

BNRCC Final
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NATIONAL ADAPTATION STRATEGY AND PLAN OF ACTION ON CLIMATE CHANGE FOR NIGERIA (NASPA-CCN)

November 2011

**Prepared for the
Federal Ministry of Environment Special Climate Change Unit**

**Prepared by the
Building Nigeria's Response to Climate Change (BNRCC) Project**



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Executive Summary

1. Introduction

Climate change is the latest challenge to sustainable human development. The scientific evidence is clear: climate change is likely to have negative impacts on efforts to achieve Nigeria's development objectives, including the targets set out in *Nigeria Vision 20:2020* and the *Millennium Development Goals* (MDGs). In particular, climate change will impede efforts to reduce the poverty experienced by the majority of Nigerians. It will retard the drive to ensure equity in the distribution of development benefits, particularly among women and men;

"The potential for climate change to bring about damaging and irrecoverable effects on infrastructure, food production, and water supplies, in addition to precipitating natural resource conflicts makes it a critical challenge that must be responded to by any economy seeking sustainable growth in the years leading up to 2020."

- *Nigeria Vision 20:2020*

and it will check the effort to promote sustainable livelihoods. In addition, climate change will likely lead to other changes such as ecosystem degradation and reduced availability of water and food. It is therefore likely to become a major driver of increased human conflict.

Climate change is already having an impact in Nigeria. Weather-related disasters have become more frequent in the past four decades and the trend continues. The nation's natural and agricultural ecosystems, including freshwater and coastal resources, are highly susceptible to the effects of climate change. These vulnerability factors make clear the urgent need to respond to the challenge of climate change in a comprehensive and systematic manner that, at the same time, addresses broader development priorities, taking account of the gender-differentiated needs and roles of the society.

To prepare for and respond effectively to the impacts of climate change, adaptation is the key. Adaptation should be comprehensive and articulated in a way that recognizes the varying needs and vulnerabilities of all sections of the society. Accordingly, the Government of Nigeria and a number of civil society organizations embarked upon the development of this **National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN)**. The NASPA-CCN seeks to minimize risks, improve local and national adaptive capacity and resilience, leverage new opportunities, and facilitate collaboration with the global community, all with a view to reducing Nigeria's vulnerability to the negative impacts of climate change.

2. Climate Change in Nigeria

Observed Climate Change

Nigeria's climate is already changing. The Nigerian Meteorological Agency (NIMET 2008) assessed the Nigerian climate over the period 1941 to 2000 and demonstrated the following changes:

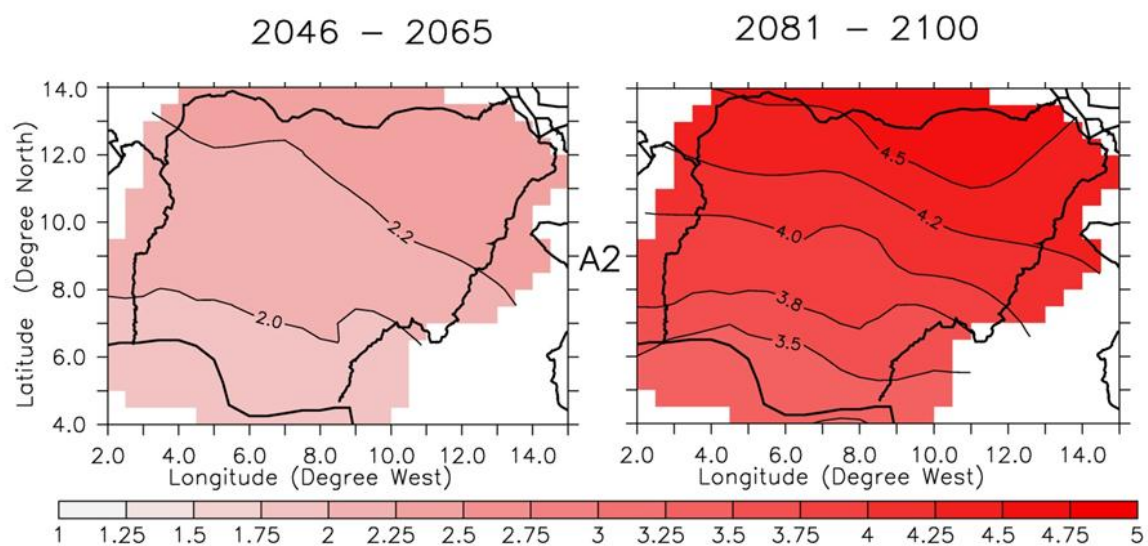
Rainfall: Compared to previous periods, during the period from 1971 to 2000 the combination of late onset and early cessation shortened the length of the rainy season in most parts of the country. Between 1941 and 2000, annual rainfall decreased by 2-8 mm across most of the country, but increased by 2-4 mm in a few places (e.g. Port Harcourt).

Temperature: From 1941 to 2000 there was evidence of long-term temperature increase in most parts of the country. The main exception was in the Jos area, where a slight cooling was recorded. The most significant increases were recorded in the extreme northeast, extreme northwest and extreme southwest, where average temperatures rose by 1.4-1.9°C.

Expected Climate Change

Future climate change is generally presented using climate scenarios, an analytic tool that provides long-term perspectives on expected changes in climate parameters. To assist in the development of the NASPA-CCN, the BNRCC Project commissioned the Climate Systems Analysis Group at the University of Cape Town to develop climate scenarios for Nigeria.

Temperature: Overall, the scenarios suggest a warmer climate in the future. For instance, the A2 scenario projects a temperature increase of 0.04°C per year from now until the 2046-2065 period, rising to 0.08°C per year after 2050. However, regional variations are expected, with the highest increase (4.5°C by 2081-2100) projected in the northeast. The figure below Figure 5 shows the projected increases in maximum daily temperature across Nigeria, presented in $^{\circ}\text{C}$ relative to the present day climate.



Rainfall: The projected changes in rainfall vary across the country, with the A2 scenario suggesting a wetter climate in the south, but a drier climate in the northeast. For the 2046-2065 period the projected change ranges from an average increase of 15 cm annually in the south to an average decrease of 7.5 cm annually in the north. Although projected annual rainfall increases in some parts of the country and decreases in others, all areas show increases in rainfall during at least some part of the year.

Summary: A summary of the projected trends in the key climate change parameters for Nigeria is presented in the following table, by ecological zone:

Climate variables	Mangrove zone	Rain forest	Tall grass (savanna)	Short grass (Sahel)
Temperature	↑	↑	↑	↑
Rainfall amount	↑	↑	↓	↓
Rainfall variability	↑	↑	↑	↑
Extreme rainfall events - droughts	Likely	Likely	↑	↑
Extreme rainfall events – storms and floods	↑	↑	Likely	Likely
Sea level rise	↑	NA	NA	NA

Legend: ↑ likely increase or increase; ↓ likely decrease or decrease; NA not applicable

3. Climate Change Impacts in Nigeria

Climate change is already having significant impacts in Nigeria, and these impacts are expected to increase in the future. Recent estimates suggest that, in the absence of adaptation, climate change could result in a loss of between 2% and 11% of Nigeria's GDP by 2020, rising to between 6% and 30% by the year 2050. This loss is equivalent to between N15 trillion (US\$100 billion) and N69 trillion (US\$460 billion). This large projected cost is the result of a wide range of climate change impacts affecting all sectors in Nigeria:

1. Agriculture (Crops and Livestock)

Changes in climate factors have significant consequences for the agricultural sector. The adverse impacts of climate change are expected to lead to production losses in the sector, compromising the attainment of the Millennium Development Goals, especially Goal 1 "Eradicate Extreme Poverty and Hunger" and Goal 7 "Ensure Environmental Stability." The range of possible climate change hazards and relevant adaptation measures are diverse and must be considered in the context of the local agro-ecological, production and socio-cultural conditions present for any particular area of Nigeria.

2. Freshwater Resources, Coastal Water Resources and Fisheries

Climate change will affect the nature and characteristics of the freshwater resources on which Nigerians depend. The impacts will vary between eco-zones, exacerbating existing problems of too much water (floods), too little water (droughts) and reduced water quality (e.g. salt water intrusion). Climate change impacts, including sea level rise and extreme weather, will also affect Nigeria's coastal and marine areas, home to 25% of the country's population and to Nigeria's economically important petroleum industry. These impacts on water resources will also affect fisheries, a main source of livelihoods and protein for riverside and coastal rural communities.

3. Forests

Nigerian forests are already under great pressures arising from increasing populations and growing economic wealth leading to greater demand for forest resources. Climate change is expected to add to these pressures, through direct impacts of the changing climate on forest growth and development and through greater demands on forests by populations adjusting to climate change.

4. Biodiversity

Increased aridity, increased intensity and variability of rainfall, and sea level rise all have impacts on organisms, species, and habitats. Climate change can also lead to loss of livelihoods (for instance loss of agricultural productivity), leading to increased dependence on biodiversity for income. These climate change-related factors will exacerbate the impacts of existing human pressure on biodiversity. This will further diminish the ability of these natural heritage resources to continue to provide ecosystem services on which human development and survival depend. Climate change may also lead to the displacement of valuable ecosystems by invading species that are favoured by the new climate regime.

5. Health and Sanitation

A large part of Nigeria's economy is dependent on natural resources that are vulnerable to climate change impacts. When these resources are affected, the health of Nigerians can also be affected. Direct health impacts of climate change stem from extreme events such as heat waves, floods, droughts, windstorms, and wildfires. Indirect effects of climate change on health may arise from malnutrition due to reduced food production, from spread of infectious disease and food- and water-borne illness, and from increased air pollution. The impact of climate change on water resources, including reduced water availability in some areas and flooding causing contamination of water in other areas, will have a negative impact on the already poor sanitation situation in Nigeria.

6. Human Settlements and Housing

Nigeria has experienced rapid urbanization with nearly 50% of the population now living in urban areas. Generally the condition of housing and provision of essential infrastructure are poor in both urban and rural areas, and Nigeria has an estimated shortage of 16 million housing units. Climate change will have an economic impact on housing throughout the country due to the wide range and distribution of hazards including sea level rise, increased frequency and severity of storm surges, increased flooding associated with high rainfall events, and high winds. Moreover, if climate change impacts decrease the national GDP as projected, this will in turn result in decreased available funding for the construction and renovation of housing.

7. Energy

The economic value of oil and gas investment in Nigeria's coastal and offshore areas is in the trillions of US dollars. This investment is at risk from the negative impacts of climate change, including rising sea levels, heavy storms, floods, high winds and shoreline erosion. Climate change is also expected to negatively impact the already limited electrical power supply through impacts on hydroelectric and thermal generation. Service interruption is also expected to result from damage to transmission lines and substation equipment impacted by sea level rise, flash floods, and other extreme weather events. Climate change impacts resulting in increased fuel-wood scarcity will increase pressure on the remaining forest resources, resulting in further degradation of the environment and negative impacts on rural livelihoods.

8. Transportation and Communications

Nigeria's transportation infrastructure includes road and highway networks, railways, canals and navigable waterways, seaports, airports, associated facilities, and vehicle fleets. Much of this infrastructure is inadequate for current needs, and vulnerable to the impacts of climate change. Under maintained road networks, for instance, will be further degraded by extreme weather, and airport operations will be disrupted by heavy rainfall events, violent thunder storms, severe winds and harmattan dust storms. Negative impacts on the transportation system can be expected to have negative impacts on the overall Nigerian economy.

9. Industry and Commerce

Many industries in Nigeria are vulnerable to a myriad of climate change-induced problems. Construction, transportation operations, road infrastructure, energy production and transmission, off-shore oil and gas operations, thermal power generation, as well as tourism and recreation, are some of the industrial sectors that are exposed to the vagaries of changing climate conditions. Industries dependent on climate-sensitive resources will suffer the most, as they derive their raw materials from sectors most affected by climate change, such as agriculture. Negative impacts on industry and commerce will lead to greater poverty among people who depend on the affected industries for their livelihoods.

10. Disaster, Migration and Security

Nigeria is prone to a wide variety of climate-induced hazards and disasters. Floods, storms, ocean surges, droughts, wildfires, pest plagues, and air and water pollution cause extensive losses to livelihoods and property, compromise development progress, and claim many lives. Climate change will increase the frequency and intensity of extreme climatic hazards; introduce hazards to areas previously free from their impacts; and increase vulnerability when climate-induced hazards exacerbate underlying risk conditions. Moreover, climate change will lead to migration of people from affected areas and to a new class of environmental refugees – people from communities that have been destabilized by climate, or where climate change exacerbates existing land degradation.

11. Livelihoods

Adverse impacts of climate change on livelihoods are noted in the discussions of other sectors, especially in Agriculture, Water Resources, Fisheries, Forestry, and Industry and Commerce. The impact of climate change on livelihoods is additional to pre-existing impacts of other factors affecting livelihoods in Nigeria.

12. Vulnerable Groups

Climate change will significantly affect vulnerable groups because of a variety of factors, including low adaptive capacity, limited resources, and poverty. In general, climate change tends to exacerbate differences among various groups. The vulnerable and socially marginalized groups – such as the poor, children, women, the elderly, and indigenous peoples – tend to bear the brunt of environmental change. In the specific context of Nigeria, women are more vulnerable to the effects of climate change than men – primarily as they constitute the majority of the country's poor and are more dependent for their livelihood on natural resources that are threatened by climate change.

13. Education

Overall the level of public awareness on issues related to climate change in Nigeria is considered to be low. There is great need to improve public understanding of the potential impact of climate change. Stakeholders in the education system (such as academics, researchers, teachers, students, and policy-makers) have a key role to play in national programmes to achieve this goal. In addition, the education system itself will be impacted by climate change, affecting school facilities and activities, school attendance, and learning.

4. How Nigeria is Responding to Climate Change

The Government of Nigeria acknowledges the importance of developing a national response to climate change, and is taking steps to build a governance structure to manage the issue. The Government first created a national focal point: the Special Climate Change Unit (SCCU) within the Federal Ministry of Environment. It also mobilized the Inter-ministerial Coordinating Committee on Climate Change. In 2010, the National Assembly passed a bill to create a national Climate Change Commission, which, once established, will likely facilitate coordination and support for the multi-level and cross-sectoral adaptation responses. In addition, development of a National Climate Change Policy for Nigeria, and of a Nationally Appropriate Mitigation Action (NAMA) programme document, is on-going.

To build on these actions, and to ensure a truly national response to the significant and multi-faceted impacts of climate change, Nigeria needs an aggressive and widely supported strategy and action plan. This strategy and plan must be integrated, comprehensive in scope, and inclusive of all stakeholders. This is what the NASPA-CCN provides for Nigeria.

5. NASPA-CCN Vision, Goals, and Objectives

VISION

This Strategy envisions a Nigeria in which climate change adaptation is an integrated component of sustainable development, reducing the vulnerability and enhancing the resilience and adaptive capacity of all economic sectors and of all people -- particularly women, children, and resource-poor men -- to the adverse impacts of climate change, while also capturing the opportunities that arise as a result of climate change.

GOAL

To take action to adapt to climate change by reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all Nigerians; and to reduce or minimize risks by improving adaptive capacity, leveraging new opportunities, and facilitating collaboration inside Nigeria and with the global community.

OBJECTIVES

To reduce the impacts of climate change through adaptation measures that can be undertaken by the Federal, State and Local Governments, civil society, private sector, communities and individuals, including measures that will:

1. Improve awareness and preparedness for climate change impacts
2. Mobilize communities for climate change adaptation actions
3. Reduce the impacts of climate change on key sectors and vulnerable communities
4. Integrate climate change adaptation into national, sectoral, State and Local Government planning and into the plans of universities, research and educational organizations, civil society organizations, the private sector and the media.

6. NASPA-CCN Strategies, Policies, Programmes and Measures

The NASPA-CCN outlines recommended strategies for each of the 13 priority sectors/themes areas described above, and defines a set of policies, programmes and measures based on these strategies. The strategies are presented below, and the full set of policies, programmes and measures are presented in the full NASPA-CCN.

1. STRATEGIES FOR AGRICULTURE (CROPS AND LIVESTOCK)
1. Adopt improved agricultural systems for both crops and livestock (for example, diversify livestock and improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information). 2. Implement strategies for improved resource management (for example, increase use of irrigation systems that use low amounts of water; increase rainwater & sustainable ground water harvesting for use in agriculture; increase planting of native vegetation cover & promotion of re-greening efforts; and intensify crop and livestock production in place of slash and burn). 3. Focus on agricultural impacts in the savanna zones, particularly the Sahel, the areas that are likely to be most affected by the impacts of climate change.
2. STRATEGIES FOR FRESHWATER RESOURCES, COASTAL WATER RESOURCES AND FISHERIES
1. Initiate a national programme for integrated water resource management at the watershed level 2. Intensify programmes to survey water quality and quantity for both ground and surface water 3. Implement programmes to sustainably extend and improve water supply and water management infrastructure 4. Explore water efficiency and management of water demand, particularly in Sahel and Sudan savanna areas 5. Enhance artisanal fisheries and encourage sustainable aquaculture as adaptation options for fishing communities.
3. STRATEGIES FOR FORESTS
1. Strengthen the implementation of the national Community-Based Forest Resources Management Programme. 2. Support review and implementation of the National Forest Policy. 3. Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status; and initiate a research programme on a range of climate change-related topics, including long term impacts of climatic shifts on closed forests. 4. Provide extension services to CSOs, communities and the private sector to help establish and restore community and private natural forests, plantations and nurseries. 5. Improve management of forest reserves and enforce low impact logging practice.
4. STRATEGIES FOR BIODIVERSITY
1. Support the active implementation of the <i>National Biodiversity Strategy and Action Plan</i> (NBSAP), particularly those strategic actions that address climate change impacts. 2. Support recommended climate change adaptation policies and programmes in sectors that affect biodiversity conservation, including agriculture, forestry, energy and livelihoods. 3. Support and implement programmes for alternative livelihoods in order to reduce unsustainable resource use that contributes to loss of biodiversity (see Sector/Theme 11. Livelihoods).
5. STRATEGIES FOR HEALTH AND SANITATION
1. Undertake research to better understand the health impacts of climate change in Nigeria. 2. Strengthen disease prevention and treatment for those diseases expected to increase as a result of climate change. 3. Reinforce programmes to build and maintain wastewater and solid waste management facilities. 4. Promote and facilitate the adoption of practices and technologies that reduce exposure and health impacts from extreme heat. 5. Establish early warning and health surveillance programmes.
6. STRATEGIES FOR HUMAN SETTLEMENTS AND HOUSING
1. Develop climate change adaptation action plans for urban areas, particularly those at greatest risk. 2. Assist communities to reduce vulnerability through participatory planning of land use & housing. 3. Discourage building/urban encroachment into vulnerable areas, high risk zones & low lying areas. 4. Discourage housing and settlement practices that are maladaptive in the face of climate change. 5. Strengthen rural settlements in order to reduce migration.

7. STRATEGIES FOR ENERGY
1. Include increased protective margins in construction and placement of energy infrastructure (i.e. higher standards and specifications). 2. Undertake risk assessment & risk reduction measures to increase resilience of the energy sector. 3. Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions. 4. Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply. 5. Expand sustainable energy sources and decentralize transmission in order to reduce vulnerability of energy infrastructure to climate impacts.
8. STRATEGIES FOR TRANSPORTATION AND COMMUNICATIONS
1. Include increased protective margins in construction and placement of transportation and communications infrastructure (i.e. higher standards and specifications). 2. Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors. 3. Strengthen existing transportation and communications infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions. 4. Develop and diversify secure communication backup systems to ensure both civil society and security forces have access to emergency communication methods.
9. STRATEGIES FOR INDUSTRY AND COMMERCE
1. Increase knowledge and awareness of climate change risks and opportunities 2. Undertake and implement risk assessments and risk reduction measures 3. Incorporate climate change into ongoing business planning 4. Review and enforce land use plans in industrial areas in light of climate change 5. Encourage relocation of high risk industries, facilities and markets 6. Promote and market emerging opportunities from climate change 7. Encourage informal savings and insurance schemes, and arrange for the availability of medium-term credit (especially for industries in crisis).
10. STRATEGIES FOR DISASTER, MIGRATION AND SECURITY
1. Strengthen capacity to anticipate disasters and impacts on internal migration and security 2. Strengthen capacity to respond through information and awareness, training, equipment, plans and scenarios, and communication 3. Strengthen individual and community-based emergency preparedness and response capacity in high risk areas 4. Strengthen rural infrastructure and the availability of jobs to discourage out-migration.
11. STRATEGIES FOR LIVELIHOODS
1. Develop a replicable approach/model that uses intermediate NGOs, community members and radio to diffuse climate change adaptation approaches and information and to gather feedback on adaptation actions focused on livelihoods. 2. Build a network of intermediate NGOs capable of working on climate change and livelihoods issues, where these NGOs support a number of communities in high risk states. 3. Animate communities with appropriate engagement methods, in order to elicit and document valid climate change and livelihood related needs/vulnerabilities. 4. Use or reinforce available (endogenous) community resources to reduce vulnerability and build livelihood-linked capacity to adapt to climate change. 5. Encourage community participation and active roles by both genders in all livelihood development initiatives.
12. STRATEGIES FOR VULNERABLE GROUPS
1. Create awareness among government staff, including disaster and emergency management personnel, about climate change impacts and how these impacts affect vulnerable groups. 2. Provide basic training for government staff on gender awareness tools to enhance implementation capacities. 3. Adapt government programmes, including emergency response plans and programmes directed at vulnerable groups, to better address the impacts of climate change on these groups.

4. Adapt public service facilities, including school buildings, to withstand storms and excess heat.
5. Intensify immunization of children and youth to provide protection against diseases that are expected to become more prevalent with climate change.
6. Retrain health workers to appreciate emerging climate change challenges within the context of immunization delivery and other comprehensive healthcare delivery.
7. Encourage faith-based and civil society organizations to provide social welfare programmes and other support to address the climate change-induced needs of vulnerable groups.

13. STRATEGIES FOR EDUCATION

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

7. NASPA-CCN Roles and Responsibilities

In view of its central governance role, the **Federal Government** should:

1. Enact a comprehensive law or body of laws to provide a mechanism for achieving Nigeria's adaptation policy objectives.
2. Mainstream climate change adaptation into all existing and new National Development Plans and official Vision statements (such as *Vision 20:2020*).
3. Respond actively and effectively to global and regional initiatives on climate change adaptation.
4. Mandate the Authority responsible for Climate Change to carry out the following functions: planning and setting priorities (including support for information and data collection), implementation, mobilization of resources, evaluation.

The **State Governments** in all states should:

1. Have a focal Ministry, Department or Agency mandated to lead and provide strong coordination for all the climate change adaptation activities.
2. Mainstream climate change adaptation into all existing and new Development Plans and official Vision statements, and into all existing and new policies and programmes.
3. Ensure that climate change adaptation is taken into account when drawing up the State's Annual Budget.
4. Actively and consistently strengthen inter-ministerial and inter-agency coordination and cooperation in climate change adaptation in the State.
5. Create an enabling environment for the organized private sector to invest in climate change adaptation, including business opportunities presented by climate change adaptation options.

Local Governments, in collaboration with the Federal and State Governments where appropriate, should:

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

The **Organized Private Sector** should:

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

Civil Society Organizations should:

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

Households and individuals should:

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

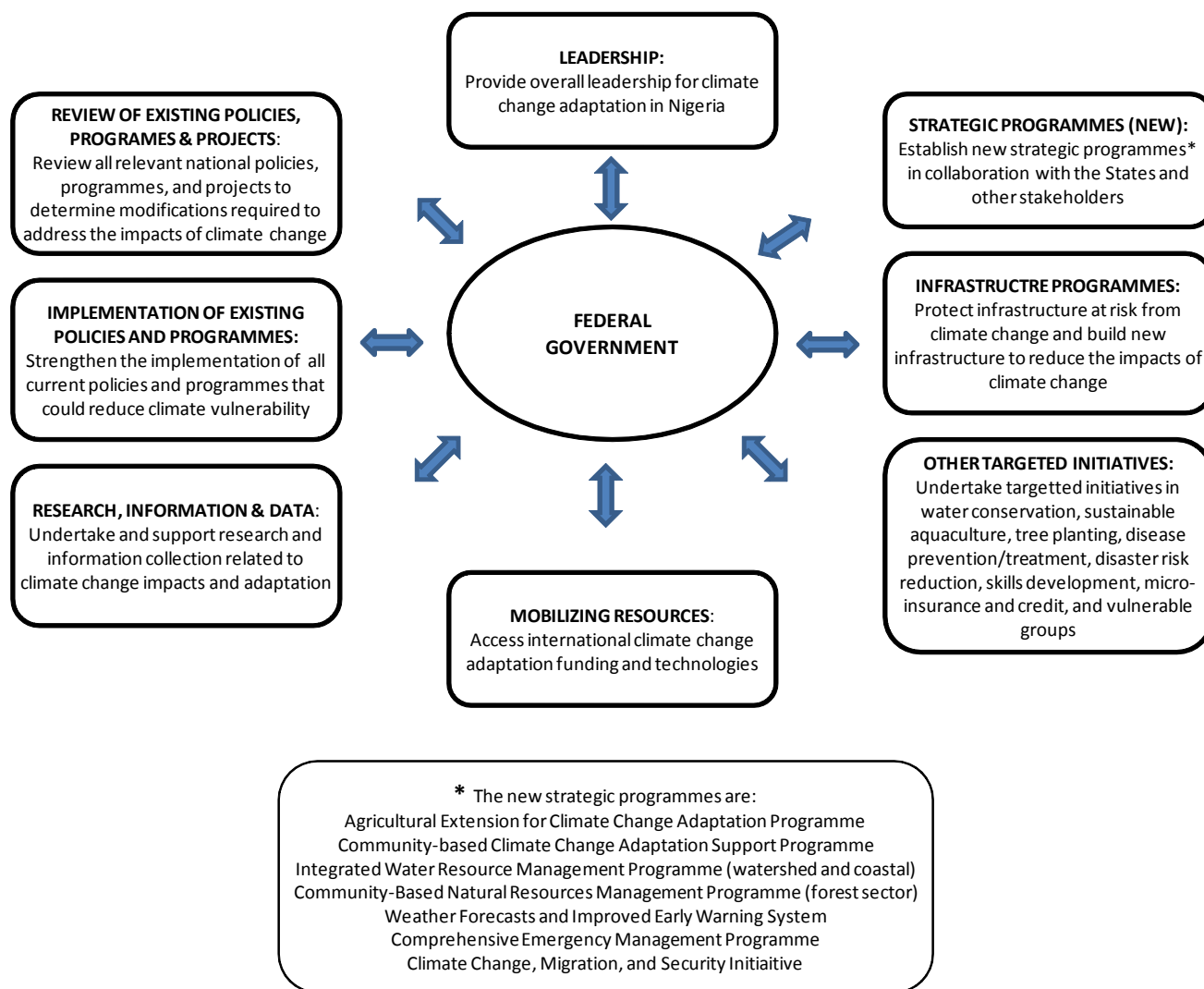
International organizations and donors should:

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

8. NASPA-CCN Implementation

Based on the sectoral/thematic strategies/policies/programmes/measures outlined above, and on the overarching roles and responsibilities also outlined above, the NASPA-CCN defines the implementation role for the key stakeholder groups: the Federal Government, the State and Local Governments, civil society organizations, and the organized private sector. The figure below summarizes the implementation role of the federal government; similar figures are presented in the NASPA-CCN for the other stakeholder groups.

NASPA-CCN Implementation: Recommended Role of the Federal Government



Implementation Plan

The implementation actions of NASPA-CCN have been divided into two levels:

Level 1: Priority Implementation Actions: Level 1 consists of broad, high level actions which relate to leadership, policies, and mobilization of resources. These actions must be implemented to enable other climate change adaptation projects and measures to be carried out.

LEVEL 1: PRIORITY IMPLEMENTATION ACTIONS	RESPONSIBILITY
1. PROVIDE LEADERSHIP Provide overall leadership for climate change adaptation in Nigeria	Federal, State and Local Governments
2. REVIEW POLICIES Review relevant policies, programmes and projects to determine modifications required to address the impacts of climate change (including gender dimensions)	ALL
3. MOBILIZE RESOURCES Access international and domestic sources of funding for implementation of the NASPA-CCN	Federal Government and all stakeholders

Level 2: Other Implementation Actions: Level 2 consists of other priority climate change adaptation actions and measures. These actions have been selected from the longer list of measures included in prior sections of this NASPA-CCN on the basis of their importance and urgency; the number of people, the size of area and the number of sectors that will be affected; the potential for sustainability; and the extent to which the actions will reduce vulnerability and increase adaptive capacity to climate change. A detailed table presenting Level 2 Implementation Actions is provided in Section 8.3 of the NASPA-CCN.

Funding

Existing funding mechanisms for climate change adaptation in Nigeria are inadequate. Nigeria needs to mobilize additional and substantive financial resources for adaptation. To do this effectively, the country needs to:

1. Situate climate change adaptation financing within the broader context of national development financing and development goals of *Vision 20:2020*.
2. Undertake a detailed financial needs assessment to properly determine the economic costs of climate change adaptation in Nigeria.
3. Review all multilateral mechanisms to finance climate change adaptation, and determine what capacities must be put in place to access and manage these funds.
4. Revise the National Fiscal Policy to incorporate the cost of climate change adaptation.
5. Develop an innovative, non-debt creating national financing mechanism to support adaptation, raise the necessary funds, and manage those funds well.
6. Ensure climate financing policies and resource allocations are responsive to real needs.

A funding plan for NASPA-CCN will be developed by the ministries, departments, and agencies of the government following adoption of the NASPA-CCN.

Acronyms

ADP	Agricultural Development Programme
AR4	Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007
BNRCC	Building Nigeria's Response to Climate Change project
CBA	Community-based Adaptation
CBD	Convention on Biological Diversity
CBNRMP	Community-based Natural Resources Management Project
CBO	Community-based Organizations (NGOs at local level)
CC	Climate Change
CCA	Climate Change Adaptation
CCASTR	Climate Change Adaptation Strategy Technical Report
CIDA	Canadian International Development Agency
CSO	Civil Society Organization
DFID	Department for International Development of the UK Government
DRR	Disaster Risk Reduction
ECOWAS	Economic Community of West African States
FCT	Federal Capital Territory
FEPA	Federal Environmental Protection Agency (now part of the Federal Ministry of Environment)
FME	Federal Ministry of Environment
FMWA	Federal Ministry of Women Affairs
FNC	First National Communication
GCM	Global Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
ICT	Information and Communication Technology
IGR	Internally Generated Revenue
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
LEEMP	Local Empowerment and Environmental Management Project
LG/LGA	Local Government/Local Government Authority
MDGs	Millennium Development Goals
MWR	Ministry of Water Resources
NAERLS	National Agricultural Extension Research Liaison Services
NAMA	Nationally Appropriate Mitigation Action
NAPEP	National Poverty Eradication Programme
NASPA-CCN	National Adaptation Strategy and Plan of Action on Climate Change for Nigeria
NBSAP	National Biodiversity Strategy and Action Plan
NDDC	Niger Delta Development Commission
NDE	National Directorate of Employment
NEMA	National Emergency Management Agency
NEST	Nigerian Environmental Study/Action Team
NGO	Non-Government Organizations
NIMET	Nigerian Meteorological Agency
NIOMR	Nigerian Institute of Oceanography and Marine Research
NOA	National Orientation Agency
NPC	National Planning Commission
NTFPs	Non-Timber Forest Products
RBDA	River Basin Development Authority
REDD/REDD+	Reducing Emissions from Deforestation and Forest Degradation
SCCU	Special Climate Change Unit of the Federal Ministry of Environment
SEMA	State Emergency Management Agency
SFMP	Sustainable Forest Management Plan
SME	Small and Medium Enterprises
SNC	Second National Communication
UNFCCC	United Nations Framework Convention on Climate Change

Definitions

Climate change has been defined as any change in climate over time, whether due to natural variability or as a result of human activity. Current global concern is focused on climate change resulting from human activity, and specifically from the release of carbon dioxide and other greenhouse gases to the atmosphere. The burning of fossil fuels, clearing of forests, and certain other human activities are major sources of greenhouse gas emissions.

Vulnerability to climate change is the degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity and its adaptive capacity.

Adaptive capacity is the ability of communities and individuals to adjust to climate change, to moderate potential changes, to take advantage of opportunities or to cope with the consequences. The adaptive capacity of individuals or social groups varies, and is dependent upon their access to and control over resources. The poor have particularly limited access to such resources, and as such are most vulnerable to climate change and least able to develop viable adaptation strategies.

Adaptation to climate change refers to longer-term strategies, which deal with climate change (in contrast to short term coping strategies). Adaptation is adjustment in natural or human systems, which moderates the harm or exploits beneficial opportunities associated with climate change. Adaptation is usually a longer-term livelihood activity and is a continuous process where results are sustained. It uses resources efficiently and sustainably, involves planning, combining new and old strategies and knowledge, and is focused on finding alternatives.

Resilience is the ability to recover from shock or, in this context, the ability to deal with change. Resilience is a concept complementary to the concepts of vulnerability and adaptation. It addresses the capacity for self-organization, learning and adapting to change, so that basic structures and ways of functioning are quickly recovered.

Sources: IPCC 2001 and 2007, CARE 2009, Ifejika Speranza 2010.

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1. Introduction

1.1 The Impacts of Climate Change

Climate change is the latest challenge to sustainable human development. The scientific evidence is clear: climate change is likely to have negative impacts on efforts to achieve Nigeria's development objectives, including the targets set out in *Nigeria Vision 20:2020* and the *Millennium Development Goals* (MDGs). In particular, climate change will impede efforts to reduce the poverty experienced by the majority of Nigerians. It will retard the drive to ensure equity in the distribution of development benefits, particularly among women and men; and it will check the effort to promote sustainable livelihoods. In addition, climate change will likely lead to other changes such as ecosystem degradation and reduced availability of water and food. It is therefore likely to become a major driver of increased human conflict.

Climate change is already having an impact in Nigeria. Weather-related disasters have become more frequent in the past four decades and the trend continues. In 2010, the National Emergency Management Agency (NEMA) reported that over 250,000 Nigerians were displaced by flood disasters that ravaged many communities across the country. Weather-related disasters, especially flooding, are reported, almost daily in the country's news media

Other parts of the world are also experiencing increasingly severe weather-related disasters. For example, the 2010 floods in Pakistan were described as the worst in that country's history, affecting 20 million people. In the same year, floods in Colombia displaced over 400,000 people; and extreme weather conditions locked Russia in the worst heat wave and drought in its documented history, with hundreds of wildfires burning out of control, destroying a quarter of Russia's crops and prompting a ban on grain exports. Drought-induced famine and locusts, and an increase in the number of extreme heat days, have also affected Niger and northern Nigeria.

These recent events highlight just how vulnerable Nigeria could be in a future with more frequent and severe extreme weather events.

"The urgency of global warming, its complexity and portent danger has become one of the greatest challenges to humanity and sustainable livelihood."

- Mr. John Odey, Honourable Minister of Environment, at the Conference of the Parties, Cancun, Mexico, December 7, 2010

* * * * *

"The potential for climate change to bring about damaging and irrecoverable effects on infrastructure, food production, and water supplies, in addition to precipitating natural resource conflicts makes it a critical challenge that must be responded to by any economy seeking sustainable growth in the years leading up to 2020."

- *Nigeria Vision 20:2020*

Flood submerges 15 communities in Kwara State

Over 15 communities and farm plantations worth millions of naira have been submerged by flood in Shonga district, Edu local government area of Kwara State.

- *Daily Trust 14 October, 2010*

* * * * *

Nightmare as heavy rain sacks Lagos

Flooding from the rain literally shut down Lagos metropolis, forcing people to stay indoors and leaving some major roads and highways flooded. It also affected Ondo, Ogun, Osun, Rivers, Edo, Enugu, Cross River, Anambra and Oyo States.

- *The Guardian 11 July, 2011*

1.2 National Circumstances

Nigeria's national circumstances, which provide the context for the present strategy and plan of action, are summarized in the text box below and on the following page.

Nigeria's *First National Communication (FNC)* (FME 2003), submitted to the United Nations Framework Convention on Climate Change (UNFCCC), indicates that the nation's natural and agricultural ecosystems, including freshwater and coastal resources, are highly susceptible to the effects of climate change. The key vulnerability factors include:

1. The heavy dependence of the economy, and of individual livelihoods, on rain-fed agriculture that is highly susceptible to fluctuations in rainfall and water supply.
2. Sensitivity of other sectors of the economy to climate variability and change (e.g. Nigeria's electrical supply is heavily dependent on hydropower, which is affected by fluctuations in rainfall).
3. Exposure of the northern two-thirds of the country to accelerated desertification linked to increasing drought, with resulting impacts on the local population and natural resource base.
4. The existence of an 853 km coastline exposed to the threats of accelerated sea level rise and increased storm surge risk, which could impact communities, infrastructure, coastal oil installations, endemic species of flora and fauna, and spawning grounds for fish.
5. Rapid population growth (2.9% per year) coupled with pervasive poverty, which reduces the resilience to a range of climate risks.
6. A lack of defined policies, low political will, and limited financial resources to address the need for early action on climate change.
7. Limited organizational and technical capacity to respond.

These vulnerability factors make clear the urgent need to respond to the challenge of climate change in a comprehensive and systematic manner that, at the same time, addresses broader development priorities, taking account of the gender-differentiated needs and roles of the society.

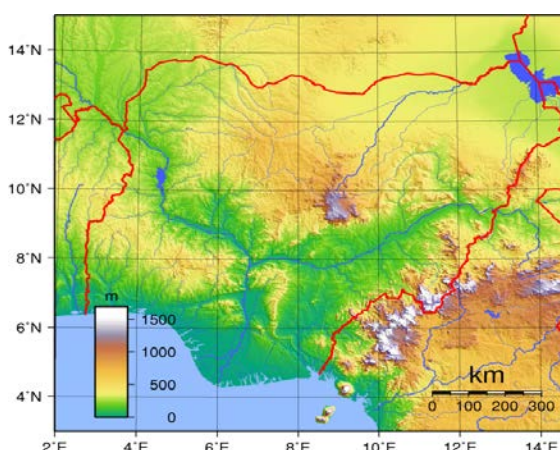
Nigeria: National Circumstances

Location. Latitudes 4° to 14°N; Longitudes 3° to 15°E.

Borders: west, Benin Republic; north, Niger Republic; east Cameroon Republic; south, Atlantic Ocean.

Area. Approximately 923,768 km².

Relief and Drainage. A land of plains at < 300 m and plateaus 300 m - 900 m above sea level. Well-drained; main rivers Niger, Benue, Sokoto-Rima, Hadejia, Gongola, Kaduna, Moshi, Awun, Ogun, Osun, Osse, Katsina-Ala, Donga, Anambra, Imo and Cross rivers.



Nigeria Relief



Nigeria Drainage

Nigeria: National Circumstances (cont'd)

Coastline. 853 km long, about 80% covered by the Niger Delta; all low-lying, < 2 m above sea level.

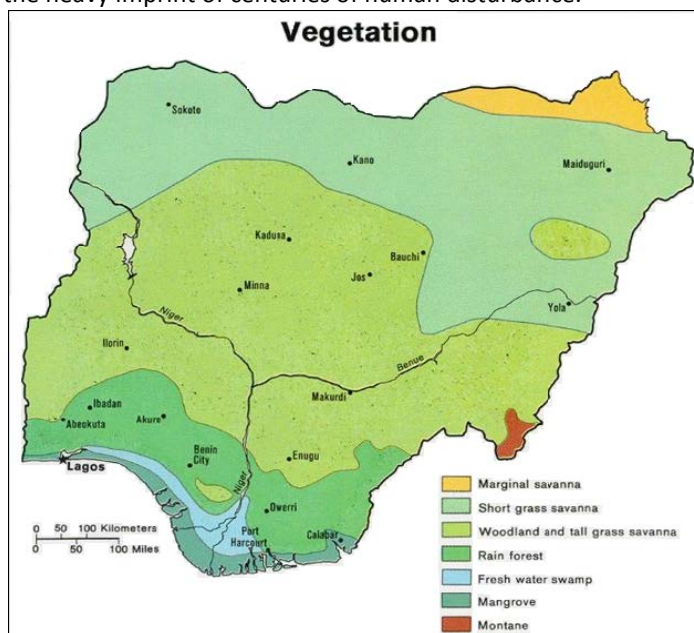
Climate. Mean temperature: 27°C; mean maximum temperature: south 32°C, north 41°C; mean minimum temperature: south 21°C, north <13°C. Two main seasons: a rainy season, south 6 - 9 months, middle belt 4 - 6 months, extreme northeast 2 - 3 months. Mean annual rainfall >3,500 mm along the coast, decreasing to <600 mm in the extreme north. Annual rainfall highly variable, especially in the north, where severe droughts periodically occur.

Vegetation. Six commonly-recognized vegetation zones: Mangrove and Freshwater swamps along the coast, giving way northwards to Rain Forest, Guinea savanna, Sudan savanna, and Sahel savanna. Virtually everywhere, actual vegetation cover bears the heavy imprint of centuries of human disturbance.

Population. 140 million (2006 census); estimated growth rate 2.9% per year.

Government. Thirty-six (36) federating States and a Federal Capital Territory (FCT); divided into 774 Local Government Areas/Area Councils. Constitution of 1999 provides for a presidential system of government consisting of an Executive, a bicameral Legislature (Senate and House of Representatives), and a Judiciary.

Economy. Primary production (agriculture, mining, quarrying) account for about 65% of real gross output; secondary activities (manufacturing, building, construction), 4%; tertiary activities (services), 30%. GDP grew by 6.0% in 2006 and 6.2% in 2007. Economy continues to be dominated by the oil sector which accounts for more than 90% of the foreign exchange earnings. In 2007, about 70% of labor force was employed in agriculture, up from 54% in 1980. Agriculture is predominantly small-holder and rain-fed. Manufacturing sector has performed poorly over the years, with widespread capacity underutilization due to perennial low and erratic power supply.



Energy. Richly endowed with non-renewable (crude oil, natural gas, tar sands and coal) and renewable (hydropower, solar radiation and wind) energy resources. Except for hydropower, renewable energy remains largely untapped. By 2005, energy consumption mix dominated by oil (53%), followed by natural gas (39%) and hydroelectricity (7%). The country consumes a considerable amount of liquefied petroleum gases, motor spirits, kerosene, diesel oil, fuel oil and gas oil, all of which contribute significantly to GHG emissions. Oil and gas production also contributes significantly to GHG emissions through the flaring of associated gas. Private production of electricity with diesel- and petrol operated generators now common practice to augment, or, sometimes, substitute for the supply from the national grid. The poor access to reasonably priced electricity is a key factor of the country's generally low standard of living. Wood is widely used for cooking and heating in both rural and urban areas and this contributes significantly to deforestation.

Transportation. 194,200 km road network, comprising 34,123 km Federal, 30,500 km State and 129,577 km Local Government, mostly in a poor state of repair. 3,505 km of poorly maintained, narrow gauge (1.067 m), single track railway network; about 3,000 km under-utilized inland waterways. 13 major ports, with 11 oil terminals, 128 private jetties, 102 hard quay berths; 21 international and domestic airports, 62 private airstrips, with Lagos, Abuja and Kano airports accounting for between 77-90% of passenger movement and 64-89% of aircraft movement. Urban transportation largely based on privately-operated bus and taxi services, and, increasingly, motorcycles, which are largely unregulated. Lagos State has successfully introduced a Bus Rapid Transit System (BRTS). Public transport infrastructure has lacked investment and adequate maintenance for many years. As a result, the contribution of the transport sector to the GDP was just 2.68% in 2008.

1.3 Climate Change Adaptation: A National Priority

Climate change affects every aspect and sector of our socio-economic development and is cross-sectoral in nature. It transcends the traditional focus on environmental issues because it affects Nigeria's overall well-being and economic growth. Nigeria's response to climate change must, therefore, address impacts on all sectors, especially natural resources management, agriculture, economic development, infrastructure, health, energy and transportation. Consideration must also be given to impacts on gender relations, youth, livelihoods, migration, and security, as well as to the management of environmental hazards (including climate-related disasters and major biodiversity losses).

To prepare for and respond effectively to the impacts of climate change, adaptation is the key. Adaptation should be comprehensive and articulated in a way that recognizes the varying needs and vulnerabilities of all sections of the society. Unlike coping strategies that focus on short term reactions when things go badly, adaptation strategies focus on sustainable responses for both the short and long term. Responding effectively to climate change requires creation of an enabling environment of policies that encourage adaptation; implementation of suitable adaptation strategies and programmes at all levels of government; and full participation of civil society and the private sector.

"A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required to reduce vulnerability to climate change."

"...Adaptation measures will be required to reduce the adverse impacts of projected climate change and variability, regardless of the scale of mitigation [emission reductions]..."

"Adaptation can reduce vulnerability, especially when it is embedded within broader sectoral initiatives...there are viable adaptation options that can be implemented in some sectors at low cost, and/or with high benefit-cost ratios."

Synthesis Report Summary for Policymakers, IPCC Fourth Assessment Report: Climate Change, 2007

To respond to climate change appropriately will mean doing some things differently, and allocating resources differently. It will require investments beyond the resources of a developing country such as Nigeria. But the cost of not taking any action is significantly higher. It is time to systematically devise comprehensive policies, programmes and measures to reduce the risk from, and build resilience to, climate-related hazards.

Today, adaptation to the impacts of climate change and climate variability is an issue of great concern across all regions of the world. There is global consensus that the impacts of current climate change are already occurring and will continue to disproportionately affect those least responsible for the problem and with the least capacity to deal with it. Enhanced international actions and local initiatives to support adaptation are considered imperative. Support from developed countries for adaptation in developing countries is agreed to be an urgent concern and a matter of equity and justice.

1.4 Developing a *National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN)*

The climate projections published by the respected Intergovernmental Panel on Climate Change (IPCC 2007) show that climate change will affect temperature, rainfall, frequency/intensity of extreme weather events, and sea level. Climate scenarios for Nigeria, presented in Section 2 of this document, project similarly significant changes in these key climate variables. The various changes are expected to have mostly adverse effects on natural and human systems, both globally and locally.

These projections, the risks and vulnerabilities discussed above, the climate change impacts already evident in Nigeria, and the complexity of the problem, all provide a strong argument for the development of an integrated, comprehensive, and effective national response strategy and action plan.

Accordingly, the Government of Nigeria and a number of civil society organizations embarked upon the development of this **National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN)**. The NASPA-CCN seeks to minimize risks, improve local and national adaptive capacity and resilience, leverage new opportunities, and facilitate collaboration with the global community, all with a view to reducing Nigeria's vulnerability to the negative impacts of climate change.

1.5 Developing this Document

NASPA-CCN has been developed through a multi-stakeholder consultative process led by four Lead Partners: the Special Climate Change Unit of the Federal Ministry of Environment; the Nigerian Environmental Study/Action Team (NEST) through its Building Nigeria's Response to Climate Change (BNRCC) Project; NigeriaCAN; and the Heinrich Böll Foundation. Further detail on the Lead Partners is provided in Appendix A.

Driven by the Lead Partners, preparation of the document involved stakeholders from many sectors and backgrounds in Nigeria, including people from grassroots communities, sector specialists and researchers. It also involved a 25-member strong Multi-stakeholder Forum made up of Federal and State Government officials, climate change experts, environmental NGOs, representatives of the organized private sector, and the Association of Local Governments of Nigeria, providing expert oversight.

Many studies and reports were consulted. New research was commissioned, and community-based pilot projects were undertaken. Key considerations relating to climate change impacts, vulnerabilities and adaptation were presented and rigorously analyzed. The first output of this process was a technical volume, entitled *Climate Change Adaptation Strategy Technical Report (CCASTR)*. Preparation of CCASTR was supported by the BNRCC project, funded by the Canadian International Development Agency (CIDA), but its content is the work of the individual contributors. The original text of the present document was distilled from CCASTR by the BNRCC team, before being widely circulated for consultation and review by experts and stakeholders.

NASPA-CCN is thus supported by a separate technical document, CCASTR, written by sector specialists. CCASTR is a reference document that presents important background information and analyses of climate change impact and adaptation issues in Nigeria. NASPA-CCN, on the other hand, focuses on priority policies, strategies, and actions.

2. Climate Change in Nigeria

2.1 Introduction

There are two dimensions to the issue of climate change in Nigeria. The first, already acknowledged by households and communities across Nigeria, and reported by the Nigerian Meteorological Agency (NIMET 2008), is changes that have already been observed in climate parameters such as temperature, rainfall and extreme weather events. The second deals with changes that are to be expected in the future. These two dimensions are dealt with in the sub-sections that follow immediately.

2.2 Observed Climate Change

A key contribution on observed climate change has come from BNRCC research and pilot projects spread throughout the ecological zones of the country. The results of these projects have been collated and synthesized, providing documentation of community level experience with climate hazards, impacts, vulnerabilities and adaptation measures. This information will be available on the BNRCC website at www.nigeriaclimatechange.org.

In addition, the Nigerian Meteorological Agency (NIMET 2008) assessed the Nigerian climate over the period 1941 to 2000 and demonstrated the following changes.

Rainfall

Between 1941 and 1970, only patches of the country, in the northeast, northwest, and southeast experienced late onset of rains. However, from 1971 to 2000 late onset of rains had spread to most parts, leaving only a narrow band in the middle of the country with normal conditions (Figure 1, which shows the change in mean onset dates of the rainy season relative to the 1911-1940 period).

Similarly, only a small patch of the country in the southwest recorded early cessation of rains between 1941 and 1970, while from 1971 to 2000 early cessation of rains had covered much of the country (Figure 2, which shows the change in mean cessation dates of the rainy season relative to the 1911-1940 period). The combination of late onset and early cessation shortened the length of the rainy season in most parts of the country. In addition, between 1941 and 2000, total annual rainfall decreased by 2-8 mm across most of the country, but increased by 2-4 mm in a few places, most significantly around Port Harcourt.

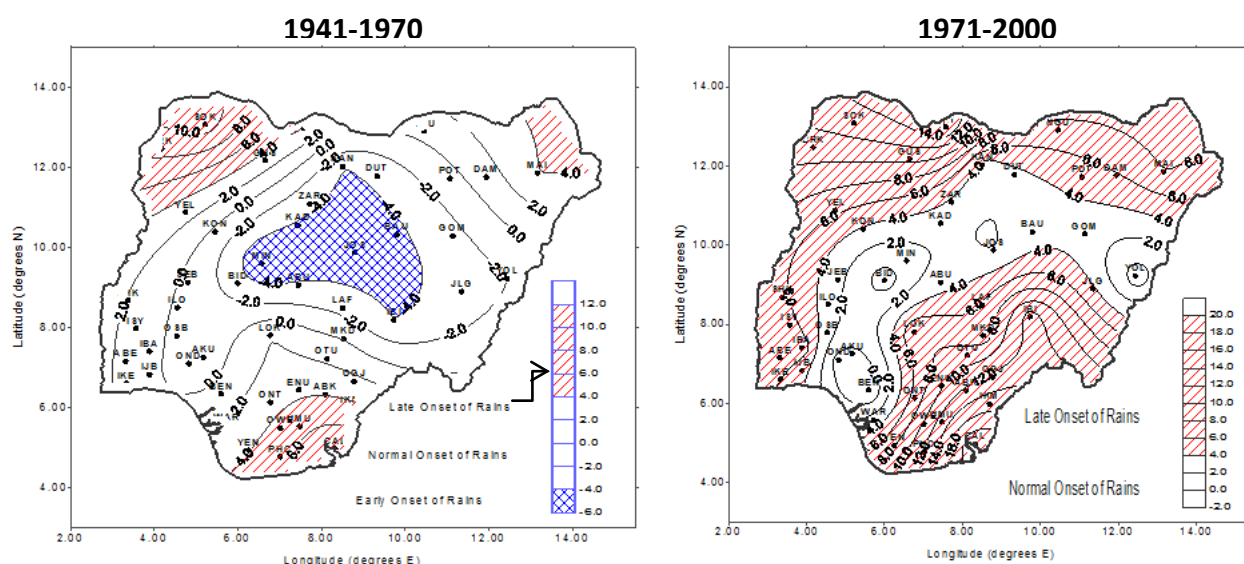
Nigerians are already feeling and adjusting to the impacts of climate variability and change

For example:

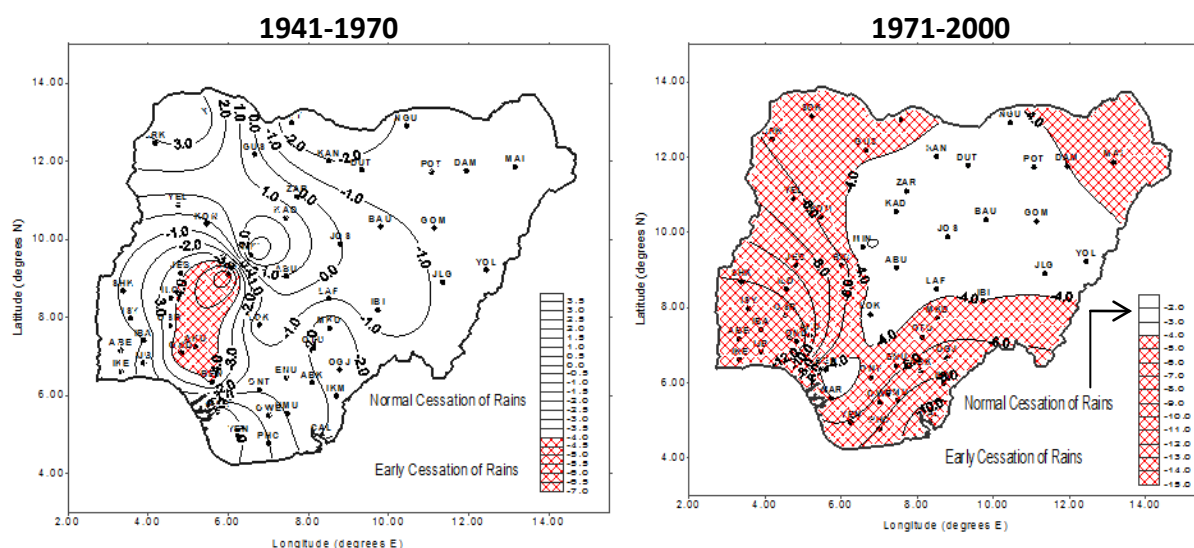
A shorter rainy season is affecting the amount of water available for cattle and the quality of grazing fields in some pastoralist communities in north-western Nigeria. Men in these communities are particularly vulnerable to declines in livestock numbers, as few economic alternatives currently exist for them. Local adaptation strategies such as diversifying the composition of their herds and harvesting water from their zinc rooftops are already being practiced. (Source: WEP BNRCC Project, www.nigeriaclimatechange.org)

* * * * *

In Lagos State, impoverished coastal communities living on reclaimed land are at risk from flooding due to storm surges and heavy rainfall events. Residents in these communities cope with impacts such as property damage, temporary homelessness, and spread of malaria. In this case, future vulnerability will be affected by rising sea levels and increased severity of storms expected in a changing climate, which will significantly affect urban development patterns. (Source: Adelekan, 2009)

Figure 1 Nigeria: Pattern of Onset of the Rainy Season: 1941-1970 and 1971-2000

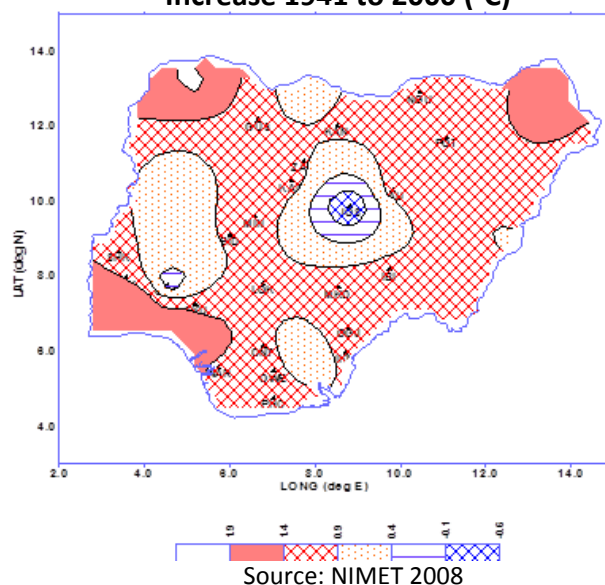
Source: NIMET 2008

Figure 2 Nigeria: Pattern of Cessation of the Rainy Season: 1941-1970 and 1971-2000

Source: NIMET 2008

Temperature

From 1941 to 2000 there was evidence of long-term temperature increase in most parts of the country. The main exception was in the Jos area, where a slight cooling was recorded. The most significant increases were recorded in the extreme northeast, extreme northwest and extreme southwest, where average temperatures rose by 1.4-1.9°C (Figure 3).

Figure 3 Nigeria: Average Mean Temperature Increase 1941 to 2000 (°C)

Source: NIMET 2008

Hail

There has been a decrease in the occurrence of hail, with total disappearance in the 1990s in the Jos area (where hail used to be of common occurrence). This change, shown in Figure 4, is additional evidence of warming of the climate in Nigeria.

2.3 Expected Climate Change

Future climate change is generally presented using climate scenarios, an analytic tool that provides long-term perspectives on expected changes in climate parameters.

Such scenarios, taken together with observed changes in climate, can inform new policies, programmes and other measures that support climate change adaptation. Climate scenarios are, however, neither predictions nor forecasts. Instead they provide useful information on how the future climate might be different from the present, based on a defined set of assumptions.

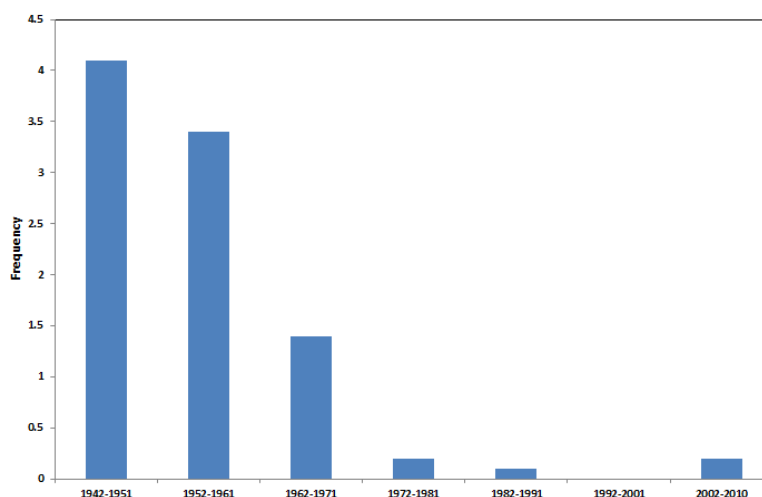
To assist in the development of the NASPA-CCN, the BNRCC Project commissioned the Climate Systems Analysis Group at the University of Cape Town to develop climate scenarios for Nigeria. An empirical approach was employed using the statistical downscaling method. Trends in the past climate over Nigeria were investigated by analyzing the historical climate records from 40 NIMET stations for the period 1971 to 2000; and future climate change information was generated by downscaling two future climate projections from nine Global Climate Models. The two future climate projections were based on two scenarios known as A2 and B1, with A2 incorporating higher GHG emissions, and B1 lower GHG emissions.

The higher global GHG emissions scenario (the A2 scenario) was selected as the strongest. The results are summarized below. The full report is available for download on the NEST, BNRCC and SCCU websites, at www.nestinteractive.org, www.nigeriaclimatechange.org and www.climatechange.gov.ng, respectively.

Temperature

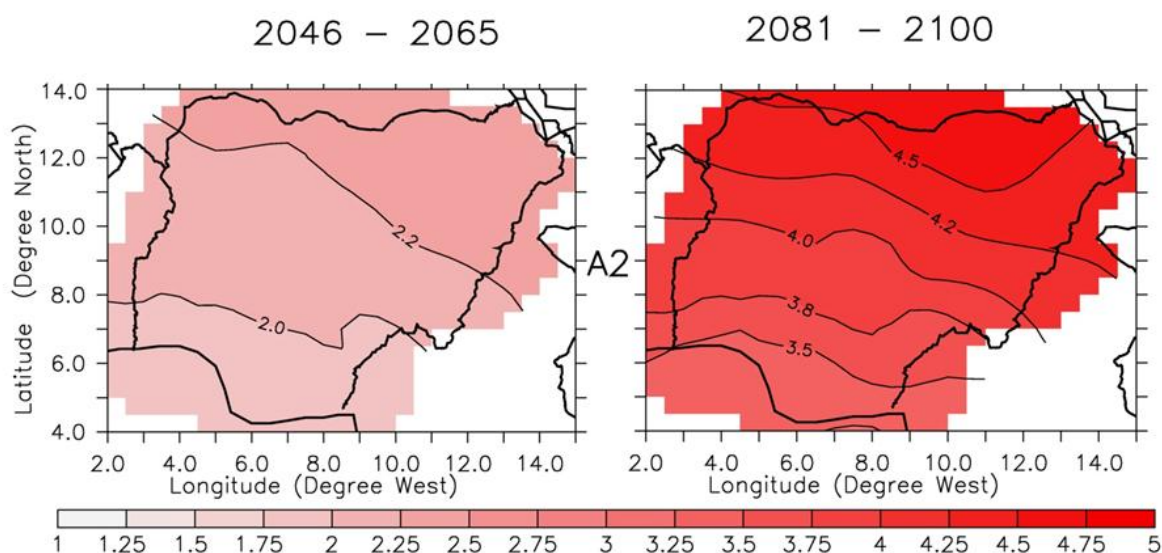
Overall, the scenarios suggest a warmer climate in the future. For instance, the A2 scenario projects a temperature increase of 0.04°C per year from now until the 2046-2065 period, rising to 0.08°C per year after 2050. However, regional variations are expected. The coastal regions are projected to warm less than the interior regions because of the cooling effects of the Atlantic Ocean, and the northerly stations are expected to be warmer than the southerly stations. The highest increase (4.5°C by 2081-2100) is projected in the northeast. Figure 5 shows the projected increases in maximum daily temperature across Nigeria, and Table 1 shows the projected increases in maximum daily temperature for a number of Nigerian cities. This temperature distribution is consistent with the findings of the 2007 Intergovernmental Panel on Climate Change (IPCC) report.

Figure 4 Decadal Hail Frequency in Jos, Nigeria (1942-2010)



Source: NIMET 2008 and additional NIMET data

Figure 5 Projected Increases in Maximum Daily Temperature over Nigeria
(°C relative to the present day climate)



(Note: In this and in subsequent maps in this section, numerical figures on the vertical and horizontal axes are Latitudes and Longitudes, respectively. The maps cover the periods 2046-2065 and 2081-2100 because the General Circulation Model daily data sets needed for the downscaling were available only for these periods. The mid-century scenarios are considered more reliable.)

Table 1 Current and Projected Maximum Daily Temperature by Location

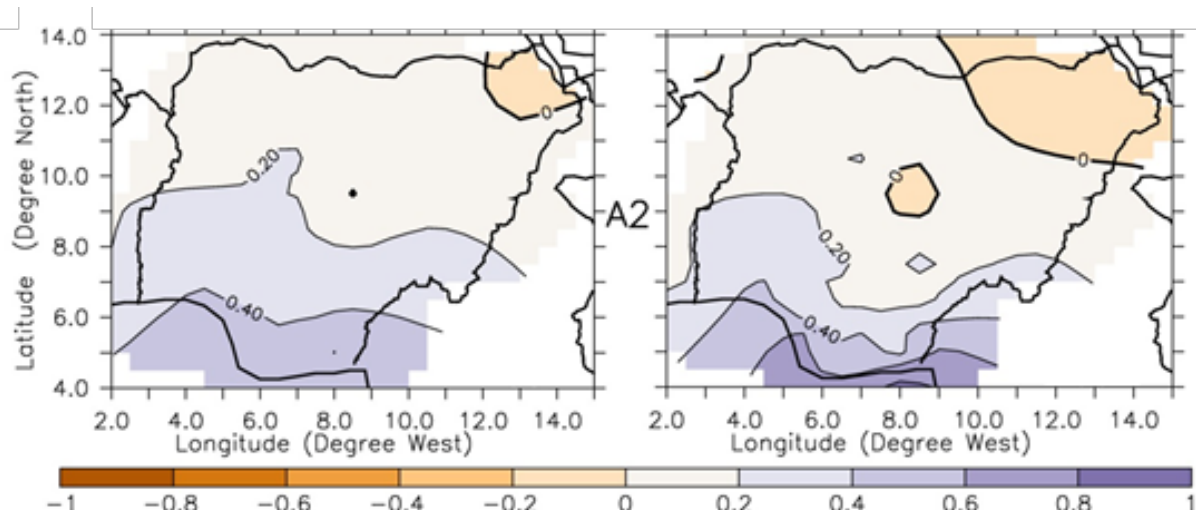
Location	Current Mean Annual Maximum (°C)	Projected Increase by 2046-2065 (°C)
Ikeja	31.6	1.4 - 2.3
Warri	32.0	1.4 - 2.3
Ibadan	32.0	1.4 - 2.5
Owerri	32.5	1.5 - 2.3
Makurdi	33.6	1.5 - 2.6
Ilorin	32.6	1.4 - 2.6
Abuja	33.1	1.4 - 2.7
Zaria	32.0	1.4 - 3.0
Kano	33.7	1.5 - 3.2
Sokoto	35.5	1.5 - 3.2
Maiduguri	35.5	1.5 - 3.2

Rainfall

The projected changes in rainfall vary across the country, with the A2 scenario suggesting a wetter climate in the south, but a drier climate in the northeast. For the 2046-2065 period the projected change ranges from an average increase of 0.4 mm per day in the south (15 cm annually) to an average decrease of 0.2 mm per day (7.5 cm annually) in the north. Figure 6 shows these projected changes across the country.

These changes are consistent with the projected increase in temperature. The higher temperatures along the coast would increase evaporation from the ocean and produce more rainfall over the coastal region, provided there are mechanisms to trigger the precipitation process. On the other hand, a warmer climate in the semi-arid region (i.e. northeast) would decrease the atmospheric humidity (moisture in the air), and thereby reduce the chance of cloud formation and rainfall.

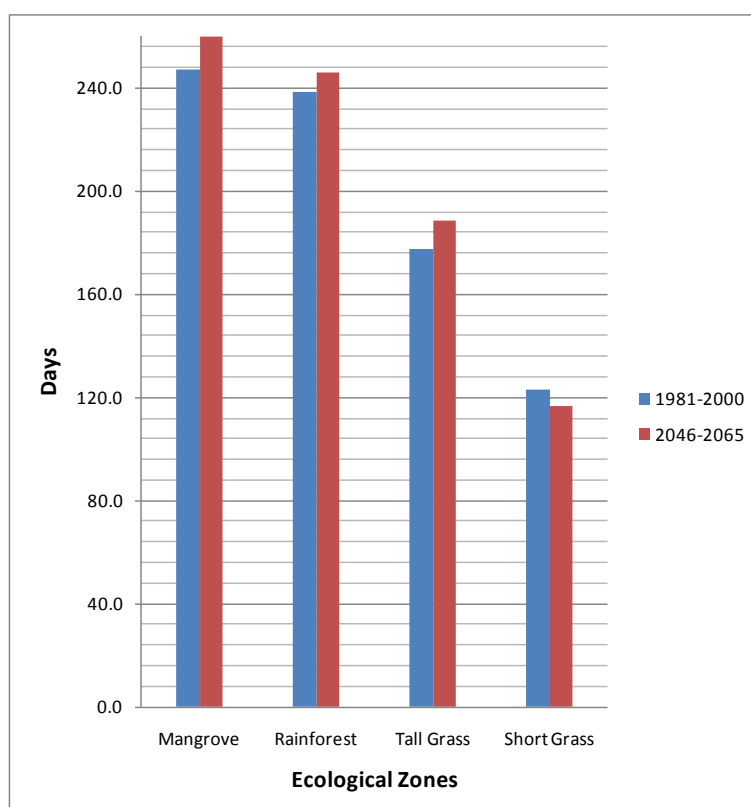
Figure 6 Projected Changes in Average Daily Rainfall over Nigeria
(mm/day relative to the present day climate)



Although projected annual rainfall increases in some parts of the country and decreases in others, all areas show increases in rainfall during at least some part of the year. The scenarios show a peak increase in monthly rainfall in the 2046-2065 period of about 2 mm/day in the mangrove and rainforest zones, and about 1 mm/day in the savanna zones.

In the mangrove, rain forest and tall grass (Guinea/Sudan) savanna, the scenarios project earlier rainfall season onset and later rainfall season cessation, resulting in a longer rainfall season by up to two weeks by the 2046-2065 period. In contrast, the scenarios project a shorter rainfall season over short grass (Sahel) savanna, with a potential decrease greater than one week. Figure 7 shows these projected changes to the rainfall season.

Figure 7 Projected Length of the Rainy Season by Zone



Extreme Events

For the 2046-2065 period in the mangrove, rain forest and tall grass savanna, the scenarios suggest a small increase in extreme rainfall days (i.e. days with more than 50 mm of rain). Over the Sahel, the A2 scenario suggests a small decrease in extreme rainfall days.

The projected changes in temperature-based extreme events are pronounced over the entire country. For instance, the scenarios suggest that by the 2046-2065 period the number of extreme heat days with the temperature reaching 38°C or more could increase by 7 days per year in the mangrove, 23 days per year in rain forest, 41 days per year in tall grass savanna, and 88 days per year in the short grass savanna. The scenarios also project significant increases in the number of heat wave days (number of days when the maximum temperature is greater than 35°C for three or more consecutive days) over the entire country – for instance, a 95% increase in the case of the northern short grass savanna zone. Figure 8 shows the projected changes in extreme heat days and Figure 9 shows the projected changes in heat wave days.

Figure 8 Actual (1981-2000) and Projected (2046-2065) Annual Extreme Heat Days by Zone

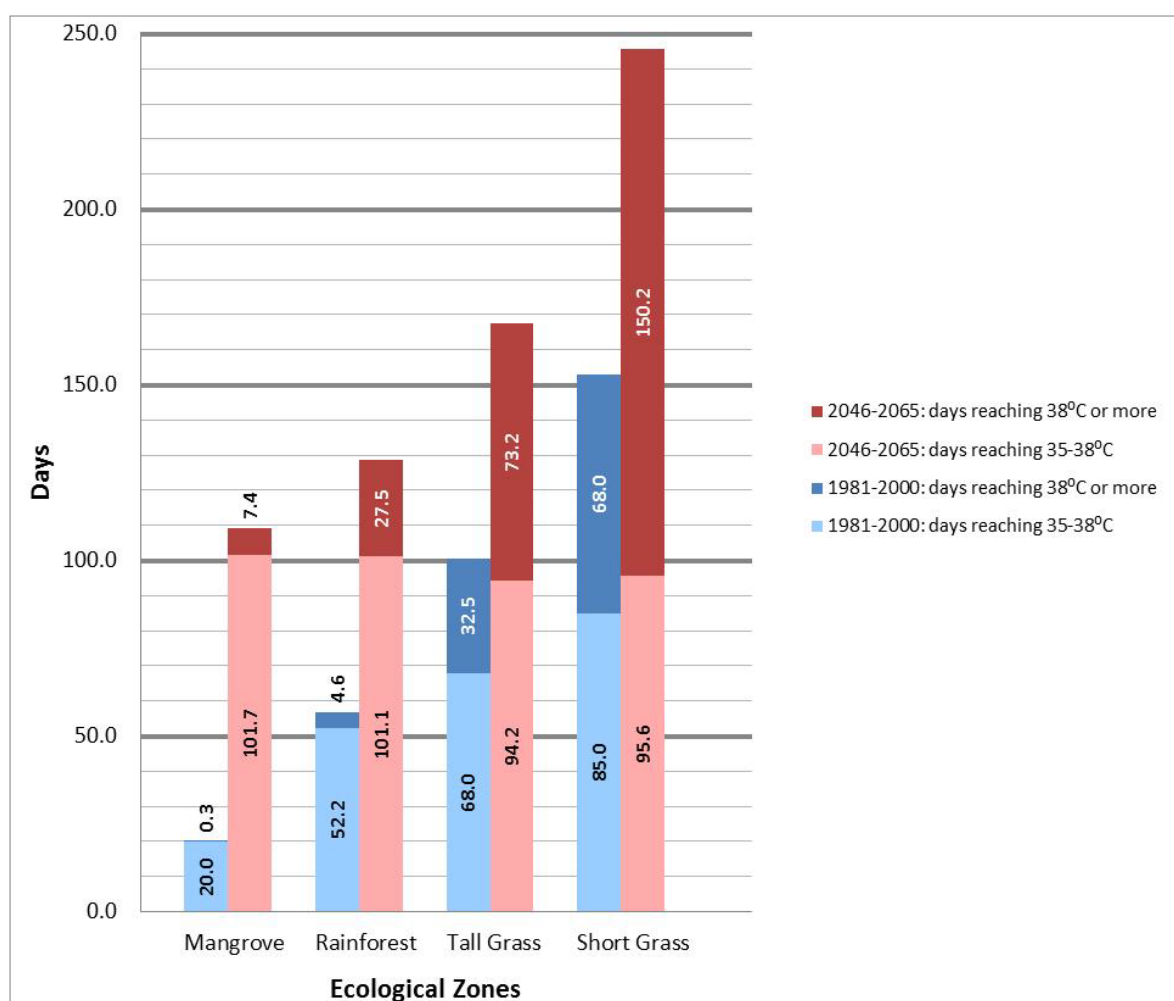
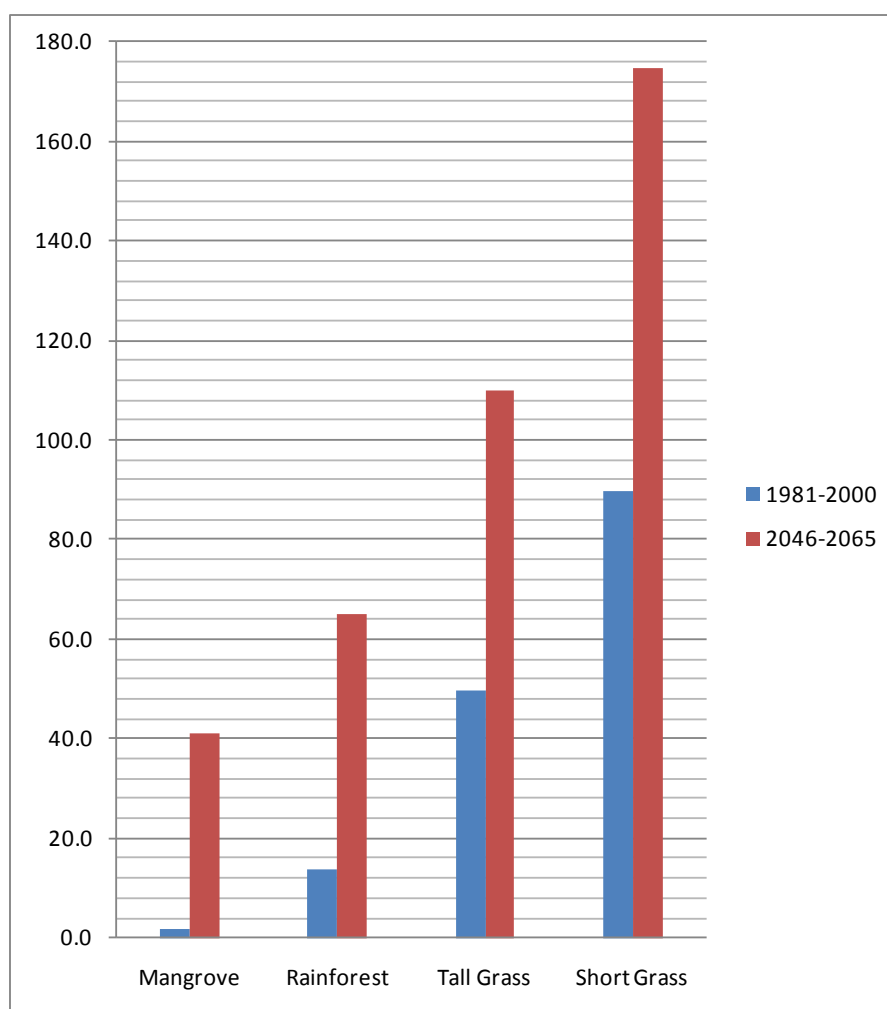


Figure 9 Actual (1981-2000) and Projected (2046-2065) Annual Heat Wave Days by Zone

2.4 Sea Level Rise

In addition to the above-noted expected changes relating to temperature, rainfall, and extreme weather events, the IPCC has projected that sea levels will rise as a result of increasing global temperatures (which affect sea level via a number of mechanisms, including the melting of polar ice caps and thermal expansion of water).

According to the IPCC (2007), the global average rate of sea level rise during the period 1993 to 2003 was about 3.1 mm per year. This trend is expected to continue, with IPCC projections indicating possible increases of between 18 and 59 cm by the end of this century. Particularly at the upper end of this scale, large areas of Nigeria's coast would be significantly exposed to increased erosion, storm damage, inundation in low lying areas, and other impacts.

2.5 Summary

A summary of the projected trends in the key climate change parameters is presented in Table 2.

Table 2 Summary of Key Trends in Climate Parameters for Nigeria, by Ecological Zone

Climate variables	Mangrove zone	Rain forest	Tall grass (savanna)	Short grass (Sahel)
Temperature	↑	↑	↑	↑
Rainfall amount	↑	↑	↓	↓
Rainfall variability	↑	↑	↑	↑
Extreme rainfall events - droughts	Likely	Likely	↑	↑
Extreme rainfall events – storms and floods	↑	↑	Likely	Likely
Sea level rise	↑	NA	NA	NA

Legend: ↑ likely increase or increase; ↓ likely decrease or decrease; NA not applicable

3. Climate Change Impacts in Nigeria

3.1 Introduction

Climate change is already having significant impacts in Nigeria, and these impacts are expected to increase in the future.

A recently completed study funded by DFID used an integrated analytical assessment model to show projected economic impacts of climate change in Nigeria (DFID/ERM 2009). According to this study, if no adaptation is implemented, climate change could result in a loss of between 2% and 11% of Nigeria's GDP by 2020, rising to between 6% and 30% by the year 2050. This loss is equivalent to between N15 trillion (US\$100 billion) and N69 trillion (US\$460 billion).

... if no adaptation is implemented, climate change could result in a loss of between 2% and 11% of Nigeria's GDP by 2020, rising to between 6% and 30% by the year 2050. This loss is equivalent to between N15 trillion (US\$100 billion) and N69 trillion (US\$460 billion).

This large projected cost is the result of a wide range of climate change impacts affecting all sectors in Nigeria. These impacts need to be understood and responded to with appropriate adaptation strategies and actions.

3.2 Impacts by Sector/Theme

In this section, key climate change impacts are summarized separately for each of the following sectors or themes:

1. Agriculture (Crops and Livestock)
2. Freshwater Resources, Coastal Water Resources and Fisheries
3. Forests
4. Biodiversity
5. Health and Sanitation
6. Human Settlements and Housing
7. Energy
8. Transportation and Communications
9. Industry and Commerce
10. Disaster, Migration and Security
11. Livelihoods
12. Vulnerable Groups
13. Education

For each sector or theme, four main climate change-related hazards are considered:

- Increased temperature
- Change in amount, intensity, and pattern of rainfall
- Extreme weather events (including sea surge and drought)
- Sea level rise.

The summaries in the following pages do not include all possible impacts, but they do include the impacts that are currently experienced as well as those expected to be most significant. The summaries indicate differences between the major ecozones, including Coastal/Rain forest, savanna (Derived, Guinea and Sudan), and Sahel (Sahel savanna). Details of the presentation are to be found in the companion document *Climate Change Adaptation Strategy Technical Report (CCASTR)*, which is available on the NEST and BNRCC websites at: www.nestinteractive.org and also www.nigeriaclimatechange.org.

1. AGRICULTURE (CROPS AND LIVESTOCK)

Changes in climate factors have significant consequences for the agricultural sector. The adverse impacts of climate change are expected to lead to production losses in the sector, compromising the attainment of the Millennium Development Goals, especially Goal 1 “*Eradicate Extreme Poverty and Hunger*” and Goal 7 “*Ensure Environmental Stability*.” The range of possible climate change hazards and relevant adaptation measures are diverse and must be considered in the context of the local agro-ecological, production and socio-cultural conditions present for any particular area of Nigeria.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

Higher temperatures result in:

1. Decreased agricultural productivity and production in all parts of Nigeria.
2. High evaporation rate and reduced soil moisture, lowering of the groundwater table, and shrinking of surface water, especially in the North.
3. Lower crop yields and poor livestock production due to increased heat in the Sahel and savanna.
4. Heat stress which reduces human labour use on farms and lowers labour productivity.
5. Rapid deterioration and wastage of farm produce.

RAINFALL

1. Changes in the amount of rain, increased rainfall intensity, and changes in rainfall patterns lead to decreased agricultural productivity and production in all parts of Nigeria (crops and livestock).
2. Lower rainfall in the Sahel and Sudan savanna leads to lack of water for livestock, less fodder, reduced ability to house livestock, and drought.
3. Increased rainfall intensity in the coastal region can lead to flooding, erosion of farmland, inundation, leaching, decreased soil fertility, and lower agricultural productivity.
4. Changing and erratic rainfall patterns make it difficult for farmers to plan their operations, may reduce the cropping season, and can lead to low germination, reduced yield, and crop failure.
5. Erratic weather interferes with processing of produce (e.g. sun-drying crops and smoking fish).

EXTREME WEATHER EVENTS

Major storms cause damage to farm land, crops and livestock. Major storms can also cause road wash outs, which make it difficult to access farms and to market products.

SEA-LEVEL RISE

Sea level rise affects coastal zones through flooding, inundation, salinization of soils and coastal erosion, which affects the livelihood of households.

2. FRESHWATER RESOURCES, COASTAL WATER RESOURCES AND FISHERIES

Climate change will affect the nature and characteristics of the freshwater resources on which Nigerians depend. The impacts will vary between eco-zones, exacerbating existing problems of too much water (floods), too little water (droughts) and reduced water quality (e.g. salt water intrusion). Climate change impacts, including sea level rise and extreme weather, will also affect Nigeria’s coastal and marine areas, home to 25% of the country’s population and to Nigeria’s economically important petroleum industry. These impacts on freshwater and coastal water resources will also affect fisheries, a main source of livelihoods and protein for riverside and coastal rural communities.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

Increased temperature results in:

1. Higher surface water temperatures that may lead to habitat loss for some temperature sensitive organisms, and increased abundance of undesirable species (e.g. algal blooms and pest species).
2. Higher evaporation and transpiration in plants that could cause reduced availability of surface and groundwater and changes in water quality (particularly salinity).
3. Warmer coastal waters which are linked to increased frequency and severity of storms and higher rainfall events.
4. Impacts on fisheries, including drying up of breeding habitat in wetlands and changes in species composition and abundance.

RAINFALL

Increased incidence of high intensity (extreme) rainfall events could lead to flooding and associated impacts such as:

1. Erosion causing loss of habitat and productive lands.
2. Siltation leading to reduced capacity of lakes/reservoirs, rivers filled with silt (entering cycles of flooding followed by drying), delta accretion, and smothering of mangroves.
3. Contamination of surface and groundwater, including fish habitat.

Drought induced by reduced rainfall can lead to desiccation and death of rivers, lakes and wetlands.

EXTREME WEATHER EVENTS

1. Greater frequency and severity of coastal storm/sea surge could impact mangroves, which constitute critical breeding habitat for many fish species.
2. Drought could reduce or eliminate dry-season habitat critical to sustaining fish populations through the dry season to the next wet season.

SEA LEVEL RISE

Sea-level rise may lead to:

1. Salinization of existing surface and ground water resources in coastal areas, and flooding in areas where rivers can no longer drain to the sea.
2. Loss of low lying coastal ecosystems and shorelines and a general shift of existing coastal ecosystems inland; exposure of new inland areas to coastal erosion processes.
3. An increase in the area of saline and freshwater flooding (wetlands), resulting in an increase in fish habitat, but also changes in species diversity and abundance.

CROSS-SECTORAL

Poor management of climate change impacts in watersheds and in coastal areas will affect other sectors. For example, flooding has direct impacts on communities and infrastructure, and leads to impacts in such sectors as agriculture, water supply, power generation, transportation, and biodiversity.

3. FORESTS

Nigerian forests are already under great pressures arising from increasing populations and growing economic wealth leading to greater demand for forest resources. Climate change is expected to add to these pressures, through direct impacts of the changing climate on forest growth and development and through greater demands on forests by populations adjusting to climate change.

KEY IMPACTS OF CLIMATE CHANGE**TEMPERATURE**

Increased temperature could lead to:

1. Increased overall aridity which could exacerbate drought potential over the long term, thus causing habitat loss and contributing to decline and death in some tree species.
2. Heat stress and decreased productivity of forests, which will contribute to decreased fodder for livestock; reduced availability of non-timber forest products such as fruit and medicines; and reduced quantity and accessibility of fuel wood.
3. Acceleration of the cycle of desertification, impacting food and fodder availability.
4. Temperature induced drought, which could increase the frequency of forest fires and reduce the ability of soil microbes to breakdown organic matter, delaying soil fertility recovery.

RAINFALL

Increased rainfall is associated with potential increases in pests, and increased incidence and extent of flooding. Flooding will:

1. Contribute to increased erosion of soils and increase the frequency of landslides
2. Contribute to destruction and die off of many tree species that are intolerant to water logging
3. Exacerbate the impacts of land clearing activities associated with infrastructure development
4. Weaken the root systems of trees and increase the rate of windthrow in forests.

In open forests (savanna and Sahel) increased drought/aridity/water stress is expected due to lowered rainfall. This will contribute to an overall decline in forest cover and herbaceous understory productivity, thus affecting forest products, including livestock fodder and non-timber forest products (NTFPs) for human consumption and use. Increased flooding can be expected following periods of intense rain in areas with poor infiltration rates, potentially causing water logging and a decline in non-adapted forest species.

EXTREME WEATHER EVENTS

Windstorms in both closed and open forest systems cause uprooting of trees, loss of flowers and thus fruit in certain tree species, and loss of commercial value and revenue from plantations.

SEA-LEVEL RISE

Saltwater intrusion from sea level rise (or storm surge) into the fresh water forest ecosystems can cause extensive damage. Canals dug by the oil operations can allow the sea surge to come further inland and affect communities living in those areas. Permanent inundation of brackish/salt water into low lying fresh water forests (fresh water swamp and other low lying forests) may cause large scale die off and loss of forested land. This may create habitat for more mangrove forests to replace other low-lying forest ecosystems previously found further inland.

4. BIODIVERSITY

Increased aridity, increased intensity and variability of rainfall, and sea level rise all have impacts on organisms, species, and habitats. Climate change can also lead to loss of livelihoods (for instance loss of agricultural productivity), leading to increased dependence on biodiversity for income. These climate change-related factors will exacerbate the impacts of existing human pressure on biodiversity. This will further diminish the ability of these natural heritage resources to continue to provide ecosystem services on which human development and survival depend. Climate change may also lead to the displacement of valuable ecosystems by invading species that are favoured by the new climate regime.

KEY IMPACTS OF CLIMATE CHANGE

Increased aridity, increased intensity and variability of rainfall, and sea level rise all have impacts on organisms and species, on habitats, and on provision of ecosystem goods and services. Climate change can also lead to loss of livelihoods (for instance loss of agricultural productivity and crop decline) leading to increased dependence on biodiversity for income.

TEMPERATURE

Temperature increases will have impact on all ecological zones. Increased aridity in the Sahel may reduce species numbers through die-off and decreased available habitat for species that are drought/heat intolerant.

RAINFALL

Rainfall changes will have an impact on all ecological zones. Flooding and water logging will affect biodiversity as a result of loss or change of habitat for water intolerant species. Variability in rainfall disrupts species behavioural patterns, such as nesting habits, and can threaten species survival.

EXTREME WEATHER EVENTS

The impact of a single extreme event on biodiversity is generally less significant than the expected impact of long term changes in temperature and rainfall, but extreme events can lead to loss of local habitat and of individual species.

SEA-LEVEL RISE

Sea level rise will cause loss of habitat on a large scale along Nigeria's coastline. This will contribute to loss of individual species and lowered abundance of threatened/endangered species.

5. HEALTH AND SANITATION

A large part of Nigeria's economy is dependent on natural resources, which are particularly vulnerable to climate change impacts. When these resources are affected, the health of Nigerians can also be affected. Direct health impacts of climate change stem from extreme events such as heat waves, floods, droughts, windstorms, and wildfires. Indirect effects of climate change on health may arise from malnutrition due to reduced food production, from spread of infectious disease and food- and water-borne illness, and from increased air pollution. The impact of climate change on water resources, including reduced water availability in some areas and flooding causing contamination of water in other areas, will have a negative impact on the already poor sanitation situation in Nigeria.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

Increased temperature could lead to heat stress; malnutrition from crop failure mostly felt in the Sahel and Sudan savanna zones; spatial expansion of diseases such as cerebrospinal meningitis, malaria and dengue; decline in urban air quality and associated respiratory problems in urban areas, especially in the Sahel and savanna; and increased incidence of wildfires leading to injury and death.

RAINFALL

Increased variability of rainfall through impact on crop productivity may contribute to malnutrition in all eco-zones, but especially in the Sahel and Sudan savanna zones already affected by unreliable rainfall. In all eco-zones, increased rainfall intensity leads to flooding and a range of associated health impacts:

1. Increased outbreaks of waterborne diseases (giardia, cholera, typhoid, hepatitis A, shigellosis, cryptosporidium).
2. Increased breeding sites for mosquitoes, leading to an increase in malaria, dengue, and yellow fever (especially in the coastal and rain forest zones).
3. Contamination of aquifers of both freshwater and coastal waters and of soils, if the flooding involves run-off from septic piles and pits, industrial sites, etc.

EXTREME WEATHER EVENTS

In the savanna and Sahel, drought and high temperatures lead to higher evaporation from water bodies, reducing water quantity and contributing to increased heat stress and sickness. In coastal eco-zones, windstorms and extreme rainfall can lead to death and injury. Drought increases the incidence of wildfires, also resulting in death/injury. Extreme temperature conditions may have social and behavioural impacts.

SEA-LEVEL RISE

Rising sea level leads to higher ground water, which can lead to contaminated water from sewage, industrial and chemical waste. Health impacts are also associated with brackish drinking water due to salt water intrusion. Storm surge can result in death and injury.

6. HUMAN SETTLEMENTS AND HOUSING

Nigeria has experienced rapid urbanization with nearly 50% of the population now living in urban areas. Generally the condition of housing and provision of essential infrastructure are poor in both urban and rural areas, and Nigeria has an estimated shortage of 16 million housing units. Climate change will have an economic impact on housing throughout the country due to the wide range and distribution of hazards including sea level rise, increased frequency and severity of storm surges, increased flooding associated with high rainfall events, and high winds. Moreover, if climate change impacts decrease the national GDP as projected, this will in turn result in decreased available funding for the construction and renovation of housing.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

High temperatures create heat stress. In settlements this situation can be exacerbated by heat islands (particularly urban heat islands). High temperatures can indirectly contribute to sand dune encroachment in settlements in the Sahel, and can increase the possibility that some settlements will be abandoned. High temperatures speed up deterioration of housing stock and bitumen roads, and increase energy demands through increased use of air conditioning/other cooling systems.

RAINFALL

Increased rainfall can cause flooding in urban and rural areas; accelerate erosion and cause landslides; and lead to deterioration of roads and other infrastructure. Both extremely low and high rainfall can cause housing deterioration, decreasing the overall quality of housing in settlements. In some cases changes in rainfall can displace people and communities, creating environmental refugees.

EXTREME WEATHER EVENTS

Extreme weather events can cause loss of habitable land, housing damage, and building collapse (for instance as a result of windstorms and flooding), and loss of human lives.

SEA-LEVEL RISE

Sea-level rise, including storm surge, can cause houses and island communities to disappear; threaten critical public and private infrastructure; and may create the need to rebuild levies, dykes, and other protective measures. Lagos and communities in the Niger Delta are particularly vulnerable.

CROSS-SECTORAL

The negative impacts of climate change in many rural areas can be expected to contribute to increased migration to urban areas, urban-urban migration, and may lead to social conflicts.

7. ENERGY

The economic value of oil and gas investment in Nigeria's coastal and offshore areas is in the trillions of US dollars. This investment is at risk from the negative impacts of climate change, including rising sea levels, heavy storms, floods, high winds and shoreline erosion. Climate change is also expected to negatively impact the already limited electrical power supply through impacts on hydroelectric and thermal generation. Service interruption is also expected to result from damage to transmission lines and substation equipment impacted by sea level rise, flash floods, and other extreme weather events. Climate change impacts resulting in increased fuel-wood scarcity will increase pressure on the remaining forest resources, resulting in further degradation of the environment and negative impacts on rural livelihoods.

KEY IMPACTS OF CLIMATE CHANGE**TEMPERATURE**

Increased temperatures, especially in the northern part of Nigeria, will cause increased energy demands in urban areas for cooling purposes, and more private generator use.

RAINFALL

1. Decreased rainfall in the north will reduce availability of trees/shrubs and biomass for fuel and affect hydroelectric output due to changing water levels in reservoirs.
2. Increased rainfall intensity in coastal and rainforest zones in the south of the country may cause problems such as system disruptions, electricity distribution cuts, and damage or destruction of transmission lines due to erosion.

EXTREME WEATHER EVENTS

Extreme weather events may cause collapse or overload of energy infrastructure.

SEA-LEVEL RISE

Rising sea levels, and increased intensity and frequency of storm surges, will cause flooding, which can impact near-shore energy infrastructure.

8. TRANSPORTATION AND COMMUNICATIONS

Nigeria's transportation infrastructure includes road and highway networks, railways, canals and navigable waterways, seaports, airports, associated facilities, and vehicle fleets. Much of this infrastructure is inadequate for current needs, and vulnerable to the impacts of climate change. Under maintained road networks, for instance, will be further degraded by extreme weather, and airport operations will be disrupted by heavy rainfall events, violent thunder storms, severe winds and harmattan dust storms. Negative impacts on the transportation system can be expected to have negative impacts on the overall Nigerian economy.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

Increased temperatures, especially in the savannas, will cause more rapid deterioration of infrastructure (roads and communication wires).

RAINFALL

Increased rainfall intensity in coastal and rainforest zones in the south of the country may cause problems such as:

1. In the **transportation** sector: flooding and deterioration of roads, destruction of bridges, increase in auto accidents, disruption of navigation due to siltation & plant growth in waterways.
2. In the **communications** sector: system disruptions caused by rain interfering with microwave transmission, disrupting telephone, internet, satellite TV and radio.

EXTREME WEATHER EVENTS

Extreme weather events may cause:

1. In the **transportation** sector: flight disruption from sand storms and rainstorms, disruptions to shipping and small craft transport, road closures.
2. In the **communications** sector: complete loss of communication systems, disruptions to telephone, internet, television, and radio.

SEA-LEVEL RISE

Rising sea levels, and increased intensity and frequency of storm surges, will cause flooding, which can impact road transportation and communications infrastructure.

9. INDUSTRY AND COMMERCE

Many industries in Nigeria are vulnerable to a myriad of climate change-induced problems. Construction, transportation operations, road infrastructure, energy production and transmission, off-shore oil and gas operations, thermal power generation, as well as tourism and recreation, are some of the industrial sectors that are exposed to the vagaries of changing climate conditions. Industries dependent on climate-sensitive resources will suffer the most, as they derive their raw materials from sectors most affected by climate change, such as agriculture. Negative impacts on industry and commerce will lead to greater poverty among people who depend on the affected industries for their livelihoods.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

Increased temperatures, especially in the extreme northern part of Nigeria, will cause increased demand for beverages and water, higher energy bills for cooling, lower productivity of workers and sellers, market closures in some locations, and lower profits.

RAINFALL

Variable and more intense rainfall, and increases or decreases in total rainfall (depending on location) can cause flooding and other damage to industrial and commercial facilities; disruption of production and output; damage to goods or loss of stock; reduced customer demand; disruption of communications and transportation; lower sales/business volume; and higher investment risk.

EXTREME WEATHER EVENTS

Extreme rainfall, windstorms and extreme temperature events may cause destruction of industrial and commercial facilities; damage to goods; reduced shelf-life of manufactured goods; frequent breakdown and repairs of imported manufacturing machines; disruption of business; high relocation and reconstruction costs; loss of investment and savings; increased cost of insurance and high risks for insurance companies; and other impacts as listed under rainfall. All of this results in higher costs of production and lower competitive capacity for business, especially for manufacturers.

SEA-LEVEL RISE

The impacts of sea-level rise on the Industrial and commercial sector may include destruction of coastal oil and gas facilities; disruption of production in coastal facilities; increased flood management costs for coastal facilities; dislocation of factory workers who reside mainly in areas of high vulnerability; increased insurance and relocation costs; and reduced investment due to high risks.

10. DISASTER, MIGRATION AND SECURITY

By the virtue of its geographic location and size, Nigeria is prone to a wide variety of climate-induced hazards and disasters. Floods, storms, ocean surges, droughts, wildfires, pest plagues, and air and water pollution cause extensive losses to livelihoods and property, compromise development progress, and claim many lives. Climate change will increase the frequency and intensity of extreme climatic hazards; introduce hazards to areas previously free from their impacts; and increase vulnerability when climate-induced hazards exacerbate underlying risk conditions. Moreover, climate change will lead to migration of people from affected areas and to a new class of environmental refugees – people from communities that have been destabilized by climate, or where climate change exacerbates existing land degradation.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE AND RAINFALL

Temperature and rainfall changes can:

1. Contribute directly to disasters such as famine, major floods, and disease outbreaks.
2. Cause or accelerate migration away from areas where changing climatic conditions impact health, livelihoods, and quality of life.
3. Increase insecurity and conflict as a secondary consequence of climate-related disasters, migration, reduced access to diminishing resources, heat stress, and other factors.

EXTREME WEATHER EVENTS

Extreme weather events increase the likelihood that disasters will occur with greater severity and frequency, and increase the chances of secondary disasters e.g. chemical spills. Multiple extreme events that require disaster response can exhaust the ability of first responders. Poor disaster response following extreme weather events can result in security concerns and weaken government.

SEA-LEVEL RISE

Sea level rise may put pressure on existing dykes and systems, increasing the chance of sudden flooding caused by broken dykes. Key coastal infrastructure may be damaged or destroyed leading to secondary disasters (e.g. oil extraction and pipelines). Sea level rise will also increase migration (flooded farms, waterlogged land, and salinization of soils promote migration).

CROSS-SECTORAL

Combined, these impacts will result in increased stress on Nigeria's disaster management, migration and security systems. Climate change will put stress on security and disaster response institutions of the country, including first responders (Army, Red Cross, Red Crescent, NEMA, SEMA, police), second responders (hospitals, families, churches, mosques, Local Governments, insurance agencies), and third responders (those involved in reconstruction).

11. LIVELIHOODS

Climate change has substantial adverse implications for sustainability of livelihoods; it may however, sometimes create opportunities for enhancing rural livelihoods.

KEY IMPACTS OF CLIMATE CHANGE

Adverse impacts of climate change on livelihoods are noted in the sectoral discussions above, especially in Agriculture, Water Resources, Fisheries, Forestry, and Industry and Commerce. The impact of climate change on livelihoods is additional to pre-existing impacts of other factors affecting livelihoods in Nigeria.

Opportunities for enhancing rural livelihoods are created in the emerging ideas of combating climate change through payment for ecosystem services, e.g. carbon payments for Reducing Emissions from Deforestation and Forest Degradation (REDD).

12. VULNERABLE GROUPS

Climate change will significantly affect vulnerable groups because of a variety of factors, including low adaptive capacity, limited resources, and poverty. In general, climate change tends to exacerbate differences among various groups. The vulnerable and socially marginalized groups – such as the poor, children, women, the elderly, and indigenous peoples – tend to bear the brunt of environmental change. In the specific context of Nigeria, women are more vulnerable to the effects of climate change than men – primarily as they constitute the majority of the country's poor and are more dependent for their livelihood on natural resources that are threatened by climate change.

KEY IMPACTS OF CLIMATE CHANGE

Climate change will significantly affect vulnerable groups because of a variety of factors, including low adaptive capacity, limited resources, and poverty.

TEMPERATURE

Heat stress causes illness and increases death rates. Heat stress associated with climate change can have additional impact on vulnerable groups, particularly in the Sahel and savanna:

1. Women: Heat stress can have increased impact on women due to socio-cultural confinement which limits ability to seek relief from heat. The impact of heat stress is greater on pregnant and menopausal women.
2. Children/Youth: Heat stress can arise when classrooms are hotter than usual; children are also more vulnerable to dehydration.
3. Aged: Elderly people have less mobility to cope with heat stress and are vulnerable to dehydration; death rates are higher.
4. Persons with special needs have reduced ability to cope with and survive heat stress; access to support systems may be reduced.

RAINFALL

Increased rainfall will affect vulnerable groups in the following ways:

1. Erosion and flooding may cause increased incidence of malnutrition where there is less food due to crop losses, and may reduce access to health facilities and other support services.
2. For women, rainfall can increase vulnerability when it cuts roads and increases distances that they have to walk to get water, get firewood, and go to market. Flooding also reduces women's economic activity and increases household labour demand.
3. For children/youth, erosion and flooding may destroy roads and cut off access to schools.
4. For the aged, high intensity rains and flooding may exacerbate already reduced economic activity. For persons with special needs, fragile housing can be destroyed by flooding, especially where dwellings are on vulnerable land.

The decreased rainfall expected in the north will also affect vulnerable groups.

1. Increased malnutrition may occur when there is less food due to reduced yield.
2. For women, reduced household water availability means reduced sanitation and more effort to find water, and water quality is reduced.

3. For persons with special needs, water challenges can intensify dependence, and reduced mobility limits their ability to access medical services to deal with illness associated with dehydration.

EXTREME WEATHER EVENTS

Extreme storms, cold, heat, and flooding can significantly affect vulnerable groups.

1. For all these groups it is difficult to undertake temporary migration due to limits on mobility.
2. They are vulnerable to destruction of household infrastructure and resources, and potentially exposed to economic, social and food insecurity arising from extreme weather events.
3. For women, food storage, small livestock and small plots can be destroyed.
4. For children and youth, school facilities can be destroyed or become inaccessible.
5. For the aged, social support networks are likely to be less available.
6. Persons with special needs can be more easily stranded and unable to escape during an emergency, leading to mortality rates that are higher than in the general population.

SEA-LEVEL RISE

Sea-level rise affects whole communities, but vulnerable people have fewer resources to cope with impacts such as reduced access to fresh water due to salt water intrusion, the physical impacts of storm surge on the community, and loss of coastal fishery resources. Vulnerable people are also less able to re-establish themselves if the community has to be relocated, and are likely to experience increased social isolation and reduced social supports.

13. EDUCATION

Overall the level of public awareness on issues related to climate change in Nigeria is considered to be low. There is great need to improve public understanding of the potential impact of climate change. Stakeholders in the education system (such as academics, researchers, teachers, students, and policy-makers) have a key role to play in national programmes to achieve this goal. In addition, the education system itself will be impacted by climate change, affecting school facilities and activities, school attendance, and learning.

KEY IMPACTS OF CLIMATE CHANGE

TEMPERATURE

Increased temperatures may create uncomfortable conditions and cause heat stress in the classroom, affecting school activities, learning capacities, and performance in academic work. Teaching and class management may become difficult.

RAINFALL AND EXTREME WEATHER EVENTS

Increased frequency of heavy rainfall, floods, strong winds, and storms can cause damage to school buildings and property, resulting in:

1. An unconducive environment for teaching and learning activities
2. Possible harm to students and teachers
3. Impacts on school attendance and achievement by students.

Changes in rainfall and extreme weather events also have both short-term and long-term socio-economic and health effects on students and teachers. These include:

1. Increased spread of endemic water- and vector-borne diseases, and other infectious diseases
2. Shortages of water and food, leading to malnutrition and famine in extreme cases.

These socio-economic and health impacts can reduce school attendance and result in poor performance in academic work. Other impacts include a dearth of teachers and poor education standards in the most affected areas, and movement of students to schools in less vulnerable parts of the country.

In view of the foregoing impacts it has become imperative for Nigeria to respond to climate change. The responses include a number of policy and related activities as outlined in the following sections.

4. How Nigeria is Responding to Climate Change

4.1 Current Activities

Institutions

The Government of Nigeria acknowledges the importance of developing a national response to climate change, and is taking steps to build a governance structure to manage the issue. The Government established a national focal point to drive the Nigeria's response: the Special Climate Change Unit (SCCU) within the Federal Ministry of Environment. The government also mobilized the Inter-ministerial Coordinating Committee on Climate Change. In 2010, the National Assembly passed a bill to create a national Climate Change Commission, which, once established, will likely facilitate coordination and support for the multi-level and cross-sectoral adaptation responses. In addition, several other government agencies are involved in climate change adaptation issues, including for instance the Nigerian Meteorological Agency (NIMET), the National Emergency Management Authority (NEMA) and the National Planning Commission (NPC).

Vision 20:2020

The Federal Government's current economic growth plan, *Nigeria Vision 20:2020, Economic Transformation Blueprint*, recognizes a changing climate as a threat to sustainable growth in the next decade. It sees climate change as a critical challenge globally and, in Nigeria, as a potential driver of "damaging and irrecoverable effects on infrastructure, food production and water supplies, in addition to precipitating natural resource conflicts." This recognition is an important first step towards a climate change adaptation strategy and action plan. The implementation strategy in *Nigeria Vision 20:2020* includes "[reducing] the impact of climate change on socio-economic development processes" as one of nine objectives for conserving the environment in a section on "preserving the environment for sustainable economic development".

Other Policies and Programmes

Nigeria recognizes the need to address climatic change in a policy responsive and strategic way. It has, therefore, put in place a *Climate Change Policy and Response Strategy* with the strategic goal of fostering a low-carbon, high growth economic development path and building a climate resilient society. The Policy includes objectives related to climate change mitigation, adaptation, climate science and technology, public awareness, private sector participation, and strengthening national institutions and mechanisms.

Nigeria is also developing a *Strategic Framework for Voluntary Nationally Appropriate Mitigation Action (NAMA)*, as a step towards meeting national obligations under the United Nations Framework Convention on Climate Change. The NAMA strategic framework will allow Nigeria to develop long-term measures and programmes supporting a low carbon, climate-resilient, pro-growth and gender-sensitive sustainable development path. It is important to note that some adaptation measures overlap with mitigation. For instance, some adaptation and mitigation measures in agriculture and land use offer opportunities to gain benefits in both areas.

Integrating climate change adaptation policies and programmes alongside development policies and programmes is widely recognized as an effective approach to managing the risks and opportunities of climate change while enhancing sustainable development. In addition to specific climate change-related policies, Nigeria has several environmental and sectoral policies and plans in place where climate change adaptation policies could apply. For example, the National Policy on Environment supports "the prevention and manage-

ment of natural disasters such as floods, drought, and desertification". And one of the objectives of Nigeria's Agricultural Policy is to *"protect agricultural land resources from drought, desert encroachment, soil erosion, and floods"*. Other examples include Nigeria's *Drought Preparedness Plan, National Policy on Erosion and Flood Control, National Water Policy, National Forest Policy, and National Health Policy*. At present, however, policies, strategies, and plans such as these are not being used to enable and support climate change adaptation in Nigeria. Indeed, in some cases objectives and targets embedded in national policy documents assume that climate conditions will remain as they are today.

At the international level, Nigeria has participated actively at meetings on climate change, including the annual Conference of Parties (CoP) to the UNFCCC, and is a party to the Kyoto Protocol. The country has submitted its *First National Communication* to the UNFCCC, and the *Second National Communication* is nearing finalization. Nigeria has also adopted the ECOWAS sub-regional Action Plan to reduce vulnerability to climate change (March 2010).

In addition to these activities by the Federal Government, other stakeholders in Nigeria have begun to respond to the current and expected impacts of climate change. Some State Governments, NGOs and other civil society groups, private sector organizations, communities, and individual Nigerians have begun to respond to the impacts of climate change.

4.2 The National Adaptation Strategy and Plan of Action (NASPA-CCN)

To build on the foregoing actions, and to ensure a truly national response to the significant and multi-faceted impacts of climate change, Nigeria needs an aggressive and widely supported adaptation strategy and action plan. This strategy and plan must be integrated, comprehensive in scope, and inclusive of all stakeholders. This is what the NASPA-CCN provides for Nigeria.

As noted above, the NASPA-CCN is linked to other initiatives of the Nigerian government. At the highest level the national *Climate Change Policy and Response Strategy* is the overarching document, setting out the direction of the country on climate change. The concept is that the NASPA-CCN and the NAMA strategic framework will dovetail into the National Policy. These three documents – National Policy, NASPA-CCN and NAMA framework -- are supported by other initiatives of the government and by various policies and strategy documents relating to other environmental issues and low carbon growth.

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5. NASPA-CCN Framework

5.1 Introduction

This section lays out the imperatives, vision, goal, objectives and guiding principles for the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria.

5.2 The Imperatives of Nigeria's Climate Change Adaptation Strategy and Plan of Action

For it to command wide acceptance and produce the desired results, NASPA-CCN is characterized by certain imperatives, which include the following:

#1 *Government, the Private Sector, and Civil Society Provide Strong and Visionary Leadership*

Nigeria is highly vulnerable to the impacts of climate change and must, as a matter of urgency, take steps to reduce its vulnerability, build its resilience and build its adaptive capacity.

As part of their need to adapt to their environment, Nigerians are already adapting to climate change in various ways. But because of the urgency of the threat and because of the power of inertia, which makes people slow to change the way they do things, Nigeria cannot afford to solely depend on individuals and communities to take these steps on their own, as and when they deem fit. Rather, the country needs a regime of guided change with full government support. This can only be achieved through strong and visionary national leadership. That is why developing an enhanced leadership is a vital aspect of climate change adaptation in the country. This leadership must be provided by: public sector entities (Federal, State and Local Governments and their institutions); the organized private sector; and civil society organizations (CSOs, including non-governmental and community-based organizations).

These stakeholders must accept responsibility and take action on climate change, including efforts to collaborate with international partners. They must also work to enable adaptation by removing or surmounting obstacles, such as a high population growth rate, pervasive poverty, lack of relevant knowledge, limited access to technology, a weak institutional framework, degraded natural resources, inadequate financial resources, a high level of social marginalization, and poor governance. These stakeholders must provide the populace with a vision, a policy framework, a legal framework, and specific climate change adaptation interventions. They must act as catalysts in the process of climate change adaptation.

#2 *The Federal Government Provides Overarching Policy and Legislative Leadership*

The Federal Government is uniquely positioned to play a critical role in ensuring an effective and coordinated approach to climate change adaptation by providing leadership, guidance, laws and regulations, information, and financial resources. It has overall responsibility for drawing up and implementing comprehensive, clear, and dynamic policy, legislative, and regulatory frameworks for climate change adaptation in the country. Developing and implementing piecemeal solutions and projects will not solve the country's climate change problems. It is mandatory that Nigeria moves away from piecemeal approaches and embraces an integrated approach. The move by the National Assembly to pass legislation setting up a national governance structure that can engender such an integrated approach for climate change, including climate change adaptation, is an important first step.

#3 *The States and the Local Governments Lead in the Regions and at the Grassroots*

The impacts of climate change and many efforts to adapt to it occur at the State and local levels. Moreover, the three tiers of government have concurrent responsibility for the environment, including climate change adaptation. Therefore the States and the Local Governments must provide leadership for climate change adaptation in their areas of jurisdiction.

#4 *The Organized Private Sector Hedges Against and Seizes Opportunities Presented by Climate Change*

As in every other sector, private sector entities are vulnerable to the impacts of climate change. If they are to continue to survive and be profitable, they must design and implement strategies that will reduce climate change impacts on their operations. They are also expected to take advantage of business opportunities which climate change adaptation often presents.

#5 *Civil Society Organizations Play the Role of Catalysts at the Adaptation Frontline*

Civil Society Organizations (CSOs) have a deep knowledge of local conditions, customs and politics. Moreover, they have the ability to work with communities, including the most vulnerable groups, within a participatory framework. Many CSOs are already doing very useful work in the areas of environment and development. They can, and, indeed, must serve as the vital link between individuals and communities on the one hand, and the public sector, the organized private sector and international partners on the other, in order to build Nigeria's adaptation to climate change. They are the catalysts needed to make things happen at the climate change adaptation frontline.

#6 *Nigeria Partners with the International Community*

The international community, including agencies of the UN (notably the UNFCCC, UNDP, UNEP, WMO, UNIDO, GEF and UNIFEM), the World Bank, the African Adaptation Fund, individual countries and their agencies, and international NGOs can provide assistance to Nigeria in the area of adaptation. Nigeria must partner with these bodies in order to benefit from such assistance.

#7 *Nigeria Enhances Institutional Capacity for Adaptation*

Institutional capacity building is the long-term, continuing process that enhances the operating environment, knowledge, skills, and access to information required of an institution to perform its functions. Institutional capacity building will be required by all the institutional stakeholders engaged in climate change adaptation, including Federal and State Government Ministries and agencies, Local Government Departments, the organized private sector, and CSOs. The task is to equip these actors and their personnel to be able to develop and implement policies, programmes, projects and other measures related to climate change adaptation, all within a context of good governance.

#8 *Government and Stakeholders Cooperate and Coordinate their Efforts*

Because there are many stakeholders in climate change adaptation, there is great need for cooperation between them and coordination of their efforts to share ideas, information and experience. Coordination must be both vertical (between Government and other

stakeholder groups), and horizontal (within each particular group of stakeholders, including, in particular, improved coordination across government agencies).

#9 *Nigeria Raises Awareness and Knowledge of Climate Change Adaptation*

In order to build climate change adaptation into every aspect of national life, people must have knowledge – and access to knowledge – of what climate change is, how it is impacting them and how they can adapt. This knowledge must be available in simplified forms translated into local languages and made accessible to a wide range of people, particularly the vulnerable. Therefore, policies and programmes must be put in place to increase access to information regarding historical climate, projections of future climate change, the potential impacts, the causes of vulnerability, technologies and measures for managing climate risks, and the know-how for implementing these technologies. The policies and programmes should be aimed at increasing the access to information for public policy makers, the organized private sector, CSOs, users of natural resources, and managers of infrastructure. This will entail a comprehensive programme of communication, education and outreach to raise awareness.

#10 *Nigeria's Adaptation Strategy is Integrated in the National Agenda*

The goals and methods of climate change adaptation are highly complementary to those of development. Therefore, a climate change adaptation strategy is really a development strategy. It must be mainstreamed into the national sustainable development agenda. Of particular importance is mainstreaming climate change adaptation with specific gender concerns into agendas that relate to economic growth, strengthening infrastructure, ensuring water supplies, food security, conflict resolution, meeting the Millennium Development Goals, among other national priorities.

#11 *Nigeria's Adaptation Strategy is Based on Knowledge and Research*

Science is at the heart of climate change knowledge and trends. Nigeria needs to know more about the nature and possible extent of climate change across the country and how it could affect natural and human systems. Other types of information, such as results from sector-specific and regional vulnerability assessments, knowledge of adaptive technologies and practices, and information on costs/benefits of implementing adaptation, are important to prioritize public and private investments.

Building the infrastructure and human resources capacity to generate and disseminate climate change science information on impacts and adaptation is a necessary first step. Nigeria also needs to acquire and share data concerning the hazards associated with temperature rise, rainfall changes, extreme weather events, sea level rise and their socio-economic impacts. In addition to analytic data, Nigeria also needs to encourage and support identification and transfer of appropriate adaptation technologies.

The strategies recommended in this document are informed by research findings from four main sources: existing literature, climate change scenario modeling, ongoing community-based research, and ongoing learning-by-doing pilot projects in communities in all the main agro-ecological zones of Nigeria.

#12 *Nigeria's Adaptation Strategy Incorporates Local Knowledge and Experience*

The strength of any strategy for adapting to climate change is enhanced by the conscientious acknowledgement of the observations of Nigerians, from public policy makers to local farmers dependent on natural resources. Nigeria's adaptation strategy must be

informed by local real-life experiences and the lessons that they teach. Knowledge, including local knowledge, is the key to climate change adaptation and to the success of strategies that support adaptation.

Communities are active agents of climate change adaptation. This has been observed in fifteen study areas of the Building Nigeria's Response to Climate Change (BNRCC) project over the last four years (see the text box below).

While taking care to minimize risk, communities in general show ingenuity and a determination to find the best adaptation options, and to share the knowledge derived from their experiences with State and Local Governments and institutions, and with other communities.

Community-based adaptation, which this document supports as one of the keystones of adaptation policy, recognizes that the basis for resilience to climate change impacts lies with both local/traditional knowledge and scientific knowledge. Community-based adaptation serves to integrate local knowledge with scientific knowledge, ensures people's right to participate in decisions that affect their lives, and thus builds adaptive capacity, all of which assist in reducing vulnerability.

Communities as Active Agents in Climate Change Adaptation (BNRCC Project)

All over Nigeria, communities are actively engaged in climate change adaptation activities in their attempt to relate to their changing environment. For example, between 2008 and 2011, the BNRCC Project carried out a number of pilot projects involving support of climate change adaptation initiatives in communities across the major ecological zones of the country. These communities include Kwaikong and Dashe (Plateau State), Falgore (Kano State), Daudu (Benue State), Bebi, Wula, Esuk Idebe, Akwa Esuk Agoi Ibam and Iko Esai (Cross River State), Gorori (Jigawa), Bursali and Billeri (Bauchi State), Tosha (Yobe State), and Sansan (Borno State).

In these communities, people were engaged in a wide range of climate change adaptation activities, including water harvesting, construction of earth dams, dry season irrigation, adoption of improved seeds and early maturing crops, use of fuel efficient woodstoves, bee keeping, snail farming, tree planting, use of simple weather forecasting tools, erosion control, sand dune stabilization, establishment of fodder production farms, and fish farming. Such initiatives should be encouraged and deserve external support. See details in www.nigeriaclimatchange.org and www.nestinteractive.org.

#13 Gender is Mainstreamed into Nigeria's Adaptation Strategy

Gender mainstreaming is the process of assessing the implications for women, female youth, men, male youth and the elderly of any plan of action, policy or programme at any level. It is a way of ensuring that these groups have the opportunity to participate in the design, implementation, monitoring and evaluation of policies and programmes, and benefit equally from climate change adaptation (CCA) policies and programmes. The use of participatory approaches during community analysis and needs assessment, where all members of the community are involved in planning, gives an understanding of the gender roles, including different vulnerabilities.

Note: Gender was mainstreamed into this document by considering gender dimensions of the impacts of and vulnerability to climate change, and the gender dimensions of the adaptation options in various sectors.

5.3 Vision, Goal, and Objectives

VISION

This Strategy envisions a Nigeria in which climate change adaptation is an integrated component of sustainable development, reducing the vulnerability and enhancing the resilience and adaptive capacity of all economic sectors and of all people -- particularly women, children, and resource-poor men – to the adverse impacts of climate change, while also capturing the opportunities that arise as a result of climate change.

GOAL

To take action to adapt to climate change by reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all Nigerians; and to reduce or minimize risks by improving adaptive capacity, leveraging new opportunities, and facilitating collaboration inside Nigeria and with the global community.

OBJECTIVES

To reduce the impacts of climate change through adaptation measures that can be undertaken by the Federal, State and Local Governments, civil society, private sector, communities and individuals, including measures that will:

1. Improve awareness and preparedness for climate change impacts
2. Mobilize communities for climate change adaptation actions
3. Reduce the impacts of climate change on key sectors and vulnerable communities
4. Integrate climate change adaptation into national, sectoral, State and Local Government planning and into the plans of universities, research and educational organizations, civil society organizations, the private sector and the media.

5.4 Guiding Principles

The NASPA-CCN was formulated and is based on the following guiding principles:

1. The best available science and local knowledge should be used to assess vulnerability and to identify adaptation priorities (see also further discussion in Section 5.2).
2. Priority should be given to adaptation measures that modify and enhance effective existing policies or programmes that support proven local, state, and national efforts.
3. Recommended policies should be consistent with the economic and political circumstances of the country and support Nigeria's *Vision 20:2020*, Nigeria's programme to address the Millennium Development Goals (MDGs), and Nigeria's national development agenda.
4. Recommended measures should complement fundamental objectives and directive principles of Chapter Two of the Constitution of the Federal Republic of Nigeria 1999; and should promote sustainable development in the country, in line with the principle of inter-generational equity.
5. Recommended policies, strategies and programmes should be guided by the five inter-related principles of the UN Development Group (UNDG): a human rights-based

approach, gender equality, environmental sustainability, result-based management, and capacity building.

6. The strategy should be implemented in a manner that supports Nigeria's transition to a low carbon economy.
7. Recommended measures should build on regional and international efforts that enhance adaptation to climate change.
8. The strategy should involve all relevant stakeholders in identifying, reviewing and implementing its provisions within a participatory framework, applying the subsidiarity principle where appropriate.
9. The strategy should recognize that adaptation has many dimensions and is best viewed as an ongoing and flexible process involving societal adjustments to climate change risks.

5.5 Timeframe

The recommended policies, programmes, and measures presented in this section have been developed with a long-term vision, but are based on a 5-year implementation time frame. This means that the full Strategy should be reviewed in detail every 5 years. At each review point it should be updated/revised in light of new knowledge and experience gained, and then formally renewed for an additional 5 years.

The 5-year review cycle coincides with the timing of a number of other important events in Nigeria. The first review of the NASPA-CCN in 2015 would allow Nigeria to incorporate NASPA-CCN experience into the 2015 review of Nigeria's efforts to achieve the MDGs. Also, with elections to be held in Nigeria in 2015, the first NASPA-CCN review will provide recommendations of value to a new administration at the start of its mandate. Looking further to the future, the ten-year time frame for the second NASPA-CCN review cycle is in line with the timeframe of *Nigeria Vision 20:2020*.

6. Recommended Adaptation Policies, Programmes and Measures

6.1 Introduction

This Section presents the recommended sectoral policies, programmes, and measures that form the core of this *National Adaptation Strategy and Plan of Action on Climate Change for Nigeria*. When acted upon, these recommendations will build the resilience of Nigerians, of local communities, and of Nigeria as a whole to the impacts of climate change.

Successful adaptation across Nigeria to current and expected impacts of climate change will involve many people, many initiatives, many major investments, new policies and programmes, and considerable time. This will require a strategy and framework for action that is ambitious but also feasible. The strategy must be directed to all key stakeholders, and they must understand the crucial role they have to play to support appropriate responses.

What is clear is that adapting to climate change will be demanding; yet it demands to be done. It is urgent but also needs to be thoughtful and long term. Adapting to climate change means working with what is known, but also working with new information and with some unknowns. It means doing some things better, but also doing some new things. It must begin with what is on the ground now and be highly oriented towards making needed changes. It must be proactive. Above all it must focus on understanding and reducing risks.

Saying that something must be done is not sufficient. An effective strategy must also define who will do it, and when, by what means, with what mandate, and with what resources. It must incorporate mechanisms to evaluate whether the initiative is producing the intended results. These important aspects of this strategy are addressed in Section III. Plan of Action, later in this document.

6.2 Selection Process

In the process of preparing this strategy document, stakeholders from many sectors and backgrounds in Nigeria were consulted and involved, including subject specialists, people from grassroots communities, researchers, and gender experts. Many studies and reports were reviewed. New research was commissioned and new insights about climate change impacts were considered.

Based on these inputs, the drafting team began by considering (1) the key sectoral adaptation goals to be achieved through the adaptation strategy, and (2) the broad high-level sectoral strategies required to achieve these goals.

Guided by these identified goals and strategies, the team then selected the recommended adaptation policies, programmes, and measures presented in this section – the practical actions required to implement the sectoral strategies and achieve the sectoral goals. The following criteria were used to guide the selection:

1. Does the policy, programme or measure address an identified priority issue related to climate change adaptation?
2. Is it feasible? Effective? Will it have significant impact?
3. Does it relate to existing policies and national development goals?
4. Does it relate to responsibilities that people, organizations and agencies actually have?
5. Is it cost-effective? Is it efficient?
6. Is it sufficiently flexible to respond to local circumstances?

6.3 Recommendations by Sector/Theme

The recommended policies, programmes and measures selected through the above process are presented below for the following sectors or themes:

1. Agriculture (Crops and Livestock)
2. Freshwater Resources, Coastal Water Resources and Fisheries
3. Forests
4. Biodiversity
5. Health and Sanitation
6. Human Settlements and Housing
7. Energy
8. Transportation and Communications
9. Industry and Commerce
10. Disaster, Migration and Security
11. Livelihoods
12. Vulnerable Groups
13. Education

As noted above, the selection of the recommended policies, programmes and measures for each sector or theme began with the identification of goals and overall strategies. In the following pages, all of this information is presented using a standardized format and under the following headings:

- Goals
- Overall strategies
- Recommended policies, programmes and measures.

It is to be noted that:

- The policies, programmes and measures recommended for particular sectors/ themes are often linked to those recommended for one or more of the other sectors/themes.
- Gender sensitivity and broad stakeholder participation are essential in the design and implementation of policies, programmes and measures under every sector/theme.
- Sustainability should be a critical element of all policies, programmes and measures.
- All Environmental Impact Assessments should take into account possible climate change impacts on development projects.

1. AGRICULTURE (CROPS AND LIVESTOCK)
GOAL
To ensure that vulnerable communities and groups alter their agricultural practices to adapt to the changing climate, including predicted temperature and rainfall changes and extreme weather events.
OVERALL STRATEGIES
1. Adopt improved agricultural systems for both crops and livestock • For example, diversify livestock and improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information. 2. Implement strategies for improved resource management • For example, increase use of irrigation systems that use low amounts of water; increase rainwater and sustainable ground water harvesting for use in agriculture; increase planting of native vegetation cover and promotion of re-greening efforts; and intensify crop and livestock production in place of slash and burn. 3. Focus on agricultural impacts in the savanna zones, particularly the Sahel, the areas that are likely to be most affected by the impacts of climate change.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR AGRICULTURE (CROPS AND LIVESTOCK)
FEDERAL GOVERNMENT 1. Review national agricultural and related policies and programmes: The Federal Government should review all national agricultural and related policies and programmes to determine modifications required in view of expected climate change. This would include policies and programmes in the following areas: • Nigerian Agricultural Policy • National Irrigation and Water Policies • Other policies and programmes relating to agricultural research, livestock, seeds, crops, markets, and food security • Other policies and programmes relating to water harvesting, erosion and flood control, soil conservation practices, drought and desertification, and related matters. The review of these policies should ensure the effective participation of all stakeholders, including women and other vulnerable groups. Where significant policy gaps are identified, or where policies and programmes are inconsistent with the need to adapt to climate change, the Federal Government should update the policies and programmes through a broad consultative process with stakeholders that ensures gender inclusion. In addition to policies and programmes, the review should examine new and existing projects in the agricultural sector (e.g. Fadama III) for climate change adaptation issues, and for opportunities to promote and mainstream adaptation within the project. 2. Federal leadership role: The Federal Government should play a leadership and catalytic role by encouraging and supporting new programme initiatives in the following areas: • <i>Agricultural Extension Services for Climate Change Adaptation Programme:</i> Support a State-led extension programme addressing climate change adaptation (State and Local Governments Recommendation #1 below). Key areas of Federal Government support could include programmes focused on Training of Trainers in priority adaptation areas, and involvement/engagement of the National Youth Service. • <i>Community-based Climate Change Adaptation Support Programme:</i> Collaborate with State Governments and civil society organizations to establish a country-wide community-based climate change adaptation support programme (State and Local Governments Recommendation #2 below).

- *Climate Change and Agriculture Research Programme:* Working through the Agricultural Research Council of Nigeria, stimulate and support a new national research initiative addressing climate change impacts and adaptation in the agricultural sector in Nigeria.
 - *Promotion of Micro-insurance and Micro-credit:* Stimulate and support CSO and private sector involvement in the provision of insurance and access to finance for small scale farmers vulnerable to climate change, to enable them to adapt their farming practices.
 - *Promotion of poverty reduction through integration of adaptation with mitigation:* Providing incentives to encourage enhanced income generation through intercropping with biofuel crops, especially in the low carbon density tracts of the country (income can be enhanced directly and through participation in carbon markets).
3. **Early warning system:** The Federal Government should review current policies and programmes for early warning, and based on this should develop and roll out a programme to improve availability and farmer access to short and long range weather forecasts.
 4. **Irrigation and water supply:** In view of projected rainfall changes, particularly in the northern ecozones, the Federal Government should increase efforts to identify environmentally sound and sustainable opportunities to improve and extend irrigation for crops and water supply for livestock.
 5. **Technology transfer:** The Federal Government should facilitate and support efforts to identify and transfer technologies that can contribute to climate change adaptation in Nigerian agriculture, including technologies from international sources.

The design and implementation of all initiatives must take gender considerations into account.

STATE AND LOCAL GOVERNMENTS

1. **Agricultural Extension Services for Climate Change Adaptation Programme:** In collaboration with the Federal Government, State Governments should strengthen State agricultural extension services and, in particular, should establish an Agricultural Extension for Climate Change Adaptation Programme. Key elements would include:
 - Improved training at State agricultural colleges to build capacity of extension workers with respect to climate change adaptation
 - Direct outreach to engage farmers/land users
 - Cooperation with other community-based initiatives, including in particular the community-based adaptation support programme (State and Local Governments Recommendation #2, below)
 - Practical demonstration of more resilient crop and livestock practices (including demonstration plots and other mechanisms)
 - Use of State Radio, FM radio and community radio for extension and information services
 - Mobilization of existing Local Government agricultural community development offices.
2. **Community-based Climate Change Adaptation Support Programme:** In collaboration with the Federal Government and civil society organizations, State and Local Governments should establish a Community-based Climate Change Adaptation Support Programme, designed to encourage, facilitate, and support climate change adaptation at the community level. The programme would encompass community-based adaptation planning, including support for community-selected initiatives. The programme could also encompass assistance at the farm level within participating communities (e.g. community farm plans).
3. **Strengthen agricultural research:** State universities and research institutions should expand agricultural research programmes relating to climate change impacts and adaptation in the agricultural sector (e.g. testing new varieties and cropping systems, low cost/low impact irrigation technologies, improved land management, etc.). Research collaboration between institutions should be encouraged to provide maximum transfer of experience.

CIVIL SOCIETY (CSOs AND COMMUNITIES)

1. **Participate in and contribute to Federal, State and Local Governments programmes:** CSOs and NGOs should actively participate in the programmes initiated by the Federal, State and Local Governments. This includes the policy and programme reviews (Federal Recommendation #1 above), agricultural extension, community-based adaptation, and research programmes (State and Local Governments Recommendations #1, 2, and 3, above). In these initiatives, CSOs and NGOs should:

- Contribute to programme design
 - Monitor and evaluate progress of implementation and provide feedback
 - Undertake practical adaptation projects
 - Rollout pilot experience into new climate change adaptation projects.
2. **Microfinance:** CSOs/NGOs should work with partners to ensure accessibility of microfinance for climate change adaptation by farm families, particularly female-headed households and rural agricultural communities. The potential role of cooperatives as one mechanism for meeting this need should be explored.
 3. **Awareness and advocacy:** CSOs and NGOs should undertake public awareness and education programmes in the area of climate change adaptation in the agricultural sector, supported by advocacy initiatives directed at the public, the private sector and all levels of government.

ORGANIZED PRIVATE SECTOR

1. **Raising awareness of association members:** Farmers and industry associations should raise their members' awareness of and participation in climate change adaptation programmes.
2. **Micro-insurance and micro-credit:** Private sector companies and organizations should explore public-private partnerships to provide micro-crop insurance and finance to small holder farmers dealing with climate change risk.
3. **Seed varieties:** Private sector seed companies should work to develop and supply new seed varieties that are adapted to a changing climate (e.g. early maturing, drought and pest resistant). The companies should also support related extension services, to assist farmers using the new varieties.
4. **Adaptation technologies:** Private sector companies supplying agricultural products should explore and begin to supply new products better adapted to a changing climate (e.g. equipment for rainwater harvesting, drip-irrigation, etc.). Companies should provide appropriate training in the use of new products and technologies.
5. **Carbon credits:** Private sector organizations should explore opportunities to obtain carbon credits for adaptation practices such as improved soil management and agroforestry. Sale of carbon credits could reduce the cost of some adaptation measures.
6. **Food security:** More broadly, the private sector is a key part of the agricultural sector in Nigeria, and as such has a role to play in securing domestic food security in the face of the impacts of climate change on agriculture. Nigeria's private sector organizations must recognize this key role, and accordingly work with other stakeholder to help ensure long term food security.

Note: The policies, programmes and measures recommended for the Agricultural Sector are closely linked to certain policies, programmes, and measures developed in other sectors. Some of the most important links are as follows:

- *Sector/Theme 2. Freshwater Resources, Coastal Water Resources and Fisheries:* Implement Integrated Water Resource Management
- *Sector/Theme 3. Forests:* Community-based Natural Resources Management Programme
- *Sector/Theme 11. Livelihoods:* NGO model for action on climate change and livelihoods.

2. FRESHWATER RESOURCES, COASTAL WATER RESOURCES AND FISHERIES

GOALS

1. To implement Integrated Water Resource Management (IWRM) in watersheds and coastal regions to reduce the impacts of climate change.
2. To plan for and adapt to current and expected impacts of climate change on water resources, coastal resources, and inland and coastal fisheries by addressing water supply, water demand and water management infrastructure.
3. To implement strategies for promoting water body enhancement for inland and coastal fisheries
4. To plan for and adapt to the expected impacts of sea level rise and storm surge on coastal resources and fisheries.

OVERALL STRATEGIES

1. Initiate a national programme for integrated water resource management at the watershed level
2. Intensify programmes to survey water quality and quantity for both ground and surface water
3. Implement programmes to sustainably extend and improve water supply and water management infrastructure
4. Explore water efficiency and management of water demand, particularly in Sahel and Sudan savanna areas
5. Enhance artisanal fisheries and encourage sustainable aquaculture as adaptation options for fishing communities.

RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR FRESHWATER RESOURCES, COASTAL WATER RESOURCES AND FISHERIES

FEDERAL GOVERNMENT

1. **Integrated Water Resource Management (IWRM):** The Federal Government should lead the development and implementation of a national programme for Integrated Resource Management (IWRM) at the watershed level, including the following elements:
 - *National Working Group:* Ministry of Water Resources (MWR) should create and lead a working group to address climate change at the watershed level or scale, to include River Basin Development Authorities; Ministry of Environment (forestry); Ministry of Agriculture; ministries, department and agencies with direct responsibilities for coastal resources management; and State Governments along Nigeria's coastline.
 - *Watershed-level IWRM Pilot Projects:* The programme should implement IWRM pilot projects in one watershed in each eco-region, with watersheds selected from among the 11 existing River Basin Development Authorities. In each watershed the pilot project should involve all levels of government, civil society and the private sector, collaborating via working groups that will identify and oversee the pilots, review outcomes, and build future initiatives.
 - *Coastal IWRM Pilot Project:* The programme should also implement coastal area IWRM pilot projects, similar in concept and approach to the watershed level pilot projects.
 - *Pilot Project Roll-out:* The programme should review all pilot project experience and outcomes; determine implications for fresh water and coastal resources management policies and programmes; and, based on this, roll-out next generation IWRM project to other watersheds and coastal areas.
2. **Existing policies and programmes:** Federal Ministries should review existing policies and programmes related to coastal, fisheries and water resources management to ensure they address current and predicted impacts of climate change on water, fisheries, and coastal resources.
3. **Economic instruments:** The Federal Government should explore the use of economic instruments/incentives as an alternative to command and control regulation to achieve sustainable water resources management.
4. **Water supply infrastructure:** In cooperation with State agencies and other stakeholders, Federal Ministries should implement programmes to extend and improve water supply infrastructure in urban and rural areas on an intensive and urgent basis.

5. **Water management infrastructure:** In cooperation with State agencies and other stakeholders, Federal Ministries should implement programmes to sustainably improve water management infrastructure, taking account of the implications of climate change for water source protection, flood prevention and drainage.
6. **Water efficiency and conservation:** The Ministry of Water Resources should explore water efficiency and management of water demand in Sahel and Sudan savanna areas of Nigeria, and the applicability of technologies/practices for water conservation and increased efficiency of water use and waste water use.
7. **Aquaculture:** Federal Ministries should encourage sustainable aquaculture as an option for fishing communities facing impacts of climate change on their livelihoods.
8. **Water quantity surveys:** In cooperation with partners, Federal Ministries should intensify programmes in the River Basin Management Areas to survey water quantities and the distribution of ground versus surface water.
9. **International funding:** The government of Nigeria should work to facilitate access to international climate change adaptation funding to support State-level initiatives in water supply, water system maintenance and water infrastructure management, in cooperation with the new Nigerian Climate Change Commission.

STATE AND LOCAL GOVERNMENTS

1. **IWRM and policy/programme review:** State and Local Governments should participate as partners in the IWRM project and in the policy/programme reviews described above (Federal Recommendations #1 and 2).
2. **Surveys and monitoring:** State agencies responsible for water resources management should intensify programmes to survey and monitor quantity, quality, and distribution of ground and surface water resources, particularly in the Sahel and Sudan savanna zones areas most vulnerable to water scarcity due to climate change.
3. **Water supply:** In cooperation with the Federal Government, state agencies should expand environmentally sustainable programmes to increase water supply in areas most vulnerable to water scarcity through bore hole and pump development, rainwater harvesting at small (household) and large scales, and reservoirs.
4. **Water quality:** State agencies should expand and strengthen programmes to reduce surface water and ground water contamination in areas of decreasing water availability, especially in Sahel and Sudan savanna zones.

CIVIL SOCIETY (CSOs AND COMMUNITIES)

1. **IWRM and policy/programme review:** CSOs should participate as partners in the IWRM project and in the policy/programme reviews described above (Federal Recommendations #1 and 2).
2. **Awareness and training:** CSOs should work to raise public awareness of water supply technologies, deliver new water technologies to the most vulnerable communities, and educate communities on how to minimize contamination of surface and ground water.
3. **Aquaculture:** CSOs should encourage and provide assistance to vulnerable communities to develop community-owned aquaculture projects.

ORGANIZED PRIVATE SECTOR

1. **IWRM and policy/programme review:** The private sector should participate as partners in the IWRM project and in the policy/programme reviews described above (Federal Recommendations #1 and 2).
2. **Innovative technologies:** The private sector should make available new and innovative technologies that are environmentally appropriate and sustainable. Of particular importance are technologies to increase water supply in areas most vulnerable to water scarcity due to climate change (e.g. Sahel and Sudan savanna eco-regions). Technologies include solar pumps, solar desalinization, water recycling, grey water use and water harvesting, etc. Other priorities include technologies for environmentally appropriate and sustainable water management infrastructure.
3. **Aquaculture:** The private sector should intensify participation in the aquaculture business, including both fish production and supply of knowledge and materials (fingerlings, fish feeds, etc.) needed by individuals and communities involved in aquaculture.
4. **Community support:** The private sector should explore opportunities to provide financial support for community initiatives concerning water supply, water management and aquaculture.

3. FORESTS
GOALS
1. To maintain and restore healthy forest ecosystems by sustainable forest management, increasing afforestation and reforestation in order to increase the resilience of human communities in the face of changing climate. 2. In the “closed” forest (coastal/mangrove and rain forest): To improve our understanding of the impacts of flooding, sea level rise and other climate change impacts on the abundance and composition of forest resources, leading to improved sustainable forest management practices. 3. In the “open” forest (savanna and Sahel): To increase the extent and diversity of forest cover in order to address increased aridity caused by higher temperature and greater rainfall variability.
OVERALL STRATEGIES
1. Strengthen the implementation of the national Community-Based Forest Resources Management Programme. 2. Support review and implementation of the National Forest Policy. 3. Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status; and initiate a research programme on a range of climate change-related topics, including long term impacts of climatic shifts on closed forests. 4. Provide extension services to CSOs, communities and the private sector to help establish and restore community and private natural forests, plantations and nurseries. 5. Improve management of forest reserves and enforce low impact logging practice.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR FORESTS
FEDERAL GOVERNMENT 1. Community-Based Natural Resources Management Programme (CBNRM): In collaboration with the states and with communities, the Government of Nigeria should launch a national Community-Based Natural Resources Management programme, initially at a pilot scale and ultimately country wide. Key programme elements should include: • Development of community-based sustainable forest management plans (SFMPs) that incorporate sustainable forest management practices and that recognize climate change impacts for both forest reserves and community forests. • Local implementation of the SFMPs, including selected initiatives such as reforestation and afforestation with tolerant species, and reduction in fuel wood demand through alternative energy systems and energy efficient technologies. • Periodic review and renewal of the SFMPs based on experience gained. 2. National Forest Policy: The Government of Nigeria should: • Actively support the implementation of existing National Forest Policy to preserve, expand, and connect protected areas ("the forest estate"). • In parallel, review the National Forest Policy and programmes to ensure they address current and predicted impacts of climate change. • Within the framework of the National Forest Policy, implement broad afforestation and re-greening programmes. • Consistent with the Forest Policy, support existing international agreements, conventions, and decisions of the non-binding UN Forest Forums that target deforestation. 3. Research programmes: The Government of Nigeria should implement research programmes to: • Identify improved varieties of trees that are adapted/adaptable to a changing climate. • Determine the impact of sea level rise, flooding and other climatic shifts on the overall extent and composition of closed forests. • Investigate the impacts of climate on pests/diseases in the forest ecosystems (low priority). 4. Forest inventory: The Federal Department of Forestry should develop and implement a programme of frequent inventorying of forest status across Nigeria (each 10 years).

5. **Valuation of ecosystems services:** Federal Government should sponsor the valuation of ecosystems services provided by forests in order to promote a better appreciation of these services.
6. **Business incentives:** The Government of Nigeria, in collaboration with State Governments, should provide incentives for investment in tree planting businesses, e.g., low interest loans.

STATE AND LOCAL GOVERNMENTS

1. **Community-Based Natural Resources Management and Business Incentives:** State and Local Governments should participate as partners in the CBNRM and business incentive programmes described above (Federal Recommendations #1 and 6).
2. **Forestry Extension Services for Climate Change Adaptation:** State Governments should provide expanded and enhanced forestry extension services to communities, civil society organizations, and the private sector. The purpose would be to transfer skills, knowledge, and resources (seedlings, financing etc.), to help establish and restore community and private natural forests, plantations and nurseries.
3. **Forest reserves:** State Governments should strengthen management of forest reserves, improve control of tree harvesting outside reserves, re-institute the strict use of management plans for forest reserves, and involve local communities in management of reserves.
4. **State Governments** should step-up the use of economic instruments/incentives as an alternative to command and control regulation to achieve sustainable forest management.
5. **Regulation of commercial forestry:** State Ministries should improve regulation of commercial harvesting to ensure low impact logging and efficient conversion practices. The Ministries should also intensify treatment of products (to increase durability, thus contributing to reduced rates of deforestation) and enforce post-harvest silvicultural treatment of logged forests to promote natural regeneration.

CIVIL SOCIETY (CSOs AND COMMUNITIES)

1. **Community-Based Natural Resources Management:** Civil society groups should participate as partners in the CBNRM programme described above (Federal Recommendation #1). Within this programme CSOs could play a particular role facilitating and encouraging the development of community forestry.
2. **Research:** CSOs should monitor, review, and interpret the outputs of the research programme described above (Federal Recommendation #3).
3. **Domestication of forest products:** CSOs should explore and implement programmes focused on domestication of forest products (afang, bush mango, etc.), in order to reduce pressure on forests.

ORGANIZED PRIVATE SECTOR

1. **Community-Based Natural Resources Management:** Private Sector groups should participate as partners in the CBNRM programme described above (Federal Recommendation #1).
2. **Compliance:** All Private Sector groups should abide by the legislation and regulations enacted at the state and federal levels to control sustainable forest management.

Note 1: Forest management is implemented primarily by the States.

Note 2: All recommended policies, strategies and programmes shall be designed in such a way as to make them open and flexible to emerging climate change-driven forest management initiatives, such as REDD+.

Note 3: Issues of equity in resources sharing, shared-benefits and inclusive governance of forest pilot programmes shall be underscored in all policies, strategies and programmes.

4. BIODIVERSITY
GOAL
To intensify efforts to conserve biodiversity in Nigeria, in order to reduce the threatened impact of climate change on biodiversity (recognizing that biodiversity is critical to human survival, economic empowerment and wellbeing, and realization of the country's environmental and sustainable development agendas).
OVERALL STRATEGIES
1. Support the active implementation of the <i>National Biodiversity Strategy and Action Plan</i> (NBSAP), particularly those strategic actions that address climate change impacts. 2. Support recommended climate change adaptation policies and programmes in sectors that affect biodiversity conservation, including agriculture, forestry, energy and livelihoods. 3. Support and implement programmes for alternative livelihoods in order to reduce unsustainable resource use that contributes to loss of biodiversity (see Sector/Theme 11. Livelihoods).
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES TO SUPPORT BIODIVERSITY
FEDERAL GOVERNMENT 1. National Biodiversity Strategy and Action Plan: The Federal Government should give high priority to the following strategic actions from the <i>National Biodiversity Strategy and Action Plan</i> (NBSAP): • Expand and strengthen the network of protected areas to include all major ecosystems: savanna (short grass & tall grass), high forests, wetlands, mangrove, montane, coastal and marine • Protect watersheds along all intra- and inter-state watercourses to protect the water bodies and aquatic biodiversity • Establish migratory corridors where practicable for isolated species and populations • Promote community participation in biodiversity conservation • Within the context of national planning, integrate community management of biodiversity as a means of poverty reduction • Determine and reduce human impacts on biodiversity. 2. Sectoral policies, programmes, and measures: Federal Ministries should strengthen the implementation of policies, programmes and other measures in sectors that can contribute to biodiversity conservation, including agriculture, forestry, energy and related livelihoods.
STATE AND LOCAL GOVERNMENTS 1. State responsibilities: State Governments should strengthen efforts to fulfill their responsibilities for protected areas (including forests) and for environmental protection. 2. Biodiversity hotspots: State Governments should develop plans to identify and protect additional areas that are biodiversity hotspots. 3. Local Governments and communities: State Governments should appropriately support Local Governments and communities that are adjacent to conservation areas by providing alternative sources of livelihood.
CIVIL SOCIETY (CSOs AND COMMUNITIES) 1. Critical biodiversity “hotspots”: In states with critical biodiversity “hotspots”, CSOs should continue to work with State Governments to protect this biodiversity by, for example, negotiating forest management protocols with the states, and providing community training in sustainable forest management practices.
ORGANIZED PRIVATE SECTOR 1. Support for community participation in biodiversity: In recognition of the economic value of maintaining biodiversity, the organized private sector should as part of its corporate social responsibility encourage, promote, and provide funding for community participation in maintaining biodiversity.

5. HEALTH AND SANITATION	
GOALS	
1. To strengthen and improve public health, disease prevention, and environmental sanitation under the framework of the Primary Health Care Programme 2. To reduce human exposure to climate change-related health risks 3. To better understand the implications of increasing temperature for human and animal health.	
OVERALL STRATEGIES	
1. Undertake research to better understand the human health impacts of climate change in Nigeria. 2. Strengthen disease prevention and treatment for those diseases expected to increase as a result of climate change. 3. Reinforce programmes to build and maintain wastewater and solid waste management facilities. 4. Promote and facilitate the adoption of practices and technologies that reduce exposure and health impacts from extreme heat. 5. Establish early warning and health surveillance programmes.	
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR HEALTH AND SANITATION	
FEDERAL GOVERNMENT	
1. Research on human health impacts: The Ministry of Health should initiate and support research to provide a better understanding of the impacts of climate change on human health in Nigeria, to ensure that treatment and prevention programmes target priority needs. 2. Research on air quality impacts: Federal Ministries should initiate and support research to understand the contribution of climate change to increased frequency/severity of smog events and their impacts on the health of Nigerians. 3. Disease prevention and treatment: In cooperation with the States, Federal Ministries should strengthen, improve and expand strategies and programmes for disease prevention and treatment for those diseases predicted to increase in incidence and range due to climate change. 4. Wastewater and solid waste management: In cooperation with the States, Federal Ministries should work to reinforce and expand programmes to build and maintain wastewater and solid waste management facilities. Climate change is expected to increase the health impacts of inadequate management of waste and wastewater.	
STATE AND LOCAL GOVERNMENTS	
1. Work with Federal Government: State Governments should work with the Federal Government to implement programmes for prevention & treatment of climate change-related diseases, and for improved wastewater & solid waste management. (Federal Recommendations #3 and 4 above.) 2. “Cool communities” pilot programme: One or more states should pilot a "cool communities" programme by: • Building on and expanding tree planting activities • Promoting appropriate architecture for cool housing and work spaces • Promote design to reduce heat island effect in urban areas.	
CIVIL SOCIETY (CSOs AND COMMUNITIES)	
1. Work with federal and State Governments: CSOs should work with the Federal and State Governments to implement programmes for prevention and treatment of climate change-related diseases, and for improved wastewater and solid waste management. (Federal Recommendations #3 and 4 above.) 2. “Cool communities” pilot programme: CSOs should work with State Governments to implement the “cool communities” programme (State Recommendation #2 above). CSOs can play key roles in this programme, including awareness raising, sharing of technologies, promotion of appropriate housing to reduce heat stress, and implementation of local projects such as tree planting.	

ORGANIZED PRIVATE SECTOR

1. **Work with federal and State Governments:** The private sector should work with the federal and State Governments to implement programmes for prevention and treatment of climate change-related diseases, and for improved wastewater and solid waste management. (Federal Recommendations #3 and 4 above.)
2. **New business opportunities:** The private sector should explore and participate in new business opportunities in innovative wastewater and solid waste management; and in innovative cooling for living and work spaces.

6. HUMAN SETTLEMENTS AND HOUSING
GOAL
To develop housing and settlement patterns/practices that enhance climate change adaptation and are resilient to climate change.
OVERALL STRATEGIES
1. Develop climate change adaptation action plans for urban areas, particularly those at greatest risk. 2. Assist communities to reduce vulnerability through participatory planning of land use and housing. 3. Discourage building/urban encroachment into vulnerable areas, high risk zones and low lying areas. 4. Discourage housing and settlement practices that are maladaptive in the face of climate change. 5. Strengthen rural settlements in order to reduce migration.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR HUMAN SETTLEMENTS and HOUSING
FEDERAL GOVERNMENT 1. Housing design and building codes: The Federal and relevant state ministries, departments and agencies (MDAs) should review and modify housing designs and building codes in the light of climate change to specifically incorporate new roofing requirements, water harvesting, alternative materials, etc.
STATE AND LOCAL GOVERNMENTS 1. Climate Change Adaptation Action Plan Programme for Urban Areas: State Ministries of Environment should not wait for Federal Government action, but should take the lead in developing and implementing climate change adaptation action plans for large urban areas including Lagos, Kano and Port Harcourt and Abuja. In addition, States should quickly develop and implement risk management plans targeting high-risk settlements, including Lekki, Warri, Port Harcourt and other island communities. Plan development and implementation should emphasize participatory approaches. 2. Risk mapping: All State Ministry of Lands and Survey should develop and update 10, 50 and 100-year floodplain maps and maps of erosion-prone areas and make these publicly available in a user-friendly format. Maps should also identify critical infrastructure vulnerable to climate change, including the location of municipal water supplies and energy facilities. 3. Land use plans: The State Ministry of Lands and Survey, in partnership with the State Ministry of Environment, should review existing land use plans in light of climate change, and should enhance implementation of these plans. Based on the mapping described above, priority should be placed on enforcing land use plans in areas identified as most vulnerable to climate change impacts. 4. Training for builders and construction workers: State ministries should organize training sessions for private building firms, local builders and construction workers to inform them of updated building codes and land use standards. 5. Revitalization of green spaces: Governors should take the lead in implementing a programme of revitalization of green spaces and shade. The programme could also include providing financial incentives for trees and shade on private property. 6. Windbreaks: In the Sahel and northern regions of the country, State Governors should work with CSOs to target high-risk communities and implement community-based projects that encourage windbreaks.
CIVIL SOCIETY (CSOs AND COMMUNITIES) 1. Adaptation action plans: CSOs should work in major urban areas to support and advocate for development and implementation of citywide adaptation plans. 2. Training in adaptation planning and implementation: CSOs should specifically provide training workshops for local decision makers, community leaders and youth advocates in basic methods of community-based vulnerability assessments, adaptation planning and implementation.

ORGANIZED PRIVATE SECTOR

1. **Climate-sensitive business practices:** Private sector companies (land and housing development companies, construction firms, etc.) and all private building owners should incorporate climate change into their business planning and practices, with particular emphasis on location of new buildings, adherence to construction standards, and resilient site design and management.
2. **Banks and insurance companies:** Banks and insurance companies should promote climate-resilient land use and construction to their clients, to reduce risk and long term costs.

7. ENERGY
GOAL
To take pre-emptive measures to reduce vulnerability of critical energy infrastructure to climate change impacts.
OVERALL STRATEGIES
1. Include increased protective margins in construction and placement of energy infrastructure (i.e. higher standards and specifications). 2. Undertake risk assessment and risk reduction measures to increase the resilience of the energy sector. 3. Strengthen existing energy infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions. 4. Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply. 5. Expand sustainable energy sources and decentralize transmission in order to reduce vulnerability of energy infrastructure to climate impacts.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR ENERGY
FEDERAL GOVERNMENT 1. Infrastructure standards: The Federal Government, through its relevant Ministries, Departments and Agencies, including the new Climate Change Commission and the Standards Organization of Nigeria, should review and update standards for construction and maintenance of energy infrastructure to include an additional protective margin for the expected risks associated with climate change. 2. Energy infrastructure: The Federal Ministry of Mines and Power should: • Coordinate risk assessments and implement response plans that include mapping and identification of high-risk infrastructure; infrastructure reinforcements and relocations; and expansion of backup and supplementary power sources (other than single use generators). • Integrate climate change concerns into implementation of the current energy master plan, including climate change impacts on future energy demands caused by excessive heat. • Develop policies that promote development/use of decentralized renewable energy resources.
STATE AND LOCAL GOVERNMENTS 1. Infrastructure standards: State Governments should act in parallel with the Federal Government to update standards for construction and maintenance of energy infrastructure to include an additional protective margin for the expected risks associated with climate change. (Federal Recommendation #1 above.) 2. Risk assessment and response plans: State Governments should work with federal agencies, CSOs and private sector providers to develop and implement risk assessment and response plans that include energy infrastructure mapping, identification of high risk infrastructure, and investment in reinforcing and/or relocating existing high risk infrastructure. (Federal Recommendation #2 above.)
CIVIL SOCIETY (CSOs AND COMMUNITIES) 1. Renewable energy development: CSOs should develop and promote renewable energy for rural uses to reduce pressure on forests and watersheds (for example, by encouraging use of more energy efficient wood stoves and solar cookers in rural areas). Note: Some such projects may offer financial co-benefits through the Clean Development Mechanism programme.
ORGANIZED PRIVATE SECTOR 1. Insurance companies: Insurance companies that insure energy facilities should undertake independent risk mapping and risk reviews to assess and provide recommendations to federal bodies in charge of energy.

8. TRANSPORTATION AND COMMUNICATIONS
GOAL
To take pre-emptive measures to reduce vulnerability of critical transportation and communication infrastructure to climate change impacts.
OVERALL STRATEGIES
1. Include increased protective margins in construction and placement of transportation and communications infrastructure (i.e. higher standards and specifications). 2. Undertake risk assessment and risk reduction measures to increase the resilience of the transportation and communication sectors. 3. Strengthen existing transportation and communications infrastructure, in part through early efforts to identify and implement all possible 'no regrets' actions. 4. Develop and diversify secure communication backup systems to ensure both civil society and security forces have access to emergency communication methods.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR TRANSPORTATION AND COMMUNICATION
FEDERAL GOVERNMENT 1. Infrastructure standards: The Federal Government, through its relevant Ministries, Departments and Agencies, including the new Climate Change Commission and the Standards Organization of Nigeria, should review and update standards for construction and maintenance of transportation and communications infrastructure to include an additional protective margin for the expected risks associated with climate change. 2. Transportation infrastructure: The Federal Ministry of Transportation should work with State Governments, CSOs and the private sector to coordinate risk assessments and response plans, including mapping and identification of high-risk infrastructure, and implementing key infrastructure reinforcements and relocations. 3. Communications infrastructure: The Federal Ministries of Communications and Information should work with State Governments, CSOs and private sector providers to develop and implement risk assessment and response plans that include: mapping and identification of high risk infrastructure, investment in reinforcing and/or relocating existing high risk infrastructure, and expansion of backup communications systems for emergencies.
STATE AND LOCAL GOVERNMENTS 1. Infrastructure standards: State Governments should act in parallel with the Federal Government to update standards for construction and maintenance of transportation and communications infrastructure to include an additional protective margin for the expected risks associated with climate change. (Federal recommendation #1 above.) 2. Risk assessment and response plans: State Governments should work with federal agencies, CSOs and private sector providers to develop and implement risk assessment and response plans that include infrastructure mapping and identification of high risk infrastructure, and investment in reinforcing and/or relocating existing high risk infrastructure. (Federal recommendations #2 and 3 above.)
ORGANIZED PRIVATE SECTOR 1. Insurance companies: Insurance companies that insure transportation and communications facilities should undertake independent risk mapping and risk reviews to assess and provide recommendations to federal bodies in charge of transportation and communications. 2. Telecommunications companies: Telecommunications companies should carry out independent risk assessments and response plans, including consideration of the impact of weather events on capacity and demand for airtime.

9. INDUSTRY AND COMMERCE
GOALS
1. To protect the Nigerian industrial & commercial sectors from the adverse effects of climate change 2. To explore new markets and opportunities arising from climate change 3. To enhance Nigeria's competitiveness in this era of global green economy.
OVERALL STRATEGIES
1. Increase knowledge and awareness of climate change risks and opportunities 2. Undertake and implement risk assessments and risk reduction measures 3. Incorporate climate change into ongoing business planning 4. Review and enforce land use plans in industrial areas in light of climate change 5. Encourage relocation of high risk industries, facilities and markets 6. Promote and market emerging opportunities from climate change 7. Encourage informal savings and insurance schemes, and arrange for the availability of medium-term credit (especially for industries in crisis).
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR INDUSTRY AND COMMERCE
FEDERAL GOVERNMENT 1. Risk assessments and mapping: Federal Ministry of Environment should work with industry and CSOs and other relevant stakeholders to undertake risk assessments, including mapping and identifying high-risk areas for industry. These risk assessments and maps should be publicly available. 2. Incentives for re-location of industrial parks: Federal Ministry of Finance, Central Bank of Nigeria, Federal Inland Revenue Service and Federal Ministry of Commerce and Industries should provide incentives to establish and promote industrial parks in less environmentally sensitive areas.
STATE AND LOCAL GOVERNMENTS 1. State radio and TV programming: State Radio and TV stations should provide business-oriented programmes on climate change impacts and adaptation in English as well as local languages. 2. Industrial land use plans: State Ministries of Lands should review and enforce land use plans in high risk industrial areas. 3. Incentives for relocation of industries: State Ministries of Lands should explore land swap schemes to encourage relocation, and in co-operation with the Federal Government state Ministries of Commerce and Industries should provide tax breaks and other incentives for relocation of industries to industrial parks/layouts in less vulnerable areas.
CIVIL SOCIETY (CSOs AND COMMUNITIES) 1. Community radio programming: Community radio should provide business-oriented programmes on climate change impacts, adaptation measures and opportunities. 2. Industry training: CSOs should provide targeted training sessions for industry leaders and insurance companies on the impacts and opportunities of climate change. 3. Local Government training: CSOs should provide training and support for Local Governments in high risk areas to encourage relocation of markets. 4. Micro-credit and micro-insurance: CSOs should expand micro credit and micro insurance schemes to ensure that credit is available for SMEs in crisis. They should also consider livelihood diversification programmes in communities vulnerable to climate change.
ORGANIZED PRIVATE SECTOR 1. Awareness: Industries should make themselves aware of climate change impacts and opportunities. 2. Standards: Business should conform to international standards and best practices related to environmental management and climate-proofing. 3. Climate-sensitive business planning: Companies should incorporate climate change into annual and long term business plans, with particular emphasis on risk reduction, but additionally with a focus on new adaptation-related business opportunities (e.g. adapted agricultural inputs, increased demand for beverages and cooling equipment). 4. Relocation: Industries should plan for relocation of facilities located in high risk, high impact areas.

10. DISASTER, MIGRATION AND SECURITY
GOALS
To strengthen the capacity of the governments and people of Nigeria to: 1. Carry out disaster risk and vulnerability assessments 2. Prepare for and respond to climate change hazards 3. Anticipate and prepare for climate change induced migrations 4. Ensure security of lives as well as public and private property in the face of climate change impacts.
OVERALL STRATEGIES
1. Strengthen capacity to anticipate disasters and impacts on internal migration and security 2. Strengthen capacity to respond through information and awareness, training, equipment, plans and scenarios, and communication 3. Strengthen individual and community-based emergency preparedness and response capacity in high risk areas 4. Strengthen rural infrastructure and the availability of jobs to discourage out-migration.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR DISASTER, MIGRATION AND SECURITY
FEDERAL GOVERNMENT 1. Comprehensive Emergency Management Programme for Nigeria: The Presidency should lead implementation of a programme that brings together key Federal and State Government agencies, CSOs, private sector organizations, and international stakeholders to develop and approve a high-level, comprehensive emergency management plan for Nigeria that targets disaster risk reduction and response. The plan should: • Define roles and responsibilities and chain of command • Include specific Disaster Risk Reduction (DRR) policy measures • Support development of federal early warning and response systems • Identify critical infrastructure and provide disaster proofing plans for this infrastructure • Require development of State Emergency Management Agency (SEMA) plans and community-specific Emergency Management Measures, and ensure that summaries of these emergency management plans and measures are available online in a public-friendly format. 2. Training and preparedness: The comprehensive emergency management programme for Nigeria should also assign to NEMA responsibility for training state officials in emergency management planning and assisting them in development and implementation of state emergency management plans, and periodically run disaster scenarios with key decision makers who would be in charge during an emergency, especially in high risk states. 3. Weather data and forecasts: NIMET should increase the quality of their weather data collection (including reliability and credibility), prepare seasonal forecasts, and communicate this information widely in a user-friendly form. 4. Climate change hazard mapping: NIMET and the Ministry of Environment should map regional climate change hazards and impacts and make these maps available online. 5. Disaster risk reduction in vulnerable communities: NEMA should work with CSOs and State Governments to identify communities that are most vulnerable to climate-related disasters, and implement programmes for disaster risk reduction (DRR) in these communities. 6. Climate Change, Migration, and Security Initiative: The Federal Ministry of Internal Affairs should: • Collaborate with the International Organization for Migration (IOM) to update data on domestic migration trends and make reports on trends publicly available • Work with the National Climate Change Authority to identify key vulnerable rural communities and improve rural infrastructure and livelihood options in these communities in order to discourage climate change-related migration • Integrate climate concerns into peace building and conflict management programmes.

STATE AND LOCAL GOVERNMENTS

1. **Comprehensive Emergency Management Programme for Nigeria:** State and Local Governments should participate as partners in the comprehensive emergency management programme described above (Federal Recommendation #1).
2. **Training:** State Emergency Management Agencies (SEMAs), where they exist, and other key state agencies, should arrange and support training in emergency management planning for staff and officials (Federal Recommendation #2).
3. **Preparedness:** In high-risk states, the SEMAs and other key state agencies areas should arrange and support disaster preparedness workshops and simulations on a regular basis (Federal Recommendation #2).

CIVIL SOCIETY (CSOs AND COMMUNITIES)

1. **Comprehensive Emergency Management Programme for Nigeria:** CSOs/NGOs should participate as partners in the comprehensive emergency management programme described above (Federal Recommendation #1).
2. **Community protection policies and plans:** In high-risk areas, CSOs/NGOs should work with State officials to develop community and social protection policies and plans.
3. **Community disaster risk reduction plans and activities:** CSOs and NGOs should support communities in the development of disaster risk reduction (DRR) plans and activities (Federal Recommendation #5).

ORGANIZED PRIVATE SECTOR

1. **Comprehensive Emergency Management Programme for Nigeria:** The private sector should participate as partners in the comprehensive emergency management programme described above (Federal Recommendation #1).
2. **Integrating climate risks:** Companies should begin to factor climate-related risk into their operations. For example:
 - Engineers should include climate change risk in their design parameters
 - Construction companies should avoid development in high risk areas
 - Insurance companies should integrate climate risk into their underwriting calculations
 - Private hospitals should prepare for increases in patients affected by both the urgent and long term effects of climate-related disasters.

11. LIVELIHOODS
GOAL
To reduce the vulnerability of people and increase their adaptive capacity to climate change impacts through improved livelihoods development.
OVERALL STRATEGIES
In addition to sector-based strategies presented elsewhere in this document: 1. Develop a replicable approach/model that uses intermediate NGOs, community members and radio to diffuse climate change adaptation approaches and information and to gather feedback on adaptation actions focused on livelihoods. 2. Build a network of intermediate NGOs capable of working on climate change and livelihoods issues, where these NGOs support a number of communities in high risk states. 3. Animate communities with appropriate engagement methods, in order to elicit and document valid climate change and livelihood related needs/vulnerabilities. 4. Use or reinforce available (endogenous) community resources to reduce vulnerability and build livelihood-linked capacity to adapt to climate change. 5. Encourage community participation and active roles by both genders in all livelihood development initiatives.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR LIVELIHOODS
FEDERAL GOVERNMENT 1. Incentives for livelihood activities: Federal Government agencies should provide incentives for augmenting livelihood activities, e.g. support for micro-credit. 2. Integration into projects: Federal Government agencies should integrate community-based climate change adaptation strategies and actions into all Federal livelihood and community-based projects, including for instance Fadama III and LEEMP. 3. Livelihoods training and skills development: National Directorate of Employment (NDE) should expand and intensify training and skills development for people in high-risk areas, including in particular skills related to climate change adaptation (such as construction of water and grain storage and wind proofing buildings).
STATE AND LOCAL GOVERNMENTS 1. Livelihood programmes: State and Local Governments should carry out and augment livelihood programmes that provide input and materials for activities that support incomes of the population.
CIVIL SOCIETY (CSOs AND COMMUNITIES) 1. Develop and implement an NGO model for action on climate change and livelihoods: Major NGOs should develop and implement an approach/model that uses intermediate NGOs, community members and radio to diffuse climate change adaptation approaches and information and to gather feedback on adaptation actions focused on livelihoods. NGOs can stimulate/animate in communities; community members such as teachers and farmers can diffuse information; and radio broadcasters can provide regular and supportive information to the wider community and elicit feedback. Key implementation steps include: • Identification, selection and training of intermediate NGOs to undertake the role of supporting community-based adaptation livelihood activities • Development by the intermediate NGOs of programmes to support local NGOs, CBOs, and communities by providing technical and process support, a channel for funding, and a supervisory structure • Selection of communities for direct and indirect support.

2. **Programme elements:** Key elements of the community-level programmes will vary between communities, but may include:
- Provide education, information, awareness raising and sensitization to communities
 - Carry out participatory, community-based needs assessments
 - Design relevant interventions and activities in communities
 - Provide input and materials for activities that support incomes
 - Provide diffusion of adaptation responses out from communities through peer education (e.g. techniques used in BNRCC's pilot projects)
 - Incorporate community-oriented radio and other effective, inexpensive rural extension methods
 - Evaluate, scale up and replicate projects.

ORGANIZED PRIVATE SECTOR

1. **Appropriate technologies:** Private investors and microfinance institutions should help create new livelihood opportunities by investing in the design, production and sale of appropriate technologies, including imported technologies.

Note 1. Key Federal Government agencies include: Federal Ministry of Women Affairs and Social Development; National Poverty Eradication Programme (NAPEP); National Directorate of Employment (NDE); Special Senior Assistant to the President on the MDGs; and national offices of projects such as CBNRMP, Fadama III, LEEMP, MPP9, and the Virtual Poverty Fund.

Note 2. Key State Government agencies include: State Ministries of Women Affairs and Social Development; State agencies working on CBNRMP, Fadama III and LEEMP; State offices of NDE; and MDG offices at the state level. Key Local Government agencies include: Community Development and Cooperative Offices/Officers.

12. VULNERABLE GROUPS
GOALS
1. To develop programmes that support and assist the adaptation to climate change by vulnerable groups, including women, children & youth, the aged, and people with disabilities/special needs. 2. To harness opportunities arising from differentiated roles, responsibilities, representation and experiences of vulnerable groups for climate change adaptation.
OVERALL STRATEGIES
1. Create awareness among government staff, including disaster and emergency management personnel, about climate change impacts and how these impacts affect vulnerable groups. 2. Provide basic training for government staff on gender awareness tools to enhance implementation capacities. 3. Adapt government programmes, including emergency response plans and programmes directed at vulnerable groups, to better address the impacts of climate change on these groups. 4. Adapt public service facilities, including school buildings, to withstand storms and excess heat. 5. Intensify immunization of children and youth to provide protection against diseases that are expected to become more prevalent with climate change. 6. Retrain health workers to appreciate emerging climate change challenges within the context of immunization delivery and other comprehensive healthcare delivery. 7. Encourage faith-based and civil society organizations to provide social welfare programmes and other support to address the climate change-induced needs of vulnerable groups.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR VULNERABLE GROUPS
FEDERAL GOVERNMENT 1. Federal Government staff: Key staff in all Ministries, Departments, Commissions and Agencies should participate in internal education and learning programmes to become more familiar with how climate change affects vulnerable groups. 2. Emergency management needs of vulnerable groups: Federal disaster and emergency management organizations (e.g. NEMA) should develop response plans for emergency evacuations specific to the needs of vulnerable groups (who face more severe problems during climate-induced emergencies), and should assign additional resources to programmes supporting these vulnerable groups. Periodic engagements with people in high risks areas should also be encouraged so that women and the elderly are better prepared in the event of a disaster. This initiative should be closely integrated with the Comprehensive Emergency Management Programme for Nigeria (Sector/Theme 10: Disaster, Migration and Security). 3. Programmes for women and youth: Programmes of the Federal Ministry of Women Affairs and Social Development and the Federal Ministry of Youth Affairs should be modified or developed to respond to the impacts of climate change on vulnerable groups. 4. Immunization of children and youth: The Federal Ministry of Health should expand programmes to immunize children and youth against cerebro-spinal meningitis, which is expected to become more prevalent with a changing climate. 5. Modifications to school buildings: Funds from the Education Trust Fund should be used to modify schools across Nigeria so that they better withstand extreme rain, windstorms and excessive heat. 6. Programmes in the Niger Delta: The Federal Ministry of the Niger Delta and the Niger Delta Development Commission (NDDC) should develop programmes that respond to the needs of coastal communities exposed to sea level rise and storm surge destruction. These programmes should build on current projects in the areas of shore protection and erosion control, environmental rehabilitation, water, schools, health care, and hospitals.
STATE AND LOCAL GOVERNMENTS 1. Cooperation with the Federal Government: State Ministries with concurrent responsibilities with the Federal Government in areas of Women Affairs, Social Development, Youth, Emergency Relief, Education, Health, etc. should develop the capacity to cooperate with, facilitate and help implement national programmes for vulnerable people affected by climate change.

2. **Social welfare:** All State and Local Government agencies with a mandate to provide social welfare and/or community-based development assistance should initiate programmes designed specifically to assist the vulnerable people most affected by climate change impacts.

CIVIL SOCIETY (CSOs AND COMMUNITIES)

1. **Advocacy:** CSOs/NGOs should advocate for State welfare agencies to acquire the capacity to address current and predicted climate change impacts affecting the welfare of vulnerable groups.
2. **Health and welfare organizations:** CSOs/NGOs should encourage faith-based health and welfare organizations to better understand climate change impacts on women, the poor, and other vulnerable groups, and to develop enhanced capacity to respond to the climate-related needs of these groups.
3. **Health impacts:** CSOs/NGOs should build their knowledge about health impacts of climate change on vulnerable groups (e.g. impacts of heat stress), and document how institutions can best respond. Faith-based organizations and CSOs/NGOs should provide information to community leaders on the need for immunization of children and youth against cerebro-spinal meningitis.
4. **Schools:** CSOs/NGOs should work with schools to help build climate change adaptation skills and knowledge among youth in the community (whether in or out-of-school).
5. **Microfinance for vulnerable groups:** CSOs/NGOs should encourage microfinance organizations to increase their understanding of climate change impacts and encourage them to develop the capacity to support vulnerable groups affected by climate change.

ORGANIZED PRIVATE SECTOR

1. **Microfinance:** Leaders of microfinance organizations should increase their understanding of climate change impacts and develop their organizational and financial capacity to provide support for vulnerable groups, including livelihood support programmes.

Note 1. Key Federal Government agencies include: Federal Ministry of Women Affairs and Social Development; Federal Ministry of Health; Federal Ministry of Youth Affairs; National Emergency Management Agency (NEMA); Federal Ministry of Education; Education Trust Funds; Federal Ministry of the Niger Delta; and the Niger Delta Development Commission (NDDC).

Note 2. Key State Government agencies include: State Ministries of Women Affairs and Social Development; State Ministries of Youth and Sport; State Emergency Relief Agencies; State Universal Basic Education Boards; State Ministries of Education; State Ministries of Health; Secondary Education Management Boards; and State Oil Producing Areas Development Commission. Key Local Government (LG) agencies include: LG Education Department, LG Health Department, and LG Welfare Department.

Note 3. Key civil society organizations include: Faith based groups; NGOs; Red Cross; and Community Development Associations.

13. EDUCATION
GOALS
1. To develop a good public understanding of the impacts of climate change and the need for people of all ages to learn about and contribute to environmental protection in general and climate change adaptation in particular. 2. To reduce exposure of school children to the impacts of climate change, including extreme weather events. 3. To increase the resilience of educational infrastructure to the impacts of climate change, including extreme weather events ("climate-proofing").
OVERALL STRATEGIES
1. Provide evidence-based information to raise awareness and trigger climate change adaptation actions that will protect present and future generations in Nigeria. 2. Develop skills-based curriculum in subjects like science, geography, social studies, language arts, environmental education and technology that will empower children to better respond to the threats of climate change. 3. Train teachers on climate change adaptation teaching strategies and techniques at pre-primary, primary, secondary and tertiary levels of education in Nigeria.
RECOMMENDED POLICIES, PROGRAMMES, AND OTHER MEASURES FOR EDUCATION
FEDERAL GOVERNMENT 1. Research: The Ministry of Education should encourage and support research to provide a better understanding of the impact of climate change on teaching and learning activities and on the physical school environment in Nigeria. 2. Awareness: In collaboration with State Governments, the Federal Government should embark on a sustained public awareness and education programme on climate change risks and adaptation options. 3. Curriculum: The Federal Government should provide support for development of curriculum addressing climate change impacts and adaptation at all levels of the education system. 4. Programmes and projects: The Federal Government should invest in school-based programmes and projects aimed at helping children and students better respond to the threats posed by climate change. 5. Universities: The National Universities Commission should encourage universities to address climate change adaptation in academic programmes and in operations (for instance, have a flexible calendar that recognizes national variations in the temperature and rainfall regimes).
STATE AND LOCAL GOVERNMENTS 1. Awareness: In collaboration with the Federal Government, State Governments should provide increased support for public awareness and education on climate change risks and adaptation options (including programming on state radio and TV stations in English and local languages). 2. Programmes and projects: Local Governments should institute tree planting and other programmes in schools, to involve students in practical community-based responses to climate change. 3. School infrastructure: State Governments should invest in building school structures that are adapted to expected changes in the climate (which will vary from region to region, but may include increased rainfall, higher temperatures, more severe storms, etc.). 4. Classroom: Education inspectorates of Ministries of Education should ensure that schools maintain acceptable ambient conditions in the classroom in spite of climate change (through low teacher/student ratios, adequate ventilation, suitable furniture, etc.).

CIVIL SOCIETY (CSOs AND COMMUNITIES)

1. **Programmes and projects:** Civil society organizations should encourage and help children and students to undertake practical climate change adaptation actions. Depending on location, these actions may include planting trees, shrubs and grasses; protecting old trees; harvesting rainwater; growing food using improved practices; etc.
2. **Community radio programming:** Community radio should provide programmes on climate change impacts, adaptation measures and opportunities.

SECTION III. THE PLAN OF ACTION

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7. NASPA-CCN Roles and Responsibilities

7.1 Introduction

In light of the imperatives stated earlier, this section lays out the roles and responsibilities of governments, the private sector, civil society, and the international community with respect to climate change adaptation in Nigeria.

7.2 The Federal Government

In view of its central governance role, the Federal Government should:

1. Enact a comprehensive law or body of laws to provide a mechanism for achieving Nigeria's adaptation policy objectives.
2. Mainstream climate change adaptation into all existing and new National Development Plans and official Vision statements (such as *Vision 20:2020* and the Millennium Development Goals), and into all existing and new sector-specific policies and programmes. This should involve all Ministries and Agencies, but of particular importance are Ministries responsible for Planning, Finance, Environment, Agriculture, Health, Water Resources, Transport, Housing, Regional and Urban Development, Energy, Education, and Science and Technology, each of which has a mandate closely linked to climate change impacts and adaptation.
3. Respond actively and effectively to global and regional initiatives on climate change adaptation. This is necessary to achieve compliance with international obligations and to align with regional positions. More importantly, adaptation measures involving management of trans-boundary resources, such as rivers, coastal zones and watersheds, may require concerted action, coordinated across borders, to be successful. Regional collaboration also allows for: 1) sharing of resources such as personnel, agro-meteorological data, climate modelling, research and training facilities; 2) improved responses to interstate migrations and the associated security risks that may arise from climate change induced disasters; and 3) undertaking joint projects (potentially including regional funding).

Every action in the planning and implementation of the NASPA-CCN should be closely examined to determine where there is advantage in collaboration in the West African sub-region. Of particular importance is the joint management of the Niger River and its watershed.

Opportunities for collaboration in climate change response strategies in the West African sub-region already exist, including for instance collaboration with the Agro-Meteorological Centre in Niamey for climate modelling, scenario development and meteorological data; coordinating climate change policies and actions of member states through ECOWAS; and cooperation on regional climate change projects (such as the regional Adaptation to Climate and Coastal Change project supported by the Global Environment Facility).

4. Mandate the Authority responsible for Climate Change to carry out the following functions:

Planning and Setting Priorities:

- Lead and coordinate planning of federal climate change adaptation activities across many federal ministries, including the National Planning Commission.

- Collect, analyze and report on data that will facilitate the making of effective policies to tackle climate change impacts in Nigeria (as elaborated in the text box below).
- Ensure that climate change adaptation is taken into account when drawing up Nigeria's Annual Budgets.

Implementation:

- Actively and consistently strengthen inter-ministerial and inter-agency coordination and cooperation in climate change adaptation.
- Create an enabling environment for the organized private sector to invest in climate change adaptation, including opportunities presented by adaptation options.
- Provide a platform for CSOs, the organized private sector and government to share information and coordinate activities.
- Work with the States, the FCT, and Local Governments, the organized private sector, CSOs and international partners to implement the adaptation aspects of the National Climate Change Policy for Nigeria.

Mobilization of Resources

- Create the enabling environment for accessing available funding from international sources such as the Global Environment Facility (GEF), the Green Fund, the Adaptation Fund under the Kyoto Protocol, the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification, and the Ramsar Convention on the Conservation of Wetlands.

Evaluation:

- Report annually to the Presidency and the public on progress towards meeting the adaptation indicators outlined in this document.

Data and Information Needs: The Federal Government Role

Key data and information needs include:

- Climate forecasting and climate scenarios data (transformation of GCM data into local climate scenarios based on regional climate modeling)
- Data linking past climates with vulnerabilities in each sector/theme (from national to community level)
- Data on sector-specific and socio-economic vulnerability and impacts across various spatial dimensions, scenarios, socioeconomic models of Nigeria's future growth path, and integrated assessment models (as impacts or actions in one sector will affect other sectors)
- Sector-specific impact assessment data for community level impacts, including the social and ecological implications
- Long-term data on sea level rise and on the rate of land subsidence in coastal areas
- Data for prediction of storm surges and waves from the South Atlantic
- Data for comprehensive analysis of droughts in the arid north, and data on the rate of desertification
- Information on sector-specific practices and technologies for adaptation to biophysical impacts of climate change, including information on least-cost approaches
- Other sector-specific research, information, and data needs as summarized in Section 8.2
- A baseline dataset to assess future progress towards the achievement of adaptation and reduction of vulnerability.

To build this body of information the Authority responsible for Climate Change should work with Federal Ministries, research institutes, and other groups to:

- Expand the network of long term weather data stations, and data stations that measure key environmental indicators (e.g. hydrological)

- Invest in climate science and modeling and in climate change impacts and adaptation research, taking advantage of partnerships between research organizations
- Generate and disseminate regionally relevant climate data and information, climate change projections, and other types of information to support sector-specific and community-based adaptation decisions
- Facilitate collaboration among governments, the private sector, and research organizations to make existing adaptation-relevant scientific and technical data and information more accessible and user-friendly
- Build knowledge and experience with new adaptive technologies and practices, and facilitate use of this knowledge and experience through improved information dissemination and technology transfer
- Learn from international initiatives by, for instance, promoting international research collaborations, and linking into databases and information clearinghouses.

7.3 State Governments

Every State of the Federation should:

1. Have a focal Ministry, Department or Agency mandated to:
 - Lead and provide strong coordination for all the climate change adaptation activities across the State
 - Report annually to the Governor and the public on the State's progress towards meeting the adaptation needs of the State
 - Facilitate the implementation of the adaptation strategy through all the sectors, coordinating with the Federal and Local Governments
 - Provide a platform for CSOs, the organized private sector and government to share information and harmonize activities
 - Recognize and engage CSOs, the organized private sector and international partners as stakeholders in creating and implementing climate change adaptation policies, and work with these groups to ensure the adaptation policies are gender-sensitive.
2. Mainstream climate change adaptation into all existing and new Development Plans and official Vision statements, and into all existing and new sectoral policies and programmes.
3. Ensure that climate change adaptation is taken into account when drawing up the State's Annual Budget.
4. Actively and consistently strengthen inter-ministerial and inter-agency coordination and cooperation in climate change adaptation in the State.
5. Create an enabling environment for the organized private sector to invest in climate change adaptation, including business opportunities presented by climate change adaptation options.

7.4 Local Governments

Local Governments, in collaboration with the Federal and State Governments where appropriate, should:

1. Strengthen the adaptive capacity of communities by:
 - Providing access to information that will support poor people's livelihoods, including adaptation strategies that are working in similar environments

- Making micro-credit available and accessible, thus relaxing the constraint of poverty, which often makes it difficult for people to adapt
 - Providing technical know-how in such areas as agricultural improvement and water, soil and forest resources management
 - Providing an appropriate incentive structure for climate change adaptation initiatives, e.g. payment for services rendered for participating in the management of natural resources
 - Promoting the development of skills for running community-based organizations (CBOs), such as cooperative societies
 - Strengthening of local capacity to contribute to the shaping of public policy and governance decisions, particularly those pertaining to climate change adaptation
 - Listening to communities, especially the most vulnerable members, to ensure appropriateness and equity in participation, community ownership and sustainability of climate change adaptation initiatives.
2. Put in place a climate change adaptation communication and outreach strategy with the objective of enabling a level of understanding that will allow all stakeholders to participate actively in climate change adaptation. This will involve:
- Taking action to meet the communication needs of stakeholders, especially the most vulnerable
 - Making climate change information accessible to individuals, households and other stakeholders by using a variety of formats and channels, such as theatre, storytelling, radio, television, the print media and social networks.

7.5 Organized Private Sector

The Organized Private Sector should:

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

7.6 Civil Society Organizations

Civil Society Organizations should:

1. Engage in outreach activities to raise people's awareness of climate change and adaptation measures
2. Carry out gender-sensitive research that will deepen our understanding of communities' awareness; the current exposure of communities and the environment; communities' vulnerability; and the status of community adaptation to climate change
3. Work with the three levels of government and international partners to deliver targeted support to people who are or will be impacted by climate change, particularly the most vulnerable groups

4. Work with communities on pilot projects to introduce new and improved adaptation options and to replicate indigenous/local climate change adaptation strategies
5. Run training programmes on climate change adaptation for communities
6. Provide independent monitoring of progress towards effective adaptation across Nigeria
7. Enhance informed participation in decision-making, by working to open up decision-making processes, mobilize broad participation, and achieve greater clarity of issues regarding climate change.

7.7 Households and Individuals

Households and individuals should:

1. Learn how they can adapt to climate change in terms of their livelihoods, energy use, how they dispose of wastes, where they build their houses and the way they manage their surroundings
2. Be willing to share information with other stakeholders on their experiences in climate change impacts and adaptation
3. Prepare to make attitudinal changes in order to build capacity for adaptation to climate change.
4. Recognize that adaptation to climate change can be informed by, and build on, what they are already doing.

7.8 International Organizations and Donors

International organizations and donors should:

1. Provide technical and financial support for:
 - Institutional capacity building for the National and State climate change authorities and for CSOs
 - Reducing transaction barriers (e.g. costs and technical skills) relating to climate change adaptation
 - Implementation of climate change adaptation policies, programmes, and other measures.
2. Provide technical support for research, monitoring and evaluation of the mainstreaming process in order to develop understanding of what contributes to its success.
3. Provide technical support in identifying disaster risk reduction initiatives, as well as poverty reduction and natural resource management programmes, which cost-effectively address climate change vulnerability.

8. NASPA-CCN Implementation

8.1 Introduction

This Section presents the NASPA-CCN implementation plan, organized as follows:

- **Section 8.2** consolidates the content of the previous sections into a summary of the NASPA-CCN responsibilities of each major stakeholder group
- **Section 8.3** organizes the various initiatives into a preliminary implementation plan
- **Section 8.4** addresses the question of NASPA-CCN funding
- **Section 8.5** discusses measurement, verification, and reporting of the NASPA-CCN results.

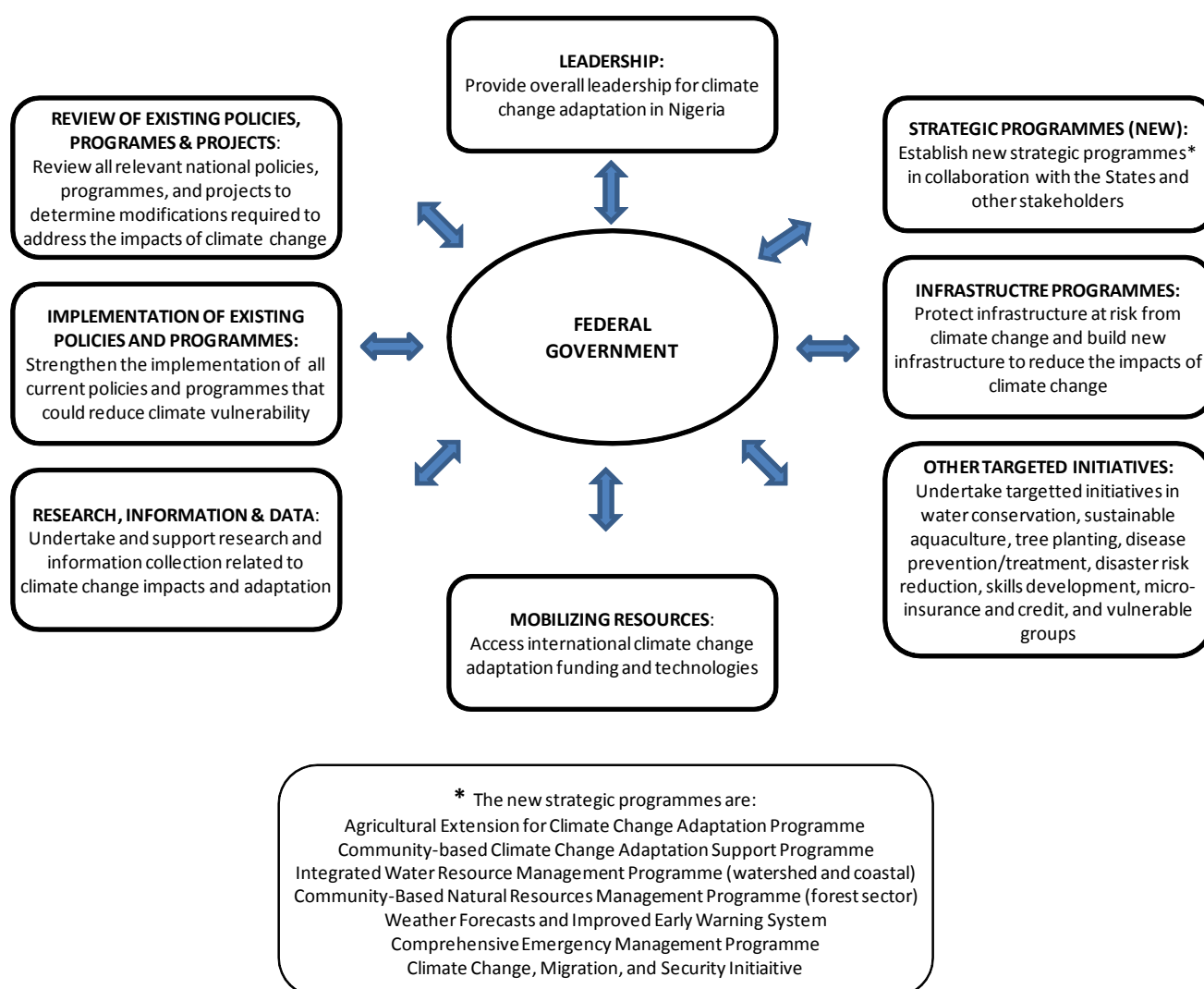
8.2 Integrating NASPA-CCN Responsibilities and Contributions

This section integrates the sectoral/thematic policies, programmes, and measures presented in Section 6 and the overarching roles and responsibilities outlined in Section 7.

Specifically, in order to provide greater clarity about the responsibilities and contributions of each stakeholder group, the information is presented separately for each of the major groups:

- Federal Government
- State Governments
- Local Governments
- Civil Society
- Organized Private Sector.

For each group the recommended NASPA-CCN responsibilities and contributions are presented in graphic form, followed by a narrative description.

Figure 10 NASPA-CCN Implementation: Recommended Role of the Federal Government**FURTHER DETAILS: FEDERAL GOVERNMENT**

LEADERSHIP: The Federal Government shall assume overall leadership in climate change adaptation in Nigeria, including establishing the necessary legal and institutional frameworks, planning and setting priorities, coordinating and facilitating action by other stakeholders, and evaluating progress.

REVIEW OF EXISTING POLICIES, PROGRAMMES AND PROJECTS: The Federal Government shall review all relevant national policies, programmes, and projects to determine modifications required in view of the need for climate change adaptation. Where significant gaps are identified, the government shall update and revise policies, programmes, and projects to mainstream climate change adaptation. This review process applies to all programmes of the Federal Government, including *Vision 20:2020*, and to all Ministries, Departments and Agencies (MDAs) (Details: Section 5.4). The review shall consider the particular needs of vulnerable groups (Section 6).

IMPLEMENTATION OF EXISTING POLICIES AND PROGRAMMES: The Federal Government shall strengthen the implementation of all existing policies and programmes that could reduce vulnerability to climate change (Section 6), including the National Forest Policy (Sector 3), National Biodiversity Strategy and Action Plan (Sector 4), public health and related programmes (Sector 5), disaster management programmes (Sector 10), and other sectoral policies/programmes (all sectors).

RESEARCH, INFORMATION, AND DATA: The Federal Government shall undertake and support research and information collection related to climate change impacts and adaptation, including:

- Collecting, analyzing and reporting on foundation information/data needs (Section 7.2).
- Leading and supporting specific adaptation-related research programmes in the areas of agriculture, forests, and human health. (Sectors 1, 3, 5).
- Developing and maintaining a national water quality survey, a national forest inventory, and risk assessments and mapping of climate change hazards (Sectors 2, 3, 9, 10).
- Preparing valuation studies of the ecosystem services provided by forests (Sector 3).

STRATEGIC PROGRAMMES (NEW): The Federal Government shall establish, in collaboration with the States, Local Governments and other stakeholders, the following major strategic programmes:

- Agricultural Extension Services for Climate Change Adaptation Programme (Sector 1)
- Community-based Climate Change Adaptation Support Programme (Sector 2)
- Integrated Water Resource Management Programme (watershed and coastal) (Sector 2)
- Community-Based Natural Resources Management Programme (forest sector) (Sector 3)
- Weather Forecasts and Improved Early Warning System (Sectors 1, 10)
- Climate Change, Migration, And Security Initiative (Sector 10)
- Comprehensive Emergency Management Programme (enhanced for climate change impacts and for vulnerable groups) (Sectors 10, 12)

INFRASTRUCTURE PROGRAMMES: The Federal Government shall:

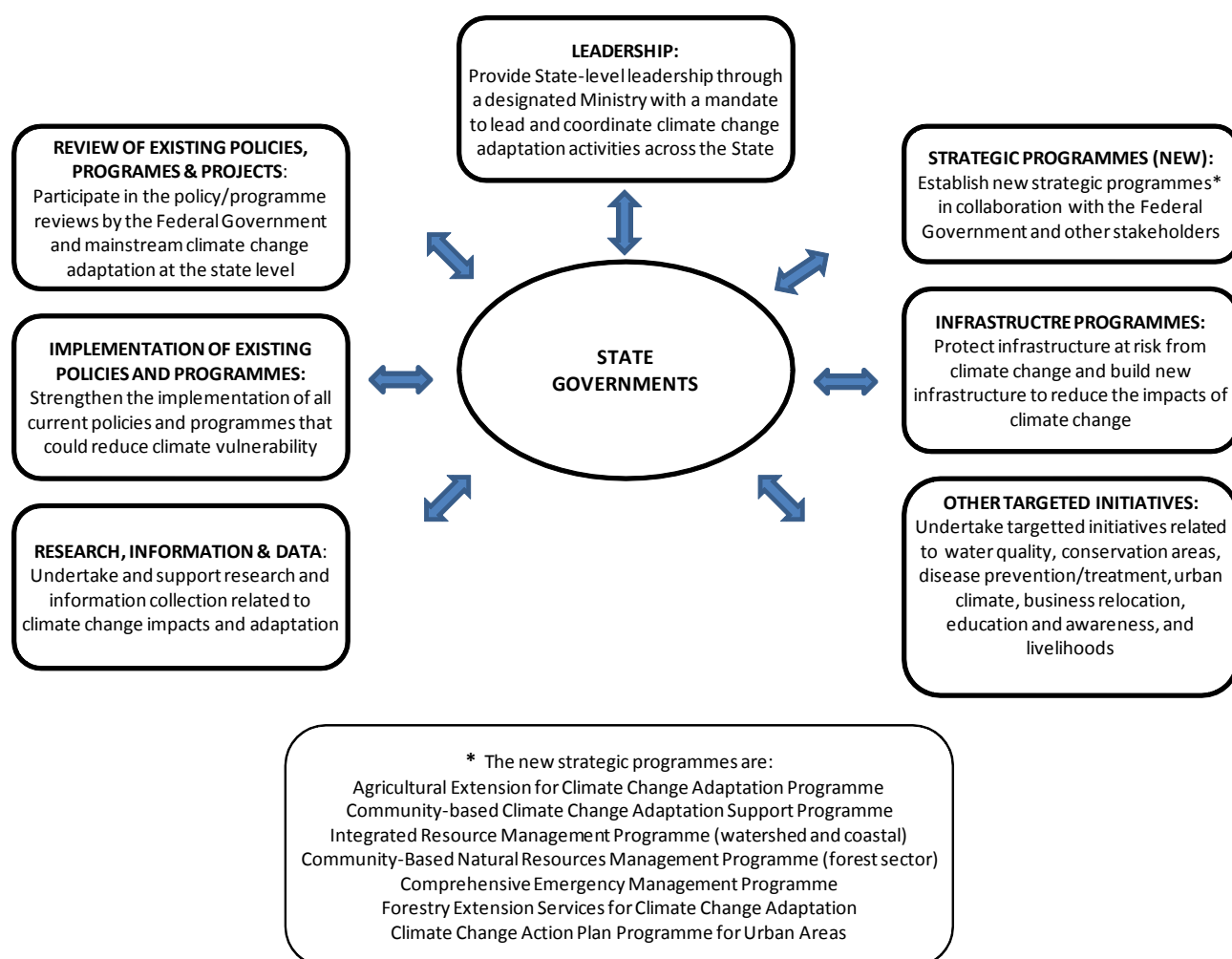
- Protect infrastructure at risk from climate change: Undertake or coordinate risk assessments and develop/implement response plans. Priority sectors include water management, energy, transportation, communications, and education (Sectors 2, 7, 8, 10, 13). Review and update standards for construction and maintenance of infrastructure to protect against climate change risks (Sectors 6, 7, 8).
- Build new infrastructure to reduce the impacts of climate change: Implement environmentally-sound and sustainable irrigation for crops and water supply for livestock; extend and improve water supply infrastructure in urban and rural areas; and build and maintain wastewater and solid waste management facilities (Sectors 1, 2, 5).

OTHER TARGETED INITIATIVES: The Federal Government shall:

- Promote poverty reduction through integration of adaptation and mitigation (for instance, intercropping with biofuel crops) (Sector 1)
- Explore water efficiency and conservation options (Sector 2)
- Explore use of economic instruments to achieve sustainable water resources management (Sector 2)
- Enhance artisanal fisheries and encourage sustainable aquaculture as options for fishing communities (Sector 2)
- Provide business incentives for tree planting (Sector 3)
- Strengthen programmes for prevention/treatment of climate change-linked diseases (Sectors 5, 12)
- Implement disaster risk reduction programmes in vulnerable communities (Sector 10)
- Expand training and skills development in areas of high climate-change risk (Sector 10)
- Promote micro-insurance and micro-credit for groups or sectors vulnerable to climate change (Sectors 1, 11)
- Sensitize government officials regarding climate change impacts on vulnerable groups (Sector 12).
- Undertake adaptation programmes that respond to the needs of coastal communities exposed to sea level rise and storm surge destruction (Sector 12).

MOBILIZING RESOURCES: The Federal Government shall work to:

- Create the enabling environment for accessing available funding from international sources
- Directly access international funding for technologies that can contribute to climate change adaptation in Nigeria (all sectors).

Figure 11 NASPA-CCN Implementation: Recommended Role of State Governments**FURTHER DETAILS: STATE GOVERNMENTS**

LEADERSHIP: State Governments should establish a focal Ministry or Agency with a mandate to lead and provide strong coordination for climate change adaptation activities across the State, including coordinating with the Federal Government; facilitating action by civil society, the private sector, and international partners; and evaluating and reporting on progress (Section 7.3).

REVIEW OF EXISTING POLICIES, PROGRAMMES AND PROJECTS: State Governments should participate as partners in the policy/programme reviews undertaken by the Federal Government (Figure 10 above). At the State level, governments shall mainstream climate change adaptation into all existing and new development plans and vision statements, sectoral policies and programmes (Section 6). State Governments shall specifically review existing land use plans in light of climate change (Sector 6).

IMPLEMENTATION OF EXISTING POLICIES AND PROGRAMMES: State Governments should strengthen implementation of current policies and programmes that could reduce vulnerability to climate change, including:

- Strengthening management of Forest Reserves and protected areas; and improving and enforcing regulation of commercial logging (Sector 3)
- Strengthening management of other protected areas (incl. biodiversity hotspots) (Sector 4)
- Enhancing implementation/enforcement of existing land use plans (Sectors 6, 9)
- Strengthening assistance to vulnerable groups most affected by climate change (through state-level social welfare and community development programmes) (Sector 12)
- Strengthening inter-ministerial and inter-agency coordination and cooperation in climate change adaptation (Section 7).

RESEARCH, INFORMATION, AND DATA: State Governments should undertake and support research and information collection related to climate change impacts and adaptation, including:

- Strengthening research at state universities and cooperating with research institutions in the area of climate change impacts and adaptation in the agricultural sector (Sector 1)
- Intensifying programmes to survey and monitor quantity, quality, and distribution of water resources, particularly in the Sahel and Sudan savanna zones (Sector 2)
- Undertaking risk mapping of floodplains, erosion-prone areas, and critical climate-sensitive infrastructure, including municipal water and energy facilities (Sector 6).

STRATEGIC PROGRAMMES (NEW): State Governments should collaborate with the Federal Government and stakeholders to establish and implement the following strategic programmes:

- Agricultural Extension Services for Climate Change Adaptation Programme (Sector 1)
- Community-based Climate Change Adaptation Support Programme (Sector 1)
- Integrated Water Resource Management Programme (watershed and coastal) (Sector 2)
- Community-Based Natural Resources Management Programme (forest sector) (Sector 3)
- Comprehensive Emergency Management Programme (enhanced for climate change impacts and for vulnerable groups) (Sector 10)

State Governments should also establish and implement the following major strategic programmes:

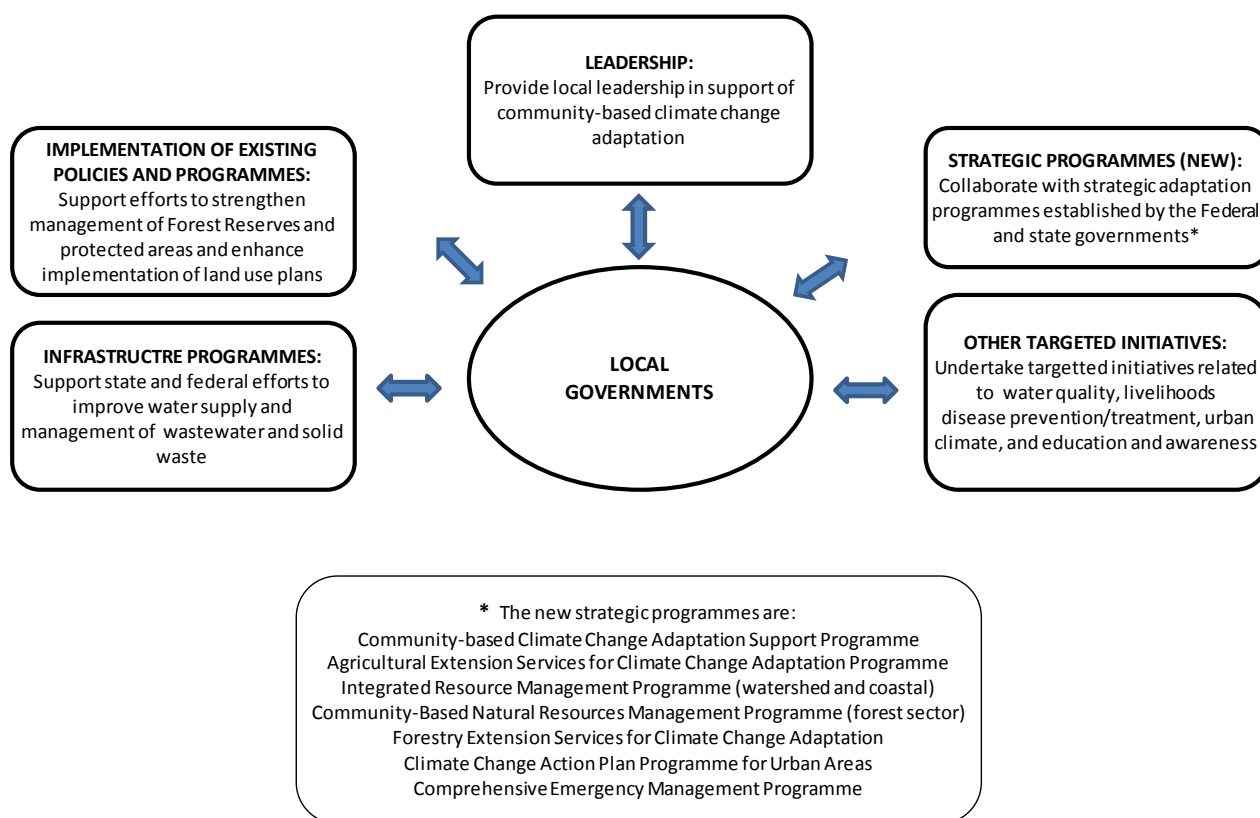
- Forestry Extension Services for Climate Change Adaptation (Sector 3)
- Climate Change Adaptation Action Plan Programme for Urban Areas (Sector 6)

INFRASTRUCTURE PROGRAMMES: In cooperation with the Federal Government, State Governments should:

- Protect infrastructure at risk from climate change: Undertake or coordinate risk assessments and develop/implement response plans. Review, update and provide training relating to standards for construction and maintenance of infrastructure to protect against climate change risks (Sectors 7 and 8).
- Build new infrastructure to reduce the impacts of climate change: Extend and improve water supply infrastructure in urban and rural areas; build and maintain wastewater and solid waste management facilities (Sectors 2, 5).

OTHER TARGETED INITIATIVES: State Governments should:

- Expand and strengthen programmes to reduce surface and ground water contamination in areas of decreasing water availability (Sector 2)
- Increase use of economic instruments/incentives to achieve sustainable forest management (Sector 3)
- Support Local Governments and communities adjacent to conservation areas by providing alternative sources of livelihood (Sector 4)
- Strengthen programmes for prevention/treatment of climate change-linked diseases (Sectors 5, 12)
- Pilot a "cool communities" programme to reduce urban 'heat island' effect (Sector 5); work with CSOs to implement community-based projects in high-risk communities (e.g. windbreaks); and implement a revitalization programme for urban green spaces/shades (Sector 6)
- Provide incentives for relocation of businesses from areas vulnerable to climate change (Sector 9)
- Provide programmes on climate change impacts/adaptation on State radio, print media and TV (Sector 9)
- Implement/augment programmes that provide input and materials for activities that support livelihoods (Sector 11).

Figure 12 NASPA-CCN Implementation: Recommended Role of Local Governments**FURTHER DETAILS: LOCAL GOVERNMENTS**

LEADERSHIP: Local Governments should provide local leadership in support of community-based climate change adaptation, including communications and outreach to build stakeholder understanding and participation in adaptation (Section 7.4).

IMPLEMENTATION OF EXISTING POLICIES AND PROGRAMMES: Local Governments should support the efforts of state agencies to strengthen management of Forest Reserves and protected areas (Sector 3), and to enhance implementation/enforcement of existing land use plans (Sectors 6, 9).

STRATEGIC PROGRAMMES (NEW): Local Governments should collaborate with the strategic adaptation programmes established by the Federal and State Governments, including:

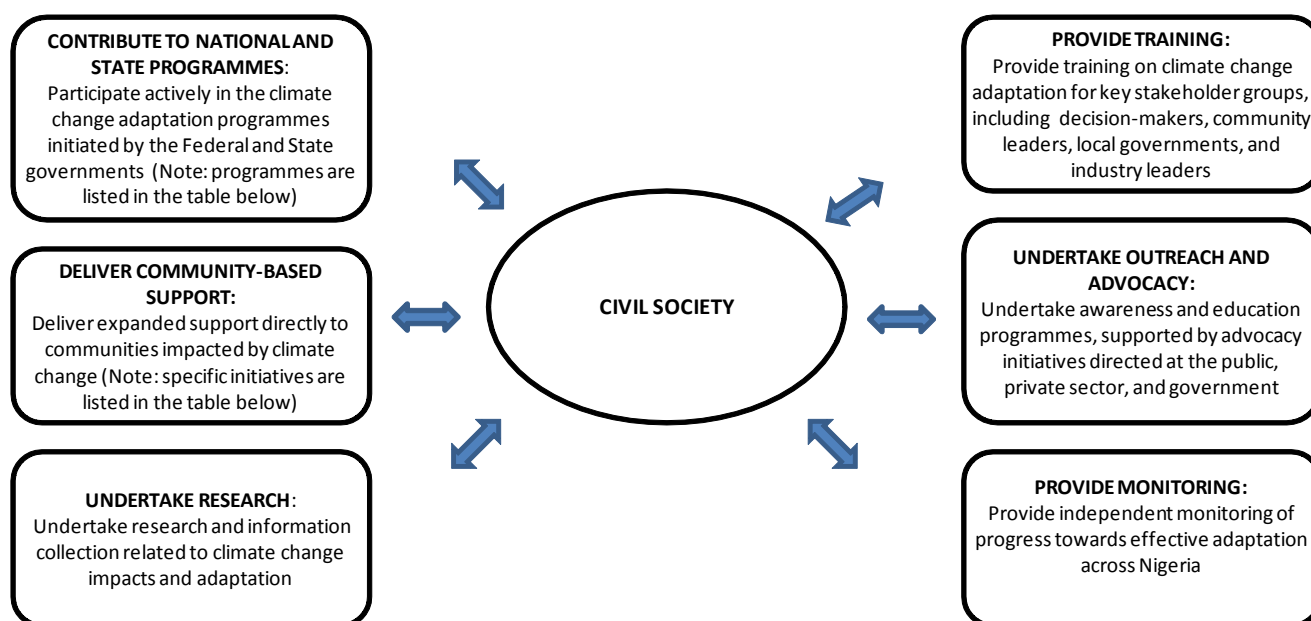
- Community-based Climate Change Adaptation Support Programme (Sector 1)
- Agricultural Extension Services for Climate Change Adaptation Programme (Sector 1)
- Integrated Water Resource Management Programme (watershed and coastal) (Sector 2)
- Community-Based Natural Resources Management Programme (forest sector) (Sector 3)
- Forestry Extension Services for Climate Change Adaptation (Sector 3)
- Climate Change Adaptation Action Plan Programme for Urban Areas (Sector 6)
- Comprehensive Emergency Management Programme (enhanced for climate change impacts and for vulnerable groups) (Sector 10).

INFRASTRUCTURE PROGRAMMES: Local Governments should work with State and Federal Governments to extend and improve water supply infrastructure in urban and rural areas, and build and maintain wastewater and solid waste management facilities (Sectors 2, 5).

OTHER TARGETED INITIATIVES: Local Governments should :

- Support programmes to reduce surface and ground water contamination in areas of decreasing water availability (Sector 2)
- Support efforts to provide communities adjacent to conservation areas with alternative sources of livelihood (Sector 4)
- Engage with programmes for prevention/treatment of climate change-linked diseases (Sectors 5, 12)

- Work with CSOs to implement community-based projects in high-risk communities; and implement a revitalization programme for urban green spaces/shades (Sector 6)
- Implement or support programmes that provide input and materials for activities that support livelihoods (Sector 11)
- Implement programmes in schools to involve students in practical community-based responses to climate change (Sector 13).

Figure 13 NASPA-CCN Implementation: Recommended Role of Civil Society**FURTHER DETAILS: CIVIL SOCIETY**

CONTRIBUTE TO NATIONAL AND STATE PROGRAMMES: CSOs and NGOs should actively participate in the climate change adaptation programmes initiated by the Federal and State Governments. This would include in particular:

- Policy, programme and project review (all sectors)
- Agricultural Extension Services for Climate Change Adaptation Programme (Sector 1)
- Community-based Climate Change Adaptation Support Programme (Sector 1)
- Integrated Water Resource Management Programme (watershed and coastal) (Sector 2)
- Community-Based Natural Resources Management Programme (forest sector) (Sector 3)
- Health and climate change: prevention/treatment of climate change-related diseases; wastewater and solid waste management; “cool communities” pilot (Sector 5)
- Climate Change Adaptation Action Plan Programme for Urban Areas (Sector 6)
- Comprehensive Emergency Management Programme (enhanced for climate change impacts and for vulnerable groups) (Sector 10).

DELIVER COMMUNITY-BASED SUPPORT: In addition to participation in major national and state programmes, CSOs and NGOs should work to deliver expanded support directly to people and communities impacted by climate change, particularly the most vulnerable groups. Specific recommendations include:

- **Develop and implement an NGO model for action on climate change and livelihoods:** Major NGOs should develop and implement an approach/model that uses intermediate NGOs, community members, and radio to diffuse and support climate change adaptation approaches and information and to gather feedback on adaptation actions (Sector 11).
- **Address the needs of vulnerable groups:** CSOs/NGOs should encourage and assist health and welfare organizations to better understand climate change impacts on women, the poor and other vulnerable groups, and to develop enhanced capacity to respond to the climate-related needs of these groups (Sector 12).
- **Support microfinance:** CSOs/NGOs should work with partners to ensure availability of microfinance and micro-insurance for climate change adaptation by farm families, rural agricultural communities, small businesses, and vulnerable groups (Sectors 1, 9, 12).

- **Implement sectoral initiatives:** CSOs/NGOs should encourage and provide assistance to communities to: develop community-owned aquaculture projects (Sector 2); domesticate forest products to reduce pressure on forests (Sector 3); negotiate forest management protocols with State Governments (Sector 4); develop and use renewable energy to reduce pressure on forests and watersheds (Sector 7); and develop community disaster risk reduction plans and activities (Sector 10).

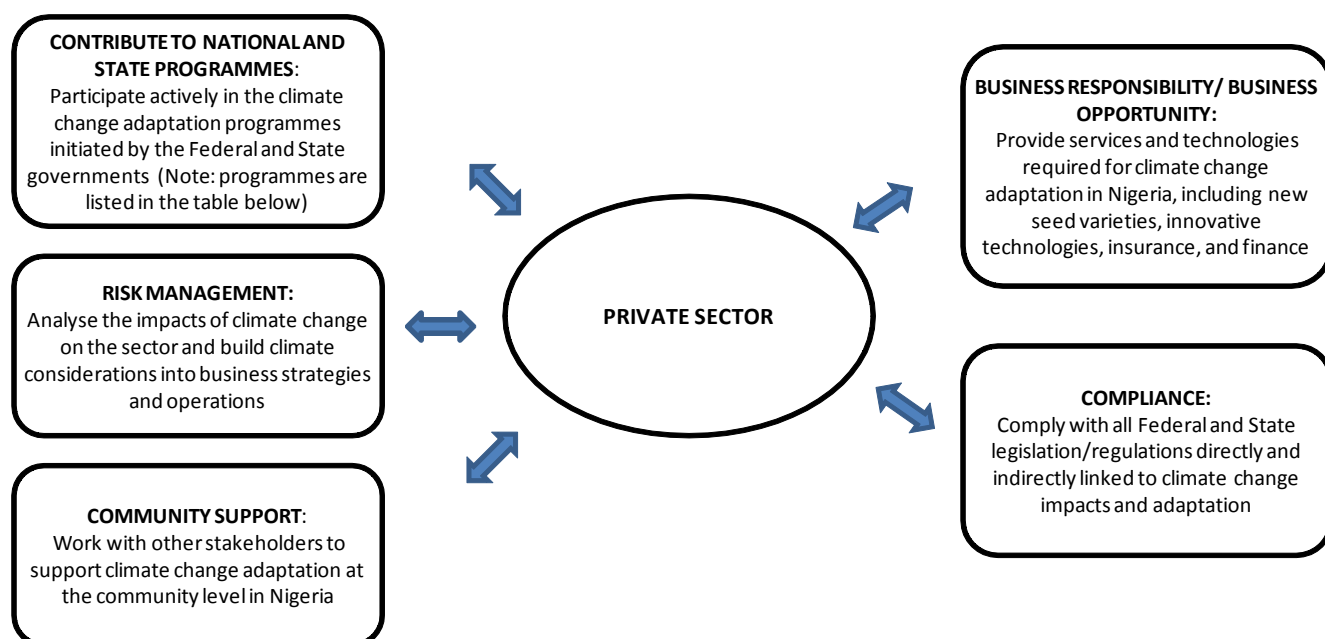
PROVIDE TRAINING: CSOs and NGOs should provide training programmes on climate change adaptation for key stakeholder groups, including training related to agricultural practices, water supply, and sustainable forest management (Sectors 1, 2, 3). CSOs should specifically provide training workshops for local decision makers, community leaders and youth advocates in basic methods of community-based vulnerability assessments, adaptation planning and implementation (Sector 6). CSOs should also provide training for Local Governments in high risk areas and targeted training sessions for industry leaders on the impacts and opportunities associated with climate change (Sector 9).

UNDERTAKE RESEARCH: CSOs and NGOs should carry out gender-sensitive research that will deepen understanding of communities' awareness of climate change; the current exposure of communities and the environment to the impacts of climate change; communities' vulnerability to climate change; and the status of community adaptation to climate change. CSOs should monitor, review, and interpret the outputs of the Federal and State Government research programmes (as described in Section 7.2 and Exhibits 10 and 11).

UNDERTAKE OUTREACH AND ADVOCACY: CSOs and NGOs should undertake public awareness and education programmes in the area of climate change adaptation, supported by advocacy initiatives directed at the public, the private sector and all levels of government. Outreach activities should make use of various channels, including community radio. Advocacy activities should include advocacy on behalf of those groups most vulnerable to the impacts of climate change (Sector 12).

PROVIDE MONITORING: CSOs and NGOs should provide independent monitoring of progress towards effective adaptation across Nigeria (Section 7.6).

Figure 14 NASPA-CCN Implementation: Recommended Role of the Organized Private Sector



FURTHER DETAILS: PRIVATE SECTOR

CONTRIBUTE TO NATIONAL AND STATE PROGRAMMES: The private sector should actively participate in the climate change adaptation programmes initiated by the Federal and State Governments. This would include in particular:

- Policy, programme and project review (all sectors)
- Integrated Resource Management Programme (watershed and coastal) (Sector 2)
- Community-Based Natural Resources Management Programme (forest sector) (Sector 3)
- Health and climate change: prevention/treatment of climate change-related diseases; wastewater and solid waste management (Sector 5)
- Comprehensive Emergency Management Programme (enhanced for climate change impacts and for vulnerable groups) (Sector 10).

RISK MANAGEMENT: The private sector should analyze the impacts of climate change on the sector, assess its own vulnerability, and build climate change considerations into its strategies and operations (Section 7.5). To achieve this, the private sector should focus on:

- **Awareness creation:** Industry and business associations (including farmers' associations) should undertake member awareness programmes (Sectors 1, 9)
- **Business planning:** Companies should incorporate climate change into annual and long term business plans, with particular emphasis on risk reduction (Sectors 9, 10). For example: engineers should include climate change risk in their design parameters; building developers should avoid construction in high risk areas and adhere to construction standards; and hospitals should prepare for increases in patients affected by climate-related disasters (Sectors 6, 10).
- **Integrating climate risk management into business:** Insurance companies should integrate climate risk into their underwriting calculations. Companies that insure energy, transportation and communications facilities should undertake independent risk mapping and risk reviews (Sectors 6, 7, 8, 10).
- **Telecommunications companies:** Telecommunications companies should carry out risk assessments and develop response plans, including consideration of the impact of weather events on capacity and demand for airtime (Sector 8).
- **Relocation:** Industries should plan for relocation of facilities located in high risk, high impact areas (Sector 9).

BUSINESS RESPONSIBILITY/BUSINESS OPPORTUNITY: Many of the services and technologies required for climate change adaptation will be delivered by the private sector. This is both a responsibility and an opportunity. In response, the private sector should pursue the design, production and sale of climate-adapted services and technologies (Sectors 9, 11). For example:

- New seed varieties that are adapted to a changing climate (Sector 1)
- Technologies to increase water supply in areas vulnerable to water scarcity (e.g. Sahel and savanna) (Sector 2)
- Inputs for aquaculture (fingerlings, fish food, etc.) (Sector 2)
- Innovative wastewater and solid waste management technologies (Sector 5)
- Innovative cooling for living and work spaces (Sector 5).

Private sector companies and organizations should also explore:

- Public-private partnerships to provide micro-crop insurance and finance to small holder farmers dealing with climate change risk (Sector 1)
- Microfinance for vulnerable groups, including livelihood support programmes (Sector 12)
- Carbon credits for adaptation practices such as improved soil management and agroforestry (Sector 1).
- International standards and best practices related to environmental management and climate-proofing (Sector 9).

COMMUNITY SUPPORT: For reasons of corporate social responsibility, private sector groups should work with other stakeholders to support climate change adaptation at the community level in Nigeria. This support should include:

- Sponsorship of needed research into climate change impacts and adaptation (Section 7.5)
- Financial support for community initiatives concerning water supply, water management and aquaculture (Sector 2)
- Promotion/funding for community participation in maintaining biodiversity (Sector 4).

More broadly, the private sector is a key part of the agricultural sector in Nigeria, and as such has a role to play in securing domestic food security in the face of the international impacts of climate change on agriculture. Nigeria's private sector organizations must recognize this key role, and work with other stakeholders to help ensure long term food security (Sector 1).

COMPLIANCE: All Private Sector groups should abide by Federal and State legislation and regulations that are directly and indirectly linked to climate change impacts and adaptation, including those related to sustainable forest management (Sector 3).

8.3 Implementation Plan

This Section presents the highest priority NASPA-CCN actions listed in Section 8.2 (and in more detail in previous sections), along with details on responsibility, timelines, and draft high-level indicators.

The implementation actions of NASPA-CCN are divided into two levels:

Level 1: Priority Implementation Actions (Table 3)

Level 1 consists of broad, high level actions which relate to leadership, policies, and mobilization of resources. These actions must be implemented to enable other climate change adaptation projects and measures to be carried out.

Level 2: Other Implementation Actions (Table 4)

Level 2 consists of other priority climate change adaptation actions and measures. These actions have been selected from the longer list of measures included in prior sections of this NASPA-CCN on the basis of their importance and urgency; the number of people, the size of area and the number of sectors that will be affected; the potential for sustainability; and the extent to which the actions will reduce vulnerability and increase adaptive capacity to climate change.

Tables 3 and 4 present the priority actions, the stakeholders responsible for them, the timeline, and indicators of performance. The cost implications of these actions have not been indicated at this time pending further more detailed design of the measures.

As in previous sections, the stakeholder groups identified are as follows:

1. Federal Government
2. State Government
3. Local Government
4. Civil Society
5. Private Sector.

The timeline presented is as follows:

- Short term: Within a budget year
- Medium term: 2 – 3 years
- Long term: 3 years and over.

Table 3 Level 1: Priority Implementation Actions

ACTION	RESPONSIBILITY	TIMELINE			DRAFT IMPLEMENTATION INDICATORS
		SHORT TERM	MEDIUM TERM	LONG TERM	
1. PROVIDE LEADERSHIP Provide overall leadership for climate change adaptation in Nigeria	Federal, State and Local Governments				Focal point for climate change governance established/identified in a gender sensitive manner
2. REVIEW POLICIES Review relevant policies, programmes and projects to determine modifications required to address the impacts of climate change (including gender dimensions)	ALL				Climate change adaptation considerations mainstreamed into existing policies and programmes
3. MOBILIZE RESOURCES Access international and domestic sources of funding for implementation of the NASPA-CCN	Federal Government and all stakeholders				Increased allocation of financial resources to climate change issues; national fund on climate change in place; and international funding accessed

Table 4 Level 2: Other Implementation Actions

ACTION	RESPONSIBILITY	TIMELINE			DRAFT IMPLEMENTATION INDICATORS
		SHORT TERM	MEDIUM TERM	LONG TERM	
1. IMPLEMENT REVIEWED POLICIES Implement/enforce/comply with existing policies, programmes and legislation relevant to climate change adaptation, including: - Federal Government: National Forest Policy, National Biodiversity Strategy and Action Plan, public health and related programmes, disaster management programmes, and other sectoral policies/programmes - State/Local Government: Enhanced management of Forest Reserves, protected areas and biodiversity “hotspots”; implementation of land use plans; enforcement of building codes; strengthening assistance to vulnerable groups most affected by climate change - All Governments: Strengthening inter-agency coordination and cooperation in climate change adaptation - Private Sector: Comply with legislation/ regulations directly and indirectly linked to climate change impacts & adaptation	ALL				- Improved level of implementation of policies and programmes - Compliance with regulations related to climate change impacts and adaptation

ACTION	RESPONSIBILITY	TIMELINE			DRAFT IMPLEMENTATION INDICATORS
		SHORT TERM	MEDIUM TERM	LONG TERM	
2. MONITOR AND EVALUATE PROGRESS Ongoing monitoring and evaluation of specified actions in the NASPA-CCN	ALL				Published evaluation reports
3. REVIEW THE NASPA-CCN Periodic review and update of the NASPA-CCN	Federal Government				Revised NASPA-CCN published
4. IMPROVE WEATHER FORECASTS & EARLY WARNING SYSTEMS 4.1. Strengthen data collection facilities for weather, river flow and sea level 4.2. Strengthen early warning services by providing timely user-targeted and friendly information 4.3. Undertake public enlightenment to achieve improved utilization of early warning information	Overall: NIMET Other: NEMA, NOA, SEMA, NIOMR, RBDAs				- Data collection abilities improved - Weather, river flow and sea level data become readily available - Reduced weather-caused loss of agricultural production - Lower casualties from climate change-induced disasters
5. IMPLEMENT COMPREHENSIVE EMERGENCY MANAGEMENT PROGRAMME 5.1. Provide and disseminate climate change hazard maps 5.2. Train state officials in emergency management planning and implementation. 5.3. Develop and implement disaster risk reduction programmes in vulnerable communities. 5.4. Develop community-specific emergency response measures	Overall: NEMA, SEMAs, FMWA Other: State and Local Governments, CSOs and Communities				Increased readiness leads to faster response to emergencies (linked to Climate Change causes) and to avoiding outbreak of insecurity
6. IMPLEMENT CLIMATE CHANGE, MIGRATION, AND SECURITY INITIATIVE 6.1. Conduct research and update data on the nexus between climate change, migration and security 6.2. Improve infrastructure and livelihood options in key vulnerable communities to discourage migration 6.3. Integrate climate concerns into peace building and conflict management programs	Federal, State and Local Governments, CSOs, Educational institutions				- Reduced climate change and resource related conflicts. - Reduced climate change/ environmental refugees
7. IMPLEMENT AGRICULTURAL EXTENSION SERVICES FOR CLIMATE CHANGE ADAPTATION 7.1. Training of trainers and of extension workers in climate change adaptation 7.2. Direct outreach to farmers/land users and practical demonstration of resilient crop and livestock practices 7.3. Cooperation with community-based initiatives and Local Government agricultural community development officers 7.4. Use of State and community radio	State and Local Governments, Federal Government support, CSOs, private extension services, NAERLS, universities				- Presence in rural areas of Extension workers who had been trained in climate change adaptation - Farmers becoming more knowledgeable about and practicing climate change adaptation

ACTION	RESPONSIBILITY	TIMELINE			DRAFT IMPLEMENTATION INDICATORS
		SHORT TERM	MEDIUM TERM	LONG TERM	
8. IMPLEMENT A NATIONAL INTEGRATED WATER RESOURCES MANAGEMENT (IWRM) PROGRAMME 8.1. Strengthen a National Working Group to address climate change at the watershed level 8.2. Design and implement integrated watershed-level pilot projects selected from among the 11 existing River Basin Development Authorities, and additional coastal zone IWRM pilot projects 8.3. Up-scale pilot project experience	Ministry of Water Resources (MWR) plus members of the Working Group (see Section 6, Sector 2) Additional local responsibility for pilot projects				- Working Group established and functioning and has produced a work plan - Pilot projects operating in watersheds and supporting climate adapted management practices (e.g. proper water harvesting for household/ community and agricultural use)
9. PROTECT INFRASTRUCTURE AT RISK FROM CLIMATE CHANGE 9.1 Undertake/coordinate risk assessments and develop/implement response plans. 9.2 Review and update standards for construction and maintenance of infrastructure	Federal and State ministries of works, water resources, agriculture, energy, transport, urban & regional planning, education				- Existing infrastructure rehabilitated and protected against climate change impact - Climate change compliant standards for construction produced and disseminated
10. BUILD NEW INFRASTRUCTURE TO REDUCE THE IMPACT OF CLIMATE CHANGE 10.1 Build improved water supply structures for crop irrigation, livestock watering and water supply to urban and rural areas 10.2 Build and maintain improved wastewater and solid waste management facilities	Federal and State ministries of agriculture, water resources, works, health				- Appropriate new infrastructure built and functioning - Scarcity of water for human and non-human use reduced - Reduced incidence of climate-related disease due to improved wastewater & solid waste management
11. IMPLEMENT A COMMUNITY-BASED CLIMATE CHANGE ADAPTATION SUPPORT PROGRAMME 11.1 Provide assistance for adaptation planning and implementation of community initiatives 11.2 Develop programme to encourage, facilitate, and support climate change adaptation at the community level	State and Local Governments and CSOs, with Federal Government support				Community-based adaptation relevant programmes/projects operating in a growing number of vulnerable communities (targets to be determined)
12. SUPPORT RESEARCH AND INFORMATION/DATA COLLECTION 12.1 Collect, analyze and report on foundation information/data needs 12.2 Lead and/or support specific adaptation-related research programmes in relevant areas 12.3 Develop and maintain appropriate data collection and management system, including national water quality and quantity survey, national forest inventory, risk assessments and risk mapping.	Federal and State Governments, private sector, and CSOs				Data and information for climate change adaptation action become readily available

ACTION	RESPONSIBILITY	TIMELINE			DRAFT IMPLEMENTATION INDICATORS
		SHORT TERM	MEDIUM TERM	LONG TERM	
13. INCREASE PUBLIC AWARENESS AND KNOWLEDGE OF CLIMATE CHANGE ADAPTATION 13.1 Review and revise the education curriculum to incorporate recent lessons and experiences on climate change impacts and adaptation 13.2. Undertake public education, awareness raising outreach, advocacy and training programmes	13.1: Federal and State Governments 13.2: All governments, CSOs				• New curricula produced for all levels of the educational system • Awareness raising tools are developed
14. ADOPT CLIMATE CHANGE RISK MANAGEMENT IN THE PRIVATE SECTOR 14.1 Climate desk officers to manage their response to climate change 14.2 Business and farmer's associations to undertake member awareness programmes 14.3 Companies to incorporate climate change risks into annual and long term business planning	Private Sector				• Private sector planning and operations take climate risks into account and practice risk reduction
15. EXPLOIT BUSINESS OPPORTUNITIES BY SUPPORTING CLIMATE CHANGE ADAPTATION 15.1 Private sector companies identify, develop, and supply goods and services for climate change adaptation (for example, new seed varieties, water supply, aquaculture, improved building design, microfinance for local adaptation, etc.)	Private sector				• Climate change adaptation products and services readily available
16. IMPLEMENT OTHER STRATEGIC PROGRAMMES 16.1 Implement Community-Based Natural Resources Management Programme (Forest Sector) 16.2 Implement Forestry Extension Services for Climate Change Adaptation 16.3 Implement Climate Change Adaptation Programmes for Urban Areas	16.1: Federal, State, Local Governments; CSOs; private sector 16.2: State Governments 16.3: State Ministries of Environment, Local Governments				• To be determined
17. IMPLEMENT OTHER TARGETED INITIATIVES 17.1 Enhance artisanal fisheries and encourage sustainable aquaculture as adaptation options for fishing communities 17.2 Support development and promotion of more efficient stoves to reduce deforestation pressure 17.3 Other important targeted initiatives are identified in Section 8.2: Other Targeted Initiatives (Federal Government), Other Targeted Initiatives (State and Local Governments), and Community Support (Private Sector)	Federal, State, and Local Governments, CSOs, private sector				• 17.1: Fish production is less affected by climate change induced disruptions • 17.2: Increased number household using energy efficient stoves • 17.3: Indicators vary by initiative

8.4 Funding

Existing funding mechanisms for climate change adaptation in Nigeria are inadequate. Nigeria needs to mobilize additional and substantive financial resources for adaptation. To do this effectively, the country needs to:

1. Situate climate change adaptation financing within the broader context of national development financing and development goals of *Vision 20:2020*.
2. Undertake a detailed financial needs assessment to properly determine the economic costs of climate change adaptation in Nigeria.
3. Review all multilateral mechanisms to finance climate change adaptation, and determine what capacities must be put in place to access and manage these funds.
4. Revise the National Fiscal Policy to incorporate the cost of climate change adaptation.
5. Develop an innovative, non-debt creating national financing mechanism to support adaptation, raise the necessary funds, and manage those funds well.
6. Ensure climate financing policies and resource allocations are responsive to real needs

A funding plan for NASPA-CCN will be developed by the ministries, departments, and agencies of the government following adoption of the NASPA-CCN. Preliminary guidelines for consideration are collated in the following box.

Preliminary Guidelines for Funding of NASPA-CCN

DOMESTIC FUNDING

1. Funding of NASPA-CCN actions should be the responsibility of line ministries with a mandate for the recommended actions. Funding should be a policy issue and not just an action issue. Providing for climate change adaptation action in budgets indicates high commitment.
2. In addition to ministry budgets, the Special Climate Change Unit should establish a special NASPA-CCN Fund, and Ecological Fund resources should be made available for NASPA-CCN implementation.
3. The Federal Government should also mobilize additional finance through the imposition of taxes, fines and charges, where appropriate, on activities that increase greenhouse gas emissions or degrade the environment (domesticating the "Polluter Pays Principle").
4. Private Sector companies should explore opportunities for investing in climate change adaptation actions, including NAMA initiatives with adaptation co-benefits

INTERNATIONAL FUNDING

1. Nigeria should take full advantage of bilateral and multilateral technical and financial assistance in climate change adaptation.
2. Nigeria should ensure maximum benefits from the financial mechanisms for implementation of the Conventions and Protocols ratified by Nigeria. Key multilateral sources of adaptation resources include the Adaptation Fund and the Green Fund.

POSSIBLE EARLY FUNDING PRIORITIES

1. Cross-cutting/enabling initiatives should receive substantial early funding attention, including support for:
 - Institutional strengthening, capacity development, and training of personnel
 - Advocacy and awareness
 - Priority research and information/data collection
 - Implementation of foundation actions in Table 3.
2. In addition, the implementation actions identified in Table 4 should be high priorities for early funding.

8.5 Measurement, Verification and Reporting of Results

An appropriate plan for measurement, verification and reporting of results needs to be put in place early in the implementation of the NASPA-CCN. Some of the ideas for this purpose are summarized in the following box.

Preliminary Guidelines for Measurement, Verification and Reporting on NASPA-CCN

1. The NASPA-CCN should be formally reviewed and updated once every 5 years.
2. In addition, implementation of the NASPA-CCN should be monitored on an ongoing basis, and evaluated on a periodic basis, to measure and verify progress and provide a basis for improved performance and enhanced results.
3. The government authority responsible for climate change should be responsible for the coordination of this monitoring, measurement, verification, and reporting process at the national level.
4. Indicators for measurement of implementation success should include, for example:
 - Increased awareness level of climate change adaptation
 - Increased area of land under irrigation
 - Increased use of improved farm inputs (including weather forecasts)
 - Increased use of improved farming technologies
 - Increased investment in new adaptive opportunities (new technologies) addressing the impacts of climate change.
5. The individual sectors should develop internal mechanisms for monitoring progress and evaluation of impacts. For example, the department responsible for health planning research and statistics should develop indicators for measurement of NASPA-CCN performance in the health sector.
6. An ad-hoc committee should be set up from time to time to assess progress. The committee should be comprised of sectoral technical experts, and should include CSOs and community representatives. An ad-hoc accreditation committee should be set up periodically to verify indicators.

Appendix A

NASPA-CCN Lead Partners, Development Team and Support

Lead Partners

Four organizations have come together as **Lead Partners** to support the development of the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria:

- Special Climate Change Unit (SCCU) of the Federal Ministry of Environment
- Building Nigeria's Response to Climate Change (BNRCC) project led by the Nigerian Environmental Study/Action Team (NEST)
- Nigeria Climate Action Network (NigeriaCAN), and
- Heinrich Böll Foundation (HBF).

From SCCU: Dr. Victor Fodeke, Dr. Sam Adejuwon, Peter Tarfa, Abdullahi Umar, Kelechi Ruth Okparaji

From BNRCC: a) From NEST: Professor David Okali, Professor Chinedum Nwajiuba, Dr. Emma Nzegbule, Robert Onyeneke, Chris Ichite, Samuel Sampson Ogallah, Hassan Pindar, John Ajigo, Isaac Oloogunibi, Chidi Peter Ahaneku, Preye Idowu-Taylor and Mba Nwoke b) from ICF Marbek: George Matheson and John van Mossel, and c) with CUSO-VSO volunteers: Sarah O'Keefe, Dr. Brent Tegler, Dr. Ellen Woodley, Jimena Eyzaguirre and Karen Shaw.

From NigeriaCAN: Ewah Eleri, Olufeyisayo Ilesanmi and Ngodoo Sylvia Akuto

From HBF: Kristine K and Wale Agbojo

Multi-stakeholder Forum

The Leadership for the development of the NASPA-CCN was provided by the **Multi-stakeholder Forum (MF)** members: Prof. Kingsley Ologe, Chair MF; Prof. Emmanuel Oladipo, Co-Chair MF, from the Integrated Ecosystems Management Project, Nigeria-Niger Joint Commission; Deborah A. Msheliza, Vice Chair MF, University of Maiduguri; Julie Ukeje, Nigeria Metrological Agency; Abdulazeez Musbau, Federal Ministry of Agriculture; Dr. Sani Dawaki Usman, Federal Ministry of Environment; Lawal M Zaiyana, Sokoto State Ministry of Environment; Odigha Odigha, Cross River State Forestry Commission; Amos T. Ali, Adamawa State Ministry of Environment; Fidelis Odey, Federal Ministry of Finance; Philip F. Aziegbe, National Planning Commission; and Maximus Ugwuoke, Lagos State Ministry of Environment; Priscilla M. Achakpa, Women Environment Program; Dr. Godwin Uyi Ojo, Environmental Right Action-ERA; Chinedu Uwaegbulam, The Guardian Newspaper; and Barrister Eze Onyekpere, Centre for Social Justice.

Lead Editors

The drafting of NASPA-CCN was undertaken by a team of **Lead Editors**: Prof. David Okali, Prof. Kingsley Ologe, Prof. Chinedum Nwajiuba, Prof. Haruna Ayuba and Peter Tarfa, with George Matheson, Senior Editorial Consultant, supported by Chris Ichite.

External Reviewers

The draft NASPA-CCN was reviewed by **External Reviewers**: Dr. Chinwe Ifejika Speranza, University of Bern, Bubu Jallow of UNEP, and Dr. Chukwumerije (Chuks) Okereke of Smith's

College, Oxford University; and by a **Gender Reviewer**: Nsikan-George Emana, Gender and Development Action (GADA).

Background Research

The NASPA-CCN was preceded by work of policy analysts and sector specialists who contributed to a background document published separately by the BNRCC project, called the **Climate Change Adaptation Strategy Technical Reports – Nigeria (CCASTR)**. The contributing consultants/authors were: Prof. Anthony Ikpi; Prof. Emmanuel Oladipo; Dr. Regina Folorunsho; Prof. B. E. B. Nwoke; Prof. Chinyere Ukaga; Dr. Abbas Yakubu; Dr. Oka Obono; Prof. J. Ayoade; Dr. Apollonia Okhimamhe; Deborah Msheliza; Huzi Mshelia; Prof. Kingsley Ologe; Dr. Oyin Olukunle; Prof. L. R. Fagbenle; Dr. Amaechi Chukwu; Dr. Patrick Ogwo; Dr. Chinyere Nwajiuba; Hassana Pindar and Sam Ogallah.

Climate Scenarios for Nigeria were commissioned by the BNRCC project and prepared by Dr. Babatunde Abiodun and Dr. Mark Tadross from Climate Systems Analysis Group (CSAG), University of Cape Town, South Africa with Dr. Ayobami T. Salami, Institute of Ecology and Environmental Studies, Obafemi Awolowo University (OAU).

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Appendix B

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