers the opportunity to reverse the trend of deforestation, recover biodiversity and improve ecosystem services, thereby enhancing carbon sequestration and reducing the concentration of GHGs (Box 1 and Box 2).
- This project has established nature-based solutions (NbSs) as important, profitable actions which have the capacity to sustainably restore the natural ecosystem of the community by reducing several climate-induced hazards and risks associated with unsustainable harvesting of forest resources.
- The actions have improved the lives and livelihoods of the community members by reducing energy poverty through the availability of a renewable energy source that is affordable and accessible to the community.

Box 1: Narratives of key informants from Owode community on the major ways in which climate change is affecting their livelihoods

Key informant 3: Yeah, climate change affects my livelihood through several ways. I'm a small-scale businessman who deals on building materials, and in the past this business has not been very productive because when the rain falls, it is usually extreme and crops are affected. In this Owode community, we have lots of subsistence farmers and they are the people that patronise us. Therefore, when the farmers' harvests are small, we don't sell, we don't have anything to sell so we are not finding it funny, especially some of us that depend on the farmers for business transactions before we can exchange and buy the farm products for feeding.

Key informant 6: The climate change has been affecting our livelihoods in several ways most especially in this our community here. I'm a small-scale businesswoman, I deal on perishable agricultural products and over the years, our agricultural products have been easy to acquire and store but it's no longer easy for us to engage in this business due to the increase in temperature. This has made our agricultural foods perish faster and this leads to financial losses and economic hardship.

Box 2: Narratives of key informants on the importance of biogas energy for the livelihoods of the Owode community

Key informant 3: Yes, biogas is very important because it is an alternative source of energy which is clean, renewable and has no effect on the environment. Don't talk about carbon monoxide. Hence biogas is important to the community and because of rapid population the community has a lot of demand, which has led to loss of biodiversity, people get the firewood to make houses and beds where they live so firewood is in scarce supply. So, biogas helps us as an alternative source of energy.

Key informant 4: Biogas is important to our community because of the rapid increase in the population of our community that has placed a lot of demands on firewood, which has led to deforestation, because I believe that biogas is an important source of energy, which is renewable and has no effect on the environment.

Co-benefits of the action/project

The main co-benefit of the project – biogas production for forest conservation – is the accelerated increase in speed and efficiency of *garri* processing using biogas as an energy source, and the overall improvement in the health and well-being of the farmers using biogas stoves. Also, the adoption of biogas as an alternative to fuelwood has led to the establishment of several biogas stove fabrication centres within the community. The project has made it easier for the establishment of several community-based support groups solely for sharing information and knowledge on biogas production, storage and distribution, and the development of other renewable energy sources. Additionally, the adoption of biogas as a renewable energy source in the community has

led to a significant decrease in forest biomass depletion, improved ecosystem services and environmental sustainability.

Connection/alignment to NDCs/national policies, strategies and actions

The LLA initiatives, practices and strategies being implemented by the farmers and members of Owode community, including the use of waste agricultural biomass for biogas production, are in strong alignment with Nigeria's NDC and other relevant national policies, strategies and action plans developed to address climate change impacts, natural hazards and disasters, environmental sustainability and the socio-economic improvement of Nigeria (Figure 5). The Nigeria National Renewable Energy and Energy Efficiency Policy (NREEEP) was set up in 2015 to develop a framework for clean energy access with the objective of developing Nigeria's energy resources in addition to ensuring the affordable, reliable and sustainable supply of renewable energy. NREEEP seeks to reach a peak supply of 292 MW of biomass electricity by 2030. Similarly, the FGN, through the Rural Electrification Agency (REA), has partnered with Sustainable Energy for All (SEforALL) to determine the least-cost solutions to achieving 100% electrification by 2030. They have considered three clean cooking technologies: liquified petroleum gas (LPG), e-cooking and biogas. Other major APFs which align with the community's actions include the 2021 Nigeria CCA, the NCCP for 2021–2030, NASPA-CCN, the NAPF, the NAPGCC and the NCCPRS. Other policies and action plans that have direct linkages with the actions of this group include:

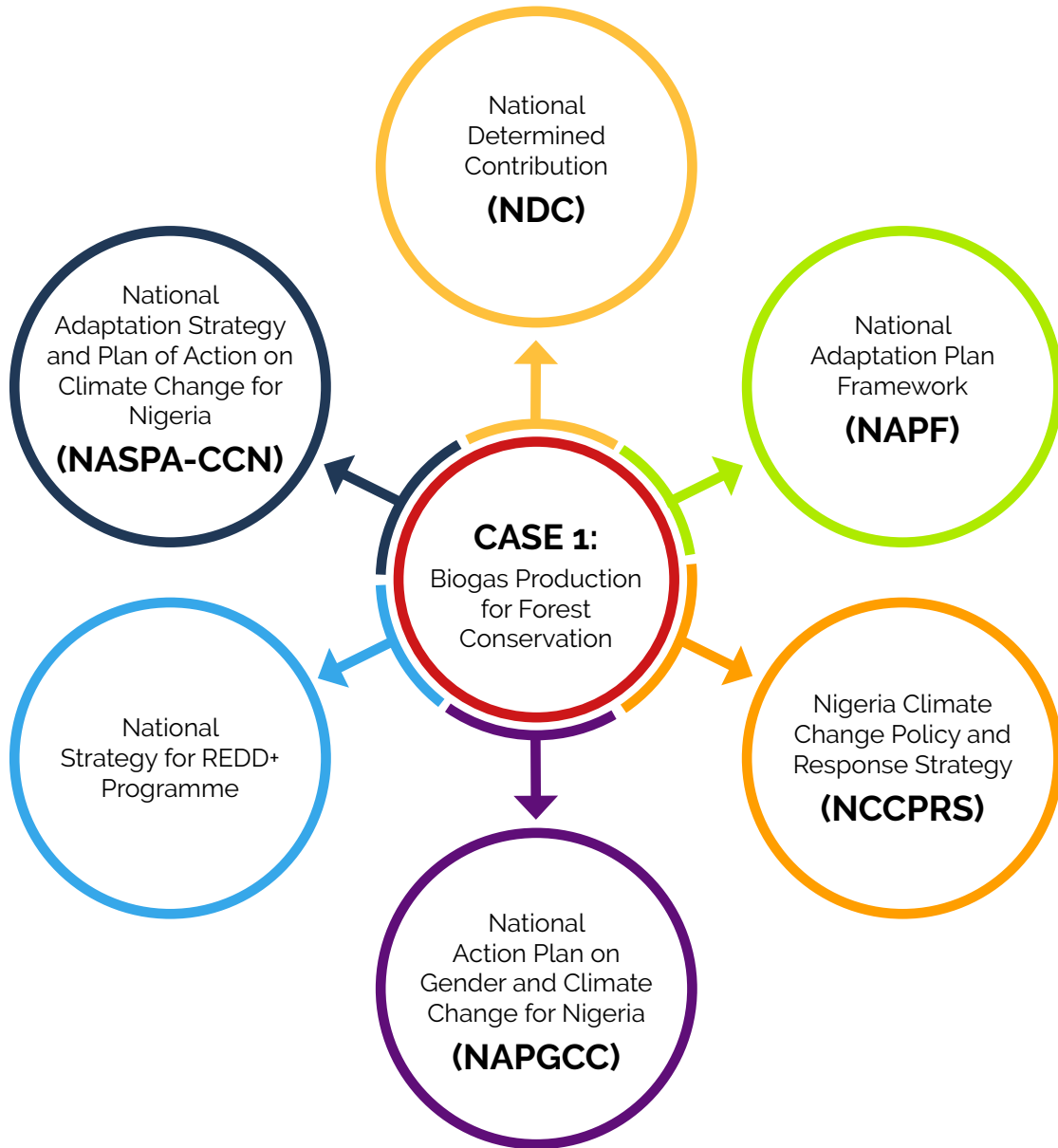
- National Strategy for Nigeria REDD+ Programme;
- NREEEP;
- National Biodiversity Strategy and Action Plan;
- National Policy of Environment.

Lessons learned and best practices

The LLA initiatives and practices implemented by farmers, labourers and members of Owode community indicate their resilience to build capacity while working at the cassava-processing farm visited during this research. They combine several strategies and practices to ensure livelihood sustainability. Interactions with the farmers and labourers indicate that similar strategies and practices are employed in over 150 medium- to large-scale cassava farms and processing units within Ogun State. The best practices and strategies employed by these farmers can be summarised as follows:

- active engagement with members of the community for innovative ideas and solutions aimed at reducing overdependence on fuelwood energy by integrating other renewable energy sources such as biogas produced from agricultural biomass;
- active collaboration with agricultural research institutions, private organisations and other tertiary institutions within Ogun State for innovative research on the scale-up of clean cooking stoves that significantly reduce emissions and other health risks by using charcoal briquettes;

Figure 5: Relationship between Case 1 (Biogas production) and national policies and strategies



Source: Author

- readiness to abandon the use of fuelwood and switch to a cleaner energy source partly because of the negative health outcomes associated with long periods of exposure to the heat and smoke emanating from constant use of firewood.

Limitations and challenges

Despite the positive outcomes and opportunities associated with the LLA initiatives and practices of farmers and labourers in Owode community, there are several limitations and challenges affecting the expansion and scale-up of the LLA initiatives and practices. Based on the feedback from key informants and data obtained from the FGD, a lack of financial support was found to be a major challenge. A majority of the farmers live and thrive in rural areas where energy poverty is

prevalent and income is very low. Furthermore, adequate provisions and support have not been made for financial institutions to make credit facilities available to farmers and other members of the community. The project is also limited by a lack of essential support and incentives to implement several national policies and frameworks in addition to the lack of synergy and collaboration between rural communities and relevant research institutions, such as the Forest Research Institute of Nigeria (FRIN), the National Parks Service (NPS), the National Agency for Great Green Wall (NAGGW) and State Forestry Services. Another crucial challenge against biogas production for forest conservation in Owode community is the limited supporting policies and implementation plans, especially at the community level. Nigeria is a signatory to several UN frameworks including the REDD+ and Sustainable Forest Goals, and in 2006 the country formulated a National Forest Policy²⁷ to improve the sustainable management of its resources and increase the total forest cover. However, the implementation of these national and international policies remains a mirage, especially in rural communities where vulnerability and exposure to the impacts of climate change are usually higher. Lastly, the majority of the participants involved in this project lack basic awareness of climate change risks and vulnerability. Hence, they are often oblivious to the necessary actions to be taken to adapt to climate change and mitigate the associated hazards and disasters.

Entry points and opportunities

- The project has the potential to increase the transfer of technological know-how which may lead to an increase in investments in renewable energy, improved energy efficiency and interests in developing and deploying clean energy technologies.
- The project has the potential to increase the resilience of the community's natural ecosystems and lead to the reforestation of degraded areas, restoration of wetlands and mangroves, and to increase protective laws around the few existing areas.
- The project will likely increase the social resilience of the community considering its broad, multidimensional approach. Building social resilience via capacity development, educating community members and investing in early warning systems, as observed in Owode community, are all vital in reducing the impacts of climate change.

Case 2 – Climate change adaptation strategies in the fisheries and aquaculture sector of Nigeria: Introduction and case context

Fisheries and aquaculture are two important sources of livelihoods in rural and peri-urban areas of Nigeria. However, climate change²⁸ and other socio-economic factors²⁹ have led to the collapse of over 60% of the sector, leading to rising food insecurity, malnutrition and increasing rates of unemployment.³⁰ Recent studies have shown that Nigeria's current fish production stands at 1.2 million metric tons per annum, while the demand has risen to 3.6 million metric tons per annum,³¹ which leaves a deficit of about 2.4 million metric tons per annum.³² The majority of the challenges facing fish farmers today are mostly attributed to the rising cost of feeds, land acquisition, flood inundation on fish farms, inadequate training, insecurity, lack of disease-resistant stocks, shortage of genetically improved stocks (fingerlings and juveniles), lack of adequate technology and insurance, low water quality and lack of financial support, among others³³ (see Box 3). Local fish farmers have devised several ways of overcoming some of these challenges by utilising locally

sourced materials and employing traditional methods to improve the quality and quantity of fish produced, thereby contributing to environmental sustainability. This case study presents an assessment and analysis of the adaptation actions of fish farmers in Nigeria with the primary objective of determining their actions, the lessons that can be learned from these actions and how further improvements can be made to promote sustainable livelihoods.

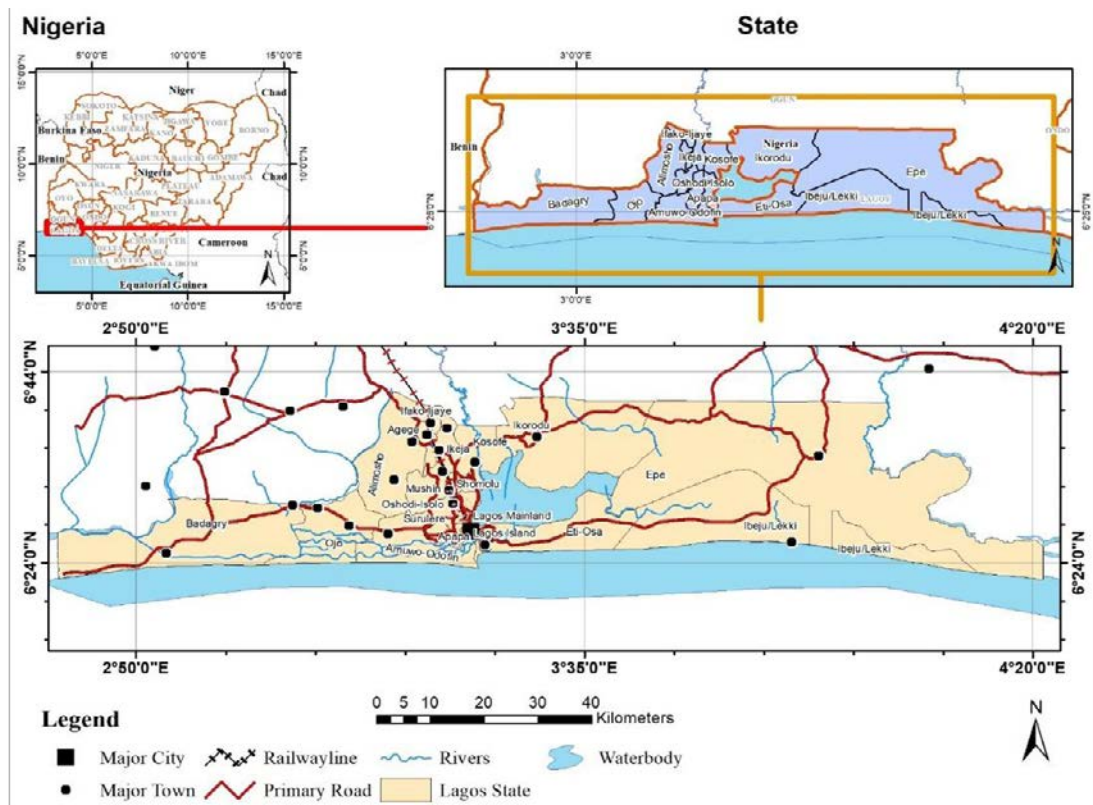
The study area is located on the Abesan and Shagari estates, in Alimosho LGA, Lagos State, Nigeria (Figure 6). The 2018 estimated population of Alimosho LGA³⁴ was about 2,047,026 with a population density of 14,855.05 per square kilometre and annual population change of 2.59%. Alimosho LGA lies within the equatorial climate and thus is characterised by high humidity and temperature in addition to high-intensity rainfall events. The study area receives a mean annual rainfall of 1,600 mm while the mean daily temperature varies from 25 to 30. Alimosho LGA is primarily inhabited by the indigenous people of Yoruba, with a significant percentage of other Nigerian ethnic groups such as Igbo, Hausa-Fulani, Ijaw, Kanuri, Ibibio, Nupe, Urhobo, Idoma, Gbagyi, Edo and Tiv. A significant number of people within the study area engage in small-scale trading, artisanal fish farming, rainfed agriculture, pig and poultry farming and sand mining, while others are employed by the various private and public institutions within the city.

Box 3: Narrative of a fish farmer on the impacts of climate change in the production of hatchlings [juvenile]

Under normal conditions, the eggs will hatch very well, but at the end of the day, because of heat, mortality increases. During the cold weather too, you could hardly have very good hatchlings [low success rate], because majority of the eggs will turn white, and production will be very low. How do you now alter that? You must adapt by increasing the heat in that place. If you don't have an enclosed environment where you use for hatching, you'd have to do it yourself [improvise]. Normally, you are supposed to have [is something missing here? Air conditioning?] where you operate [within a climate controlled room] to be able to achieve optimum results. We have been taking risks but now the climate change impacts are exacerbating the problem, plus the government that doesn't give us any assistance because if you see the whole house in this Shagari estate here, everybody has borehole. There's a problem, so we need an assistance [male participant, focus group discussion, Shagari estate, Lagos, Nigeria].

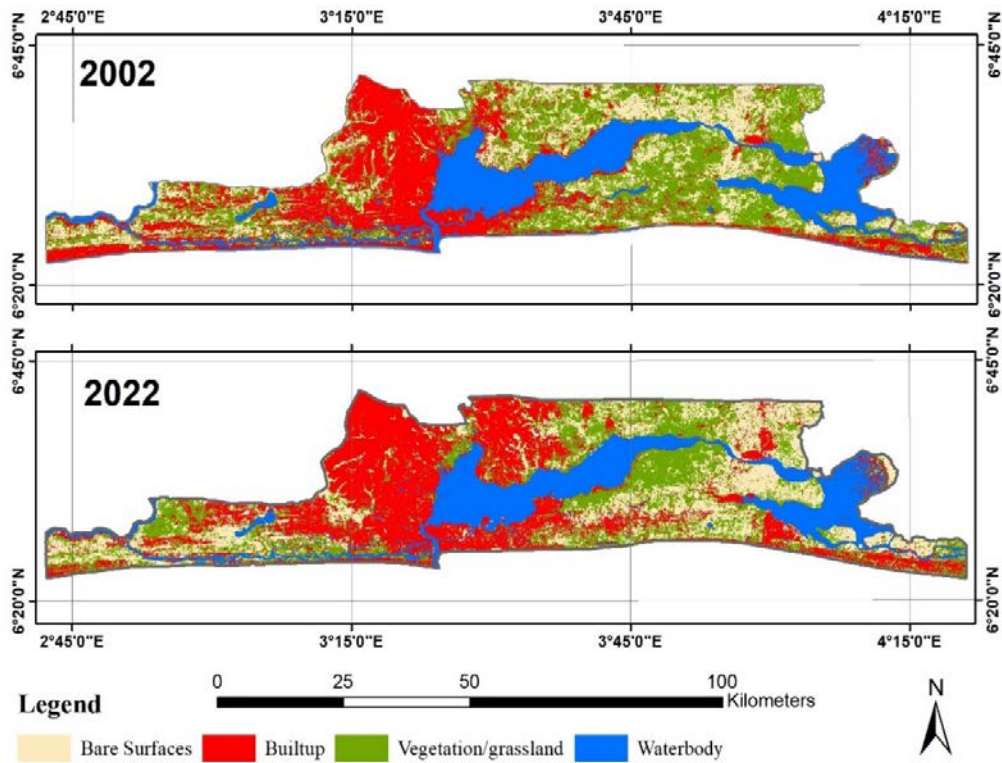
The study area and its environs have a high water table and excellent drainage, making aquaculture production a sustainable business venture for about 10% of its inhabitants. However, there is widespread pollution of surface and groundwater resources from industrial effluents, agricultural (animal and aquaculture) waste, human waste and tank farms. Rapid population growth, expansion of settlements and agricultural intensification have changed the land use dynamics of the entire state. A land use analysis of Lagos State carried out using Landsat-7 ETM and Landsat-8 OLI satellite imagery shows that vegetation/grassland and the waterbody decreased by 32.35% and 5.41% respectively from 2002 to 2022 (Figure 7, Table 3). In contrast, built-up areas (settlements) and bare surfaces increased by 17.84% and 13.69%, respectively. The marked decrease in vegetation cover due to urban expansion, fuelwood exploitation and an increase in paved surfaces has been attributed to the worsening climate crisis in the state.

Figure 6: Location map of Alimosho LGA in Lagos State, Nigeria



Source: Authors

Figure 7: Land use maps of Lagos state (Nigeria) for 2002 and 2022



Source: Authors

Table 3: Land use change dynamics of Lagos State for 2002 and 2022

LULC Class	2002		2022		Changes from 2002 to 2022		Increase/ Decrease
	Area (km ²)	%	Area (km ²)	%	Area (km ²)	%	
Bare surfaces	727.14	19.81	842.45	22.96	115.31	13.69	Increase
Built-up areas	995.55	27.13	1,211.65	33.02	216.10	17.84	Increase
Vegetation/grassland	1,198.92	32.67	905.90	24.69	-293.02	-32.35	Decrease
Waterbody	748.05	20.38	709.64	19.34	-38.42	-5.41	Decrease
	3,669.67	100.00	3,669.64	100.00			

Source: Authors

Key findings

Motivations

A detailed analysis of the data obtained from this case study shows that the fish farmers on the Abesan and Shagari estates of Lagos State, Nigeria, are motivated by several factors, as summarised below:

- They are motivated by the need to maintain their means of livelihood and reduce the rising cost of fish farming.
- They are compelled by the lack of supporting government policies and frameworks.
- A majority of the farmers within the two communities adopted fish farming as a hobby and passion, while others are motivated because fish farming gives them 'a sense of community'.
- Most of the smallholder farmers are influenced by the need to participate in the climate adaptation actions within the fish farming community.
- The fish farmers also stated that they are motivated by the associated co-benefits such as access to clean water and utilisation of nutrient-rich fish farm effluent to improve crop yield.

Practices and strategies

The fish farmers currently face a multitude of climate impacts which adversely affect their means of livelihood. Some of these impacts include seasonal flood inundations, a receding groundwater level, acidic and warmer groundwater, the increasing cost of juvenile and fries (hatchlings) production, low dissolved oxygen (DO) levels in groundwater and toxic groundwater. Consequently, the farmers employ a combination of adaptation actions to ensure resilient operations. Their work is stratified into several stages involved in catfish production and processing, which include hatchery, fingerlings, melange, table size, grow-out, broodstock and processed (market-ready) catfish. The first two stages (hatchery and fingerlings) are the most technologically advanced of the production stages

and are mostly done by a few of the farmers, who are relied upon by others for supply. Other practices and strategies employed by the farmers against the impacts of climate change are:

- drilling deeper water boreholes for easy access to constant water availability;
- readiness to experiment and take risks;
- inclusion of training and apprenticeship programmes that ensure that best practices are passed on;
- introduction of bitter leaf juice (*Vernonia amygdalina*) into the fishponds to reduce fish mortality because bitter leaf juice contains antioxidants that help in removing free radicals from the fishponds;
- cross-breeding female *Clarias gariepinus* and male *Heterobanchus longifilis* to produce their hybrid *Heteroclarias*, which is very rugged and disease resistant. The farmers also prefer the hybrid because it has a very low mortality rate, consumes less feed and can gain weight rapidly, thus ensuring return on investment;
- raising broodstock 'in-house' to avoid buying sub-standard stock;
- installation of water treatment plants within the farm premises to treat the water and improve its pH before supplying to the fishponds (Box 4);
- use of storage tanks to store, aerate and monitor the water quality before supplying to the fishponds (Figure 8);
- use of white and black plastic sheets to enclose the fish ponds containing the hatchlings and fingerlings, to control temperature, sunlight and any other external conditions;
- introduction of several types and mixtures of locally sourced feeds which are highly nutritious and oftentimes pelletised. The feeds are usually made up of crop grains (rice, millet, wheat, maize and guinea corn), fish-meal, certain vegetables and grasses and the innards of birds and animals.

Box 4: Adaptation strategies of fish farmers against the impacts of climate change in Lagos, Nigeria: A discussion with a key informant

The adaptation strategy that I have employed because of this climate change in my business, which is fish farming, is that number one, we realised that the groundwater level has gone down [decrease in water table], so I have to sink a new borehole that will be able to go down so that I can get more water for my business. That's number one. Number two, I have to adapt by building a water treatment plant to be able to get the nutrients that the water needed like pH, acidity and the alkalinity, bringing my water to neutral and increasing the oxygen level. I run a flow-through system in my water because of the climate change. The oxygen level has decreased and when the oxygen level has decreased, it's difficult for the fish to thrive. Also, I use soda ash and bicarbonate along with the water treatment plant. So, all these things have help me to be able to navigate the challenging effect of climate change in my business.

Figure 8: A typical fish farm in Abesan estate, Alimosho LGA, Lagos State



Source: Authors

Main outcomes of action

The main outcomes of the adaptation actions of the fish farmers on the Abesan and Shagari estates is a resilience to the negative impacts of climate change on their livelihoods. Furthermore, the case study results show that the LLA initiatives of the fish farming communities in these estates have the capacity to strengthen the livelihoods and resilience of smallholder fish farmers in rural and peri-urban areas of Nigeria. Indeed, by adopting these strategies, the participants have managed to maintain their fish farming practices and improve the economic, social and environmental sustainability of their community.

Co-benefits of the action/project

The adaptation actions of the fish farmers (e.g. use of storage tanks to aerate, store and monitor water quality; installation of water treatment plants; drilling of deeper boreholes; cross-breeding female *Clarias gariepinus* and male *Heterobanchus longifilis* to produce hybrid *Heteroclarias*; introduction of locally sourced materials as fish feeds and herbs) have significantly reduced climate

impacts on their livelihoods in addition to offering several associated co-benefits, discussed below.

Access to clean water: The drilling of deeper water boreholes and the installation of water treatment plants help to reduce frequent outbreaks of cholera and other waterborne diseases within the community. These adaptation actions have improved the sustainability of the community by providing access to clean potable water in line with SDGs 3 and 6.

Technological advancement: The fish farmers attend regular training exercises and apprenticeships as vital components of their adaptation actions, which have helped them to become technologically savvy and innovative. This has also helped them to perform complex tasks, such as catfish hybridisation, fish feed formulation using local materials and the setting up of water treatment plants, thereby reducing overall production and maintenance costs.

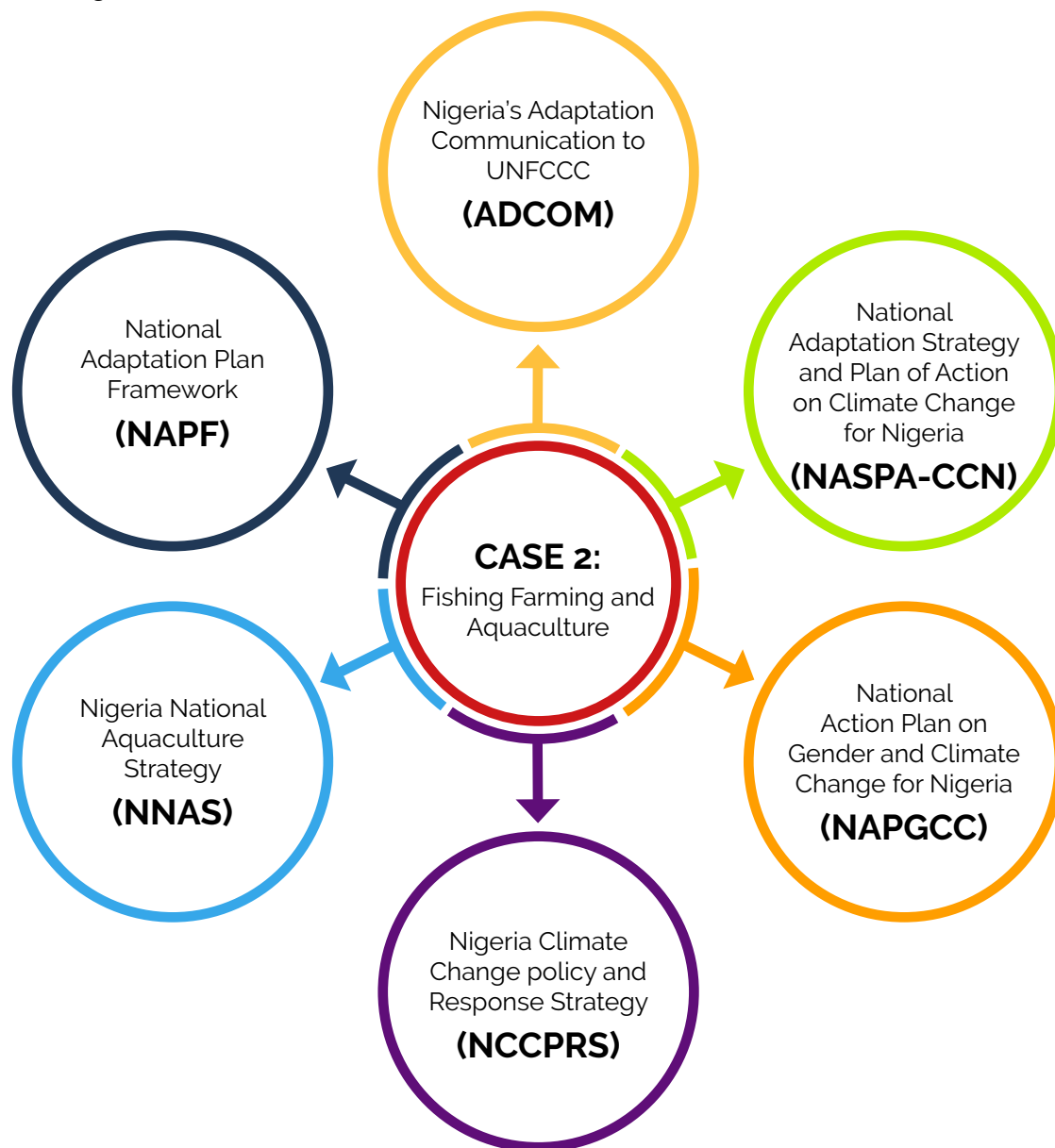
Improved social coherence and integration: The distribution and stratification of fish farming services into several stages (e.g. hatchery, fingerlings, melange, table size, grow-out and broodstock) by the fish farmers helps them build strong community relationships which ensure that quality is maintained all year round. This also helps them set market prices, minimise competition and ensure sustainability.

Reduced economic losses: The utilisation of bitter leaf juice (e.g. *Vernonia amygdalina*) as herbs to reduce fish mortality and the introduction of alternative sources of fish feeds, such as appropriate portions of food waste, vegetables and animal innards, have helped the farmers to reduce waste generation and conserve scarce resources in line with SDG 12. Additionally, the integration of solar energy systems as an alternative source of energy has helped the farmers increase production efficiency and quality.

Connection/alignment to NDCs/national policies, strategies and actions

The adaptation actions of the fish farmers are fully aligned with several national policy frameworks, actions and strategies (Figure 9). For example, the initiatives of the fish farmers to boost local production by integrating several NbSs into their adaptation actions are in line with the Nigeria National Fisheries Policy, which aims to 'achieve increased domestic fish production from all sources on a sustainable and renewable basis to the level of self-sufficiency and export in the medium to long term'.³⁵ Furthermore, the two important policy objectives of the Nigeria National Aquaculture Strategy (NNAS), which align very well with the adaptation actions of the fish farmers, are to: i) support accelerated fisheries and aquaculture production through private sector investment, and ii) strengthen the socio-economic life in fishing communities by providing access to credit, inputs, equipment and facilities. The adaptation strategies and actions of the fish farmers are found within three NDC priority sectors: agriculture, forestry and other land use (AFOLU); food security and health; and fresh water and coastal wetlands. National policies and strategies which align with the farmers' actions include the NAPF, NASPA-CCN, NCCPRS, the 2021 CCA and the NAPGCC. Other related policies and action plans include the 2021–2030 NCCP, the National Water Policy, the Agricultural Promotion Policy, the National Agricultural Resilience Framework, the National Biodiversity Strategy and Action Plan, the Nigeria Industrial Revolution Plan and the 2050 LTV for Nigeria.

Figure 9: Relationship between Case 2 (Fish farming & aquaculture) and national policies and strategies



Source: Author

Lessons learned and best practices

A critical review of the LLA initiatives and practices of the fish farmers on the Abesan and Shagari estates reveal several lessons and practices that policy makers can integrate into Nigeria's NAPF and NDC.

Frequent training and apprenticeship programmes: The fish farmers participate in frequent informal training and apprenticeship programmes which ensure that the best practices and quality standards are passed on. The fish farming communities organise and carry out the training and apprenticeship programmes because of the complexity involved in certain stages of fish production, and partly due to the absence of agricultural extension workers and relevant government support agencies. These

informal trainings and apprenticeship programmes have closed existing local knowledge gaps and helped the fish farmers to share their traditional knowledge and skills with members of the community.

Extensive use of NbSs: The integration of NbSs in fisheries and aquaculture production by the fish farming communities on the Abesan and Shagari estates has improved the sustainability of fisheries production, and has promoted both the fish farmers' equity and their resilience against the impacts of climate change. The fish farmers also integrate an ecosystem approach to aquaculture (EAA) to mitigate the effect of anthropogenic activities which alter ecosystem functions and lead to several negative environmental, social and economic consequences.³⁶ The NbS and EAA approaches used by the farmers include: supplementation of fish feeds with locally sourced foods like worms, insects, larvae, snails, fish waste, food waste and crop grains; use of native lime, agricultural lime and limestone to reduce water acidity and improve water quality; and utilisation of fish farm effluent as a fertiliser for crop production.

Robust monitoring, evaluation, learning and knowledge sharing: The fish farmers understand the importance of continuous monitoring, evaluation, learning and knowledge sharing, and have integrated these processes as an important part of their plan to build resilience against the impacts of climate change.

Use of multifaceted approaches: The fish farming groups adopt several multifaceted approaches as part of their adaptation actions, including cultural, traditional and scientific approaches. These approaches are innovative and effective and were formulated following valid scientific processes.

Limitations and challenges

The LLA practices and initiatives implemented by the fish farming groups on the Abesan and Shagari estates in Lagos, Nigeria, are marred by several challenges and limitations, which have the potential to cause long-term effects on the sustainability of their livelihoods. The main challenge associated with the poor implementation of the farmers' adaptation actions stems from a lack of access to financial services (credit, insurance and advisory facilities). This has made it very difficult for the farmers to acquire the necessary tools, skills, seed and feeds needed to sustain their farms or expand their businesses. The FGN has established at least six commercial agricultural banks to service the needs of farmers, including the Bank of Agriculture (BOA), the Agri-Business Small and Medium Enterprises Investment Scheme (AGSMEIS), the Commercial Agriculture Credit Scheme (CACS), the Agricultural Credit Support Scheme (ACSS), the Agricultural Credit Guarantee Scheme Fund (ACGSF) and NIRSAL. However, these FGN-supported lending institutions offer high interest rates, which vary from 5% to at least 9%, coupled with other conditions that make it difficult for small- and medium-scale fish farmers to access these loans.

Furthermore, the fish farmers lack basic technological capabilities and experienced workers to carry out some complex tasks such as the daily reading of water pH levels; performing water quality tests using disposable test kits; pumping of groundwater; checking fish health, mortality and feeding habits; and performing artificial reproduction by injecting mature female catfish with hormones (hormone-induced reproduction).

Another limitation is the lack of proper waste management systems to minimise pollution and improve environmental sustainability. The majority of the fish farm effluent is discharged into nearby streams, lakes and lagoons, which over time leads to surface and groundwater contamination,

environmental degradation and loss of ecosystem functions and services. Finally, the adaptation actions of the fish farmers are limited by weak government regulations, policies and support systems that do not cater for their needs.

Entry points and opportunities

The LLA initiatives and practices of the fish farmers on the Abesan and Shagari estates, Lagos, present several entry points and opportunities which could be harnessed and scaled up for regional and nationwide actions against the impacts of climate change on the fisheries and aquaculture sector of Nigeria. Some of the entry points and opportunities associated with the climate adaptation actions in this case study are discussed below.

Fish hybridisation and genetics: Fish hybridisation is one of the most significant adaptation actions of the fish farmers against the impacts of climate change. The increasing impacts of climate change have compelled them to cross-breed female *Clarias gariepinus* and male *Heterobanchus longifilis*, to produce a highly rugged and disease-resistant hybrid, *Heteroclarias*. However, many opportunities and entry points remain in this area due to the limited amount of experienced work force, and a lack of advanced technological know-how needed to scale-up the hybridisation process. Another opportunity lies in the genetic study of fisheries and aquaculture to develop species that are better adapted to regional environmental conditions.

Improved water and nutrient management: The fish farmers currently recycle less than 50% of the fish farm effluent, leading to the contamination of nearby streams, lagoons, rivers and aquifers. Therefore, developing improved water and nutrient management practices will help reduce nutrient runoff and soil erosion, which can lead to improved water quality and reduce the impacts of climate change. A typical example of an opportunity in this area is the development and use of an aquaponics system – a climate-adaptive and sustainable method of fisheries and aquaculture production, where the waste produced by farmed fish is used up as nutrients by plants grown hydroponically, thereby purifying the water.

Enhanced production infrastructure: The fish farmers optimise production by carrying out a series of enhanced infrastructural modifications in their farms, such as: the installation and integration of solar power systems for constant energy supply, construction of overhead water storage tanks, installation of conventional and unconventional water treatment and aeration systems, construction of perimeter fences to prevent predators and unauthorised entries, installation of automated water circulation systems, improving drainage infrastructure, siting of fish farms on elevated terrain to minimise flood inundations, and upgrading of hatcheries for optimum production. The farmers understand that the negative consequences of climate change impact on fish farming infrastructure. Hence their adaptation actions are focused on improving fish farm infrastructure and equipment, with many opportunities for scale-up.

Improved supply chain resilience: Improving the resilience of the supply chain is the most significant adaptation action of the fish farmers. They achieve this by diversifying production, investing in more efficient and climate-resilient practices and minimising the impacts of climate variability and extreme weather events. This includes choosing more winter-hardy fish species, using feed with a higher nutrition value, adjusting stocking rates to take advantage of favourable conditions and implementing additional management practices.

Case 3 – Adaptation practices of rural communities to land degradation in south-eastern Nigeria: Lessons learned and opportunities for scale-up

Introduction and case context

Gully erosion is one of the most significant contributors to land degradation in south-eastern Nigeria, often displacing several communities at once and resulting in forced migration and loss of livelihoods. The frequency and magnitude of hazards and disasters caused by landslides and gully and soil erosion have been attributed to the high population density of the south-east region, coupled with erratic weather patterns that exacerbate these catastrophic events. Frontline communities in rural areas, whose sources of livelihoods are mostly subsistence agriculture and petty trading, are usually the hardest hit (Box 5). However, the majority of these communities have learned to adapt to their changing environment by utilising traditional methods and local knowledge to minimise the risks of soil/gully erosion on their farms and farm roads. A typical example is Abatete town in Anambra State, south-eastern Nigeria, where women, men and youths use various traditional methods to curb the effects of soil/gully erosion and landslides on market roads, farm roads and vegetable/crop farms which serve as their major source of livelihoods. Therefore, understanding the adaptive capacities of these local communities against land degradation and the motivation behind their actions is important for improving climate-resilience strategies. The objectives of this study were to: i) evaluate the adaptation needs and knowledge gaps at the local community level; ii) identify gaps, barriers, opportunities and entry points for broader societal action at local levels; and iii) assess the alignment and coherence of national and global climate policies with action at the local level.

Abatete³⁷ is located in Idemili-North LGA³⁸ of Anambra State, in south-eastern Nigeria (Figure 10). The small town is bordered by Abacha, Alor, Eziowelle, Nimo, Ideani, Oraukwu, Uke and Umuoji communities. It has an estimated population of 80,000, while Idemili-North LGA has an estimated population of 603,197 with a population density of approximately 5,227 square kilometres. The study area has a wet equatorial climate with average high and low temperatures of 33 and 24, respectively. The study area also receives about 1,600 mm of rainfall per year, with September and February being the wettest and warmest months, respectively. Women constitute 49.3%, and men 50.7% of the population. The major sources of livelihoods for both men and women in the community include small- to large-scale cultivation and processing of palm oil, vegetables, cassava, maize, plantain (*Musa x paradisiaca*), yams (*Discoria sp.*) and rice.³⁹ Other sources of livelihoods include trading, poultry and livestock farming, textile manufacturing, wood carving and blacksmithing.

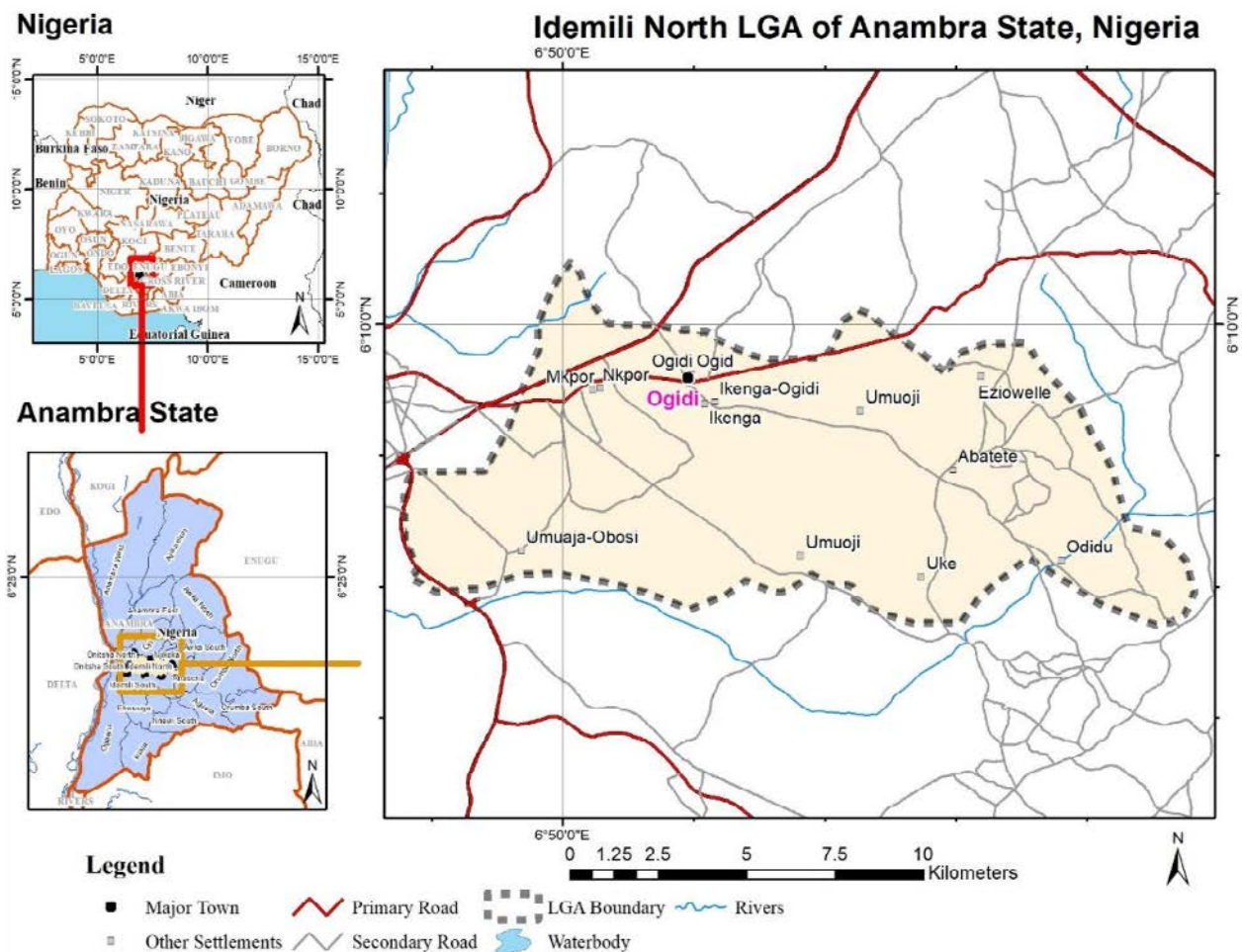
Abatete and other communities within Anambra state suffer from the growing impacts of land degradation by water erosion (gully), which has threatened the lives and property of people in the affected areas. A recent assessment by a state government official shows that gully erosion has degraded nearly 70% of the state's landmass, resulting in internal displacements and widespread damage to infrastructure.⁴⁰ The frequency and magnitude of gully erosion in the state has been attributed to rapid urbanisation and other human activities which are fast changing the landscape from thick rainforest to a continuously built-up area, with derived vegetation as outliers within the study area. This is confirmed by the results of land use analysis of Idemili North LGA, which show that between 2002 and 2022 forest and vegetation/shrubs decreased by 271% and 130% respectively, while bare surfaces, built-up areas and farmland increased by 33%, 49% and 40%, respectively

(Figure 11, Table 4). Hence, effective climate adaptation measures are required to reverse the negative trends of deforestation for the sustainable management of gully erosion hazards in the affected communities.

Box 5: The impacts of climate change on the livelihoods of smallholder farmers in the Abatete community

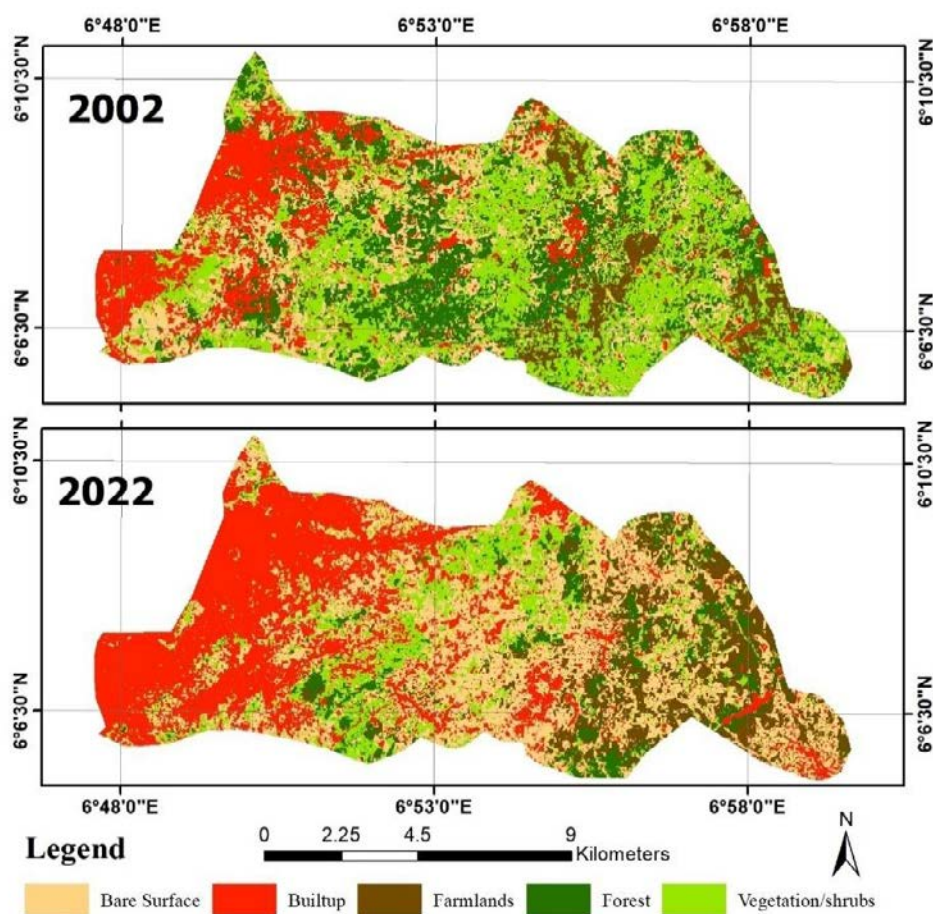
Key informant 6: Flooding is one of the major climate change impacts that we have experienced which has damaged our roads, hence we no longer have access to our farms. And even when we manage to harvest our crops in the farm, we are not able to transport them to the market, and so, it ends up perishing within a week. So, flooding and soil erosion have caused a lot of harm. They have done more harm than good.

Figure 10: Location map of Abatete town in Idemili North LGA, south-eastern Nigeria



Source: Authors

Figure 11: Land use maps of Idemili North LGA of Anambra State (Nigeria) for 2002 and 2022



Source: Authors

Table 4: Land use change dynamics of Idemili North LGA of Anambra State for 2002 and 2022

LULC class	2002		2022		Change 2002 to 2022		Annual Increase/Decrease		Remark
	Area	%	Area	%	Area	%	Area	%	
Bare surface	28.64	21.62	42.91	32.39	14.27	33.26	0.71	1.66	Increase
Built-up areas	23.39	17.65	45.92	34.66	22.53	49.07	1.13	2.45	Increase
Farmlands	10.82	8.16	18.17	13.71	7.35	40.46	0.37	2.02	Increase
Forest	28.96	21.86	7.80	5.89	-21.15	-271.04	-1.06	-13.55	Decrease
Vegetation/shrubs	40.68	30.71	17.68	13.35	-23.00	-130.03	-1.15	-6.50	Decrease
Total	132.48	100.00	132.48	100.00	0.00	0.00			

Source: Authors

Key findings

Box 6: Motivations behind the adaptation actions

Key informant 5: We are taking these actions to help us to survive, because that's our only source of livelihood. We take these actions for economic reasons. The farm is where we get what we use to feed our children and train them in school. We also take these actions for easy access to our roads because people come to buy from us and we take these vegetables to other villages too. And if we don't take these actions, they cannot access our roads.

Practices and strategies

Information obtained from the villagers and participants of the FGD showed that the community members integrate several LLA practices and strategies to reduce the impacts of land degradation on their livelihoods. According to the community members, the majority of these practices and strategies were developed from the local knowledge, culture and traditional values of the community. Community members utilised five major practices and strategies to build resilience against the impacts of climate change.

Planting of erosion-resistant trees at soil/gully erosion sites is the most common method of erosion control across the dense tropical forests of south-east Nigeria. The villagers control soil erosion and prevent the evolution of rill erosion into deep gully systems by planting trees with deep root systems, such that the deep roots bind the soil, forming a soil-root matrix that is resistant to erosion. This method is an NbS that is very cheap and effective, and requires less labour, making it preferable for the women's groups in the community.

Laying sandbags at active gully erosion hotspots is one of the simplest and cheapest ways of controlling gully erosion and shallow slope failures. The villagers lay sandbags at active erosion sites, mostly on farm roads, footpaths and other access roads frequently used for the transportation of agricultural produce to the markets or urban areas.

The community members and the various women's groups **make high ridges and mounds around vegetable beds** and also utilise the raised-bed cultivation method to improve drainage, minimise waterlogging and soil erosion and control flood inundations during high-rainfall events. These practices are typically carried out by smallholder vegetable farmers in the community (Figure 12).

The **placing of logs in shallow ditches** is one of the cheapest and most effective ways of controlling gully erosion in rural communities. The smallholder farmers place logs, such as the stems of palm and/or banana trees or plantains (*Musa sapientum* and *Musa paradisiaca*) and other woody biomass, in shallow ditches located along farm roads and footpaths to trap sediment and water.

The community members practise **contour ploughing and mixed cropping** as two important strategies for soil and gully erosion control.

Figure 12: (a-b) Conditions of farm roads and localities within the community as a result of soil/ gully erosion; (c) Planting of vegetables using the raised-bed cultivation system to minimise soil erosion and flood inundation on the farms; (d) Collection of primary data via a recorded interview session with a member of the community



Source: Authors

Main outcomes of action

- The actions taken by the local women have improved the accessibility of farm roads, thereby increasing productivity and the shelf life of perishable foods.
- This has led to a significant reduction in the evolution of sheet and rill erosion into ephemeral and permanent gullies because the women identify potential gully erosion hotspots on time and apply the necessary preventive measures needed to avert potential disaster and property damage.
- The action has improved the life and well-being of the community in addition to reducing poverty and food insecurity.
- The action has helped to improve the livelihoods of all minority groups within the community, including people with disabilities, women and youths, thereby fostering social integration.

Co-benefits of the action/project

- The action has led to a significant increase in food security for the community and the state at large.

- The action has led to the enhanced economic development of the community and the state given the significant reduction in unemployment and hunger and the availability of jobs in the agricultural and financial sectors.
- The action has helped to foster social equity and has helped the community build resilience to the impacts of climate change, thereby improving sustainability.

Connection/alignment to NDCs/national policies, strategies and actions

The farmers' actions have a direct connection to three key priority sectors – agriculture, forestry and biodiversity – and are within the strategic plans of some national policies: NASPA-CCN, NAPF, NAPGCC and the Land Degradation Neutrality (LDN) of Nigeria (Figure 13). Others include the NAP, the Agricultural Promotion Policy (APP), the National Biodiversity Strategy and Action Plan (NBSAP), and the National Agricultural Resilience Framework (NARF). However, these actions are only partially aligned with Nigeria's NDC.

Lessons learned and best practices

- Efficient monitoring of weather patterns and sharing of information within the group as an early warning system against floods and gully erosion hazards
- Well-structured traditional capacity-building activities such as apprenticeship and training opportunities
- Use of multifaceted approach for soil/gully erosion control and mitigation

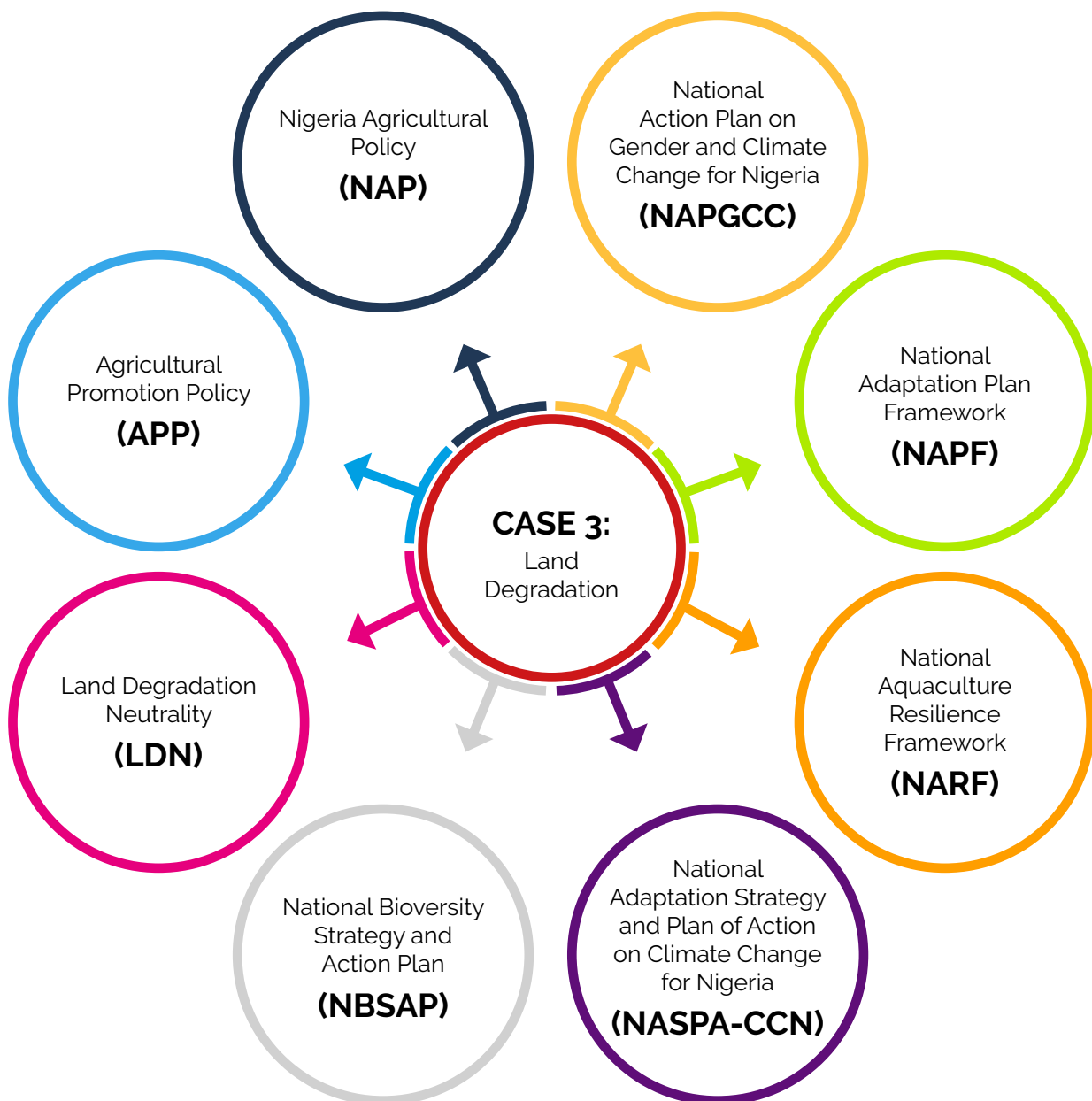
Limitations and challenges

- Lack of government support
- Limited access to financial services such as insurance policies and credit facilities
- Poor government and policy support
- Lack of scientific knowledge required for mitigating permanent gullies

Entry points and opportunities

- Advocate for support for the adaptive management of liveable spaces to reduce the vulnerability of communities to climate impacts, e.g. restoring forest ecosystems and investing in green infrastructure, such as the introduction of raised-bed cultivation systems, climate-smart irrigation systems, urban forests, green roofs, and other soft engineering measures to mitigate land degradation and extreme weather events.
- Advocate for increased government investment in early warning systems, emergency management plans and disaster risk reduction strategies to better prepare for climate change impacts.
- Carry out education and awareness-raising campaigns for increased public understanding of

Figure 13: Relationship between Case III (land degradation) and national policies and strategies



Source: Authors

the potential hazards and disasters associated with land degradation and the need to build resilience using both traditional and indigenous knowledge systems.

- Increase investment in climate change adaptation technologies and infrastructure as regards land degradation, e.g. installing climate-smart technologies and other early warning systems for the prediction and monitoring of soil/gully erosion hazards and disasters.
- Promote sustainable agricultural practices and food security, e.g. mixed cropping, agroforestry, use of animal manure, sustainable land management, sustainable crop production and other soil and water conservation practices.

- Strengthen policy and governance by integrating LLA and Community-based Adaptation (CbA) into the NAPF with strong legal and institutional framework.
- Support local livelihoods through poverty alleviation, job creation and income diversification.

Synthesis, analysis and summary of the key message

Local communities in Nigeria are building resilience against the impacts of climate change and reducing natural disaster risks by integrating several LLA strategies and practices in their adaptation actions. A detailed analysis of the results reveals several behavioural, cultural and socio-economic motivations driving LLA in the three case studies. These include the fear of losing their homes and businesses, and the need to sustain livelihoods, fight poverty, reduce food insecurity, build self-reliance and ensure the sustainability of the environment.

The majority of these adaptation actions are unique to each agroecological zone of Nigeria. For example, the integration of aquaculture and vegetable production (aquaponics), which is a sustainable method of water conservation and recycling, has helped local communities in the drought-prone regions of northern Nigeria to reduce food insecurity and sustain their livelihoods. Moreover, smallholder farmers in the southern region of Nigeria utilise a number of adaptation practices to mitigate seasonal flooding, flood inundations and land degradation. The farmers' adaptation practices include intercropping, crop rotation, mixed farming, early and planting date adjustment, tree planting and the construction of drainages.

However, local communities are experiencing many challenges in their efforts to protect their lives and livelihoods. The results obtained from the documentation of the three case studies on indigenous adaptation strategies and practices show that the major constraints to effective LLA implementation are lack of financial, human and infrastructural resources required to effectively plan and implement the LLA strategies. Other factors include lack of technical expertise and capacity to manage adaptation efforts, inadequate policies and regulations, weak governance and administration, and a lack of awareness of the risks and consequences associated with climate change.

The case studies reveal several lessons that can be learned and integrated into Nigeria's NAPF for effective actions against the impacts of climate change. The most important is the need to integrate indigenous knowledge and traditional practices into LLA and climate action more broadly. Indigenous people's knowledge and traditional practices contribute significantly to LLA and environmental sustainability by helping communities diversify their livelihood systems as a way of coping with climate change and environmental changes. Indigenous knowledge and traditional strategies and practices also help communities effectively and sustainably integrate NbSs, including sustainable harvesting and use of resources, traditional ecological knowledge systems, and research into and monitoring of biodiversity and ecosystems.

Another important lesson is the need to invest in stakeholder engagement inclusion in leadership and management of adaptation actions. Part of the reason all three LLA initiatives are successful is that the projects were community-owned, context-specific and tailored to local needs. Therefore, investing in stakeholder and community engagement ensures the inclusion of community members in the decision-making process, thereby ensuring ownership and creating buy-in.

The importance of capacity development and the need for equitable adaptation platforms were present in all three case studies. Capacity building through the provision of adequate resources and training programmes is important for undertaking effective LLA initiatives and practices. Similarly, the creation of equitable and transparent adaptation platforms ensures that LLA strategies are inclusive of the full range of stakeholders, including persons with disabilities, women and children.

Being a multi-ethnic nation with six distinct agroecological zones and diverse landscapes and ecosystems, Nigeria has a lot to benefit from this research in its bid to reduce disaster vulnerability and ensure environmental sustainability. The FGN needs to provide the frontline communities with the necessary tools and resources needed for effective CbA strategies.

SECTION FOUR

General analysis
and discussion

What constitutes LLA strategies?

The principle of LLA strategies can be described as an adaptation solution which is tailored to the local context and led by local stakeholders. This means that frontline communities and local governments should be involved in the design, implementation and evaluation of adaptation plans, with the aim of increasing their ownership of the process and their capacity to respond to climate change. LLA strategies also recognise the importance of indigenous knowledge systems and traditional practices in the adaptation process.

LLA strategies refer to approaches that prioritise local communities' knowledge, experiences and needs in developing and implementing climate change adaptation plans. These strategies seek to empower and engage local communities in the decision-making process and build resilience to the impacts of climate change. LLA strategies can also be referred to as the development and implementation of actions, policies and strategies that are informed and driven by the needs, values and aspirations of local communities and involve the communities in the decision-making processes to ensure that their perspectives and priorities are taken into consideration.

LLA focuses on bottom-up, community-driven initiatives that are tailored to local needs, resources and capacities. It seeks to build the capacity of local actors to plan and implement adaptation activities, and to link local and global resources to support adaptation initiatives. Some of the key components of LLA in Nigeria are:

- **Community participation and ownership:** These strategies involve engaging communities in the planning and implementation of adaptation actions, which ensures their full participation, ownership and commitment to the outcomes.
- **Context-specificity and cultural sensitivity:** LLA strategies take into account the unique social, cultural, economic and ecological contexts of the communities they serve, ensuring that they are tailored to the specific needs and conditions of the community.
- **Collaboration and partnerships:** These strategies involve building partnerships and collaborations between different groups, actors and stakeholders, including governments, civil societies and community-based organisations, to ensure that expertise, knowledge and resources are leveraged to achieve shared goals.
- **Sustainability over the long term:** Effective LLA strategies are designed to be sustainable over the long term, integrating solutions and actions that build resilience to future risks and uncertainties.
- **Understanding the local context:** LLA requires an understanding of the local environment, including the geographical, cultural and economic characteristics of the area.
- **Engaging with stakeholders:** Effective LLA requires engaging with stakeholders at all levels, including local governments, CSOs and the private sector.
- **Building local capacity:** LLA must be supported by the capacity of local actors to effectively plan and implement adaptation measures.

- Developing local partnerships: LLA should involve the active participation of a broad range of actors, including the public and private sectors, CSOs and local communities.
- Establishing effective monitoring and evaluation systems: LLA requires an effective monitoring and evaluation system to ensure that adaptation measures are effective and to inform decision making.

The main examples of LLA strategies include:

- Participatory vulnerability assessment: This approach involves engaging local communities in identifying and assessing their vulnerabilities to climate change impacts, such as floods or droughts. The assessment considers local knowledge and experiences to develop adaptation plans that are culturally and socially appropriate.
- Community-based adaptation: This approach involves identifying and prioritising climate change impacts that affect local communities and developing adaptation solutions that are contextually relevant and sustainable. The approach prioritises the integration of traditional knowledge and practices with modern technology for effective adaptation.
- Ecosystem-based adaptation: This approach focuses on harnessing the benefits of ecosystem services to build resilience to climate change impacts. Local communities are engaged in identifying and prioritising ecosystem services that can be used to address climate change impacts, such as floods, droughts and land degradation.
- Social protection: This approach focuses on developing social safety nets to support vulnerable communities in adapting to climate change impacts. The approach aims to improve community resilience and reduce the adverse effects of climate change on livelihoods and well-being.

In summary, LLA strategies prioritise the participation, knowledge and capabilities of local communities, as well as the development of synergies between different actors and stakeholders, in order to adapt to the challenges of a changing climate. LLA strategies are critical in building resilience to climate change impacts, particularly in vulnerable communities. These strategies empower local communities to take action in addressing their unique adaptation needs, leading to more sustainable and effective adaptation plans.

Importance of LLA to national and international climate actions

LLA is critical for effective national and global climate actions as it helps countries and the global community to ensure that adaptation efforts are tailored to the specific needs of local communities, and that they are implemented in ways that are culturally, economically and politically appropriate. LLA also helps to build social resilience by helping communities prepare for and respond to climate-related impacts. LLA serves as an important source of innovation, showcasing approaches that can then be adopted by other communities and countries. By increasing the number and effectiveness of LLA efforts, national and global climate action can be better informed, more effective and more resilient.

LLA is important for a number of reasons. First, it gives local communities the opportunity to define their own path to adapting to climate change and to create a plan that works best for them. This can

be especially important in remote and rural areas, where local knowledge of the environment and climate patterns can be invaluable. Second, local communities are often the first to feel the effects of climate change and are therefore likely to be the best equipped to identify potential problems, determine potential solutions and devise strategies to cope with these effects. Third, LLA can also play an important role in strengthening the resilience of communities by enabling them to plan ahead, become more aware of the climate risks they face and develop strategies to reduce their vulnerability. This can help to ensure that communities are better prepared for the future impacts of climate change.

This last point is essential, because it enables communities to develop their own locally appropriate mitigation and adaptation strategies based on an understanding of the local context. This is key for ensuring that solutions are tailored to the particular needs and challenges of each community. Moreover, LLA encourages local ownership and participation, which can help to ensure that solutions are implemented in a timely and effective manner. Finally, by taking the lead in the development of adaptation strategies, local communities can become more self-reliant, enhancing their capacity to manage and respond to the impacts of climate change.

Gaps, challenges and barriers

Nigeria has made some efforts to mainstream climate change adaptation into its development plans at the national and sub-national levels. However, the country is still facing a number of challenges hindering it from reaching its climate adaptation goals. The four most important gaps the Nigerian government needs to close are capacity building, financial resources, technology development and use, and alignment of policy with regional adaptation needs, practices and strategies. These challenges limit Nigeria's adaptive capacity and its ability to build resilience. Moreover, the apparent exclusion of relevant stakeholders, such as youths, women, persons with disabilities, CSOs, indigenous people and local and state governments, in the decision-making process is a major barrier to effectively implementing these APFs. Other limitations include the lack of an implementation timeline and target, a lack of synergy and collaboration among stakeholders, the existence of numerous overlapping responsibilities, insufficient capacity/technical expertise to implement the NAPF, and a limited capacity to monitor, evaluate and document adaptation planning across the various spheres of governance.

Notwithstanding these gaps and limitations, Nigeria has numerous opportunities to mainstream climate change adaptation, reduce vulnerability and meet its MTNDP 2021–2025 and 2050 LTV. It has the opportunity to develop its economy and meet its emission targets by developing robust APFs with a focus on agriculture, forestry and fishery. These sectors have the potential to generate 12 million job opportunities by 2035. The Nigerian government can also build capacity by training its youth population, which accounts for 70% of the country's population, to see opportunities in 'climatepreneurship' by turning locally available resources into business opportunities.

Opportunities and entry points

The LLA initiatives and strategies implemented by communities in all three case studies reveal several opportunities and entry points that can be utilised to strengthen and promote Nigeria's LLA initiatives. Firstly, the results obtained from the case studies show that local communities have much experience in integrating indigenous knowledge systems and practices as important adaptation strategies to combat land degradation and carry out natural resource conservation, biodiversity and forest

restoration, renewable energy production, fisheries and aquaculture production, climate-smart agriculture and water resource management. The initiatives and actions offer important entry points and opportunities for the Nigerian government to build upon and scale up for broader climate adaptation actions. The Nigerian government needs to take advantage of these opportunities to foster accountability and transparency by making sure that frontline communities are included in the decision-making process, with their needs forming an important part of the climate adaptation process.

Also, via the creation of green jobs, the majority of the LLA initiatives and strategies of the communities offer a multitude of opportunities and entry points for the improved socio-economic well-being of the communities and the entire nation. The green jobs identified as part of the LLA actions and practices include biogas production, biomass recycling and forest restoration, production of energy-efficient cooking stoves, fisheries and aquaculture production and diversifications in renewable energy and REDD+-related jobs. The availability of these green jobs will have a positive impact on the Nigerian economy following the introduction of the NESP and the ERGP, implemented to cushion the devastating impacts of the COVID-19 pandemic.

Additionally, the effective implementation of LLA actions in local communities is marred by a lack of financial opportunities and technical capabilities. While frontline communities have shown willingness to accept agency over adaptation actions, they are usually limited by finance and technical capacities to effectively implement these actions. Hence, the Nigerian government and MDBs can seize these opportunities to support frontline communities for effective adaptation actions against the impacts of climate change.

Importance of the project

Climate change adaptation in Nigeria and other African nations remains poorly understood, with sparse research to date on LLA in Nigeria. Frontline communities have been recognised as the groups most vulnerable to climate risks. Therefore, an effective climate adaptation plan requires an understanding of their adaptation initiatives and strategies.

One of the major problems affecting effective climate actions in Nigeria is the lack of understanding of how local communities are coping with the impacts of climate change. This research project, 'Climate Adaptation Strategies, Initiatives, and Practices: Issues and Pathways in Nigeria', has provided significant insights into the barriers, challenges, entry points and opportunities for climate change adaptation, using a deep dive into three case studies to document the narratives of local communities and their coping strategies.

One of the major significances of this research project is that it has shed light on the need for local communities to take agency over climate adaptation projects by participating in the decision-making process, in addition to monitoring and evaluating the project. This helps to build trust, equity and transparency among community members. Policy makers, CSOs, MFIs and the Nigerian government can leverage this to build resilience by supporting local communities with the right policies, financial support and technical capabilities.

In sum, the results obtained from this research form the basis for further research, actions and the development of relevant policies on LLA initiatives in Nigeria. Our research has also helped to identify the gaps, barriers, challenges and opportunities for LLA in Nigeria in a way that will assist Nigeria in making informed decisions in its climate change adaptation initiatives.

SECTION FIVE

Conclusion and
main messages

Nigeria is in climate crisis. About 35% of the country's landmass has been lost to desertification. The lives and livelihoods of more than 40 million smallholder farmers who practise rainfed agriculture have consequently been affected by seasonal droughts, desertification, floods and locust invasion. Climate change is destroying the country's agricultural potential.

In the southern parts of the country, coastal erosion, storm surges, landslides, saltwater intrusion, floods and water pollution are destroying the lives and livelihoods of millions of people. As the sea level rises (by a predicted 0.4–1.0 m by 2100), there is also high probability that many cities around the Nigerian coastline will be submerged by 2050, displacing countless others. In the north, seasonal droughts, floods and heatwaves are exacerbating desertification, leading to frequent farmer and herder crises, food insecurity, an increase in inflation and poverty, and low life expectancy.

As Nigeria's average temperature has been projected to rise by 1.5 in the next two decades and by 2–2.5 by 2060, the frequency and intensity of these hazards and disasters are likely to increase. They are also compounded by the country's complex socio-ecological systems. Bearing in mind that the country is already losing about 5% of its GDP to climate impacts – which could rise to 30% by 2050 – the country cannot afford to lose its focus in developing strategic climate adaptation plans which cut across the major climate-sensitive sectors of power, energy, agriculture and land use, oil and gas, and transport.

In fact, the country needs to double down on its climate adaptation strategies. It has already taken strategic steps to achieve net zero by 2060 by signing into law the CCA, and it has recently inaugurated the National Council on Climate Change, with the aim of mainstreaming climate change into national plans and programmes. While such initiatives are commendable, the government needs to go further by declaring a climate emergency and approving a robust climate emergency action plan for climate adaptation and disaster risk reduction. It also needs to develop robust climate adaptation strategies that will integrate ecosystem-based adaptation with LLA. Due to the diverse nature of Nigeria's ecological zones, these strategies have been proven essential for disaster risk reduction, food security and environmental sustainability across the nation.

Endnotes

- 1 World Bank. 2021. World Bank country data 2021. Nigeria | Data (worldbank.org)
- 2 Kamer L. 2022. African countries with the highest gross domestic product (GDP) in 2021 (in billion US dollars). Africa: GDP by country 2021 | Statista
- 3 Nasir M. 2022. Deep structural reforms guided by evidence are urgently needed to lift millions of Nigerians out of poverty, says new World Bank report. Press release, Nigeria Poverty Assessment (worldbank.org)
- 4 Fitch Ratings. 2023. Nigerian banks – Peer review, Special Report. Nigerian Banks - Peer Review (fitchratings.com)
- 5 African Economic Outlook. 2022. Nigeria economic outlook. Nigeria Economic Outlook | African Development Bank - Building today, a better Africa tomorrow (afdb.org)
- 6 Lain J & Vishwanath T. 2021. The Covid-19 crisis in Nigeria: What's happening to welfare? New data call for expanded social protection in Africa's most populous country. <https://blogs.worldbank.org/africacan/covid-19-crisis-nigeria-whats-happening-welfare-new-data-call-expanded-social-protection>
- 7 NBS. 2022. CPI and inflation report August 2022. National Bureau of Statistics. <https://nigerianstat.gov.ng/elibrary/read/1241228#:~:text=The%20percentage%20change%20in%20the,16.60%25%20recorded%20in%20August%202021>
- 8 Ogundana O. 2023. Nigerian electricity tariffs: Which way forward? TheCable, <https://www.thecable.ng/nigerian-electricity-tariffs-which-way-forward>
- 9 Adelekan I. et al. 2022. IPCC Sixth Assessment Report (AR6): Climate Change 2022 – Impacts, adaptation and vulnerability: Regional factsheet Africa. Switzerland. https://policycommons.net/artifacts/2264240/ipcc_ar6_wgii_factsheet_africa/3023294/
- 10 Okunola O. 2021. What do we know about disaster risk practices in Nigeria? <https://www.preventionweb.net/news/what-do-we-know-about-disaster-risk-reduction-practices-nigeria>
- 11 Verisk Maplecroft. 2016. Climate Change Vulnerability Index. <https://www.maplecroft.com/risk-indices/climate-change-vulnerability-index/>
- 12 University of Notre Dame. 2021. Notre Dame Global Adaptation Initiative | Rankings. <https://gain.nd.edu/our-work/countryindex/rankings/>
- 13 World Bank. 2021. Climate change could further impact Africa's recovery, pushing 86 million Africans to migrate within their own countries by 2050. Press release. <https://www.worldbank.org/en/news/press-release/2021/10/27/climate-change-could-further-impact-africa-s-recovery-pushing-86-million-africans-to-migrate-within-their-own-countries>; Ogbo A, Lauretta NE & Ukpere W. 2013. Risk management and challenges of climate change in Nigeria, *Journal of Human Ecology*, 41(3), 221–235.
- 14 Federal Government of Nigeria. 2013. Nigeria post-disaster needs assessment – 2012 floods. https://www.gfdrr.org/sites/default/files/publication/NIGERIA_PDNA_PRINT_05_29_2013_WEB.pdf
- 15 WHO. 2021. World malaria report 2021. Global report. <https://www.who.int/publications/i/item/9789240040496>
- 16 Cogger T, Dinshaw A, Tye S, Kratzer B, Aung MT, Cunningham E, Ramkissoon C, Gupta S, Bodrud-Doza M, Karamallis A & Mbewe S. 2022. Locally led adaptation: From principles to practice. World Resources Institute. www.wri.org/research/locally-led-adaptation-principles-practice
- 17 Global Center on Adaptation. Locally Led Adaptation. <https://gca.org/programs/locally-led-adaptation/>
- 18 Cogger T, Dinshaw A, Tye S, Kratzer B, Aung MT, Cunningham E, Ramkissoon C, Gupta S, Bodrud-Doza M, Karamallis A & Mbewe S. 2022. Locally led adaptation: From principles to practice. World Resources Institute. www.wri.org/research/locally-led-adaptation-principles-practice; Yoseph-Paulus R & Hindmarsh R. 2018. Addressing

- inadequacies of sectoral coordination and local capacity building in Indonesia for effective climate change adaptation, *Climate and Development*, 10(1), 35–48.
- 19 Nyong A, Adesina F & Osman Elasha B. 2007. The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel. *Mitigation and Adaptation Strategies for Global Change*, 12, 787–797.
 - 20 Gasu MB, Gasu GN & Ntemuse UE. 2021 A review of biodiversity loss and climate change: Policy measures and adaptation strategies in Nigeria, *Malaysian Journal of Tropical Geography*, 47(1 and 2), 100–122.
 - 21 NwaNri N & Owoeye F. 2022. In Nigeria's disappearing forests, loggers outnumber trees – a photo essay. Reuters. <https://www.reuters.com/investigates/special-report/nigeria-environment-trees/>
 - 22 Ogundele AT, Oladipo MO & Adebisi OM. 2016. Deforestation in Nigeria: The needs for urgent mitigating measures, *International Journal of Geography and Environmental Management*, 2(1), 15–26.
 - 23 UNDP. 2022. Sustainable fuelwood management – Nigeria. United Nations Development Programme. <https://www.undp.org/nigeria/projects/sustainable-fuelwood-management#:~:text=Over%2070%25%20of%20the%20population,exacerbated%20by%20rapid%20population%20growth>
 - 24 Salau G. 2016. Depleting forest reserves: Eating today at expense of tomorrow. *The Guardian*. Depleting Forest Reserves: Eating Today At Expense Of Tomorrow | The Guardian Nigeria News - Nigeria and World News — Sunday Magazine — The Guardian Nigeria News – Nigeria and World News
 - 25 Onyekuru AN & Marchant R. 2014. Climate change impact and adaptation pathways for forest dependent livelihood systems in Nigeria, *African Journal of Agricultural Research*, 9(24), 1819–1832.
 - 26 Egboka BCE, Okoye EI & Chibuzor SI. 2022. Anthropogenic factors and climate change as agents of desertification in a developing economy such as Nigeria, *Biodiversity Int J*, 6(1), 23–26.
 - 27 Ujor GC. 2018. The forest policies of Nigeria: A cursory analysis, *Nigerian Agricultural Policy Research Journal*, 5(2237-2021-1406), 20–30.
 - 28 Olutumise AI. 2023. Impact of relaxing flood policy interventions on fish production: Lessons from earthen pond-based farmers in Southwest Nigeria, *Aquaculture International*, 1–24.
 - 29 Falola A, Mukaila R & Emmanuel JO. 2022. Economic analysis of small-scale fish farms and fund security in north-central Nigeria, *Aquaculture International*, 30(6), 2937–2952.
 - 30 Yakubu SO, Falconer L & Telfer TC. 2022. Scenario analysis and land use change modelling reveal opportunities and challenges for sustainable expansion of aquaculture in Nigeria, *Aquaculture Reports*, 23, 101071.
 - 31 The Nation. 2022. Nigeria needs 3.6 metric tonnes of fish annually. *The Nation*. 'Nigeria needs 3.6 million metric tonnes of fish annually' | The Nation Newspaper (thenationonlineng.net)
 - 32 Falaju J. 2022. FG raises concern over 2.4 million tonnes domestic fish deficit. *The Guardian*. FG raises concern over 2.4 million tonnes domestic fish deficit — Business — The Guardian Nigeria News – Nigeria and World News
 - 33 Onyenekwe CS, Sarpong DB, Egyir IS, Opata PI & Oyinbo O. 2022. A comparative study of farming and fishing households' livelihood vulnerability in the Niger Delta, Nigeria, *Journal of Environmental Planning and Management*, 1–25.
 - 34 Lagos State Government. 2019. Abstract of local government statistics. Abstract-of-Local-Government-Statistics-Y2019.pdf (lagosstate.gov.ng)
 - 35 Federal Ministry of Agriculture and Rural Development. 2008. Nigeria – National Aquaculture Strategy. <https://faolex.fao.org/docs/pdf/nig189027.pdf>, 7.
 - 36 FAO. 2010. FAO technical guidelines for responsible fisheries. No. 5, Suppl. 4, Rome. 53pp. Aquaculture development. 4. Ecosystem approach to aquaculture | GLOBEFISH | Food and Agriculture Organization of the United Nations (fao.org)
 - 37 Chukwunonye, A.E., Achunam, N.S., Dolly, A.E., Ndubuisi, U.I., Ezenwa, O.P., Nwanneka, I.U., Chidozie, A.R., Amara, E.C. and Ikenna, E., 2016. Prevalence of Diarrhoea Disease Among Infants in an Urban and a Rural Local Government Area in Anambra State, Nigeria: A Comparative Study. *European Journal of Preventive Medicine*, 4(3), pp.56-60.
 - 38 Mbaneme, F.C.N. and Mbaneme, E.O., 2013. Assessment of Solid Waste Management in Idemili North Local Government Council. *International Journal of Engineering Innovations and Research*, 2(5), p.417.
 - 39 Ugwu, D.S., 2006. Crop production in the compound farming system of southeastern Nigeria. *Journal of Agriculture and Social Research (JASR)*, 6(1), pp.1-10.
 - 40 Nzeagwu U. 2022. Gully erosion destroys 70% of Anambra land area, says commissioner. *The Guardian*, <https://guardian.ng/news/gully-erosion-destroys-70-of-anambra-land-area-says-commissioner/>

About APRI

The Africa Policy Research Institute (APRI) is an independent and nonpartisan African think tank. It researches key policy issues affecting African countries and the African continent. APRI provides insights to the German and European Union policy-making processes on Africa. In addition, APRI provides policy options to African policy makers and civil society actors.

About CCCD-AEFUNAI

The Centre for Climate Change and Development (CCCD) is a dynamic research think tank based at the Alex-Ekwueme Federal University Ndufu-Alike (AEFUNAI) in Ebonyi State, Nigeria. The Centre focuses on innovative learning, research and policy guidance in the areas of environmental sustainability, climate change and green development in Nigeria and Africa more broadly.

About DCC

The Department of Climate Change (DCC) is the official information hub on climate change in Nigeria. It was established by the Federal Government of Nigeria under the Federal Ministry of Environment to serve as the vehicle for driving national climate actions and efforts. It was established with the broad mandate of coordinating activities towards national implementation of the climate change national and international agreements, including the Paris Agreement



License:

Creative Commons
(CC BY-NC-ND 4.0)

<https://creativecommons.org/licenses/by-nc-nd/4.0>

Photo credit – APRI 2022

Designed and typeset by COMPRESS.dsl 800799
www.compressdsl.com

Imprint

APRI - Africa Policy Research Private Institute gUG
(haftungsbeschränkt)
Brunnenstraße 9
10119 Berlin
Germany

Executive Director:

Dr. Olumide Abimbola

Contact:

Dr. Grace Mbungu
Senior Fellow and Head of Climate Change Program, APRI
Email: gmbungu@afripoli.org



**DEPARTMENT OF
CLIMATE CHANGE**
GATEWAY TO NATIONAL
ACTION ON CLIMATE CHANGE



**CENTRE FOR CLIMATE
CHANGE & DEVELOPMENT**