



# **Executive Summary**

Agroecological practices are understood as representing the most effective way to achieve sustainable food security and nutrition for all in a changing climate, particularly in a developing economylike Nigeria. Yet, their importance and relevance to helping society to adapt to and mitigate the impacts of climate change in the food security value chain is still not fully explored because of policy constraints. This calls for a new advocacy and powerful movement is to bring together governments, international agencies, non-governmental organizations (NGOs), communities, and academics from all disciplines to promote the value of agroecology to adapt to and even mitigate the impacts of climate change on national food security for sustainable development.

The extent to which agroecological practices are captured in Nigeria's climate change and agricultural policies constitutes the focus of this study report. The output would serve as an advocacy tool that is needed to raise the awareness in governments, international agencies, nongovernmental organizations and communities about the links between climate change and agriculture, and the consequences for development in general and food security, in particular. As a consequence of relative uncertainty associated with climate change projections, policy responses will have to be formulated based on both our traditional and current scientific knowledge to address impacts and consequences of climate change and variability on agricultural production and food and nutrition security as well as our national development as a whole.

A two-pronged strategic approach has been adopted for this study. The first was to assemble available and accessible information, in terms of policies, strategies and institutions, as well as actors and stakeholders, on issues of climate change adaptation and agricultural development in Nigeria. These documents were sourced mainly from the Federal Ministry of Environment (Department of Climate Change). Documents were also sourced from the Federal Ministry of Agriculture and Rural Development, Federal Ministry of Water Resources, Federal Ministry of Finance, Budget and National Planning and their Agencies.

The second strategic approach involved rapid online consultation with some identified actors and programme implementers that have either documented some indigenous knowledge about critical climate change adaptive measures to agriculture or have some information about those that have demonstrated the effectiveness of these measures in building community resilience to the impact of climate change on agriculture. In addition, some in-depth online interviews were conducted for a few selected individuals to assess the agroecological sensitivity of implemented climate change related policies and programmes.

The vulnerability of Nigeria's agriculture sector to climate change is discussed Section 2. It shows that climate change and variability remain a main challenge to agriculture sector of the country and particularly in reducing food insecurity and achieving the second SDG (reduce hunger, achieve food security and improved nutrition and promote sustainable agriculture). However, there are many mitigation and adaptation potentials to reduce the current food insecurity in the



country. Agroecology, as a science and practice, covers many areas of climate change mitigation and adaptation in agriculture that provide opportunities to sustainably increase productivity, resilience, reduce GHG and enhance achievement of national food and nutrition security and development goals.

The nexus between agroecology and climate change is explored in Section 3 of the report. It indicates that climate change is adding new uncertainty and is capable of undermining current national efforts to address food security and malnutrition problems in the country. By introducing agroecological principles, we can reduce the risk of exposure to climate change. It represents perhaps the most effective way to achieve sustainable food security and nutrition for all in a changing climate. Agroecology proposes a comprehensive answer to these challenges and contributes to the realization of the Right to Food by offering a new basis for sustainable food systems, resilient agricultural livelihoods and good nutrition. It can help overcome many climate-induced shocks that most small-scale farmers face in their agricultural activities. What is critical is to note that agroecosystems will be more resilient in the face of climate change and variability when inserted in a complex landscape matrix, featuring genetically heterogeneous and diversified cropping systems managed with organic matter rich soils and water conservation techniques.

Overall, the best agroecological practices are those that enhance soil fertility, increase productivity, ensure nutrition and health, and demonstrate that they are done without harming the environment and are culturally appropriate.

Nigeria has a number of climate change and climate-related policies and strategies. The country also has the Agricultural Resilience Framework and Agriculture Promotion Policy that have potentials for addressing climate change adaptation for sustainable food and nutrition security. In addition, there are policies and strategies for the overall management of the environment and the forest and biodiversity resources that have bearings on the adoption of agroecology for climate change adaptation.

An analysis of the level of agroecological relevance and sensitivity of the current climate change and other related national policies, strategies and plans indicate that no policy specifically related to agroecology exists within the current national climate change and agriculture policy arena in Nigeria. The National Agricultural Resilience Framework (NARF) is the closest related national framework that can be adapted for agroecological policy intervention in Nigeria. As the focus of the NARF is to strengthen the capacity of small and large-scale agricultural producers to increase productivity, grow wealth and thrive in the face of growing challenges from multiple social and environmental stressors, including changing climate, it has many agroecology elements and intervention opportunities that can easily be adapted into a national agroecological strategy.

Overall, there is no policy on agroecology in Nigeria, even though the country's policy landscape is full of policies that have some elements of agroecology considered and mentioned in them. Furthermore, the country has no Climate Change Law that could have been easily amenable to incorporate agroecology issues that could have reinforce needed synergies between objectives of food security, poverty reduction, adaptation and mitigation actions in Nigeria's agricultural sector.

Despite not clearly and explicitly mentioning agroecology in their contents, it is indirectly addressed in selected national climate change and other related policies, strategies plans, particularly those in the agriculture sector in which issues of climate-resilient crops and livestock and adaptation actions such as water conservation and recycling, indigenous knowledge, efficient use of water

and energy, early warning systems and agroforestry are often considered. Sustainable land and water management, including agroforestry and agro-silvopastoral systems, efficient management of water resources, managing soil organic matter for soil carbon sequestration, preventing and mitigating land degradation and restoring degraded soils and land are the most popular agroecological practices mentioned in most documents to increase tree cover in farmland, improve nutrition and incomes, preserve and maintain the environment and, enhance carbon stocks.

The National Agricultural Resilience Framework represents the most comprehensive document with the highest potential of conceptualising into a national framework or strategy for agroecology in Nigeria. Next to this is the Agriculture Sectoral Plan of the country's Nationally Determined Contribution (NDC) that captures a lot of the elements of agroecology, which could be valuably upscaled in the ongoing revision of the document. Other relevant policies and strategies with good potential for enhancing the national recognition of the relevance of agroecology to climate change adaptation and resilient agroecosystems for improved productivity and food and nutrition security are (i) National Climate Change Policy; (ii) National Climate Change Programme; (iii) NASPA-CCN; and (iv) Agricultural Promotion Policy (APP). Surprisingly, APP that one would expect to lay emphasis on agroecology fails to do so.

There are many reasons why agroecology has not been mainstreamed into agricultural and climate change policies in Nigeria. The lack of understanding of agroecology amongst policymakers may be the greatest barrier to its inclusion in climate change policies and strategies. Presently, while agroecology has a space in climate policy dialogues in Nigeria, very few people who design policies know or even understand it. Additionally, agroecology is not being discussed or advocated for like climate change. There is limited sensitization and awareness raising among policy makers. Successful adoption of agroecology to fight climate change will require increasing policymakers' understanding and knowledge about the concept over a long time period.

Although agroecology is not being discussed or advocated for like climate change, it nevertheless has a large potential space in climate policy dialogues. However, a number of actions need to be put in place to elevate agroecology to a high level of policy discussion. Similar to what is being advocated for Climate Smart Agriculture (CSA), these actions are related to: (i) expanding the evidence based approach; (ii) advocating agroecology-specific policy framework in the context of addressing climate change challenge; (iii) building capacity of relevant national and local institutions for agroecology advocacy; (iv) facilitating local and international financing; and (v) embarking on practical field demonstrations, as part of national response to climate change. These actions must be facilitated by a relevant principles and guidelines for an effective process that will scale up agroecology for resilience to climate change.

Great opportunities exist for the scaling up and mainstreaming of agroecology into climate change and other related (particularly agriculture) national policies with the removal of the identified constraints. The obvious approach is to review relevant and related policies regarding negative consequences for adoption of agroecological practices and reform as necessary, coupled with positive development of policies that encourage adoption of agroecological practices in an integrative manner across different sectors and scales.

Locally appropriate agroecological practices clearly have potential to increase the resilience of livelihoods and enhance adaptation to climate change at field and farm levels across a wide range of contexts, often with significant mitigation co-benefits that might help to finance their establishment. Their potential will only be realized if action is taken across hierarchical levels to



remove afore-mentioned barriers to their adoption. These will include: (i) addressing market failures and reforming policies that create perverse incentives to encourage adopting comprehensive performance metrics for agricultural systems that factor in social and environmental externalities; (ii) rethinking the relationship between formal science and local knowledge to bridge differences in outlook and emphasis between social movements and the scientific establishment, so as to foster co-learning among the diverse range of stakeholders involved in development and promotion of agroecological practice; and (iii) integrating policy processes across sectors and scales to create an enabling environment that encourages adoption of agroecological practices.

Nigeria should immediately review the implementation of the sectoral plan for agriculture in the NDC to ensure proper integration of agroecological practices in its national response to the challenge of climate change. The Federal Ministries of Environment and Agriculture and Rural Development could then jointly produce a policy document from NDC implementation in the agriculture sector that will be solely devoted to agroecology within the context of promoting environment-friendly and climate resilient agriculture, which may also encompass some element of the CSA.

Towards identifying possible platforms and spaces for agroecology advocacy in Nigeria, the study identifies some reputable NGOs that can be used to bring together civil society and academia to discuss agroecology in the country. With HOMEF playing a lead role, these organizations can facilitate exchanges on potential alternative collaborative research and policy-making avenues to advance agroecological policies that will include all elements or principles of agroecology for sustainable agriculture and food systems.

The existence of the National Agricultural Extension and Research Liaison Service (NAERLS), Ahmadu Bello University, Zaria provides a good opportunity for the relevant civil society organizations to work with an established and proven government institution for the advocacy of agroecology through appropriate policy modality for its promotion to advance the course of agricultural development for enhanced productivity and food and nutrition security in the country. NAERLS is one of the 18 national agricultural research institutions under the Federal Ministry of Agriculture and Rural Development (FMARD)<sup>1</sup>, and it is responsible for development, collation, evaluation and dissemination of proven agricultural innovation and to research on extension methodologies and policy. The extension and research activities of the institute take into account the long-term ecological, economic and social consequences of changes in rural life and linkages, all of which fit in well with agroecological principle or elements mentioned in this study. It also conducts its activities in partnership with other research institutes under FMARD and other national and international partners and collaborators.

It is the premise of this study that civil society groups and research institutes would work together to form a **National Advocacy Platform on Agroecology (NAdPA)**, and, if possible, with support from development partners. The group will advocate for the incorporation of agroecological principles and elements in climate change and other related government policies to ensure food and nutrition security in a changing climate. This may not be an easy task, unless a bottom-up approach is convincingly adopted to facilitate proper understanding among the various stakeholders. For this purpose, we propose the adoption of Community-based Adaptation (CBA) framework that will

Others include Lake Chad Research Institute; Institute for Agricultural Research; Nigeria Institute of Agricultural Research and Training; National Cereal Research Institute; National Root Crop Research Institute; National Horticultural Research Institute; Nigerian Store Product Research Institute; Rubber Research Institute of Nigeria; Cocoa Research Institute of Nigeria; Nigerian Institute for Oil Palm Research; National Animal Production Research Institute; National Veterinary Research Institute; National Institute for Freshwater Fisheries; Nigerian Institute for Oceanography and Marine; Unilorin Sugar Research Institute; National Centre for Genetic Resources and Biotechnology; Agricultural

engage a range of stakeholders among CSOs directly with government institutions to facilitate participatory planning, development and implementation of climate change policy activities specifically dedicated to agroecological practices. The main interacting elements of this strategic approach are (i) the National Stakeholder Forum, which in our case is NAdPA; (ii) Participatory Planning; (iii) Implementation of CBA; and (iv) Monitoring and Accountability.

NAdPA, as a national stakeholders' forum, will be made to be part of the national effort to address the challenge of climate change in the agriculture sector. It will compose a mix of representatives from government, civil society, the private sector, academia and the media, but with much responsibility on the civil society organizations (CSOs) and community-based organizations (CBOs), to document proven agroecological practices that are amenable to the Nigerian agroecological zones for wide adoption.

Participatory planning is to enable good documentation of local knowledge on agroecology at community level that can be scaled up to the national forum. NGOs and CBOs will undertake and utilise the participatory planning for impact and relevance.

The implementation of the community-based wide-scale adoption of proven agroecological practices will be facilitated by the leading NGO, in this case HOMEF, with support from the National Advocacy Forum or NAERLS (as government focal point) to demonstrate their effectiveness in improving agricultural productivity in an environment-friendly and climate resilient manner for sustainable food and nutrition security. Ensuring that the advocacy has meaningful impact of translating proven local agroecological practices into climate change and agricultural policies requires good and functional monitoring means for accountability.

In all the steps and processes for the functionality of NAPA, the principle of purposeful inclusiveness will be adopted to ensure that all stakeholders are properly engaged and involved and that the policy-science interface is properly reflected in decisions. This will strengthen local agroecological knowledge and promote good sharing of evidence-based and scientifically-proven practices at all levels. It will also ensure that knowledge and innovations are available and accessible to all, including policymakers for comprehensive framing of laws and policies on agroecology for Nigeria. Climate extension and farmer mentor workshops that incorporate extension and the emerging young farmers in Nigeria with aim to facilitate knowledge transmission between generations of farmers and to share strategies to manage agricultural risks, as well as ensure climate resilience through agroecology will be organised on a regular basis to reinforce the benefits of agroecology for climate resilient agriculture and food and nutrition security in the country.



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## 1. Background

#### 1.1 Introduction

Current food systems in Nigeria are inadequate to ensure food and nutrition security in the country. Moreover, the food systems are at a crossroads. There is a strong need for transforming food production and consumption patterns in a sustainable way. A major external threat to the attainment of food and nutrition security in the country is climate change and variability. The attainment of sustainable food and nutrition security requires that farmers adapt and build resilience to the increasing challenges from climate change and ensure that nutritious food is available for all. Agroecology provides one solution towards this transformation. It has a strong potential to contribute to farming system resilience against climate change impacts, as well as to the conservation of biodiversity, and to reversing land degradation trends. Thus, agroecology has become high on the global agenda for the attainment of Sustainable Development Goals (SDGs).

Human-induced global warming has already caused multiple observed changes in the climate system. Scientific evidence indicates that human-induced global warming is shifting the climate system inti a state of disequilibrium. The latest predictions issued by the World Meteorological Organization (WMO) in June 2020 indicated that in the period 2020 to 2024, annual global temperature is likely to be at least 1°C warmer than preindustrial levels (defined as the 1850-1900 average) in each of the coming 5 years and is very likely to be within the range 0.91 - 1.59°C. This warming will further throw the global climate into a more chaotic crisis leading to an increase in extreme weather events and climate variabilities and abnormalities such as droughts, floods and heat waves<sup>2</sup>.

Agriculture is one of the most important sectors vulnerable to climate change and variability. The global consensus is that changes in temperature and precipitation will result in changes in land and water regimes that will subsequently affect agricultural productivity. Just as agricultural production is highly sensitive to climate change, food security is also sensitive to agricultural production. In that regard, the potentially devastating consequences of climate change on agricultural production could be immediately transmitted to food security and livelihoods.

Climate change threatens the food systems that millions of Nigerians depend on. It poses one of the gravest risks to humanity and it affects a wide variety of socio-economic activities important to world food and nutrition security. According to Myers et al. (2014), if nothing is done to adapt, even under a 2°C warming scenario in 2100 compared to average pre-industrial global

<sup>2</sup> WM0 (2020) Global Annual to Decadal Climate Update <a href="https://public.wmo.int/en/media/press-release/new-climate-predictions-assess-global-temperatures-coming-five-years#:">https://public.wmo.int/en/media/press-release/new-climate-predictions-assess-global-temperatures-coming-five-years#:</a>

temperatures, food insecurity could rise up to 90% in the different sub-regions of Africa. They further stressed that the global agricultural output would shrink, 50% of the world's population would face temporary food scarcity by 2050, fruit and vegetable decreasing per-capita availability would lead to over  $500\,000$  extra deaths per year by 20806, and the nutrient values of grains would decrease (especially regarding proteins, iron and zinc) due to a higher  $C0_2$  concentration.

At the national level, Nigeria's 2015 Nationally Determined Contribution (NDC) concluded that under a business-as-usual scenario, climate change could lead to between 10 to 25 per cent decline in agricultural productivity by 2080. In some parts of the north, the decline in yield in rain-fed agriculture could be as much as 50 percent. This in turn would impact the country's GDP, reducing it by as much as 4.5 percent by 2050, even though the share of agriculture in GDP will decline from 40 to just 15 percent. Furthermore, in the absence of mitigating measures, the net import of yams and other vegetables is expected to decrease in the long-term. The net import of rice, however, is expected to increase by as much as 40 percent.

The livestock sub-sector will also be affected by climate change. The climate change hazards affecting livestock production include late onset and early retreat of rainy season, higher than normal temperatures, flooding, salt water intrusion and windstorms. Late onset of the rainy season causes a lack of available water for livestock and reduces forage availability. Higher than normal temperatures lead to poor livestock health which reduces the market value of affected livestock thereby reducing farmers' income. Flooding leads to loss of livestock, destruction of livestock enclosures and outbreak of diseases. In general, the livestock sub-sector is vulnerable to climate change hazards because of the low adaptive capacity of livestock farmers to its impacts. Thus, increasing shortage of rainfall, late onset of rains and rising temperature in the in the sub-region will result in declining livestock production and productivity as well as increased incidence of diseases. This trend will ultimately reduce animal protein supply in the country as much of the livestock production in Nigeria comes from the sub-region (BNRCC, 2011).

Much of the initial policy dialogues focused on mitigating emissions that induce climate change with limited discussion of adaptation policies that can address climate impacts. In that regard, adaptation to climate change and variability (including extreme events) at the national and local levels is regarded as a pragmatic strategy to strengthen capacity to lessen the magnitude of impacts that are already occurring, could increase gradually (or suddenly), and may be irreversible. Current perspective is that adaptation is seen as a set of strategic measures that will reduce vulnerability to climate change on both short and long-term basis. In the case of agriculture such adaptation measures may include include options such as improving water management practices, modernization by adopting and utilizing new technologies, and changing crop types. These are generally referred to as agroecological practices or techniques.

Despite the recognition that agroecological practices are critical to ensuring food and nutrition security in a changing climate, the extent to which these are carried along in agricultural and climate change policies in particular remains inadequate. To reduce the impact of climate change on food and nutrition security system requires that an urgent action is taken in agriculture policy and value chain. Agriculture systems must become more resilient to extreme weather events and their adaptive capacity must be improved and strengthened to face the changes in local climatic conditions. To do this effectively requires that appropriate policy frameworks are in place to enable government to meet the challenge of putting in place adaptation measures in the agriculture sector that will enable it to continue to meet the challenge of the expected growth in national population and demographic transition and subsequent increasing demand for diverse and nutritious foods.

A major question that arises is how can agricultural systems become more resilient and adaptive while reducing GHG emissions and increasing production and diversification of food? Agroecological practices are understood as representing the most effective way to achieve sustainable food security and nutrition for all in a changing climate, particularly in a developing economylike Nigeria. Yet, their importance and relevance to helping society to adapt to and mitigate the impacts of climate change in the food security value chain is still not fully explored because of policy constraints. This calls for a new advocacy and powerful movement is to bring together governments, international agencies, non-governmental organizations (NGOs), communities, and academics from all disciplines to promote the value of agroecology to adapt to and even mitigate the impacts of climate change on national food security for sustainable development.

The extent to which agroecological practices are captured in Nigeria's climate change and agricultural policies constitutes the focus of this study report. The output would serve as an advocacy tool that is needed to raise the awareness in governments, international agencies, nongovernmental organizations and communities about the links between climate change and agriculture, and the consequences for development in general and food security, in particular. As a consequence of relative uncertainty associated with climate change projections, policy responses will have to be formulated based on both our traditional and current scientific knowledge to address impacts and consequences of climate change and variability on agricultural production and food and nutrition security as well as our national development as a whole.

#### 1.2. Purpose and objectives of the study

This desktop study is to set out the climate change policy environment of Nigeria in the context of its accommodation of agroecological practices that could enhance the adaptive and mitigative capacities of the country's agriculture sector towards improved productivity and resilience in the face of increasing climate threat. The main objectives of the study are to:

- determine the extent to which nation's climate change legal, policy and strategy landscapes have incorporated agroecological practices, with particular reference to the National Policy on Climate Chane, National Climate Change Programme, National Adaptation Strategy and Action Plan (NASPA), Nationally Determined Contribution (NDC) and any other relevant national documents that are available;
- show the possibility of inclusion of agroecology in the nation's climate policy; and
- suggest possible platforms and spaces for agroecology advocacy.

#### 1.3. Methods Used

The study on which this report is based followed much of the methodological approach indicated in the Terms of Reference and focused on:

- Literature review and review of relevant policy and project/programme documents;
- A few online consultations with relevant Ministries, Departments and Agencies (MDAs), nongovernmental organizations (NGOs), development partners (e.g. UNDP) and individuals as a result of the COVID-19 contact restrictions; and
- Synthesis of the information gathered for the report writing.

In summary, a two-pronged strategic approach has been adopted for the execution of the assignment. The first was to assemble available and accessible information, in terms of policies,

strategies and institutions, as well as actors and stakeholders, on issues of climate change adaptation and agricultural development in Nigeria. These documents were sourced mainly from the Federal Ministry of Environment (Department of Climate Change). Documents were also sourced from the Federal Ministry of Agriculture and Rural Development, Federal Ministry of Water Resources, Federal Ministry of Finance, Budget and National Planning and their Agencies.

The second strategic approach involved rapid online consultation with some identified actors and programme implementers that have either documented some indigenous knowledge about critical climate change adaptive measures to agriculture or have some information about those that have demonstrated the effectiveness of these measures in building community resilience to the impact of climate change on agriculture. In addition, some in-depth online interviews were conducted for a few selected individuals to assess the agroecological sensitivity of implemented climate change related policies and programs. An example of response from an interviewee is given in Annex 1.

The outputs from the desk review and the consultations were then subjected to thorough analysis to bring out salient issues that will help to identify opportunities for agroecological mainstreaming to enhance the relevance of policies and local knowledge and information to strengthening national adaptive response to agricultural productivity under increasing climate change and variability. Emphasis was placed on analyzing local agroecological knowledge of smallholders.

A major limitation of this study is the inability to visit the field and farmers to ascertain the effectiveness of some of the proven agroecological technologies and practices due to COVID-19 pandemic and limited financial resources. Nevertheless, a serious attempt was made to focus on most of the technologies that appear to have wide appeal or scientific evidence to back their adoption. However, as soon as situation permits, effort should be made to have appropriate consultations with governments at all levels in the country to get policy-decision makers' approval for some of the most valuable technological options for climate productive and resilient agriculture in the country, as may be identified in this report.

#### 1.4 Report Structure

This report is divided into seven sections. Following the introduction, Section 2 puts the report in the national context of agriculture and climate change and variability. The nexus between agroecology and climate change is explored in Section 3, while the imperative for a paradigm shift in policies for the promotion of agroecology in the country is examined in Section 4. The opportunities for the inclusion of agroecology in Nigeria's climate change policy landscape is discussed in Section 5. Possible platforms and spaces for agroecology advocacy in the country are identified in Section 6. Main conclusions of the study are highlighted in the last section of the report.



# 2. National Context: Agriculture and Climate Change and Variability in Nigeria

#### 2.1 Agriculture and Livestock Production

Agriculture is Nigeria's single largest economic sector, and one of the most important areas for development for the country. In 2016, it accounted for 24.4% of Gross Domestic Product (GDP), but only 4.8% of the country's total foreign earnings. It employs up to 70% of the labour force (FMARD, 2016). Indirectly, the sector provides a base for political stability through the provision of safe, secure and reasonably priced food for the entire population. Agriculture in the country is highly concentrated on crop production, which accounts for 90% of output. Fishery, forestry and livestock, account for the remaining 10%. The livestock sub-sector in Nigeria accounts for about 12.7% percent of agricultural GDP and 5% of the country's total GDP (Cervigni et al., 2013)<sup>3</sup>.

Nigeria's agriculture is practiced in three major types of agricultural land namely upland or rainfed (94%), lowland or swamp (8.3%) and irrigation (1.5%). It is largely rain-fed and vulnerable to climate variabilities. Total area planted to various commodities is on the increase in response to growing demand for food. Similarly, national production of exportable agricultural commodities is on the increase.

Crop production in Nigeria follows patterns that relate to local conditions with climate being one of the most important determining factors. The location, size, and characteristics of geographic positions and relief in Nigeria give rise to a variety of climates ranging from a tropical rainforest climate along the coast to a Sahelian climate in the northern part of the country.

In terms of diversity, the pattern and structure of the agricultural sector follows the ecological diversity of the country, which range from the mangroves on the coast, rainforest in the south, savanna in the middle belt and the Sahel in the north. These ecological zones are related to the nature of agricultural production with a south to north pattern that roughly follows fisheries, tubers, cereals and livestock respectively as the dominant products. Various vegetables, fruits and tree crops are produced in all the ecological areas but are predominantly associated with the rainforest and savanna ecological zones. These patterns of production are influenced mostly by the length of rainy season and the amount of annual rainfall (BNRCC, 2011).

In the southern Coastal and Rainforest ecological zones where the rainy season is longer and annual rainfall greater, the staple foods are based on root crops. The middle belt Savanna ecological zone is characterized by a drier and more seasonal (wet/dry) climate and the staple crops include root crops and cereals. In the northern Savanna and Sahel ecological zones, characterized by low

rainfall and a short and variable wet season with low annual rainfall, the staple foods are based on cereal crops and legumes. Ecological regions of the country associated with higher elevations and cooler temperatures, such as the plateau areas, favour specialized root crops such as carrots, Irish potato and sweet potato (Oladipo, 2013).

Agricultural production that contributes to the country's food security is diverse. Common crops include rice, cassava, maize, sugar, sorghum, yam, cashew and a broad range of horticultural products. Production is dominated by about 15 million smallholders who account for over 90 percent of the national food production. Over 90% of agricultural production is rain-fed with smallholder subsistent producers accounting for 80% of all farm holdings. These smallholders, mostly women, farm an average of 1 to 2 hectares per smallholder, usually with little or limited mechanization, access to fertilizers, and preservation or storage facilities. Both crop and livestock productions remain below potentials (FMARD/UNDP/GEF, 2017).

Livestock production accounts for one third of Nigeria's agricultural GDP, providing income, employment, food, farm energy, manure, fuel and transport. Pastoral herding is a major occupation of the people in the Sahel and parts of the savanna regions of Nigeria. Approximately 75% of all the livestock in Nigeria are in the northern region (World Bank, 1992). The livestock species are cattle, goat, sheep, camel, local poultry; other non-livestock animals are donkey, horse, and wildlife. The Nigerian National Livestock Survey (1989–1991)<sup>4</sup> indicated that species of cattle (muturu, zebu and others), goats, sheep, donkeys, horses, camels, pigs, cats, dogs, rabbits, giant rats, guinea pigs, chickens, guinea-fowl, pigeons, turkeys, fish and snail have been domesticated and kept in Nigeria. Recent FAO statistics indicate that Nigeria had 20.7m cattle, 80.8 million goats, 42.5 million sheep, 207.6 million poultry and 6.5 million pigs in 2012. This is projected to increase to 53.6 million, 207.8 million, 78.2 million, 1.284 billion and 21.1 million respectively by 2050<sup>5</sup>. The feeding sources are natural range lands, tree forage, and crop residues. Because of the low annual availability of feed, animals are kept partly under a transhumant system in which animals are moved shortly before the dry season to the more humid southern areas for grazing and watering.

Climate change poses formidable challenge to the development of the agriculture sector in the country. The sector has been very sensitive to climate change and it has been affected by floods, droughts and erratic rainfall. In general, the agriculture-livestock sector can be significantly impacted by climate change. The rise in temperature between 2 to 3°C over the entire country together with increased humidity resulting from climate change is likely to aggravate the heat stress in dairy animals resulting in reduced growth and milk production.

#### 2.2 Nigeria's Changing Climate

Climate variability constitutes one of the most arduous and complicated problems confronting human development. The risk factors are becoming very high and the impacts are expected to raise considerably the developmental impediments of safeguarding food, nutrition and livelihood security as well as poverty eradication in most Sub-Saharan African nations including Nigeria (IPCC, 2014).



See R. Blench The Nigerian National Livestock Resource Survey A Personal Touch available at <a href="https://www.rogerblench.info/.../Nigerian/">www.rogerblench.info/.../Nigerian/</a>./Nigerian/<a href="https://www.rogerblench.info/.../Nigerian/">www.rogerblench.info/.../Nigerian/</a>

FAO (undated) Africa Sustainable Livestock 2050 – Transforming Livestock Sector – Nigeria. What do long-term projections say? <a href="http://www.fao.org/3/CA3374EN/ca3374en.pdf">http://www.fao.org/3/CA3374EN/ca3374en.pdf</a>



The effect of global warming and the attendant change in the climatic conditions is already evident in Nigeria. The country is becoming warmer on both annual and seasonal timescales with marked variability in the mean temperature conditions. Various analyses show that mean temperatures have been consistently increasing throughout the country in the last five decades and have been rising significantly since the 1980s. The linear warming for 30-year (climatic mean) averages on a decadal slice further revealed changes in temperature by an average of 0.2°C. There is a general concern about the observed significant increase in warm extremes in all the sub-regions of the country.

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There is also the concern that the annual and decadal rainfall indices for Nigeria are marked by large inter-annual and inter-decadal variations with most of the period characterized by normal conditions. The arid and semi-arid areas of northern Nigeria would be more vulnerable to climate change in the long run than any other part of the country, with a high probability of tending towards alteration between periods of floods and droughts (Oladipo, 2019).

More worrisome is the increasing knowledge that the country will be subject to consistent changes in rainfall and temperature conditions, particularly towards the end of the century. For example, the spatial mean annual precipitation for time series of 2050 (2041-2060) and 2070 (2061-2080) for two emission scenarios (RCP4.5 and RCP8.5) compared to the baseline (1960-1990) shows an increase in precipitation (Figure 1). Similarly, the spatial mean annual precipitation for time series of 2050 (2041-2060) and 2070 (2061-2080), for both emission scenarios such as RCP4.5 and RCP8.5, compared to the baseline (1960-1990), shows an increase in temperature (Figure 2). Under the RCP4.5 for 2050 and 2070, the minimum temperature increase could range from 1.48 °C to 1.78 °C and the maximum temperature increase of about +3.08°C to +3.48°C compared to the baseline. It is expected that much of the northern part of Nigeria could experience a very high temperature increase. Under the RCP8.5, for 2050 and 2070, the minimum temperature increase could range from +2.41 °C to +2.68 °C and the maximum temperature increase of about +4.25°C to +4.63°C compared to the baseline. Under this high radiative trajectory pathway almost all parts of Nigeria could experience an increase of minimum of 2 °C and maximum of more than 4°C in which the highest increase could be in the Northern part of Nigeria (FGoN, 2019).

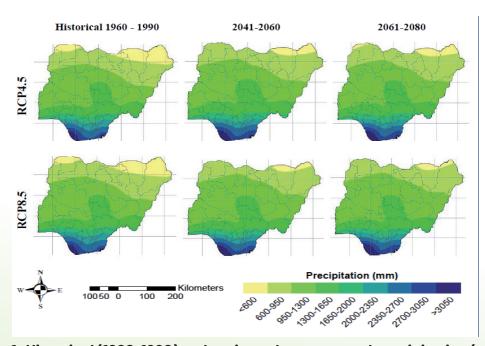


Figure 1: Historical (1960-1990) and projected mean annual precipitation (mm) over

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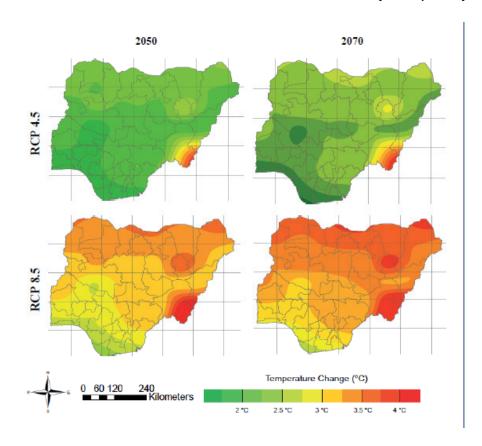


Figure 2: Mean annual temperature changes for time series of 2050 and 2070 at RCP 4.5 and RCP8.5 compared to the historical baseline of 1960-1990 (FGoN, 2019).

Towards improving the food security situation in the country, government is pursuing a transformation agenda in the agriculture sector through a strategic focus of driving agricultural growth and food security in a clear and measurable way, supporting public private partnership, focusing on value chains of commodities where Nigeria has comparative advantage, providing growth enhancement input/credit support to farmers, promoting and stimulating investments to drive a market-led agricultural transformation and focusing on youth and women. Government, has however also realised that its efforts could be threatened by the impacts of climate change. For example, the World Bank (2013) reported that the country has warned that higher temperature and more erratic rainfall could contribute to a long-term 20–30 percent reduction in crop yields in Nigeria.

#### 2.3 Impacts of the Changes on Agriculture in Nigeria<sup>6</sup>

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As the agricultural production system in Nigeria is predominantly rain-fed, it is highly vulnerable to climate change. In such a case, extreme rainfall patterns and/or variability becomes a critical production risk. Crop production in the country has experienced and is experiencing many hazards related to climate change. Climate change impacts are associated with a range of climatic variables such as temperature, rainfall, and extreme events. Also important are the country's social, cultural, geographical and economic backgrounds which determine the resilience of communities dealing with climate change impacts. Studies by Abiodun, et al. (2011), Cervigni et al. (2013) and Hassan et

<sup>6</sup> Much of the material in this section is taken from Oladipo (2013)

al. (2013), using science-based modeling approaches, as well as empirical studies by DFID (2009), BNRCC (2011), Bubsy et al., (2011) and Idowu et al., (2011) provide some good information on the potential impact of climate change on agriculture in Nigeria. They all indicate that climate change is affecting crop and livestock production in various ways and magnitudes.

In general, climate change is driving aridity and desertification and intensifying floods in northern Nigeria, as well as increasing flooding and erosion in the middle belt and southern regions, especially in the coastal and high forest agroecological zone. Flooding and erosion lead to crop failure by removing topsoil, making soil more acidic and washing away or submerging crops. In addition, global warming-induced increase in temperature since the 1970s is having significant impact on crop productivity on all the agroecological zones of the country, while sea-level rise, resulting from climate change, is affecting crop production in coastal areas.

As elaborated by BNRCC (2011), farmers in the coastal and high forest agro-ecological zones face a range of impacts from climate change hazards, contributing to a loss of livelihoods. Agriculture-related climate change impacts can include:

- decline in crop yields resulting in reduced marketable surpluses;
- irregular fruiting of cocoa;
- total failure of some crops;
- increase in pests and disease;
- soil degradation and loss of farm land due to flooding and erosion;
- reduction in bush foods such as bush mango (Irvingia gabonensis) and Getup africana also known as Okazi, Afang or eru; and
- post-harvest losses of farm products due to bad/extreme weather events

In the Savanna and Sahel agro-ecological region, increasing variation in the amount, geographic distribution and timing of rainfall. Traditionally, planning and timing of farming operations are tied to the onset and duration of rainfall, particularly the first rainfall events of the wet season. Thus, the impact of changing climatic conditions in these zones may include:

- decreased rainfall, increased temperature and evaporation;
- more frequent drought spells leading to source water shortage;
- changes in the onset of the rainy season changing planting dates and the length of
- the growing season of annual crops;
- increased fungal outbreaks and insect inter-relation due to changes in temperature
- and humidity;
- decrease in the available areas that can be cultivated and decline in yields;
- increased risk of food shortage and famine;
- increased potential of malaria transmission and the related reduction in available
- labour to work on farms;
- increased movement of pastoralists to more humid southern areas in search of
- fodder and water;
- lower quality and quantity of grazing lands;
- increased desertification of arable lands;
- increased rural to urban migration leading to a reduction of available farm labour;
- and
- loss of soil fertility.

The livestock sub-sector is affected by climate change and other environmental hazards within all ecological regions of Nigeria. The climate change hazards affecting livestock production in Nigeria include late onset of rainy season, higher than normal temperatures, flooding, salt water intrusion and windstorms. Late onset of the rainy season causes a lack of available water for livestock and



reduces forage availability. Higher than normal temperatures would lead to poor livestock health which reduces the market value of affected livestock thereby reducing farmers' income. Flooding leads to loss of livestock, destruction of livestock enclosures and outbreak of diseases.

In general, the livestock sub-sector is vulnerable to climate change hazards because of the low adaptive capacity of livestock farmers to its impacts. Thus, increasing shortage of rainfall, late onset of rains and rising temperature in the Sahel and Savanna will result in declining livestock production and productivity as well as increased incidence of diseases. In the Rainforest and Coastal zones, flooding and erosion will displace livestock farmers, destroy their assets and increase disease infestation in livestock farms. This trend will ultimately reduce animal protein supply in the country as much of the livestock production in Nigeria comes from these regions (BNRCC, 2011).

In quantitative terms, and for some specific crops, crop modeling results by Nelson et al. (2010); Cervigni et al. (2013) and Hassan et al. (2013) indicated some mixed results such as:

- There will be a loss of yield in areas planted with sorghum in the northern Sahelian zone, which is already prone to desertification, due to temperature increase will make it too hot for sorghum cultivation in these areas. All the models predict yield loses on the order of 5–25 percent below baseline, with a few areas showing even higher losses (Figure 3). However, under the IFRI's IMPACT Model (Nelson et al., 2010), a general increase in sorghum production, yield, area and net exports is predicted.
- Maize will perform relatively better in the face of climate change by gaining between 5 and 25 percent in yield, with some areas predicted to have a yield increase greater than 25 percent. Less area is predicted to be lost to maize than to sorghum, and as in the case of sorghum, the areas predicted to be lost to maize fall within the Sahelian region of the northeastern extreme of the country (Figure 4).
- Under the IFRI's IMPACT Model, millet production, yield, and net exports<sup>7</sup> are predicted to increase in all the scenarios. The production of cassava and other root crops as well as sweet potatoes and yams is projected to increase in all scenarios of the Model.

A good indication of a projected food surplus for Nigeria.

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## PROMOTING AGROECOLOGY FOR CLIMATE RESILIENT AGRICULTURE AND FOOD SECURITY IN NIGERIA – REALIGNING POLICIES

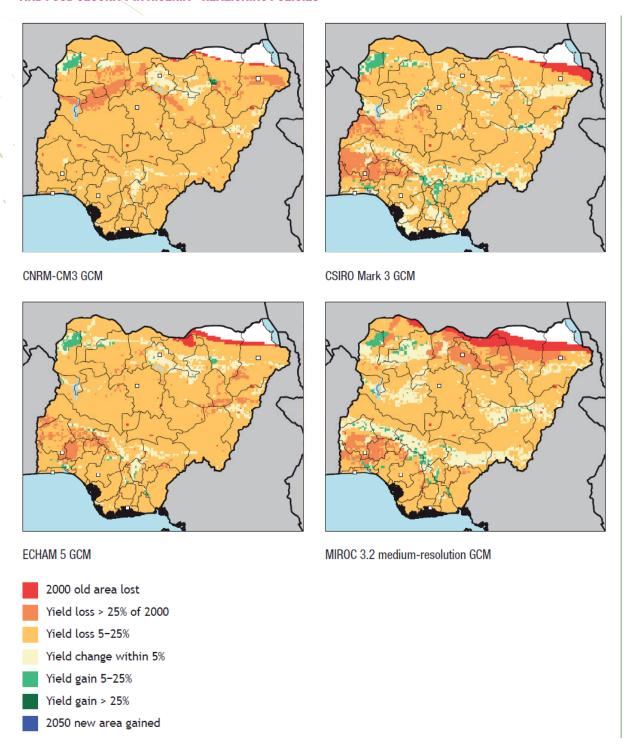


Figure 3: Yield change under climate change: Rainfed sorghum in Nigeria, 2010–50, A1B scenario<sup>8</sup> by different models (Hassan et al. 2013)

A1B = greenhouse gas emissions scenario that assumes fast economic growth, a population that peaks midcentury, and the development of new and efficient technologies, along with a balanced use of energy sources; CNRM-CM3 = National Meteorological Research Center-Climate Model 3; CSIRO = Australia Commonwealth Scientific and Industrial Research Organisation; ECHAM 5 = fifth-generation climate model developed at the Max Planck Institute for Meteorology (Hamburg); GCM = general circulation model; MIROC = Model for Interdisciplinary Research on Climate, developed at the University of Tokyo Center for Climate System Research.



PROMOTING AGROECOLOGY FOR CLIMATE RESILIENT AGRICULTURE

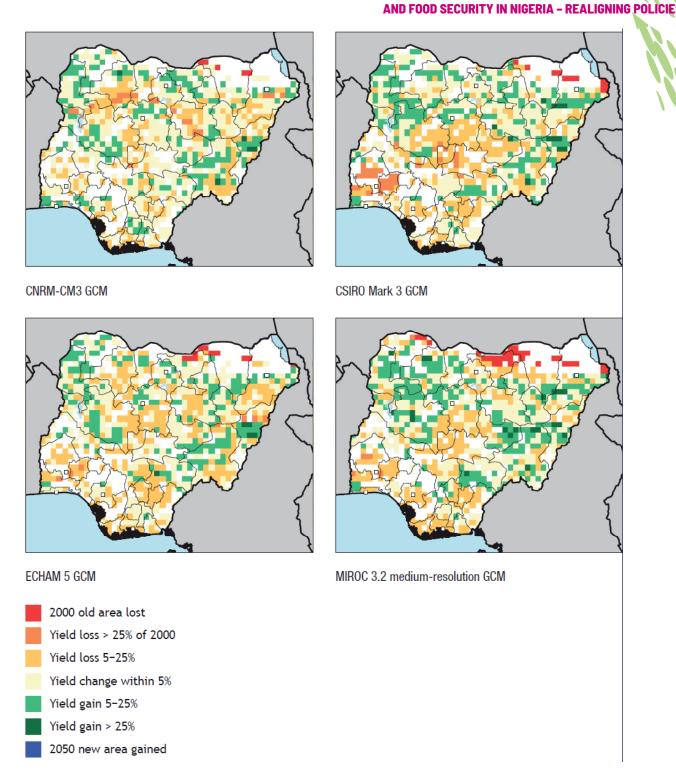


Figure 4: Yield change under climate change: Rainfed maize in Nigeria, 2010–50, A1B scenario by different models (Hassan et al. 2013)

On agroecological subzonal and crop type basis, Cervigni et al. (2013) have demonstrated that there will be some reductions in yield with negative implications for the country's food security. In particular, they showed that:

- In the short term (2006–35) in some agroecological subzones (AESZs), cereals show yield reductions, which accelerate in the medium term (2036–65);
- Reductions projected for sorghum, millet, maize, and rice in 2020 are probable in all AESZs



AND FOOD SECURITY IN NIGERIA - REALIGNING POLICIES

- except AESZ10, where the uncertainty is very high, and AESZs1 and 2, where increases are projected;
- Rice seems particularly vulnerable in the north, with longer-term reduction in yields of 20–30 percent or more (see Figure 5);

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- By 2050 the probability of lower yields in all cereals in all AESZs is very high except for millet in AESZ 2 and maize in AESZs 4 and 10, where projections are clouded by uncertainty;
- Results for the root crops, cassava and yams, show high variability in yield impacts: the more pessimistic models suggest yield decline in all AESZs in both 2020 and 2050, while more optimistic models in some cases show significant increases in cassava yield (e.g., in AESZs 4, 9, and 12) for both;
- Impacts on the yam crop suggested lower yield increases in some AESZs in 2020, with high concordance between models. Decreases are projected generally for 2050, even though increases are projected for some AESZs;

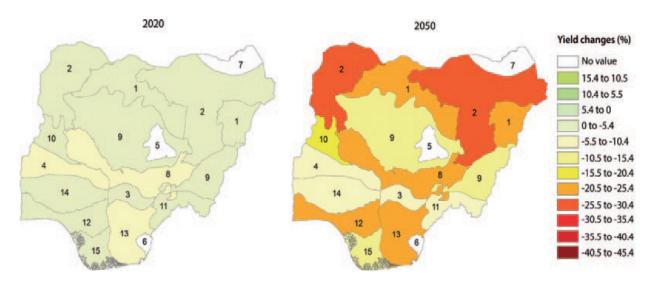
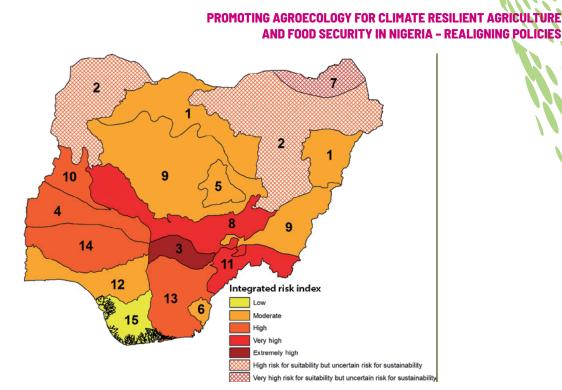


Figure 5: Predicted Changes in Rice Yields (after Cervigni et al. 2013)

For the livestock, the gross primary productivity (GPP) will decrease significantly in the northern and central areas by 2050, indicating a significant reduction in the availability of feed for the sector. The southwest is less likely to experience significant reduction in GPP. Overall, an integrated risk index (obtained by a combination of suitability and sustainability classifications – see Cervigni et al. 2013) showed that the southern part of the central belt seems to be moving toward high to extremely high unsafe conditions for livestock (Figure 6)



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Figure 6: Distribution of Integrated Risk for Livestock in 2050 Compared to 1990 (Cervigni et al. 2013)

The divergence of conclusions presented in the preceding synthesis indicated the high degree of uncertainty in the current understanding of climate change implications for agriculture in Nigeria. There is need for a more comprehensive and multi-disciplinary nature of research needed to unravel the key direct implication for climate change on agriculture in Nigeria, beyond what currently obtains. Nevertheless, the general consensus is that Nigeria's agriculture sector is strongly predisposed to severe negative impacts of climate change due to its weak resilience and low adaptive capacity. Much of the economy is dependent on climate-sensitive resources, particularly agriculture.

Nigeria's First Nationally Determined Contribution (NDC) concludes that under a business-as-usual scenario, agricultural productivity could decline between 10 to 25 per cent by 2080. In some parts of the north, the decline in yield in rain fed agriculture could be as much as 50 percent. This in turn would impact GDP, reducing it by as much as 4.5 percent by 2050, even though the share of agriculture in GDP will decline from 40 to just 15 percent (FGoN, 2015). Furthermore, in the absence of mitigating measures, the net import of yams and other vegetables is expected to decrease in the long-term. The net import of rice, however, is expected to increase by as much as 40 percent. However, as indicated by Havlíka et al.., (2015), understanding the extent and location of the impacts of climate change, particularly for the agricultural and forestry sector, is a complicated task due to the complexity of the chain of effects and their uncertainties. All of these could have serious implications for the food and nutrition security of the country, unless better climate change and variability mitigation and adaptation mechanisms are in place to address the challenges. Agricultural adaptation requires that new technologies and farm-level innovations, as well as functional institutional arrangements are put in place.



#### 2.4 Potential Effects of the Changes on Food Security

With particular reference to food and nutrition security, climate change is projected to negatively impact the four pillars of food security (availability, access, utilisation and stability) and their interactions. The following assessments are taken from Chijioke et al., (2011); Zewdie (2014) and Mbow et al. (2019).

**Impact on food availability**: The major direct impact of climate change is expected to have on food security is through food availability component due to changes in agricultural productivity that would be related to many aspects of climate change like temperature increase, change in rainfall amount and patterns, rising atmospheric concentrations of  $\mathrm{CO}_2$ , change in climatic variability and extreme events and sea water rise. For example, warming of the climate more than  $3^{\circ}\mathrm{C}$  is expected to have a negative effect in all regions, particularly for cereal crops in the drylands of Nigeria. Furthermore, as concluded in Zewdie (2014) about two thirds of arable land in Africa is expected to be lost by 2025 due to decreased rainfall and reduce yields with an estimation of up to 50 percent in some Sub Saharan countries, including Nigeria, where over 90% of the cultivated land depends on rain feed agriculture.

**Impact on food accessibility**: The ability of individuals, communities and countries to purchase food in sufficient quantities and quality may be impaired by possible food price increases and declining rates of income growth resulting from climate change; thereby limiting food accessibility by many subsistent households.

**Impact on food utilization**: The most significant component of food security in a changing climate is food utilization. Even when the availability and accessibility are not infringed upon, if food sources are not able to contribute to a balanced, nutritious diet, then the implications for health and productivity of the population could be significant (Zewdie, 2014). In general, climate change and variability affect food utilization capacity through different mechanisms. For example, it affects the production rate and pattern of different food items and this can affect the nutritional requirements of the population, just as it can also affect the income and capacity of the household to purchase a diversity of food items to get a balanced diet.

Extreme weather events that result in high and volatile food prices have also been found to be capable of forcing households to reduce both quality and/or quantity of food they consume, consume less preferred food and allocate food only to certain household members (Chijioke et al., 2011). In addition, as climate change may limit access to clean water and sanitation infrastructure, resulting in increase in diarrheal disease, it may contribute directly to child morbidity and poor food utilization by limiting the absorption of nutrients. Also climate change will cause new patterns of pests and diseases to emerge, affecting human health like increased incidence of vector borne diseases in flood prone areas, changes in vectors for climate responsive pests and diseases, and emergence of new diseases could affect both the food chain and people's physiological capacity to obtain necessary nutrients from the foods consumed. In a complex manner, climate change may initiate a vicious circle where infectious diseases, including waterborne diseases, cause or compound hunger, which, in turn, makes the affected population more susceptible to those diseases. This may result in added declines in labour productivity and an increase in poverty, morbidity and finally mortality (Zewdie, 2014).

**Impact on food stability:** Climate change-induced increased frequency and severity of extreme events will bring greater fluctuations in crop yields and local food supplies that can adversely affect the stability of food supplies and thus food security. If climate fluctuations become more



pronounced and more widespread, droughts and floods could cause short-term fluctuations in food production by dramatically reducing crop crop yields and livestock numbers and productivity.

Overall, climate change and variability remain a main challenge to agriculture sector of Nigeria and particularly in reducing food insecurity and achieving the second SDG (reduce hunger, achieve food security and improved nutrition and promote sustainable agriculture). However, there are many mitigation and adaptation potentials to reduce the current food insecurity in the country. Figure 7 shows how food production, adaptation and mitigation goals might overlap and gives examples of possible practices for each goal, but also activities which could represent dual or triple wins. Agroecology, as a science and practice, covers many areas of climate change mitigation and adaptation in agriculture that provide opportunities to sustainably increase productivity, resilience, reduce GHG and enhance achievement of national food and nutrition security and development goals.

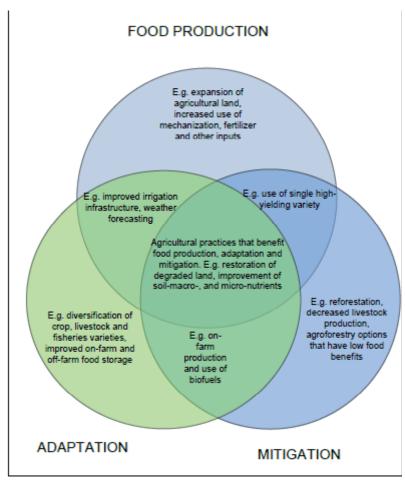


Figure 7: Potential synergies and trade-offs among food production, adaptation and mitigation (Lamboll and Nelson, 2014).

# 3. Agroecology and Climate Change

#### 3.1 Nexus between conventional farming and agro-ecology

Agroecology is often viewed as an alternative and sometimes in direct opposition to conventional farming. The two approaches are not mutually-exclusive but complementary (see, for example, Silici, 2014).

While conventional farming focuses attention on the productivity of a single crop, agro-ecology adopts a holistic approach in identifying, analyzing and resolving issues related to the farming system. The agricultural ecological system (agro-ecosystem) is seen as a UNIT, and the health of the agrosystem is more valued than productivity of a single crop. It brings into harmony the farming system with the productive potential and the physical limits of the surrounding landscape.

In terms of resource use, conventional farming emphasizes nutrient cycling on the cropping system. Agro-ecology on the other hand, places emphasis on the recycling and optimization of the use of nutrients and energy on the farm by:

- avoiding the unnecessary use of agrochemical and other technologies that adversely affect the environment and human health;
- enhancing the conservation and regeneration of soil and water resources and of agrobiodiversity and minimizing losses of energy, water, nutrients and genetic resources;
- enhancing the recycling of biomass, with a view to optimising organic matter decomposition and nutrient cycling over time; and
- minimising the use of external, non-renewable resources (including fossil fuels).

In addition, while conventional farming concentrates at the farm level, agroecology promotes the diversification of species and genetic resources at farm and landscape level) over time. Rather than focusing on individual crops, agro-ecological practices enhances beneficial biological interactions and synergies among the components of agrobiodiversity, thereby promoting key ecological processes and services. It also helps in strengthening the 'immune system' of agricultural systems by enhancing functional biodiversity (natural enemies, antagonists, etc.). It promotes the use of local crop varieties and livestock breeds so as to enhance genetic diversity and adaptation to changing biotic and environmental conditions, including climate change.

#### **3.2** Elements of Agroecology

Sustainable and resilient food and agricultural systems are critical for the reduction of climate change and vulnerability impact on Nigeria's food and nutrition security. In this regard, agriculture

systems must become more resilient to extreme weather events and their adaptive capacity must be improved and strengthened to face the changes in local climatic conditions, as well as respond to the expected growth in the country's population and demographic transition and subsequent increasing demand for diverse and nutritious foods. Agroecology, as the application of ecological principles to agriculture, is a way not only to improve agricultural productivity, but also to make the sector more resilient and adaptive to climate shocks.

There are some critical elements of agroecology that can make agricultural systems to become more resilient while reducing GHG emissions and increasing production and diversification of food. Ten elements have been identified by FAO (2019) in the context of environmentally friendly, economically successful and socially acceptable agricultural practices as critical for the mitigation and adaptation of climate change in the agricultural and food systems. Sinclair et al. (2019) upgraded them to 13 elements or principles. They are:

- i. Diversity (Biodiversity): This is key to agroecological transitions to ensure food security and nutrition while conserving, protecting and enhancing natural resources in the face of climate risk, as agroecological systems optimize the diversity of species and genetic resources in different ways. Increasing biodiversity through diversification contributes to a range of production, socio-economic, nutrition, climatic and general environmental benefits, as well as strengthening ecological and socio-economic resilience, including by creating new market opportunities.
- ii. Co-creation and Sharing of Knowledge: Agricultural innovations respond better to local challenges when they are co-created through participatory processes. The co-creation and sharing of knowledge play a central role in the process of developing and implementing agroecological innovations to address challenges across food systems including adaptation to climate change.
- **iii. Synergies:** Diversified systems that selectively combine annual and perennial crops, livestock and aquatic animals, trees, soils, water and other components on farms and agricultural landscapes enhance synergies in the context of an increasingly changing climate. Thus, building synergies enhances key functions across food systems, supporting production and multiple ecosystem services.
- **iv. Efficiency/Input Reduction:** This approach, by which we produce more using fewer external resources, is an effective means of managing diversity to create synergies between different system components through the improved use of natural resources, especially those that are abundant and free, such as solar radiation, atmospheric carbon and nitrogen. Reducing dependency on external resources empowers producers by increasing their autonomy and resilience to natural (e.g. climate risk) or economic shocks.
- v. Recycling: Agroecological practices support biological processes that drive the recycling of nutrients, biomass and water within production systems, thereby increasing resource use efficiency and minimizing waste and pollution. More recycling means agricultural production with lower economic and environmental costs. Recycling delivers multiple benefits by closing nutrient cycles and reducing waste that translates into lower dependency on external resources, increasing the autonomy of producers and reducing their vulnerability to market and climate shocks.
- vi. Resilience (Healthy Soil and Animal Health): Diversified agroecological systems are more



resilient and have a greater capacity to recover from disturbances including extreme weather events such as drought, floods and to resist pest and disease attack. Thus, enhanced resilience of people, communities and ecosystems is key to sustainable food and agricultural systems.

- vii. Human and Social Values (including Participation and Fairness): Agroecology places a strong emphasis on human and social values, such as dignity, equity, inclusion and justice all contributing to the improved livelihoods. By building autonomy and adaptive capacities to manage their agro-ecosystems, agroecological approaches empower people and communities to overcome poverty, hunger and malnutrition, while promoting human rights, such as the right to food, and stewardship of the environment for sustainable development so that future generations can also live in prosperity. In addition, it seeks to address gender inequalities by creating opportunities for women. In general, as a bottom-up, grassroots paradigm for sustainable rural development, agroecology empowers people (including women, youth and children) to become their own agents of change. Thus, protecting and improving rural livelihoods, equity and social well-being, as a major element of agroecology, is essential for sustainable food and agricultural systems.
- viii. Culture and Food Traditions (Social Values and Diet): By supporting healthy, diversified and culturally appropriate diets, agroecology contributes to food security and nutrition while maintaining the health of ecosystems.
- ix. Responsible Land and Natural Resource Governance: Sustainable food and agriculture requires responsible and effective governance mechanisms at different scales from local to national to global to support the transition to sustainable food and agricultural systems.
- x. Circular and Solidarity Economy (Connectivity, Participation): Circular and solidarity economies that reconnect producers and consumers provide innovative solutions for living within our planetary boundaries while ensuring the social foundation for inclusive and sustainable development. This is in line with a principal element of agroecology which seeks to reconnect producers and consumers through a circular and solidarity economy that prioritizes local markets and supports local economic development by creating virtuous cycles.
- xi. Land Health: Critical for agricultural productivity on a sustainable basis
- **xii. Animal Health:** Improved animal healthy and diversity for sustainable livestock development.
- **xiii. Participation:** Inclusiveness to enshrine fairness and amicable sharing of benefits to withstand climatic shocks.

The linkages among these elements and summaries of how they generate adaptation benefits are depicted in Figure 8. It is critical to note that these elements of agroecology are interlinked and interdependent.



PROMOTING AGROECOLOGY FOR CLIMATE RESILIENT AGRICULTURE

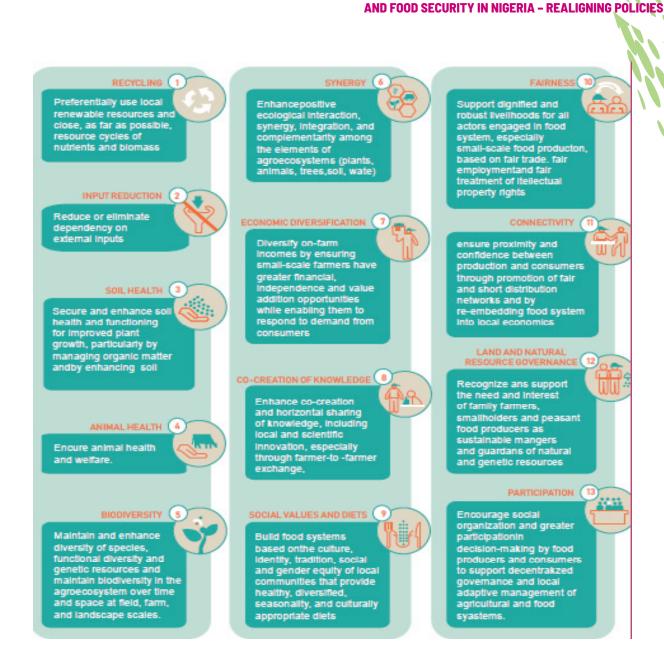


Figure 8: Linkages among key principles of agroecology that interact to promote adaptation and resilience to climate change shocks (adapted from Sinclair et al., 2019)

#### 3.3 How Agroecology can Stand up to Climate Change

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Climate change is adding new uncertainty as well as increasing uncertainty in Nigeria's development. It is now recognized as capable of undermining current national efforts to address food security and malnutrition problems in the country. It adds a new set of threats to food security, including but not limited to (i) increased frequency of natural disasters; (ii) changes in local climate conditions; (iii) increased intensity of cyclical meteorological events; (iv) accelerated desertification, floods, heat waves, new pests and diseases similar in dimension to the current COVID-19. These phenomena will reduce crop productivity and nutrient density of crops. In this context, small scale farmers, infant children and women in particular, and the poorest, are the most vulnerable. Agriculture systems must, therefore, become more resilient to extreme weather



events and their adaptive capacity must be improved and strengthened to face the changes in local climatic conditions.

By introducing agroecological principles, the risk of exposure to the impact of climate change can be reduced. Thus, to consolidate mitigation and adaptation measures in agriculture for enhanced food and nutrition security, agroecology has in recent decades been promoted in the sector to ensure sustainable future. Through its positive impact on income generation, employment, food production, processing, consumption and dietary diversification, agroecology has naturally become a facilitator of nutrition-sensitive agriculture and the best option to build good nutrition for all, particularly under increasing climate variability and higher risks of climate change-intensified natural disasters and extreme weather events (Action Against Hunger, 2018).

Agroecology represents perhaps the most effective way to achieve sustainable food security and nutrition for all in a changing climate. According to Action Against Hunger (2018), agroecology proposes a comprehensive answer to these challenges and contributes to the realization of the Right to Food by offering a new basis for sustainable food systems, resilient agricultural livelihoods and good nutrition.

For many reasons, agroecology can help overcome many climate-induced shocks that most small-scale farmers face in their agricultural activities. First, as agroecology is largely based on knowledge, it helps farmers to understand how ecological systems work and how to react appropriately in the case of climate threat and interference. Next agroecology promotes a diversified production system. Thus, in the case of climatic extremes, one product might be affected while others could still be harvested. Alternative production like animal husbandry, honey production, soap making etc. Helps compensate for losses in farming. Third, the use of synergies, an efficient resource use and recycling measures will also allow farmers to become more flexible to prepare for and react to climate variability. In addition, local production and consumption systems that are based on traditional species, local markets and social safety nets, are less prone to global climate impacts causing less market volatility. Figure 9 identifies how agroecosystems will be more resilient in the face of climate change and variability when inserted in a complex landscape matrix, featuring genetically heterogeneous and diversified cropping systems managed with organic matter rich soils and water conservation techniques (Altieri, 2017).

<sup>9</sup> See How agroecology (AE) is standing up to climate change <a href="https://www.biovision.ch/en/projects/international/agroecology-against-climate-change/">https://www.biovision.ch/en/projects/international/agroecology-against-climate-change/</a>

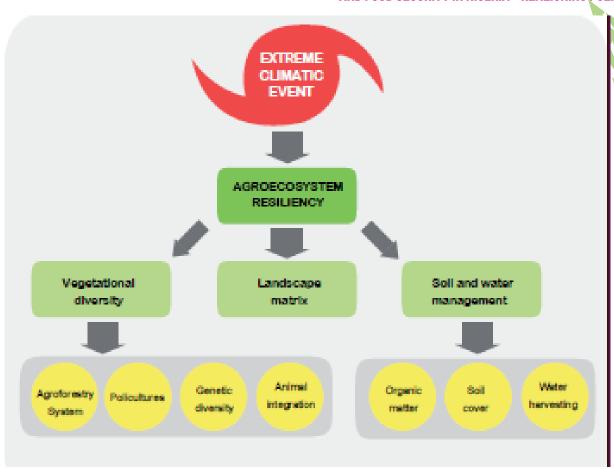


Figure 9: Landscape, on-farm diversity, and soil and water features that enhance the ecological resilience to extreme climatic events (Altieri, 2017)

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In general and within the framework of addressing the challenge climate change poses to food and nutrition security, agroecological approaches to sustainable food systems for food security and nutrition "favour the use of natural processes, limit the use of synthetic inputs, promote closed cycles with minimal negative externalities and stress the importance of local knowledge and participatory processes that develop knowledge and practice through experience, as well as more conventional scientific methods, and address social inequalities. Agroecological approaches recognize that agri-food systems are coupled social-ecological systems from food production to consumption and involve science, practice and a social movement, as well as their holistic integration, to address food security and nutrition" (HLPE, 2019, p. 39). Agroecology also proffers solutions all along the food chain, including but not limited to (i) optimum management of soil organic matter for better fertility and reduced erosion; (ii) production of sufficient, safe and nutritious food, distribution through shorter value chains; (iii) better income for farmers; (iv) better food at a better price for consumers; (v) improved waste management; and (vi) composting of organic residues (Action Against Hunger, 2018: p.2). However, for agroecology to be meaningfully adapted and used for the improvement of the food nutrition systems to withstand climate change impacts, it must be promoted in every policy strategy, programme and national commitments or initiatives.

#### 3.4 Agroecological Practices for Climate Change Adaptation in Nigeria

By virtue of its geographical extent, Nigeria occupies many ecological zones favourable to different agricultural and agroecological practices. The main challenges for cropping and livestock farming arising from climate change are generally similar in many ecological zones or areas: decline of water resources, increasing variability of rainfall and water availability, risk of cropland degradation and

decrease of soil fertility, loss of arable land, rangeland degradation, and reduced feed availability. These factors affect crop yields and animal productivity to different degrees.

Traditionally, Nigeria farmers, like their counterparts in other parts of West Africa, use many agroecological practices to best manage local resources, crops and livestock, and to combat land degradation. Clements et al. (2011) provided a very comprehensive assessment of various technologies in agriculture that are basis for various agroecological practices for climate change adaptation that are adaptable to Nigerian conditions. The Alliance for Food Sovereignty in Africa (AFSA) has also documented numerous examples of valuable contributions of agroecology to sustainable farming in many parts of Africa, demonstrating that the continent can feed itself through the approach that cares for its environment, based on its rich cultural knowledge, supported by relevant science and technology (AFSA, 2016).

Debray et al. (2018) have further investigated the the potential of specific agroecological practices for sustainable agricultural production under climate change and even investigated evaluate the potential of these practices to directly or indirectly contribute to systems adaptation to climate change. They also investigated the development and implementation of agroecological practices that have potential to help farmers adapt systems to climate change impacts in some concrete cases of the farming systems analysed. In a similar manner, Onyeneke et al. (2019) conducted a systematic review of 95 studies concentrating on climate adaptation by smallholder rural farmers in Nigeria in the period 2010 to 2019. In general, the main agroecological practices can be clustered into the following categories:

- 1. Planning for climate change and variability (climate information services and education): Knowledge and climate education services provide knowledge to farmers about potential avenues to cope better in the presence of climate change.
- 2. Sustainable water use and management. Water-linked management practices include sustainable water management techniques, in the form of, rainwater harvesting or application of irrigation, which are aimed at reducing crop water to boost crop productivity, while contributing to economic sustainability.
- **3. Sustainable soil and land management:** Such practices may include, but not limited to:
  - i. tree planting, cover cropping, mulching, cross-slope to control climate change-induced or intensified erosion through structural and vegetative barriers;
  - ii. minimum or zero tillage practices to provide low disruption of the soil layers, while maintaining or improving soil quality;
  - iii. appropriate and integrated soil fertility enhancement using organic and chemical fertilizer to boost the quality of the soil, water retention capacity and retention of soil organic carbon;
  - iv. integrated agricultural practices, including mixed farming and agroforestry, particularly mixed crop-livestock-agroforestry system to foster livelihood diversification and security;
  - v. Integrated soil nutrient management, through conservation tillage, surface mulching, agroforestry and slow-forming terraces to foster enhanced site-specific knowledge and enhance environmental resilience and benefits in areas of intense rainfall by enabling adaptation to the risk of soil erosion by improving the rainwater seep-through ability of the soil, while retaining water for plant life.

#### 4. Sustainable Crop Management: Practices include:

- i. crop diversification, new crop varieties, ecological pest management, seed and grain storage foster climate resilience through innovations in crop development;
- ii. planting indigenous crop varieties that are well-suited for the immediate environment, where other varieties might fail;
- iii. undertaking innovative crop development activities, farm productivity is increased through the use of early-maturing and higher yielding crop species;
- iv. adopting other crops for production, especially heat resistant crops serve as a buffer against climate change-induced high temperatures and low precipitation

## **5.** Sustainable Farming Systems (including crop-specific innovation): These may include but not limited to:

- mixed farming practices to provide resilience by restraining pests and diseases, due to diverse crops responding dissimilarly to climatic impacts and retaining functional ability relative to non-diverse cropping systems;
- ii. crop rotation to maximize the use of lands for the production of various crops, while reducing pests and diseases;
- iii. adopting drought-resistant crop varieties to guard against crop failure and yield from the increased incidence of climate-induced droughts;
- iv. adjusting planting dates to address variability in rainfall which has been largely linked with largely responsible for poor productivity in Nigerian agricultural system – These may include planting before the start of rains, immediately after the first rains, and a few days after the rain, as well as staggering planting dates deliberately to pass around risk, by ensuring that any available rainwater will be utilized maximally by crops planted in dry fields;

#### **6. Sustainable livestock management practices**. They include:

- i. animal health improvement through administration of vaccines and antibiotics, introduction of anti-stress, planting trees to create shade around poultry pen, proper feed formulation, animal vaccination, constant water to regulate body temperature, proper treatment of water, veterinary services and quarantine services;
- ii. improved breeding strategy, including the use of high nutrient feed, use of nutrientdense diet, cross-breeding of animals and improved grazing pastures and sites.
- iii. improved breeding management, including growing hybrid birds as a form of adaptation in which indigenous species are cross-bred with foreign, improved species, with the aim of boosting adaptability of livestock to changing environmental and climatic conditions.
- iv. improved livestock management, including planting trees to serve as wind breaker, building shade to reduce heat, reducing flock size for adequate ventilation and improving livestock housing system.

Some of these technologies and practices have straightforward connections to climate change, but for others these connections are more indirect. The potential capacity of various agroecological practices to adapt to climate change and relevance to the country is depicted in Table 1. Action Against Hunger (2018) has reported a few agroecological successes that serve as evidence of the relevance of the practices to tackling climate change. They include the following:

In drought years, organic maize as up to 31% better yields than conventional maize;



- A meta-analysis showed organic farming could increase yields by 80% in developing countries;
- In case of flooding, plots farmed with agroecological practices retain 40% more top soil;
- "Push-pull" maize system allowed doubling maize and milk production in Kenya;
- The rice-duck system delivered a 20% increase in yield in Bangladesh;
- Mixed farming systems can lead to a 25% higher labour income per hectare without increasing environmental pollution;
- Small farmer revenues have been increased by 15-60% in Costa Rican organic production systems.

#### 3.5 Prioritising Agroecological Climate Change Adaptation Practices

It is important to determine the benefits of a particular practice relative to a particular ecological location. Clements et al (2011) have provided some criteria that could be used to prioritise the effectiveness of different agroecological practices. They include the following:

- **Environmental:** Due consideration should include the extent to which the practice conserves and strengthens biological diversity and promotes environmental sustainability, as well as promote sustainable local resource use.
- Awareness and Information: A good and suitable practice should enable and facilitate (i) access to information about climate change and the uncertainty of future conditions, (ii) integration of information from seasonal and weather forecasting and early warning systems into decision-making processes, and (iii) strengthening local knowledge and information.
- Productivity: Clear and demonstrable evidences of the extent to which the practice (i) supports nutrients of soil and water cycles conserves adequate biological conditions for future production; (ii) enables farmers to produce enough for self-consumption (to achieve food security), (iii) improves crop quality and productivity; (iv) improves crops quality and (v) is easy to disseminate and replicate.
- **Economic:** A good practices should (i) strengthen existing productive systems; (ii) increase the amount of information about variations of prices of inputs and final products in the different months of the year; (iii) reduce transaction costs of productive and commercial activities; and (iv) not generate influence, power and natural resource management inequities, which could be the source of social conflicts that obstruct the development of productive activities.
- **Cultural:** This concerns the extent to which the practice (i) respects cultural diversity, (ii) allows for an intercultural dialogue and the incorporation of local knowledge, and (iii) ease of understanding and application by farmers. This is because culture can provide, alter or limit options for adaptation and can determine how individuals within communities respond to the prospect of changes to their lives and livelihoods in the face of climate change.
- **Political:** The political element is the extent to which the practice is appropriately mainstreamed into national policies and can be scaled-up for wider implementation.
- Institutional: Adaptation of any of the practices should be evaluated and prioritised based on the extent to which they strengthen formal and informal institutions, such as



government ministries, civil society organisations and community-based organisations. In particular, practices should support civil society to form social networks and participate in decision-making processes.

Overall, the best agroecological practices are those that are culturally appropriate, enhance soil fertility, increase productivity, ensure nutrition and health, and have demonstrable environmental benefits.





Table 1: Summary of Adaptation Technologies in the Agriculture Sector and Situation of Adoption in Nigeria (adapted from Clements et al. 2011; Oladipo, 2013; Debray et al., 2018 and Onyeneke et al. 2019).

Adaptation Category	Technology	Contribution of Technology to Adaptation	Practice in Nigeria	Responsible Institutions	Remarks
Planning for Climate Change and Variability	Seasonal to interannual prediction; warning systems;	Agricultural decisions pertaining to scheduling of planting/harvest operations, fertilizer/pesticide use, crop type determination, herd management, crop sequence, crop rotations and land use and adaptation of current systems.	The Nigerian Meteorological Agency (NIMET) in the Ministry of Civil Aviation provides seasonal rainfall forecasting, but its applicability for crop forecasting remain limited	NIMET, Federal Ministry of Agriculture and Rural Development	Need for improved collaboration between NIMET and the Ministry of Agriculture for improved seasonal to interannual prediction and establishment of warning systems.
	Decentralised community-run early warning systems	Improve capacity to adapt to climate change	Department of Desertification Control and Drought Amelioration in the Ministry of Environment is in the process of establishing an Early Warning System for drought control.	Federal Ministry of Agriculture and Rural Development.	Critical for the Ministry of Agriculture and Rural Development to facilitate community based early warning system to enhance the adaptive capacity of farmers.
	Index-based climate Insurance	An assured financial mechanism to support farmers in years of financial loss due to climatic events.	Not functional in Nigeria. Central Bank of Nigeria proposing the Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) that can promote index-based climate insurance.	Central Bank of Nigeria & Insurance Companies	Need to sensitize the private sector on the opportunities in agricultural insurance business.
Sustainable Water Use and Management	Sprinkler and Drip Irrigation	Reduces water wastage and promotes efficient water use, particularly in the arid semi-arid areas that are very vulnerable to climate variability and change.	Not extensively practiced	Federal Ministry of Water Resources	
	Rainwater Harvesting	An adaptation strategy for people living with high rainfall variability, both for domestic supply and to enhance crop, livestock and other forms of agriculture.	Limited use in the southern part of the country, but not for agriculture.	Ministry of Water Resources	
Soil Management	Slow-forming Terraces	Facilitates adaptation to climate change by optimising water use, and reduces soil erosion	Use limited to hilly topographies of Mambila and Jos Plateaux	Federal Ministry of Agriculture and Rural Development	Adequate sensitization and training
	Conservation Tillage	Reduces risk from drought by reducing soil erosion, enhancing moisture retention and minimising soil impaction. In combination, these factors improve resilience to climatic effects of drought and floods.	Farmers engage in both no- tillage and minimum tillage, but they are limited by their limited education to explore to the maximum benefits offered by conservation tillage technology.	National Agricultural Extension and Research Liaison Services (NAERLS)	Adequate training for farmers imperative for enhanced adaptive capacity.
	Integrated Nutrient Management	Contributes to adaptation by having positive effects on crops in many ways, including (i) exerting a considerable influence on the susceptibility or resistance of plants towards many types of pests and diseases; (ii) enabling crops to explore a larger volume of soil in order to access water and nutrients; and (iii) facilitating improved root development that enables the plant to access water from deeper soil layers, which makes such crops to be less susceptible to drought.	Heavy dependence on fertilizers with limited interest in integrated nutrient management	Federal Ministry of Agriculture and Rural Development	More sensitization and training needed in the era of climate-smart agriculture.





Sustainable Crop Management	Crop Diversification and New Varieties	Increases crop portfolio so that farmers are not dependent on a single crop to generate their income. A farmer increases his/her chances of dealing with the uncertainty and/or the changes created by climate change, as different crops will respond to climate scenarios in different ways.	Farmers practice mix cropping and crop rotation, which are not as resilient in the face of increasing climate variability and change.	NAERLS/ Federal Ministry of Agriculture and Rural Development	Training and extension services, as well as support to research for climate extereme tolerant crops.
	Biotechnology for Climate Change Adaptation of Crops	Improve water use efficiency and the ratio of biomass produced to the amount of water used, through enhanced photosynthesis and reduced transpiration.	Not adopted as most of the farmers are not educated.	National Biotechnology Development Agency	Needs to be made a national priority.
	Ecological Pest Management	Builds farmers' resilience to potential risks posed by climate change, such as damage to crop yields caused by newly emerging pests and diseases.	Poorly understood and adopted.	Federal Ministry of Agriculture and Rural Development	Research important
	Seed and Grain Storage	Ensures feed is available for livestock and seed stock is available in the event of poor harvests due to drought.	Poor storage facilities	National Food Reserve Agency and Nigerian Stored Products Research Institute	Good opportunity for the country to enhance its adaptive capacity in this area.
Sustainable Livestock Management	Livestock Disease Management;	Improving livestock disease control reduces disease through improved animal husbandry practices.	Traditional transhumance approach for livestock disease control.	Federal Department of Livestock	Requires national improvement
	Selective Breeding via Controlled Mating	Reduces mortality rates, increase fertility rates, and can also be used to improve the quality of livestock products such as milk and fibre, thereby putting livestock producers at a lower risk from losing animals to climate change impacts.	Traditional transhumance approach for livestock disease control.	Federal Department of Livestock	Requires national improvement
Sustainable Farming Systems	Mixed farming	Diversification of crops and livestock allows farmers to have a greater number of options to face the uncertain weather conditions associated with the increased climate variability.	Farmers practice mix cropping and crop rotation, which are not as resilient in the face of increasing climate variability and change.	NAERLS/ Ministry of Agriculture and Rural Development	Training and extension services
	Agroforestry.	Improves the resilience of agricultural production to current climate variability as well as long-term climate change through the use of trees for intensification, diversification and buffering of farming systems.	A number of agrofestry practices, but mainly in the context of desertification control	Federal Ministry of Environment (Department of Forestry)	Training and extension services to enhance national adaptive capacity.

#### POTENTIAL PLATFORMS FOR ADVOCACY

Approach	Stakeholders	Potential Contribution	Situation in the Country	Responsibility	Remarks
Capacity Building and Stakeholder' Organization	Community- based Agricultural Extension Agents.	The habits and abilities of constant adaptation impacted by extension agents enable farmers to cope with climate change.	Many extension Agents trained, but impact poorly felt.	NAERLS/ Federal Ministry of Agriculture and Rural Development; NGOs	Training and extension services
	Farmer Field Schools.	The agronomic knowledge that farmers acquire from participating in farmer field schools as well as the habits and abilities of constant adaptation enables farmers to cope with climate change.	Practiced in the country with support from development partners such as Oxfam, World Bank, IFAD etc.	NAERLS/ Federal Ministry of Agriculture and Rural Development; NGOs	Training and extension services required





Forest User Groups (FUGs)	The activities of FUGs (e.g. improved education, health, sanitation, rural infrastructure and safe drinking water) can build the capacity of a community to adapt to future challenges and opportunities presented by climate change.	A few groups established during afforestation programmes, but sustainability uncertain.	Federal Ministry of Environment (Department of Forestry); NGOs	Training and extension services to enhance national adaptive capacity.
Water User Associations	Contribute to adaptation to climate change by providing a cooperative mechanism through a number of activities which may include (i) monitoring the impact of climate change on water resources; empowering water users and decision-makers to manage and allocate water resources with consideration for climate change, the environment and other technical information through consultative processes; promoting basin-level participation in national climate change and water management processes; etc.`	A few groups established during the implementation of FADAMA programmes, but sustainability uncertain.	Federal Ministry of Water Resources; NGOs	Training and extension services to enhance national adaptive capacity.









# 4. Promoting Agroecology: Imperative for a Paradigm Shift in Policies

A recent summary of a virtual workshop facilitated by the International Institute for Sustainable Development (IISD, 2020) highlighted that:

- climate change multiplies existing risks in the food system and creates additional risks for rural livelihoods and for world food security;
- agriculture is both a contributor to, as well as heavily influenced by, climate change;
- agroecological practices, including mixed crop-livestock systems, make agricultural production more resilient to droughts, erratic rainfall patterns, and increasing temperatures by managing soils, water resources, and biodiversity in a sustainable way;
- agroecology lowers upfront investments by decreasing the need for external farming inputs, reducing farmers' economic vulnerability in case of harvest loss;
- agroecology supports economic diversification, an effective risk-reducing strategy for smallholder farmers to economically adapt to climate change;
- secure land tenure creates positive incentives for investments in adaptation measures;
   and
- the institutional and policy landscape for rural development in most countries must change for the upscaling of systemic approaches to climate change.

In addition, Leiport et al (2020) have provided scientific evidence that demonstrates that agroecology increases climate resilience, as long as it builds on ecological principles, in particular on biodiversity, overall diversity and healthy soils. Furthermore, the IPCC Special Report on Climate Change and Land (IPCC, 2019) and the 2019 HLPE Report of the Committee on World Food Security have also highlighted the climate potential of agroecology (HLPE, 2019). In addition, FAO (2013) elaborated a number of actions that can facilitate the implementation of agroecological practices for climate change adaptation or equivalent of climate smart agricultural practices. They include the following:

- Expanding the evidence base to include projected effects of climate change on agriculture and vulnerability of the sector and food security.
- Enabling policy frameworks responsible for agriculture, climate change, food security and land use.
- Strengthening national and local institutions to empower, enable and motivate farmers and build the capacity of national policy makers to make appropriate decisions on climate change and agriculture for sustainable development.
- Enhancing financing options to spur sustainable agricultural development.
- Implementing practices at field level to optimize local farmers' knowledge as the primary custodians of knowledge about their environment, agro-ecosystems, crops, livestock, and local climatic patterns and support them to identify suitable climate-smart options that can be easily adopted and implemented.

These studies have indicated the importance and relevance of appropriate policy frameworks for the promotion of agroecology in agriculture and subsequently in food and nutrition systems and security. They have also demonstrated that fostering agroecology to build resilience and sustainability is potentially a viable climate change adaptation strategy. Yet, despitee increasing knowledge about the relevance and importance of agroecology to transform agriculture towards increased limate-resilience and sustainability, it has not been widely adopted by farmers. This is traced back to various reasons, such as the lack of enabling institutional and policy environments, the strong pressure from industrialization and commercialization processes or the lack of funds for research and education (Nicholls and Altieri, 2018).

The focus of this study is to evaluate the extent to which the climate change policy landscape in Nigeria is mainstreamed with the imperative of agroecology for climate change adaptation. This is in recognition of the fact that inorder to achieve sustainable Food Security and Nutrition for all in a changing climate, agroecology must be promoted in every public policy and initiatives. In particular, policies need to be designed to promote farmers' adaptation through agro-ecological practices and also promote agroecology as a movement to strengthen farmers' resilience and adaptation through experience sharing. The extent to which is true in Nigeria is captured through an analysis of the existing climate change and climate change-related national policies, strategies and programmes. The main objective is to ascertain how agroecology can foster climate change adaptation, mitigation and resilience through climate-related policies. The emphasis is on assessing the potential for agroecology to be considered and recommended as a relevant adaptation/mitigation approach in the agriculture-climate discussions in Nigeria for sustainable food and nutrition systems and security.

# 4.1 Landscape Analysis of National Climate Change and other related Policies, Strategies and Plans

Nigeria has a number of climate change and climate-related policies and strategies. The country also has the Agricultural Resilience Framework and Agriculture Promotion Policy that have potentials for addressing climate change adaptation for sustainable food and nutrition security. In addition, there are policies and strategies for the overall management of the environment and the forest and biodiversity resources that have bearings on the adoption of agroecology for climate change adaptation.

To assess the level of agroecological relevance and sensitivity of the current policy and strategy context, a simple methodology was adopted. It involves literature review and word count analysis to find out if agroecology is explicitly mentioned or intended and to also identify and assess policies that may not explicitly mention agroecology but address selected elements of it. This approach is to determine and reference what the current overall policy situation is and whether agroecology is framed and embodied by such. This way, the degree to which agroecology approaches are already addressed, fostered or hindered through existing policies and strategies in the climate change context is assessed.

We reviewed existing relevant policies for their agroecological sensitivity and how they can support the uptake and upscale of agroecology. This policy angle approach involved the review of the following documents:

- i. National Climate Change Policy (2019)
- ii. National Climate Change Programme (2019)

- iii. Nationally Determined Contribution Implementation Action Plan for the Agriculture Sector (2016)
- iv. Intended Nationally Determined Contribution (2015)
- v. National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA) CCN 2011)
- vi. National Action Plan on Gender and Climate Change for Nigeria (2020)
- vii. National Agricultural Resilience Framework (2014)
- viii. National Policy on the Environment (2017)
- ix. The Agriculture Promotion Policy (2016)
- x. National Forest Policy (2019)
- xi. National Biodiversity Strategy and Action Plan (2015)
- xii. Vision 20:2020 (2010)
- xiii. Economic Recovery and Growth Plan (2017 2020)

#### 4.2 Major Findings from the Review of Policies

Table 1 of Annex 2 presents the key elements of the detail analysis of the policy/strategy/plan documents that were reviewed. A summary of the major findings from the analysis of the reviewed policies is given in Table 2 to show their agroecological sensitivity and potential entry points to upscale the consideration of agroecology in them.

The analysis indicated that no policy specifically related to agroecology exists within the current national climate change and agriculture policy arena. The **National Agricultural Resilience Framework(NARF)** is the closest related national framework that can be adapted for agroecological policy intervention in Nigeria. As the focus of the NARF is to strengthen the capacity of small and large-scale agricultural producers to increase productivity, grow wealth and thrive in the face of growing challenges from multiple social and environmental stressors, including changing climate, it has many agroecology elements and intervention opportunities that can easily be adapted into a national agroecological strategy. These include:

- Shifting of the sowing/planting date (1 month earlier or later than the traditional calendar) deriving from increased access to improved weather forecasts;
- Adopting conservation/organic agriculture practices, including manure and residues management;
- Using inorganic fertilizers, with application tied to weather forecasts;
- Enhancing rain water harvesting;
- Conserving feeds in the form of hay making, haylage, crop residue processing and conservation;
- Educating pastoralists on feed conservation;
- Reseeding all gazzeted grazing reserves;
- Developing stock route and watering points;
- Increasing the area of cultivated land under irrigation;
- Promoting indigenous practices for sustainable water use in agriculture;
- Intensifying water resources conservation campaign and practice, to reach out to the farming communities;
- Reducing water used in irrigation by changing the cropping calendar, crop mix, irrigation method, and areas cultivated;
- Supporting SLM research and dissemination of best practices and techniques to promote the creation of additional knowledge to support SLM interventions;
- Improving and strengthen SLM knowledge management, monitoring and evaluation and

information dissemination;

- Adopting ecosystem approach to adaptation measures and practices; and
- Implementing integrated approaches to land management e.g., sustainable land management (SLM) practices such as agro@forestry and conservation agriculture that can significantly increase yields while delivering better environmental outcomes to enhance farmers' resilience to climate variability and change.

The study further reveals that despite the absence of the word "agroecology" in the reviewed agriculture and climate change policies, strategies and plans there is a significant consideration of many agroecology elements and practices aiming at increasing agricultural productivity and building resilience in many of them. The most significant ones are (i) National Climate Change Policy; (ii) National Climate Change Programme; (iii) NASPA-CCN; (iv) NDC; and (v) Agricultural Promotion Policy.

The **National Climate Change Policy** has a strategic objective of promoting sustainable land-use systems that enhance agricultural production, ensure food security and maintain ecosystem integrity. It also intends to reduce greenhouse gas emissions in agriculture, forestry and other land use without compromising food security, while increasing the carbon sink potential of the country's natural capital, through (i) wide adoption of climate-smart, climate-resilient and ecologically resilient cropping and livestock practices and systems, (ii) reduction of forest loss and degradation, (iii) increasing use of alternative domestic fuel to fuelwood in rural areas and (iv) promotion of agro-forestry, reforestation and afforestation, including community-based forest management and recovery, among others. This is in addition to enhancing resilience of the country's agricultural systems to climate risk to protect livelihoods of small and marginal farmers, particularly women and youth that will also involve improving national capacity to adapt to the impact of climate change in the agriculture sector.

Some of the proposed actions in the National Climate Change Programme of relevance to agroecology include: (i) increasing total area under agroforestry at farm level; (ii) increasing farm area under sustainable land management and climate-smart agricultural practices; (iii) developing and implementing a Dairy Nationally Appropriate Mitigation Action (NAMA) for efficient livestock management systems that enhance productivity and promoted GHG emission reduction in the sub-sector and improve genetics in the dairy herd; (iv) increasing adoption of biogas technology use; (v) increasing the number of farmers using low-carbon (Recirculating) aguaculture systems by at least 20% by 2030; (vi) improving farmers' knowledge about proper use of weather information in carrying out agricultural activities to reduce or even avoid climate change risks; (vii) promoting and supporting climate-smart agricultural and climate-resilient practices in cropping, livestock production and fisheries and aquaculture systems across the ecological zones of the country to manage agro-climatic risks and potential disasters; (viii) supporting Climate Change Adaptation activities in Fisheries and Aquaculture; (ix) promoting and supporting efficient and climatefriendly water conservation and irrigation systems for efficient use of water in agriculture; (x) promoting and supporting alternative climate-resilient livelihoods in rural communities for agroclimatic risk reduction and management; and (xi) implementing ecological restoration programs in degraded systems across all ecological zones, with emphasis on using climate-resilient trees, including fruit trees and economic and indigenous species adapted to local conditions, among others.

Nigeria's **NDC**'s emphasis in the agriculture sector is on reducing agriculture-related GHG emissions through changes in land use (e.g. removal of trees or tillage), improving the efficiency of production to deliver optimal levels of nitrogen more efficiently to crops and managing livestock to make the most efficient use of feeds will reduce the amounts of  $CH_4$  produced relative to output,

while increasing resilience of food systems and enhancing adaptive capacity of the system. This will involve: (i) improving soils and nutrient management by optimizing production through appropriate management of nutrients and soils; (ii) promoting agroforestry to increase carbon stocks, reduce GHG emissions and improve water retention in soils, as well as provide opportunity for crop diversification; (iii) improving management of burning of savannah and crop residue to reduce soil degradation and improve soil organic matter; (iv) creating fixed grazing systems or dedicated pastures; (v) improving genetics in the dairy herd to reduce GHG emissions intensity; (vi) adopting improved agricultural systems for both crops and livestock by (a) diversifying livestock and improvement of range management; (b) increasing access to drought-resistant crops and livestock feeds; (c) adopting better soil management practices; and (d) providing early warning/ meteorological forecasts and related information, among others. Building resilience that implies improving efficiency of resource use in all agricultural production systems (including water and energy) as well as the implementation of initiatives that will increase productivity, as indicated in the NDC indicates its very high potential to carry along most agroecology elements in its implementation. There is also the mentioning of diversification of crop and livestock to reduce the impact of climate change on them.

**NASPA-CCN** will adopt improved agricultural systems for both crops and livestock by (i) diversifying livestock and improve range management; (ii) increasing access to drought resistant crops and livestock feeds; adopt better soil management practices; and (iii) providing early warning/meteorological forecasts and related information. It will also strategize to improve resource management by (i) increasing use of irrigation systems that use low amounts of water; (ii) increasing rainwater and ground water harvesting for use in agriculture; (iii) increasing planting of native vegetation cover and promotion of re-greening efforts; and (iv) intensifying crop and livestock production in place of slash and burn.

The **Agricultural Promotion Policy** has the strategic goal of promoting long-term economic growth and security, while factoring climate change and sustainability of the use of natural resources (land and soil, water and ecosystems) for increased agricultural production and to make agriculture more climate-smart and resilient. It also aims to create broad public and stakeholder awareness on Climate Smart Agriculture, facilitate soil map to improve land use and management practices, and increase the adoption of global best practices on climate change, including the aspects of adaptation, mitigation and carbon credit.

By making the promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems a key aspect of its strategy, the **National Policy on the Environment** indirectly recognizes the role of agroecological interventions in environmental sustainability.

Although the focus of the **National Forest Policy** is to achieve sustainable management of forests and forest resources that would ensure sustainable increase in the economic, social and environmental benefits for the present and future generation, it still has a small section on agro-forestry that entails (i) supporting sustainable agro-forestry practices in off-reserved areas to enhance food and nutrition security, climate change resilience, rational use of resources, economic empowerment and poverty reduction; and (ii) encouraging a wider adoption of agro-forestry at field level in the management of forest areas, especially in buffer zones and enclave communities, and in farming systems. Thus, there is some elements of agroecology in the Policy, even if it is not explicit.

The **National Biodiversity Strategy and Action Plan** surprisingly indicates no specific mentioning of agroecology. However, by promoting the mainstreaming of biodiversity issues into national





development policies relevant to poverty reduction and climate change mitigation and adaptation in the forestry, food and agriculture, commerce and industry, environment, health, and education sectors of the economy, some elements of agroecology can be inferred.

The **Vision20:2020** and the **Economic Recovery and Growth Plan** (ERGP- 2017 – 2020) are long-term and medium-tern national development plans respectively with no clear mentioning of agroecology. Nevertheless, the Vision planned to (i) significantly enhance the level of production, adoption and utilisation of appropriate technology and mechanisation for small, medium and large-scale farms; (ii) utilise home-grown technology, promote greater use of biotechnology tools in selection and breeding of crops, livestock, fisheries and forestry; and (iii) promote the use of 'green' technology to ensure sustainable agricultural production; a safe and clean environment and adopting the use of natural rivers and/or stream flow; solar and wind to generate electricity to power agricultural equipment such as irrigation pumps, among others. The ERGP also planned to set up a one-stop shop for small farmers and commercial farms to encourage the use of high-yield and disease-resistant seedlings and open up irrigable land to enable year-round agricultural production. Thus, the two Plans implicitly have some elements of agroecology included in them.

In summary, the content analyses of 11 existing and agroecologically-related policies, strategies and plans indicate that there is no specific policy for agroecology in Nigeria. However, many of them recognize Nigeria's agro-ecological diversity and the imperative to sustain and even increase the country's agro-biodiversity for sustainable food production and nutrition security through the adoption of various agroecological practices without mentioning them explicitly. The documents have various degrees of potentialities for the upscale of agroecologically-related ideas into full-fledged agroecology policies, strategies or plans that can be implemented to drive the country's sustainable path in food production and nutrition security.



# Table 2: Analysis of the Agroecological Potentials of Existing National Policies, Strategies and Plans

 S/ No.	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Presence of Agroecological Considerations		Agroecological		Potent Entry Points Upsca the Co eration Agross	s to ale onsid- on of	Remark
	National Climate Change Policy	Promote a low-carbon, climate-resilient and gender- responsive sustainable socio-economic development;  Strategic objective is the promotion of sustainable land-use systems that enhance	Reduce greenhouse gas emissions in agriculture, forestry and other land use without compromising food security, while increasing the carbon sink potential of the country's natural capital, through(i) wide adoption of climate-smart, climate-resilient and ecologically resilient cropping and livestock practices and systems, (ii) reduction of forest loss and degradation, (iii) increasing use of alternative domestic fuel to fuelwood in rural areas and (iv) promotion of agro-forestry, reforestation and afforestation, including community-based forest management and recovery, among others.  • Enhance resilience of the country's agricultural systems to climate risk to protect livelihoods of small and marginal farmers, particularly women			X		The development of an Implementation Plan for the Policy provides a great opportunity for detailed incorporation of relevant agroecological approached that are suitable to different agro-ecological		
		agricultural production, ensure food security and maintain ecosystem integrity.	and youth that will also involve improving national capacity to adapt to the impact of climate change in the agriculture sector.					zones of the country		







S/ No.	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Agroeco	Presence of Agroecological Entry Considerations Points to Upscale the Consideration of Agroecology		s to ale onsid- on of	Remark	
				Strong	Weak	Neutral	High	Low	
2	National Climate Change Programme	Consolidate climate change-related ongoing initiatives and process to enhance the country's adaptive capacity to respond to different levels of impact of climate change and its opportunities.	<ul> <li>Increase the total area under agroforestry at farm level by x ha by 2030;</li> <li>Increase farm area under sustainable land management and climate-smart agricultural practices by x ha by 2030 for carbon sequestration;</li> <li>Develop and implement a Dairy Nationally Appropriate Mitigation Action (NAMA) for efficient livestock management systems that enhance productivity and promoted GHG emission reduction in the sub-sector and improve genetics in the dairy herd;</li> <li>Increase adoption of biogas technology use by x million households and x number of abattoirs;</li> <li>Increase the number of farmers using low-carbon (Recirculating) aquaculture systems by at least 20% by 2030;</li> <li>Perform detailed analyses of the vulnerability and adaptation potential of Nigeria's agricultural (different crops and), livestock and fishery sectors;</li> <li>Undertake performance analysis to identify climate change adaptation measures and projects in the agricultural, livestock and fishery sectors, focusing on small-holder farmers;</li> <li>Improve farmers' knowledge about proper use of weather information in carrying out agricultural activities to reduce or even avoid climate change risks;</li> <li>Promote and support climate-smart agricultural and climate-resilient practices in cropping, livestock production and fisheries and aquaculture systems across the ecological zones of the country to manage agro-climatic risks and potential disasters;</li> <li>Support Climate Change Adaptation Activities in Fisheries and Aquaculture;</li> <li>Promote and support efficient and climate-resilient livelihoods in rural communities for agro-climatic risk reduction and management;</li> <li>Improve post-harvest management to ensure sustainable food security and household income in a changing climate;</li> <li>Improve post-harvest management to ensure sustainable food security and household income;</li> <li>Support and conduct research to facilitate transfer of appropriate technology for the promotion of climate-resilient agricul</li></ul>		Weak	Neutral	X	Low	The development of and implementation of a Plan of Action provides a great opportunity for detailed incorporation of relevant agroecological approached that are suitable to different agro-ecological zones of the country



S/ No	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Presence of Agroecological Considerations		Agroecological Entry			s to ale onsid- on of	Remark
				Strong	Weak	Neutral	High	Low		
3	NDC Implementation Action Plan for the Agriculture Sector	Reduce agriculture- related GHG emissions through changes in land use (e.g. removal of trees or tillage), improving the efficiency of production to deliver optimal levels of nitrogen more efficiently to crops and managing livestock to make the most efficient use of feeds will reduce the amounts of CH4 produced relative to output.	GHG emissions and improve water retention in soils, as well as provide opportunity for crop diversification;  Improve management of burning of savannah and crop residue to reduce soil degradation and improve soil organic matter;  Reduce post-harvest losses in key crops to increase productivity and sustainable supply.  Create fixed grazing systems or dedicated pastures;  Improve genetics in the dairy herd to reduce GHG emissions intensity;  Adopt improved agricultural systems for both crops and livestock by (i) diversifying livestock and improvement of range management; (ii) increasing access to drought-resistant crops and livestock feeds; (iii) adopting better soil management practices; and (iv) providing early warning/meteorological forecasts and related information;  Implement strategies for improved resource management through (i) increase in the use of irrigation systems that use low amounts of water; (ii) increase in rainwater and sustainable ground water harvesting for use in agriculture; (iii) increase in planting of native vegetation cover and promotion of re-greening efforts; and (iv) intensification of crop and livestock production in place of slash-and-burn practices.	X			X		Revision and implementation of the NDC	
4	NASPA-CCN	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.	Adopt improved agricultural systems for both crops and livestock by (i) diversifying livestock and improve range management; (ii) increasing access to drought resistant crops and livestock feeds; adopt better soil management practices; and (iii) providing early warning/meteorological forecasts and related information.  Implement strategies for improved resource management by (i) increasing use of irrigation systems that use low amounts of water; (ii) increasing rainwater and ground water harvesting for use in agriculture; (iii) increasing planting of native vegetation cover and promotion of regreening efforts; and (iv) intensifying crop and livestock production in place of slash and burn.	X			X		Review of NASPA-CCN and the devel- opment and implementation of itsimple- mentation framework	

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S/ No.	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Presence of Agroecological Considerations Points to Upscale the Consideration of Agroecol-		Remark			
				Strong	Weak	Neutral	ogy High	Low	
5	National Agricultural Resilience Framework (NARF)	Strengthen the capacity of small and large@scale agricultural producers to increase productivity, grow wealth and thrive in the face of growing challenges from multiple social and environmental stressors, including changing climate.	<ul> <li>Shift of the sowing/planting date (1 month earlier or later than the traditional calendar) deriving from increased access to improved weather forecasts;</li> <li>Adopt conservation/organic agriculture practices, including manure and residues management;</li> <li>Use inorganic fertilizers with application tied to weather forecasts;</li> <li>Enhanced rain water harvesting;</li> <li>Conserve feeds in the form of hay making, haylage, crop residue processing and conservation;</li> <li>Educate pastoralists on feed conservation;</li> <li>Reseed all gazzeted grazing reserves;</li> <li>Develop stock route and watering points;</li> <li>Increase the area of cultivated land under irrigation;</li> <li>Promote indigenous practices for sustainable water use in agriculture;</li> <li>Intensify water resources conservation campaign and practice, to reach out to the farming communities;</li> <li>Reduce water used in irrigation by changing the cropping calendar, crop mix, irrigation method, and areas cultivated;</li> <li>Support SLM research and dissemination of best practices and techniques to promote the creation of additional knowledge to support SLM interventions;</li> <li>Improve and strengthen SLM knowledge management, monitoring and evaluation and information dissemination;</li> <li>Adopt ecosystem approach to adaptation measures and practices;</li> <li>Implement integrated approaches to land management e.g., sustainable land management (SLM) practices such as agro-forestry and conservation agriculture that can significantly increase yields while delivering better environmental outcomes to enhance farmers' resilience to climate variability and change.</li> </ul>	X			X		Development of an Action Plan to implement NARF



S/ No.	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Presence of Agroecological Considerations		Potential Entry Points to Upscale the Consideration of Agroecology		Remark	
				Strong	Weak	Neutral	High	_	
6	National Policy on the Environment	Ensure environmental protection and the conservation of natural resources for sustainable development. Strategic objectives include: (i) securing a quality of environment adequate for good health and well being; and (ii) promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems among others	<ul> <li>Adopt an integrated approach to address, bio-physical and socio-economic aspects of desertification and drought in the semi-arid ecosystem;</li> <li>Minimize the adverse impacts of agricultural practices on agro-ecosystems and natural ecosystems;</li> <li>Promote efficient measures for productive and sustainable resource management and establish drought early warning systems in the semi-arid area of the country;</li> <li>Promote measures to minimize pastoralists-farmers' conflicts and introduce youth empowerment programmes as a means of tackling insurgency;</li> <li>Integrate public awareness and education on management of land and water resources in the semi-arid ecosystem;</li> <li>Strengthen national and state institutions towards implementing sustainable agricultural practices and effective tackling of land degradation problems;</li> <li>Promote and support eco and organic farming so as to maintain soil fertility.</li> </ul>		X			X	Limited oppor- tunity through development of specific implementa- tion plans for areas of soil and drought management.
7	The Agriculture Promotion Policy	Treat agriculture as a business and as key to long-term economic growth and security, while factoring climate change and sustainability of the use of natural resources (land and soil, water and ecosystems) for increased agricultural production and to make agriculture more climate-smart and resilient.	Boosting public awareness through advertising of importance of climate smart agriculture;     Improving the management of land, water, soil and other natural resources;     Strengthening institutional linkages and partnerships for ensuring climate smart agricultural governance, policies, legislations and financial mechanisms;     Carrying out environmental impact assessment on major agricultural projects;     Creating broad public and stakeholder awareness on Climate Smart Agriculture;     Facilitating soil map to improve land use and management practices;     Increasing the adoption of global best practices on climate change, including the aspects of adaptation, mitigation and carbon credit.				X		Development of a National Climate-Smart Agriculture Strategy and its Implementation Framework
8	National Forest Policy	Achieve sustainable management of forests and forest resources that would ensure sustainable increase in the economic, social and environmental benefits for the present and future generation.	Support sustainable agro-forestry practices in off-reserved areas to enhance food and nutrition security, climate change resilience, rational use of resources, economic empowerment and poverty reduction;     Encourage a wider adoption of agro-forestry at field level in the management of forest areas, especially in buffer zones and enclave communities, and in farming systems.		X			X	Limited oppor- tunity unless deliberate at- tempt is made to incorporate agro-forestry as a distinct entry point for the manage- ment of the country's forest resources









S/ No.	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Presence of Agroecological Considerations Points to Upscale the Consideration o Agroecol ogy		s to ale onsid- on of	Remark		
9	National	Foster a Nigeria	Mainstream Biodiversity into National Development,	Strong	Weak X	Neutral	High	<b>Low</b>	
	Biodiversity Strategy and Action Plan	with healthy living	Poverty Reduction and Climate Change Plans through (i) integrating biodiversity issues into national development policies relevant to poverty reduction and climate change mitigation and adaptation in the forestry, food and agriculture, commerce and industry, environment, health, and education sectors of the economy; (ii) influencing the creation of a network of stakeholders to enhance integrated biodiversity management through participatory planning, knowledge sharing and capacity building across all levels of government; (iii) integrating of biodiversity education into national curricula at all levels so that at least 30% of Nigeria's population is aware of the importance of biodiversity to the ecology and economy of the country.						
10	Vision 20:2020	Optimize human and natural resources to achieve rapid economic growth, and translate that growth into equitable social development for all citizens	<ul> <li>Rehabilitate and complete existing irrigation projects, establish new ones across the nation and provide incentives for the development of new community-based and privately initiated irrigation projects;</li> <li>Significantly enhance the level of production, adoption and utilisation of appropriate technology and mechanisation for small, medium and large-scale farms;</li> <li>Utilise home-grown technology, promote greater use of biotechnology tools in selection and breeding of crops, livestock, fisheries and forestry;</li> <li>Promote the use of 'green' technology to ensure sustainable agricultural production; a safe and clean environment and adopting the use of natural rivers and/or stream flow; solar and wind to generate electricity to power agricultural equipment such as irrigation pumps;</li> <li>Create a new generation of farmers, by incorporating modern technology, especially ICT (e.g. farmer information call service), incentives (scholarships, grants, soft loans), and professionalising agriculture to attract youths and new graduates into agricultural production, processing and marketing in order to sustain agricultural growth through the entire agriculture value chain.</li> </ul>		X			X	Ongoing revision of Vision 2020 and development of an implementation plan for the agricultural sector plan.



S/ No.	Policy/ Strategy/ Plan	Goal/Objective	Strategic Action/Activities	Agroeco Conside	ological rations		eration Agros	s to ale onsid- on of ecol-	Remark
11	Economic Recovery and Growth Plan (ERGP)	Restore economic growth while leveraging the ingenuity and resilience of the Nigerian people.  Boost growth in the agriculture sector by expanding crop production and the fisheries, livestock and forestry subsectors as well as developing the value chain, using irrigable land and river basin infrastructure effectively to enable year-round climate-resilient agricultural production.	Setting up a one-stop shop for small farmers and commercial farms (one per Local Government) to encourage the use of high-yield and disease-resistant seedlings;     Opening up a minimum of 100,000 hectares of irrigable land through the 12 River Basin Development Authorities by 2020 to enable year-round agricultural production;     Expanding the use of dams for commercial farming and aquaculture.		X	Neutral	X X	Low	Ongoing revision of the ERGP and development of appropriate implementation plan to incorporate agroecological principles for growth and resilience of the agriculture sector in the post COVID-19 era

#### 4.3 Discussion and Analysis of Results

Analysis of various climate change and other related national policies in the context of the critical principles of ecology indicates that there is no policy on agroecology in Nigeria, even though the country's policy landscape is full of policies that have some elements of agroecology considered and mentioned in them. Furthermore, the country has no Climate Change Law that could have been easily amenable to incorporate agroecology issues that could have reinforce needed synergies between objectives of food security, poverty reduction, adaptation and mitigation actions in Nigeria's agricultural sector.

Despite not clearly and explicitly mentioning agroecology in their contents, it is indirectly addressed in selected national climate change and other related policies, strategies plans, particularly those in the agriculture sector in which issues of climate-resilient crops and livestock and adaptation actions such as water conservation and recycling, indigenous knowledge, efficient use of water and energy, early warning systems and agroforestry are often considered. Sustainable land and water management, including agroforestry and agro-silvopastoral systems, efficient management of water resources, managing soil organic matter for soil carbon sequestration, preventing and mitigating land degradation and restoring degraded soils and land are the most popular agroecological practices mentioned in most documents to increase tree cover in farmland, improve nutrition and incomes, preserve and maintain the environment and, enhance carbon stocks.

Overall, the National Agricultural Resilience Framework represents the most comprehensive document with the highest potential of conceptualising into a national framework or strategy for agroecology in Nigeria. Next to this is the NDC Agriculture Sectoral Plan that captures a



lot of the elements of agroecology, which could be valuably upscaled in the ongoing revision of the document. Other relevant policies and strategies with good potential for enhancing the national recognition of the relevance of agroecology to climate change adaptation and resilient agroecosystems for improved productivity and food and nutrition security are (i) National Climate Change Policy; (ii) National Climate Change Programme; (iii) NASPA-CCN; and (iv) Agricultural Promotion Policy (APP). Surprisingly, APP that one would expect to lay emphasis on agroecology fails to do so. In the words of one of the interviewees, *Nigeria Agriculture Promotion Policy 2016-2020 did not mention anything like agroecology. An undated Nigeria agricultural policy* (obtained on line) had ecological specialization under strategies for animals and crops.

The ongoing revision of NASPA-CCN to produce a new National Adaptation Plan for the country provides a good opportunity to a very comprehensive inclusion of agroecology in the climate change strategy. As the National Climate Change Policy and Climate Change Programme are yet to be fully approved by the Government, they also provide immediate good opportunities for advocacy to explicitly adopt agroecology as a policy initiative for climate change adaptation and the building of resilience of agricultural systems while minimizing emissions for enhanced food and nutritional security and improved livelihoods in the country.

There are many reasons why there is lack of agroecology policy in Nigeria. Time has not permitted any in-depth stakeholder consultation on the reasons. Nevertheless, we adapted the findings in Kenya (Sinclair et al., 2019) to infer the following:

- Food and nutrition security, which aims at maximizing yields for economic benefit as well as for providing enough food for the population, is the current priority for the government. The focus is on production and integrated food system perspective is mostly missing. Thus, smallholder agroecology in particular that has been found to be not only an effective solution to complex agricultural challenges, but also an affordable way to increase yields without external inputs outside the farm is perceived as being applicable only on small scales and not capable of meeting the government's objective of huge production of food. In that regard, climate smart agriculture (CSA) seems to be seen and accepted as a more viable option towards achieving food and nutrition security for the country.
- In addition, although agroecology is not a new concept, it is only recently that it is being placed on the international agenda because of its relevance to sustainable food and nutrition security in the face of increasing threat to agricultural productivity and agroecosystems from climate change. It, therefore, remains largely not well understood by policymakers and even practitioners and other stakeholders. This makes research and advocacy for knowledge sharing in the country imperative.
- Multiplicity of concepts and ideas about agroecology practices further compounds any effort to have a policy on agroecology as there are many diverse approaches due to differences in ecological zones and local knowledge. Thus, similar agroecology practices that are being employed by farmers throughout the country are called differently. As Sinclair et al (2019) puts it, "if the government opts to develop strategies for every new approach that comes up, then there will be thousands of strategies which will be, not only confusing, but also difficult to implement".
- There is also the difficulty of poor distinction between agroecology and CSA. While there are overlaps between the two, they are not necessarily the same; neither are they interchangeable concepts. In the words of Cambareri (2018), "CSA is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively

support development and ensure food security in a changing climate, based on three pillars: (i) a sustainable increase of agricultural productivity and incomes; (ii) adapting and building resilience to climate change; and (iii) reducing and/or removing greenhouse gas emissions". It may also include practices such as the use of biofertilizers such as manure or biochar and precise application of plaguicides. Thus, CSA largely represents a continuation of business-as-usual industrial agriculture in which farmers are increasingly dependent on agrichemical corporations for external inputs. Moreover, CSA limate-Smart Agriculture is seen as capable of promoting agriculture to become a part of carbon offset schemes that will create one more driver of land dispossession of small-scale food producers and place unfair mitigation burden on developing countries that have least contributed to the climate crisis<sup>10</sup>

Unlike CSA, agroecology, which has evolved over decades, is a concept that has been defined as an environment-friendly way to perform agriculture and recommended for various initiatives ranging from productive small-scale agriculture in the 80s to attaining sustainability of large farms and even of the whole food system. In recent time, the sociologic bias has completely taken hold of the concept. Agroecology is now seen as a way of social empowerment, giving the concept more a political than a technical dimension. In this regard, agroecology in the context of food sovereignty goes much further than CSA's focus on agricultural production alone; it raises concern about the structure of the entire food system. Therefore, it is difficult to find only one definition of agroecology. However, at the heart of agroecology is the idea that agroecosystems should mimic the biodiversity levels and functioning of natural ecosystems.

- In general, CSA have selectively incorporated some agroecological practices and some of its general definitions describe attributes that are also claimed by agroecology. A typical example is the FAO definition of CSA as sustainably increasing productivity, resilience (adaptation), reducing/removing greenhouse gases (GHGs) (mitigation), while enhancing the achievement of national food security and development goals (FAO, 2010). Because of this type of overlap, CSA that emphasises the need to sustainably increase agricultural productivity and incomes may be having an edge over ecology among policy makers.
- There is also the possibility of conflicting interests by policy makers that may have vested interests in conventional agriculture or by profiteers of other opposing policies.

The lack of understanding of agroecology amongst policymakers may be the greatest barrier to its inclusion in climate change policies and strategies. Presently, while agroecology has a space in climate policy dialogues in Nigeria, very few people who design policies know or even understand it. Additionally, agroecology is not being discussed or advocated for like climate change. There is limited sensitization and awareness raising among policy makers. Successful adoption of agroecology to fight climate change will require increasing policymakers' understanding and knowledge about the concept over a long time period.

#### 4.4 Need for a Policy Shift

Promoting agro-ecology through a paradigm shift in policy will require an understanding of a number of issues, including, but not limited to, the following<sup>11</sup>:

<sup>10</sup> Editorial: Agroecology and Climate. Nyeleni Newsletter No 20 (2014) www.nyeleni.org

<sup>11</sup> Personal communication from Prof. H. K. Ayuba, Department of Geography, Nasarawa State Univeristy, Keffi, Nigeria



- i. How farmers define or perceive efficient agriculture. If efficient agriculture is defined by the (indiscriminate) use of herbicides, pesticides and chemical fertilizers, these practices in the long run are not climate resilient. For instance, with epileptic rainfall patterns, fertilizer pellets will not dissolve and could cause more harm to crops. The indiscriminate use of herbicides and pesticides have brought about a lot of invasive species in the farms.
- ii. Policy Constraints that affect effective promotion of agroecological practices (e.g)
  - Weak research on land and soil suitability for various crops and the kind of fertilizers to be used by farmers;
  - Inadequate extension support services;
  - Insecure land tenure system; and
  - Agricultural and trade policies that are biased towards the interests of the agro-food industry
- **iii. Emerging innovations in agro-ecological practices** such as precision farming and integrated nutrient management (such as use of compost, organic manure and nitrogen-fixing crops: which allows the reduction or elimination of the use of chemical fertilizers); as well as new breeding techniques which can help farmers to respond to new challenges posed by the changing climate, water stress, and land degradation
- iv. Holistic landscape management concept as against farm-level management. Holistic landscape management moves away from farm level management and places emphasis (a) around field perimeters (windbreaks, shelterbelts, insect strips and living fences); (b) across multiple fields (mosaics of crop types and land-use practices); and (c) at the landscape to-regional scale (river buffers, woodlots, pastures and natural or semi-natural areas)
- v. Understanding of social-political (whether policies are geared biased towards the commercial farmers as against smallholder farmers), cultural (whether the agricultural innovations are culturally sensitive) and economic changes (in terms of cost of accessing farm inputs, whether demand is more on foreign crops) as well as understanding of myriads of factors influencing farmers' decisions and choices

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# 5. Opportunities for Inclusion of Agroecology in Nigeria's Climate Policy

Although agroecology is not being discussed or advocated for like climate change, it nevertheless has a large potential space in climate policy dialogues. However, a number of actions need to be put in place to elevate agroecology to a high level of policy discussion. Similar to what is being advocated for CSA, these actions are related to: (i) expanding the evidence based approach; (ii) advocating agroecology-specific policy framework in the context of addressing climate change challenge; (iii) building capacity of relevant national and local institutions for agroecology advocacy; (iv) facilitating local and international financing; and (v) embarking on practical field demonstrations. These actions must be facilitated by a relevant principles and guidelines for an effective process that will scale up agroecology for resilience to climate change.

#### 5.1 Expanding the Evidence Base

This will involve highlighting the best agroecological practices that enhance soil fertility, increase productivity, ensure nutrition and health, and demonstrate that they are done without harming the environment and are culturally appropriate. Research and science that will effectively demonstrate both the socio-economic and ecological value of agroecology, as related to socio-economic and ecological resilience, soil fertility, productivity, gender sensitive and participatory technology development, and labour, will be the approach to convince and win over policymakers into advocating and supporting the concept for the sustainability of agro-production systems for food and nutrition security in the country.

#### 5.2 Supporting Specific Agroecological Enabling Frameworks

In showcasing examples of agroecological approaches that can enhance environmental sustainability and resilience in farming systems, Sinclair et al. (20180 have demonstrated the feasibility of having specific policy frameworks that promote agroecology at scale. Typical policy framework usually includes a mix of possible interventions that are consistent both with existing farmer livelihoods, and with land and tree conservation strategies, including restoration of forest cover through planting, promotion of succession in fallows, agroforestry, and enrichment of fallows in areas maintained for crop production. For example, through a participatory consultation of its agricultural subsidy programme, the government of Switzerland revised its Agricultural Policy to provide direct payments to producers who included biodiversity-friendly practices in their farming system to increase both incomes and productivity of farmers. In a similar vein, France enacted a new law to transition to agroecology national. This law proposed a transformation of agriculture

to meet economic, environmental, and social performance goals. This initiative included many stakeholders (public service, academia, NGOs, farmers, and educational institutions), and included efforts to reduce use of pesticides, antibiotics, and energy, and to increase organic agriculture. By 2018, €10 million had been invested, about 7,500 farms or 9,000 farmers were engaged in agroecological initiatives, and organic production had increased through collaborations called the economic and environmental interest groupings. These are collectives of farmers (with other stakeholder partners) recognized by the government, who engage in a multi-year project of modification or consolidation of their agroecological practice. This has led to an increased mobilization and awareness about agroecology as a viable approach to change agricultural production modes and transform the agrifood system in thethe country in the face of increasing climate risk (Gonzalez, et al. 2018).

#### 5.3 Strengthening National and Local Institutions

Strong local institutions to empower, enable and motivate farmers are essential. This will involve building the capacity of national policy makers to participate in international policy fora on climate change and agriculture, and reinforce their engagement with local government authorities. Also, supporting institutions will have to have in-house capacity building resources.

#### 5.4 Enhancing Financing Options

Innovative financing mechanisms that link and blend climate and agricultural finance and investments from public and private sectors are a key means of implementing agroecology for improved agrosystem productivity towards sustainable food and nutrition security. Climate financing instruments such as the Green Climate Fund (GCF) could be a way of spurring sustainable agroecological-based agricultural development. In addition, the Global Environment Facility (GEF) could be used to develop comprehensive Nationally Appropriate Mitigation Actions (NAMAs) and National Adaptation Plans (NAPs) that will specifically target agroecology for agricultural development. All these will be in addition to national sector budgets and support from development partners to facilitate funding for climate integration into sector planning and budgeting for agriculture in the country.

#### 5.5 Implementing practices at field level

Farmers are the primary custodians of knowledge about their environment, agro-ecosystems, crops, livestock, and local climatic patterns. Adapting to CSA must be related to local farmers' knowledge, requirements and priorities. Local projects and institutions support farmers to identify suitable climate-smart options that can be easily adopted and implemented. This, for example has been done through Farmer Field Schools in Adamawa and Kebbi States by Oxfam in Nigeria.

#### 5.6 Constraints to Scaling up Adoption of Agroecological Practices

The constraints to agroecological practices have been classified by Sinclair et al. (2018) into three categories: (i) creating a level playing field upon which agroecological approaches can be judged and decisions made to invest in them; (ii) embracing the complexity required for generic agroecological principles to be locally adapted to suit highly variable contexts; and (ii) enabling integration across sectors and scales necessary to foster holistic, rather than fragmented, implementation of policy.

- Creating a Level Playing Field: Presently, agroecological approaches are at a serious disadvantage relative to alternatives because of market failures that undervalue them, perverse policies that are antagonistic to them, and low investment in research about them and for their implementation. Market failures have distorted decisions about investing in agroecology by farmers and other public and private sector actors are because many impacts of agricultural systems do not have market prices. These must be addressed through appropriate response to consumers choices, public and private sector market interventions and development and adoption of comprehensive performance metrics for agricultural systems that take into account all social, economic, and ecological impacts for effective comparisons among alternative investments.
- Embracing Complexity: As agroecological practices occur where farmers apply agroecological principles to their local circumstances, rather than there being a prescribed set of agroecological practices, they generate a vast array of interrelated locally adapted agroecological practices, based as much on local knowledge as on science. Agroecological approaches, therefore, are series of agricultural innovation systems which are conditioned by the historical, political, social, and cultural context of a given place and in which a diverse range of actors shape the innovation processes in a rather complex manner. This could pose a serious barrier to the wide adoption of agroecology. This also indicates a need for a fundamental reconfiguration of international, national, and local research and extension systems so that they are fit for the purpose of supporting local innovation, rather than geared towards transfer of externally generated technology. There are three key dimensions to this configuration that merit attention.
- Enabling Integration: The fragmentation of actors in policy formation and implementation across sectors and missing links in the implementation of policy over layers of governance at different scales when moving from national commitments to local action is a major barrier to achieving wide adoption of agroecological practices at scale. To properly put agroecology on the country's agricultural development and climate change landscape requires developing means to achieve integration horizontally (across sectors) and vertically (across scales).

#### 5.7 Opportunities for Scaling up Adoption of Agroecological Practices

Based on the preceding analysis, great opportunities exist for the scaling up and mainstreaming of agroecology into climate change and other related (particularly agriculture) national policies with the removal of the identified constraints. The obvious approach is to review relevant and related policies regarding negative consequences for adoption of agroecological practices and reform as necessary, coupled with positive development of policies that encourage adoption of agroecological practices in an integrative manner across different sectors and scales. In line





with the identified constraints, the following, adapted from Sinclair et al. (2018), are some of the opportunities for mainstreaming agroecology into climate change policies in the country:

- Improve the evidence base: A good starting point to create a good level playing field for agroecology is to improve support to research and investment to demonstrate clearly the high potential of agroecology to provide better adaptation and mitigation benefits when compared with alternatives. As the country is embarking on improving national agricultural productivity for food and nutrition security in a climate-resilient environment, increased public and private investment in research and promotion of agroecological practices are required to raise the level of knowledge about agroecological practices to that of competing alternative approaches. In addition, identified market failures that are capable of distorting farmers' decisions must be properly addressed.
- Address the complexity options by context: Multiple proven agroecological practices that are adaptable to different local conditions and fit different farmers' social, economic and ecological contexts need to be developed, tested, advocated and mainstreamed into policies to support agroecological innovation more widely. This can be done through constructive stakeholder scientific engagement to generate diverse and inclusive agroecological options suited to variable local contexts. It will also require documenting detailed and explanatory local knowledge of farmers about agroecological practices (how to manage them, and what determines their performance) and sharing them widely through extension staff and working through some form of multistakeholder innovation platform that brings actors together in a participatory forum. The approach to support and upscale local agroecological innovation will also involve encouraging farmer-to-farmer dissemination of successful practices. A recommended approach will be to transform the platform into a sort of **social movement**, rather than just a congregation of scientists and extension workers, that can then achieve rapid spread of agroecological practices among large numbers of farmers (e.g. Acevedo-Osorio and Chohan, 2019). Such a participatory approach with social movements can help develop a translation of agroecology from the grassroots to policy.
- Integrate Across Sectors and Scales: As agroecological practices often involve integration of components that are the responsibility of different ministries, significant effort will be required to develop instruments that enable horizontal inter-ministerial cooperation to develop and implement appropriate policies to support widespread adoption of agroecological practice. The implementation of the NDC in Nigeria provides a good opportunity such inter-ministerial integration, but it would involve reconciling overlapping responsibilities with inter-ministerial cooperation in the country. Agroforestry, for example, could become an explicit element of the country's national agricultural policy. In addition, existing regional and sub-regional commitments to ecosystem restoration that imply agroecological practices could be adapted and used to develop policy implementations at local landscape scales to create incentives for more environmentally friendly and sustainable land use practices that include agroecological practices.



# 5.8 Outlook for the Widespread Use of Agroecological Practices to Enhance Adaptation in Nigeria

Locally appropriate agroecological practices clearly have potential to increase the resilience of livelihoods and enhance adaptation to climate change at field and farm levels across a wide range of contexts, often with significant mitigation co-benefits that might help to finance their establishment. However, as stressed in the preceding section, their potential will only be realized if action is taken across hierarchical levels to remove afore-mentioned barriers to their adoption. These will include: (i) addressing market failures and reforming policies that create perverse incentives to encourage adopting comprehensive performance metrics for agricultural systems that factor in social and environmental externalities; (ii) rethinking the relationship between formal science and local knowledge to bridge differences in outlook and emphasis between social movements and the scientific establishment, so as tofoster co-learning among the diverse range of stakeholders involved in development and promotion of agroecological practice; and (iii) integrating policy processes across sectors and scales to create an enabling environment that encourages adoption of agroecological practices (see Sinclair et al. 2018 for details).

Nigeria should immediately review the implementation of the sectoral plan for agriculture in the NDC to ensure proper integration of agroecological practices in its national response to the challenge of climate change. The Federal Ministries of Environment and Agriculture and Rural Development could then jointly produce a policy document from NDC implementation in the agriculture sector that will be solely devoted to agroecology within the context of promoting environment-friendly and climate resilient agriculture, which may also encompass some element of the CSA.

# 6. Possible Platforms and Spaces for Agroecology Advocacy in Nigeria

The current approach is generally to incorporate elements of agroecology into existing policy visions, rather than being used as a framework for a deeper transformation of agricultural policies. But as Sinclair et al. (2018) point out, agroecosystems include the human communities that shape them, hence social and political dynamics are inevitably a central concern in agroecology. Agroecological approaches have often arisen in response to agrarian crises, and in concert with broader efforts of social movements to initiate widespread change. It is, therefore, not surprising that agroecology has become the political framework under which many social movements and peasant organizations defend their collective rights, and advocate for a diversity of agriculture and food systems practiced by small-scale food producers in different places. To these organizations, agroecology is not only a narrow set of technologies but also a political struggle to generate local knowledge, promote social justice, nurture identity and culture, and strengthen the economic viability of rural areas, which more than often is based on agriculture. Such a participatory approach with social movements can help develop a translation of agroecology from the grassroots to policy.

From all indications, Nigeria is devoid of specific agroecology networks, but there are some reputable NGOs that can be used to bring together civil society and academia to discuss agroecology in the country. With HOMEF playing a lead role, these organizations can facilitate exchanges on potential alternative collaborative research and policy-making avenues to advance agroecological policies that will include all elements or principles of agroecology for sustainable agriculture and food systems.

The existence of the National Agricultural Extension and Research Liaison Service (NAERLS), Ahmadu Bello University, Zaria provides a god opportunity for the relevant CSOs to work with an established and proven government institution for the advocacy of agroecology through appropriate policy modality. NAERLS is one of the 18 national agricultural research institutions under the Federal Ministry of Agriculture and Rural Development (FMARD), and it is responsible for development, collation, evaluation and dissemination of proven agricultural innovation and to research on extension methodologies and policy. The extension and research activities of the institute take into account the long-term ecological, economic and social consequences of changes in rural life and linkages, all of which fit in well with agroecological principle or elements mentioned in this study. It also conducts its activities in partnership with other research institutes under FMARD and other national and international partners and collaborators. The names and focus of NAERLS and some of the identified organizations are given in Table 3.



# Table 3: Identified National Institutions and Civil Society Organization for a Potential Coalition Platform for Agroecology Policy Advocacy

S/No	Name	Nature of Institution	Areas of Focus
1	National Agricultural Extension and Research Liaison Service (NAERLS)	Government (ABU, Zaria)	Mission: To develop, collate, evaluate and disseminate proven and relevant agricultural innovation and research on extension methodologies and provide leadership in capacity building and of stakeholders to meet the present and future agricultural development challenges of the country.
			Relevant Mandate Package and disseminate improved agricultural innovation (including agroecological principles and practices)
			NAERLS also works with Fadama Community Associations and Fadama User Groups that could be collaborated with to advance the course of discourse on agroecology.
2	Home and Mother Earth Foundation (HOMEF)	CSO (Benin)	Promoting locally generated knowledge and practice for people-centred development; living in harmony with nature and the environment; unearthing the systemic roots (social, political and economic factors) of environmental and food challenges.
3	Women Farmers Advancement Network (WOFAN	CSO(Kano)	Advocacy, business management, agriculture, value chain and food processing, preservation, water and soil conservation, sustainable environment and climate change adaptation, improved agricultural technology, HIV/AIDS & health awareness programmes, Child care development, civic and political participation;
4	Human and Environmental Development Agenda (HEDA)	NGO (Lagos)	Citizens' awareness and mobilization on core human development issues, including <b>agriculture</b> , <b>food security</b> , <b>climate change</b> , <b>human rights</b> , public sector accountability and electoral reform processes.
5	Women Environmental Programme (WEP)	NGO (Abuja, Makurdi, Tunisia, Burkina Faso etc)	Sensitize and raise awareness of the general public on the impacts of climate change particularly on gender, its mitigation and adaptation; stimulate the management of natural resources within the framework of national and international policies/convention for sustainable development of the environment; build capacity of the relevant stakeholders on the management of the environment, conflict transformation, renewable energy, water and sanitation, violent extremism and organic pollutants; and educate women and youths on their civic rights and responsibilities, and on democratic governance.
6	Agricultural Agenda Nigeria Initiative (AANI)		De-risking the agricultural sector to make farming and participation in all aspects of the agricultural value chain attractive to investors of different capacities; Empowerment of smallholders, including youth and women, to participate in the entire agriculture value chain; Facilitating access to funding to farmers and monitoring their operations for compliance with global best practices, environmental concerns and other standards, as well as alignment with national policies.
7	Care and Action Research Non- Governmental Organization (CaRE-NGO)	NGO (Kaduna)	Promote a range of sustainable development activities that will not only make individuals/communities realize their naturally endowed resources/potentials but also use same to have a decent living and sense of dignity as human beings actively involved in practical agroecological practices.





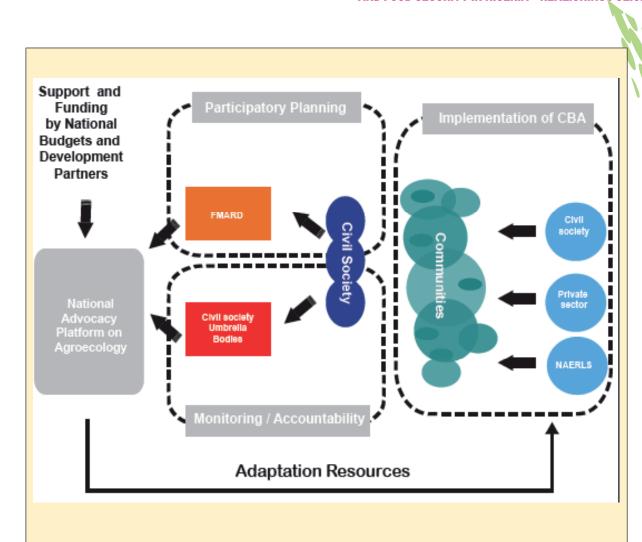


#### 6.1 Creating Conditions for Successful Establishment of the Advocacy Platform

The above approach is premised on the understanding civil society groups and research institutes would work together to form a *National Advocacy Platform on Agroecology*, and, if possible, with support from development partners. The group will advocate for the incorporation of agroecological principles and elements in climate change and other related government policies to ensure food and nutrition security in a changing climate. This may not be an easy task, unless a bottom-up approach is convincingly adopted to facilitate proper understanding among the various stakeholders. For this purpose, we propose the adoption of Community-based Adaptation (CBA) framework that will engage a range of stakeholders among CSOs directly with government institutions to facilitate participatory planning, development and implementation of climate change policy activities specifically dedicated to agroecological practices (Figure 10). The main interacting elements of this strategic approach are (i) the National Stakeholder Forum, which in our case is the National Advocacy Platform on Agroecology; (ii) Participatory Planning; (iii) Implementation of CBA; and (iv) Monitoring and Accountability. The steps are summarized as follows:

- i. The National Advocacy Platform on Agroecology NAdPA (National Stakeholder Forum in the adapted figure) will be made to be part of the national effort to address the challenge of climate change in the agriculture sector. It will compose a mix of representatives from government, civil society, the private sector, academia and the media, but with much responsibility on the CSOs, to document proven agroecological practices that are amenable to the Nigerian agro-ecological zones for wide adoption.
- ii. Participatory planning is to enable good documentation of local knowledge on agroecology at community level that can be scaled up to the national forum. NGOs and CBOs will undertake and utilise the participatory planning for impact and relevance.
- iii. The implementation of the community-based wide-scale adoption of proven agroecological practices will be facilitated by the leading NGO, in this case HOMEF, with support from the National Advocacy Forum or NAERLS (as government focal point) to demonstrate their effectiveness in improving agricultural productivity in an environment-friendly and climate resilient manner for sustainable food and nutrition security.
- iv. Ensuring that the advocacy has meaningful impact of translating proven local agroecological practices into climate change and agricultural policies requires good and functional monitoring means for accountability.

In all the steps and processes for the functionality of NAPA, the principle of purposeful inclusiveness will be adopted to ensure that all stakeholders are properly engaged and involved and that the policy-science interface is properly reflected in decisions. This will strengthen local agroecological knowledge and promote good sharing of evidence-based and scientifically-proven practices at all levels. It will also ensure that knowledge and innovations are available and accessible to all, including policymakers for comprehensive framing of laws and policies on agroecology for Nigeria. Climate extension and farmer mentor workshops that incorporate extension and the emerging young farmers in Nigeria with aim to facilitate knowledge transmission between generations of farmers and to share strategies to manage agricultural risks, as well as ensure climate resilience through agroecology will be organised on a regular basis to reinforce the benefits of agroecology for climate resilient agriculture and food and nutrition security in the country.



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Figure 10 Using Community-based Adaptation (CBA) Approach to Facilitate the Establishment of a National Advocacy Platform on Agroeoclogy for Nigeria (Modified after Clements et al., 2011)

# 7. Conclusion

Climate change is a complex problem, which, although environmental in nature, touches and has consequences for all spheres of existence of humanity. It impacts on and is impacted by global issues, including food, trade, poverty, economic development, population growth, sustainable development and resource management. Stabilizing the climate is definitely a huge challenge that requires planning and steps in the right directions. In the agriculture sector, the uncertainty of raising temperatures, erratic rainfall patterns, droughts and the emergence of unfamiliar pests and diseases, demands a form of agriculture that is resilient, and a system of food production that supports local knowledge transfer and on farm experimentation through building adaptive capacity of farmers. Agroecology is one such practice that deals with mitigation as well as adaptation to climate change.

This review and analysis show that a broad variety of agroecological practices exist in the country that provide high potential for the agro-food and farming systems to adapt to climate change. Some of these technologies and practices have straightforward connections to climate change, but for others these connections are more indirect. The best agroecological practices are those that enhance soil fertility, increase productivity, ensure nutrition and health, and demonstrate that they are done without harming the environment and are culturally appropriate.

The study indicates that no policy specifically related to agroecology exists within the current national climate change and agriculture policy arena of Nigeria. The National Agricultural Resilience Framework (NARF) is the closest related national framework that can be adapted for agroecological policy intervention in the country. Despite the absence of the word "agroecology" in the reviewed agriculture and climate change policies, strategies and plans, there is a significant consideration of many agroecology elements and practices aiming at increasing agricultural productivity and building resilience in many of them. The most significant ones are (i) National Climate Change Policy; (ii) National Climate Change Programme; (iii) NASPA-CCN; (iv) NDC; and (v) Agricultural Promotion Policy.

In particular, the ongoing revision of NASPA-CCN to produce a new National Adaptation Plan for the country provides a good opportunity to a very comprehensive inclusion of agroecology in the climate change strategy. As the National Climate Change Policy and Climate Change Programme are yet to be fully approved by the Government, they also provide immediate good opportunities for advocacy to explicitly adopt agroecology as a policy initiative for climate change adaptation and the building of resilience of agricultural systems while minimizing emissions for enhanced food and nutritional security and improved livelihoods in the country.

The lack of understanding of agroecology amongst policymakers may be the greatest barrier to its inclusion in climate change policies and strategies. Presently, while agroecology has a space in climate policy dialogues in Nigeria, very few people who design policies know or even understand

it. Additionally, agroecology is not being discussed or advocated for like climate change. There is limited sensitization and awareness raising among policy makers. Successful adoption of agroecology to fight climate change will require increasing policymakers' understanding and knowledge about the concept over a long time period.

Although agroecology is not being discussed or advocated for like climate change, it nevertheless has a large potential space in climate policy dialogues. However, a number of actions need to be put in place to elevate agroecology to a high level of policy discussion. Similar to what is being advocated for CSA, these actions are related to: (i) expanding the evidence based approach; (ii) advocating agroecology-specific policy framework in the context of addressing climate change challenge; (iii) building capacity of relevant national and local institutions for agroecology advocacy; (iv) facilitating local and international financing; and (v) embarking on practical field demonstrations. These actions must be facilitated by a relevant principles and guidelines for an effective process that will scale up agroecology for resilience to climate change.

The analysis indicates that great opportunities exist for the scaling up and mainstreaming of agroecology into climate change and other related (particularly agriculture) national policies with the removal of the identified constraints. The obvious approach is to review relevant and related policies regarding negative consequences for adoption of agroecological practices and reform as necessary, coupled with positive development of policies that encourage adoption of agroecological practices in an integrative manner across different sectors and scales.

To explore the potentially good outlook for the use of agroecological practices to enhance adaptation in the country, Nigeria should immediately review the implementation of the sectoral plan for agriculture in the NDC to ensure proper integration of agroecological practices in its national response to the challenge of climate change. The Federal Ministries of Environment and Agriculture and Rural Development could then jointly produce a policy document from NDC implementation in the agriculture sector that will be solely devoted to agroecology within the context of promoting environment-friendly and climate resilient agriculture, which may also encompass some element of the CSA.

Although Nigeria is devoid of specific agroecology networks, there are, nonetheless, some reputable NGOs that can be used to bring together civil society and academia to discuss agroecology in the country. With HOMEF playing a lead role, these organizations can facilitate exchanges on potential alternative collaborative research and policy-making avenues to advance agroecological policies that will include all elements or principles of agroecology for sustainable agriculture and food systems.

The existence of the National Agricultural Extension and Research Liaison Service (NAERLS), Ahmadu Bello University, Zaria provides a god opportunity for the relevant civil society organizations to work with an established and proven government institution for the advocacy of agroecology through appropriate policy modality for its promotion to advance the course of agricultural development for enhanced productivity and food and nutrition security in the country. To this end, a community-based adaptation framework that can be used to facilitate the establishment of a National Advocacy Platform on Agroecology (NAdPA) is proposed, and the imperative to create the necessary conditions for its establishment stressed. The principle of purposeful inclusiveness should be adopted to ensure that all stakeholders are properly engaged and involved and that the policy-science interface is properly reflected in decisions. This will strengthen local agroecological knowledge and promote good sharing of evidence-based and scientifically-proven practices at all levels. It will also ensure that knowledge and innovations are available and accessible to all, including policymakers for comprehensive framing of laws and policies on agroecology for Nigeria.

# REFERENCES

Abiodun, B. J., Salami, A. T. & Tadross, M. (2011). *Developing Climate Change Scenarios: Biophysical Impacts and Adaptation Strategies in Nigeria*. Ibadan, Nigeria: Nigerian Environmental Study/Action Team (NEST).

Álvaro Acevedo-Osorio, A. and Chohan, J. K. (2019): Agroecology as social movement and practice in Cabrera's peasant reserve zone, Colombia. AGROECOLOGY AND SUSTAINABLE FOOD SYSTEMS 2020, VOL. 44, NO. 3, 331–351

https://doi.org/10.1080/21683565.2019.1623359

Action Against Hunger (2018): Promoting Agroecology. <a href="https://www.actioncontrelafaim.org/wp-content/uploads/2018/02/acf\_promotingagroecology\_gb.pdf">https://www.actioncontrelafaim.org/wp-content/uploads/2018/02/acf\_promotingagroecology\_gb.pdf</a>

AFSA (2016): Agroecology: The Bold Future of Farming in Africa. AFSA & TOAM. Dar es Salaam. Tanzania.

Altieri, M. A. 2017: Developing and promoting agroecological innovations within country program strategies to address agroecosystem resilience in production landscapes: a guide. The GEF Small Grants Programme <a href="https://comdeksproject.files.wordpress.com/2017/04/agroecology-guidance-note.pdf">https://comdeksproject.files.wordpress.com/2017/04/agroecology-guidance-note.pdf</a>

Altieri, M. A., Nicholls, C. I., Henao, A and Lana, M. A. 2015: Agroecology and the design of climate change-resilient farming systems. *Agronomy for Sustainable Development* <a href="https://nacla.org/article/agriculture-doesn%25E2%2580%2599t-get-rid-farmers-interview-miguel-altieri">https://nacla.org/article/agriculture-doesn%25E2%2580%2599t-get-rid-farmers-interview-miguel-altieri</a>

BNRCC (2011): National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN)

Busby, J., Smith, T., White, K., Weaver, C., Peratsakis, C., Moran, A., Raleigh, C., 2011: Climate Change Adaptation in Nigeria: Key Considerations for Decision Makers. CCAPS Program, Working Paper.

Cambareri GS. Climate-smart agriculture vs. agroecology to mitigate GHG emissions in Argentinean Agriculture: a false dichotomy. *MOJ Eco Environ Sci.* 2018;3(4):237**2**238. DOI: 10.15406/mojes.2018.03.00093

Cervigni, R., Riccardo, V., and Monia, S, eds. 2013. *Toward Climate-Resilient Development in Nigeria*. Directions in Development. Washington, D.C: World Bank.

Chijioke, O.B,. Haile, M. and Waschkeit, C. (2011): Implications of climate change on crop yield and food accessibility in Sub Saharan Africa. Bonn University, Germany. <a href="https://www.zef.de/fileadmin/downloads/forum/docprog/Termpapers/2011\_1\_0yiga\_\_Haile\_Waschkeit.pdf">https://www.zef.de/fileadmin/downloads/forum/docprog/Termpapers/2011\_1\_0yiga\_\_Haile\_Waschkeit.pdf</a>

Clements, R., Haggar, J., Quezada, A., and Torres, J., 2011: Technologies for Climate Change Adaptation. X. Zhu (Ed.) - Agriculture Sector UNEP Risø Centre, Roskilde.

Debray, V., Wezel, A. Lambert-Derkimba, A., Roesch, K., Lieblein, G. and Francis, C. A (2018):

Agroecological practices for climate change adaptation in semiarid and subhumid Africa. Agroecology and Sustainable Food Systems. https://doi.org/10.1080/21683565.2018.1509166

Devendra, C. (2012); Climate Change Threats and Effects: Challenge for Agriculture and Food Security. Akademi Sains Malaysia

DFID, 2009: Impact of Climate Change on Nigeria 2s Economy

FAO (2013): Climate-Smart Agriculture Source Book

FAO (2019): The 10 Elements of Agroecology - Guiding the Transition to Sustainable Food and Agricultural Systems. <a href="http://www.fao.org/3/i9037en/i9037en.pdf">http://www.fao.org/3/i9037en/i9037en.pdf</a>

FGoN (2019) Third National Communication to the UNFCCC (Draft Report).

FMARD (2016): Agriculture Promotion Policy -Federal Ministry of Agriculture and Rural Development.

FMARD/UNDP/GEF (2017) - Fostering Sustainability and Resilience for Food Security in the Savanna Zones of Northern Nigeria Project Document.

Gonzalez, R. A., Thomas, J. and Chang, M. (2018): Translating Agroecology into Policy: The Case of France and the United Kingdom. Sustainability (10), 2930; www.mdpi.com/journal/sustainability

Hassan, S. M., Ikuenobe, C. E., Jalloh, A., Nelso, G. C. and Thomas, T. S. 2013: Nigeria in Jalloh, A. et. al. West African Agriculture and Climate Change: A Comprehensive Analysis. IFPRI Pub.

HLPE (2019): Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

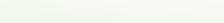
Idowu, A. A., Ayoola, S.O., Opele, A.I., and Ikenweiwe, N. B., 2011: Impact of Climate Change in Nigeria. Iranica Journal of Energy & Environment 2 (2): 145-152.

IISD (2020): Innovating Climate Change Adaptation through Agroecology Virtual Workshop 27 – 29 May Adaptation through Agroecology Bulletin https://enb.iisd.org/download/pdf/sd/enbplus172num48e.pdf

IPCC (2014): Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral aspects. In: Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R., White, L.L. (Eds.), Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 1132.

IPCC (2019): Climate Change and Land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security and greenhouse gas fluxes in terrestrial ecosystems. Geneve, Switzerland. 906 pp.

Lambell, R. and Nelso, V. Exploring the links between Climate Change, Agriculture and Development: A Briefing Paper http://www.erails.net/FARA/climateGlearning/climateGlearning/Home/





Lamboll, R. and Nelson, V. (2014) Exploring the links between Climate Change, Agriculture and Development: A Briefing Paper <a href="https://www.nri.org/images/documents/development-programmes/climate\_change/publications/WorkingPaper1Briefing.pdf">https://www.nri.org/images/documents/development-programmes/climate\_change/publications/WorkingPaper1Briefing.pdf</a>

Leippert, F., Darmaun, M., Bernoux, M. and Mpheshea, M. 2020. *The potential of agroecology to build climate-resilient livelihoods and food systems*. Rome. FAO and Biovision. <a href="https://doi.org/10.4060/cb0438en">https://doi.org/10.4060/cb0438en</a>

Mahaman, B., Pascal, P. and Brochard, V. Promoting Agroecology. Action Against Hunger <a href="https://www.actioncontrelafaim.org/wp-content/uploads/2018/02/acf\_promotingagroecology\_gb.pdf">https://www.actioncontrelafaim.org/wp-content/uploads/2018/02/acf\_promotingagroecology\_gb.pdf</a>

Mbow, C., C. Rosenzweig, L.G. Barioni, T.G. Benton, M. Herrero, M. Krishnapillai, E. Liwenga, P. Pradhan, M.G. Rivera-Ferre, T. Sapkota, F.N. Tubiello, Y. Xu, 2019: Food Security. In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D.C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

Myers, S. S et al. (2014): Increasing CO2 Threatens Human Nutrition. *Nature* Vol. 510, pp 139 – 142.

Nicholls, C.I. and Altieri, M.A. (2018): Pathways for the amplification of agroecology. *Agroecology and Sustainable Food Systems*, 42(10): 1170–1193.

Oladipo, E. (2013): Assessment of the Adaptation of the Agriculture Sector to Climate Change and Variability in Nigeria. Technical Report submitted to CILLS (INSAH)

Oladipo, E. (2019): Assessment of Climate-Related Challenges to the Livestock Systems in Nigeria. Technical Report submitted to the Federal Ministry of Agriculture and Rural Development (Department of Animal Production and Husbandry Services)

Onyeneke, R. U., Nwajiuba, C. A., Emenekwe, C.C., Nwajiuba, A,. Onyeneke, C. J., Ohalete, P and Uwazie, U. I. 2019: Climate change adaptation in Nigerian agricultural sector: A systematic review and resilience check of adaptation measures. **AIMS Agriculture and Food**, 4(4), 967–1006. <a href="https://www.researchgate.net/publication/337285490\_Climate\_change\_adaptation\_in\_Nigerian\_agricultural\_sector\_Asystematic\_review\_and\_resilience\_check\_of\_adaptation\_measures">https://www.researchgate.net/publication/337285490\_Climate\_change\_adaptation\_in\_Nigerian\_agricultural\_sector\_Asystematic\_review\_and\_resilience\_check\_of\_adaptation\_measures</a>

Silici, L (2014): Agroecology: What it is and what it has to offer. International Institute for Environment and Development

https://www.researchgate.net/publication/264245203\_Agroecology\_What\_it\_is\_and\_what\_it\_has\_to\_offer

Sinclair, F., Wezel, A., Mbow, C., Chomba, S., Robiglio, V., and Harrison, R. (2019): "The Contribution of Agroecological Approaches to Realizing Climate-Resilient Agriculture." Rotterdam and Washington, DC. Available online at <a href="https://www.gca.org">www.gca.org</a>.

Zewdie, A (2014): Impacts of Climate Change on Food Security: A Literature Review in Sub-Sahara Africa. *Journal of Earth Science and Climate Change*. Vol. 5 (8), 225- https://ec.europa.eu/knowledge4policy/publication/impacts-climate-change-food-security-literature-review-sub-saharan-africa\_en



#### **ANNEX 1**

#### Example of response to some of the questions asked

Typical Response to Basic Questions on Climate Change Policy and Agroecology in Nigeria

Q1. Do you feel that agroecology as a concept is properly carried along in our climate change policy or agriculture policy?

Yes

#### Q2. If yes, in what way?

The concept of agroecology is nuanced in both the National Agricultural Resilience Framework (NARF) and the Agricultural Promotion Policy (APP).

In the NARF, a whole chapter (3) is dedicated to enhancing the natural resource base. Although it did not explicitly use the term Agroecology, however, it's two goals allude to the concepts enshrined in agroecology. Goal 1: Secure the sustainable use of natural ecosystems; Goal 2: Develop sound biome adaptation frameworks that address the vulnerabilities of each biome to climate change and ensure sustainable natural resource management.

While in the APP, the integration of agroecological approaches is relegated to the Climate-Smart Agriculture chapter (4.3.4). Little reference is made to the improvement in the 'management of land, water, soil and other natural resources' and the promotion in the use of renewable energy.

#### Q3. If not, how can it be properly mainstreamed into our policies?

Emphasis must be made on the shift into agroecological practices in the APP to enable the Ministries of Agriculture prioritise regenerative agriculture in their programs/projects. Also, the policy must look into promoting natural/ organic inputs alongside inorganic inputs such as fertilizers and pesticides. The policy must also include the prioritization of local research to boost agroecological practices within the country.

# **Q4.** What do you see as the future of agroecology in national effort to enhance our food and nutrition security?

AgroMeteorological information is critical to adopting agroecological practices as such practice need smart approaches to ensure its sustainability. Yearly, the Nigerian Meteorological Agency (NiMET) publishes its Seasonal Rainfall Predictions (SRP) the document shows the predictions for the onset and cessation of rainfall, the rainfall amount and the expected minimum and maximum temperatures in each agroclimatic zone. This information is critical for farmers, however, many of them do not have access to same and when they do, are unable translate it to improve their farming practices. Therefore, there is a critical need to bridge the gap between the government MDAs and NiMet to equip farmers with this information. Our organization, HEDA Resource centre, has taken the lead in this regard by downscaling this information across 16 states in the drought prone northern states of Nigeria.

Agroecological practices will come to fore if the policy documents such as the NARF are adopted by the state Governments but also implemented by all. The NARF already contains a strategy to adopting such systems, it is the implementation that is lacking.





#### **ANNEX 2**

Summary of the Main Features of the Reviewed Climate Change and Climate or Agriculture-related Policies<sup>12</sup>

- i. National Climate Change Policy (2019)
- ii. National Climate Change Programme (2019)
- iii. Nationally Determined Contribution Implementation Action Plan for the Agriculture Sector (2016)
- iv. Intended Nationally Determined Contribution (2015)
- v. National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN 2011)
- vi. National Agricultural Resilience Framework (2014)
- vii. National Policy on the Environment (2017)
- viii. The Agriculture Promotion Policy (2016)
- ix. National Forest Policy (2019)
- x. National Biodiversity Strategy and Action Plan (2015)

#### 1. National Climate Change Policy (2019)

National Policy on Climate Change defines a new holistic framework to guide the country's response to the development challenge of climate change. It prescribes sectoral and cross-sectoral strategic policy statements and actions for the management of climate change within the country's pursuit for climate resilient sustainable development.

Towards promoting a low-carbon, climate-resilient Nigeria, the Policy will ensure sustainable development and a climate proofed economy through multi-stakeholder engagement. The Policy's overall goal is to promote a low-carbon, climate-resilient and gender-responsive sustainable socio-economic development, with a major expected outcome of reduced vulnerability of the country to climate change impacts in all sectors, including agriculture. One of its strategic objectives that is relevant to the present study is the **promotion of sustainable land-use systems that enhance agricultural production, ensure food security and maintain ecosystem integrity.** The principle of promoting environmental quality and ecological equilibrium also implies the recognition of some agroecological principles.

<sup>12</sup> Issues of significant relevance to agroecology as a potential means of addressing the challenge of climate change in various policies and strategies are illuminated in yellow colour



#### **Policy Focus on Mitigation**

The overall policy objective of the measures for mitigation is to strengthen measures to reduce greenhouse gas emissions (direct and fugitive emissions), mainly from the energy (including power generation), oil and gas, biomass (agriculture, forest and land use), industry, transport and waste sectors. Policy focus areas, that will also emphasize gender-responsive and socially-inclusive approach, are as follows:

- Energy: Producing adequate energy for the country's development needs and minimizing GHG emissions to achieve national high socio-economic growth through the delivery of clean, affordable and balanced energy mix that includes (i) expanded use of renewable energy, particularly solar and wind, both on-grid and off-grid, and (ii) promotion of energy efficiency and management activities that include new and innovative energy efficiency methodologies and techniques in power generation, including the use of gas-fired power stations.
- Agriculture, Forestry and Other Land Use: Reducing greenhouse gas emissions in agriculture, forestry and other land use without compromising food security, while increasing the carbon sink potential of the country's natural capital, through (i) wide adoption of climate-smart, climate-resilient and ecologically resilient cropping and livestock practices and systems, (ii) reduction of forest loss and degradation, (iii) increasing use of alternative domestic fuel to fuelwood in rural areas and (iv) promotion of agro-forestry, reforestation and afforestation, including community-based forest management and recovery, among others.
- Industry: Shift to low emission production systems using the best technology to ensure efficiency from the building of the facility
  to the fabrication of production equipment that will reduce the demand for fuels and enhance overall efficiency for green industrial
  development.
- **Oil and Gas:** Pursue low-carbon transition for oil and gas companies in the country and support low-cost, technically feasible solutions to reduce methane emissions in oil and gas operations, including recovery and use of escaping gas, as well as promote the deployment of natural gas as Nigeria's major fuel for power generation, industrialization, and domestic use, particularly cooking, towards stopping gas flaring
- **Transport:** Reduce climate risk to the country's transport infrastructure by promoting a climate-resilient transport system that is a fast, safe, efficient, affordable, gender-responsive, socially-inclusive, integrated and inter-modal for goods and people. to reduce GHG emissions from the sector.
- Waste: Efficient waste handling for GHG removals and overall climate mitigation through recycling, waste reduction waste to wealth and energy recovery from wastes to significantly lower emissions from the sector.
- Water: As the water industry will be at the forefront in dealing with the effects of climate change in Nigeria, reducing GHG emissions in the sector will facilitate the development and deployment of new infrastructure, technologies and management systems, which should contribute to the 2030 low-carbon target of the country's NDC.

#### **Policy focus on Adaptation**

The general country's Adaptation Programme, as elaborated in the Policy, will focus on reducing vulnerabilities of the people and promoting community and ecosystem resilience to the impact of climate change, while ensuring that women, girls and other vulnerable groups are engaged and involved in planning and implementing long-term climate change adaptation interventions. Specific interventions will be targeted at the agriculture and food security, forestry and biodiversity, water resources, energy and infrastructure, health, human settlement, industry, transportation, communication and security that are considered to be the most vulnerable sectors to climate change in Nigeria. Policy focus areas with appropriate mainstreaming and integration of gender-responsiveness and social inclusiveness are as follows:

- Agriculture: Enhancing resilience of the country's agricultural systems to climate risk to protect livelihoods of small and marginal farmers, particularly women and youth that will also involve improving national capacity (human, institutional, financial and technological) to adapt to the impact of climate change in the agriculture sector.
- **Forestry:** Making the forest sector climate resilient to increase and sustain production and to create value addition across the most valuable segments of its value chain, with emphasis on strengthening the resilience of its forest's natural capital.
- **Energy:** Making whole value chain of the energy system generation, transmission, distribution, as well as consumption climate resilient and less impacted by climate events. In other words, reducing both exposure and vulnerability of the country's energy system, particularly the electricity production, to climate change hazards.
- Water: Promoting water security and climate resilient growth and development through the implementation of water resources management strategy that is cost-effective and contributes to the economic prosperity and poverty reduction through several pathways, while strengthening systems and capacity for longer-term climate risk management. It will also integrate gender perspectives in the management of the sector.
- **Transport:** Promoting sustainable climate-resilient transport system to reduce climate change-induced extreme weather events and threats to Nigeria's transportation assets and infrastructure, particularly the road transport.
- Industry: Pursuing climate resilient industrial development pathway
- Information and Communication Technology (ICT): Adopting anticipatory adaptation measures to strengthen the operational and resource efficiency of ICT infrastructure and service providers and customers reliant on ICT services at multiple levels, including broadening awareness of the risks that climate change poses to a company's physical assets, supply chain, business continuity, and employees, as well as an understanding of how the ICT sector can play a role in helping customers adapt to increasing disruption, resource constraints, and information needs. In general, making the ICT sector in the country climate resilient.
- Human Settlements: Settlements (rural and urban) made more resilient to climate-related disasters and long-term climate risks and managed in ways that protect people and encourage prosperity. It also includes improving their abilities to reduce greenhouse gas emissions and enhance their adaptive capacities. climate resilient urban development—targeting multiple hazards, different assessment approaches, and emphasizing the institutional dimensions of achieving climate resilient pathways—showcase the multi-faceted nature of the shocks and stresses (both external and internal) impacting on the sustainable development of cities.
- Security: Sustainably mainstreaming of climate change into national development and human security.





#### 2. National Climate Change Programme

To foster a comprehensive and broad-based result-oriented national response to climate change, a number of critical action programmes are proposed/developed. These programmes will further consolidate climate change-related ongoing initiatives and process to enhance the country's adaptive capacity to respond to different levels of impact of climate change and its opportunities. The programmes complement the National Climate Change Policy by identifying measures and actions that will be implemented in a programmatic manner to address most of the challenges posed by climate change and climate vulnerability in the country. The following are proposed national programmes that have direct and indirect bearings on agroecology for both climate change mitigation and adaptation.







#### Mitigation Programme - Reducing Emissions in the AFOLU Sector

In addition to its potential to reduce GHG emissions, agriculture, forestry and other land use (AFOLU) is the only sector that has the capacity to remove GHGs safely and cost-effectively from the atmosphere without reducing productivity. Agriculture, in particular, has the potential to benefit from synergies between climate change adaptation and mitigation within the right enabling conditions. For example, efficient livestock production systems can significantly reduce GHG emissions and enhance sinks while increasing productivity. In the same vein, conservation and improved management of peatlands reduces GHG emissions, maintains ecosystem services and helps communities adapt to climate change. In general, mitigation can be achieved in the sector through activities that increase the removals of GHGs from the atmosphere or decrease emissions by sources leading to an accumulation of carbon stocks. Moreover, AFOLU sector offers one of the cheapest options to achieve the NDC target in the country.

In the implementation of the National Climate Change Policy, there are opportunities for mitigating GHG emissions from agriculture and land use, whilst at the same time ensuring development benefits, fall into two broad categories, namely reducing emissions and enhancing removals and sequestration. The objective of the programme will be to decrease emissions by sources and increase the accumulation of carbon stocks in the sector. Similar to the objectives of the adoption of agroecology for climate change adaptation. Some key actions would include:

- i. Increasing the forest cover of the country to 25% by 2030;
- ii. Increasing the total area under agroforestry at farm level by x ha by 2030;
- iii. Increasing farm area under sustainable land management and climate-smart agricultural practices by x ha by 2030 for carbon sequestration;
- iv. Promoting and supporting plantation development through afforestation, reforestation and forest restoration for sustainable timber supply and climate change mitigation;
- v. Developing and implementing a Dairy Nationally Appropriate Mitigation Action (NAMA) for efficient livestock management systems that enhance productivity and promoted GHG emission reduction in the sub-sector and improve genetics in the dairy herd;
- vi. Developing and implementing a NAMA on sustainable charcoal supply chain to reduce emissions, promote sustainable development, increase access to clean energy and reduce deforestation and land degradation;
- vii. Implementing the National REDD+ Strategy;
- viii. Increasing adoption of biogas technology use by x million households and x number of abattoirs; and
- ix. Increasing the number of farmers using low-carbon (Recirculating) aquaculture systems by at least 20% by 2030.

#### **Adaptation Programme - Agriculture and Food Security**

This programme recognizes that agriculture, as the most weather-dependent of all human activities is highly climate impacted, with consequences on food security. The high reliance on rain-fed agriculture makes the sector in Nigeria highly vulnerable to climate change. The way the country manages its agriculture under increasing climate variability will be a key determinant of whether or not we are able to eradicate hunger and all forms of malnutrition, as well as reduce poverty within the context of national commitment to achieving SDGs 1 to 3.

In the national programme for Climate-Resilient Agricultural (including crop production, livestock and fisheries) and Food Security, climate change and climate variability will be mainstreamed to ensure the sustainability of the sector. Emphasis will be on building national and sub-national capacity to address climate risks in the country's food and agriculture value chain, including effective research, extension work and farmers, as well as infrastructure development that will increase the resilience of rural agricultural communities in an inclusive and gender and socially-responsive manner that will enable them to adapt to the impact of extreme events including floods and long dry spells. Some key activities intended for implementation that will have direct or indirect bearing to agroecology in the food and nutrition value chain include:

- i. Performing detailed analyses of the vulnerability and adaptation potential of Nigeria's agricultural (different crops and), livestock and fishery sectors:
- ii. Conducting a socioeconomic assessment of the impact of climate change on the agricultural, livestock and fishery sectors;
- iii. Undertaking performance analysis to identify climate change adaptation measures and projects in the agricultural, livestock and fishery sectors, focusing on small-holder farmers;
- iv. Improving farmers' knowledge about proper use of weather information in carrying out agricultural activities to reduce or even avoid climate change risks:
- v. Promoting and supporting climate-smart agricultural and climate-resilient practices in cropping, livestock production and fisheries and aquaculture systems across the ecological zones of the country to manage agro-climatic risks and potential disasters;
- vi. Supporting to Climate Change Adaptation Activities in Fisheries and Aquaculture;
- vii. Promoting and support efficient and climate-friendly water conservation and irrigation systems for efficient use of water in agriculture;
- viii. Promoting and support alternative climate-resilient livelihoods in rural communities for agro-climatic risk reduction and management;
- ix. Improve post-harvest management to ensure sustainable food security and household income in a changing climate;
- x. Improving agro-marketing systems to reduce fluctuations in food prices and improve household income; and
- xi. Supporting and conduct research to facilitate transfer of appropriate technology for the promotion of climate-resilient agriculture.

#### Adaptation Programme - Forest

Forest ecosystems are exposed to different aspects of climate variability and change, as well as other drivers that may exacerbate related impacts, including those related to food and nutrition security. Critical climatic and non-climatic threats and stressors will be addressed to reduce the vulnerability of Nigeria's forests to climate change and enhance the effectiveness of adaptation measures that will be implemented. Some of these that have direct and indirect bearing to agroecology include:

- i. Implementing ecological restoration programs in degraded systems across all ecological zones, with emphasis on using climate-resilient trees, including fruit trees and economic and indigenous species adapted to local conditions;
- ii. Documenting and communicating indigenous ecological knowledge to inform public policy and environmental decision-making;
- iii. Promote and support sustainable forest management;
- iv. Promoting and supporting integrated and multi-disciplinary researches for shared understanding of future climate-related challenges to facilitate improved decision making in the face of climate change.
- v. Improving governance, capacity and regulatory structures for the effective management of the country's forest and other natural resources.







# 3. Nationally Determined Contribution (NDC) Implementation Action Plan for the Agriculture Sector (2016)

This plan is part of a wider programme to develop NDC implementation plans for the five main sectors of Nigeria's economy that has both direct and indirect bearings to agroecology. The plan is a follow-up to the 2015 Intended NDC (INDC), which identifies Climate Smart Agriculture and Stopping Using Charcoal as the main entry points for climate mitigation and adaptation in the Agriculture and Land Use Sector that have direct and indirect bearings to agroecology. It emphasizes reducing agriculture-related GHG emissions through changes in land use (e.g. removal of trees or tillage), improving the efficiency of production to deliver optimal levels of nitrogen more efficiently to crops and managing livestock to make the most efficient use of feeds will reduce the amounts of CH4 produced relative to output. The plan also stresses enhancing removals and sequestration through effective management of agricultural land and forests (e.g. storing carbon in stored in agro-forestry systems) to ensure that they are a net carbon sink rather than a source of emissions.



## **Priority Measures**

Some of the climate change mitigation priority measures in the plan that are consistent with the principles of climate smart agriculture (CSA) or agroecological technologies include:

- i. Improved soils and nutrient management: Optimizing production through appropriate management of nutrients and soils is essential. This measure is relevant for both tillage and grassland systems and will impact on methane and nitrous oxide efficiency.
- **ii. Agro-forestry**: The inclusion of trees in farming systems can have multiple benefits, in addition to increasing carbon stocks and reducing GHG emissions. It has productivity benefits, as it improves water retention in soils. It offers the opportunity of crop diversification, thereby increasing farmers' incomes. It also creates areas of shade for livestock, and produces perennial crops.
- **iii.** Improved management of burning of savannah and crop residue: These common practices contribute to GHG emissions and are also detrimental to local air quality. Burning also accelerates soil degradation and reduces soil organic matter.
- iv. Use of alternative domestic fuel in rural areas: Traditional methods of burning wood and charcoal lead to land cover change and indoor air pollution, with significant health impacts. Gradual reduction of this activity would lead to maintenance of the forest carbon stock and an increase in carbon sink as additional forest biomass accumulates.
- v. Measures to reduce post-harvest losses in key crops: A lack of storage infrastructure and investment leads to significant levels of crop wastage after harvest. Addressing this will increase productivity and sustainable supply.
- vi. Creating fixed grazing systems or dedicated pastures: The majority of Nigeria's cattle herd is reared under a nomadic pastoral system. By moving the cattle herd on to more productive managed grassland, improvements in animal health and nutrition can lead to increased productivity, allowing animals to be marketed earlier and reduce associated methane.
- **vii.** Improved genetics in the dairy herd: Productivity in the dairy herd is currently very low. Improving output will improve farmers' livelihoods, in addition to reducing GHG emissions intensity significantly.
- viii. Adopt improved agricultural systems for both crops and livestock: For example, by diversifying livestock and improvement of range management; increasing access to drought-resistant crops and livestock feeds; adopting better soil management practices; and providing early warning/meteorological forecasts and related information.
- ix. Implement strategies for improved resource management: Through the increase in the use of irrigation systems that use low amounts of water; increase in rainwater and sustainable ground water harvesting for use in agriculture; increase in planting of native vegetation cover and promotion of re-greening efforts; and intensification of crop and livestock production in place of slash-and-burn practices.
- **x.** Focus on agricultural impacts in the savanna zones: Particularly in the Sahel, where the impacts of climate change are likely to be felt the most.



# 4. National Adaptation Strategy and Plan of Action for Climate Change Nigeria (NASPA-CCN)

This is an inclusive and widely supported adaptation strategy and action plan. It is linked to other initiatives of the Nigerian government. In developing the NSAPA-CCN, Nigeria envisions a country 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. Its goal is 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.

The main objective of NASPA-CCN is 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. In the Agriculture Sector that has relevance to agroecology, the goal of NASPA is 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.

## **Priority Strategies**

The following are critical strategies in NASPA-CCN that have direct or indirect bearings to agroecology:

- i. 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.
- **ii.** Implement strategies for improved resource management: For example, increase use of irrigation systems that use low amounts of water; increase rainwater and 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.

## 5. National Agricultural Resilience Framework (2014)

The National Agricultural Resilience Framework (NARF) on climate-smart agriculture is a robust implementation plan that incorporates innovative agricultural production strategies and risk management mechanisms to promote resilience in the agricultural sector in Nigeria. It encompasses policies required to successfully implement a national climate and smart agricultural programme. Its goal is to strengthen the capacity of small and large-scale agricultural producers to increase productivity, grow wealth and thrive in the face of growing challenges from multiple social and environmental stressors, including changing climate. This national agricultural resilience initiative is the first attempt at developing a sector-specific climate adaptation and risk mitigation programme in Nigeria.



#### **NARF Strategic Objectives**

- Strengtheningtheoverall policy/institutional framework improved resilience and adaptation to climate variability and change in the agricultural sector, including planning and implementation. systems for resource mobilization, and effective project monitoring and evaluation.
- Evaluation and introduction of risk transfer and risk management strategies (e.g., improved seasonal and real time weather forecasts, insurancebased risk mitigation options etc.) into the agricultural sector widespread and deployment of same through communication technologies, including mobile phones.
- Improving productivity through training community and grass root farmers on land and water management strategies (e.g., irrigation farming, water harvesting, soil fertility enhancement erosion and control etc.) improved farming practices and usina policy instruments such economic as incentives, regulations and communication.
- iv. Reinforcing existing social safety nets through support systems that reduce vulnerability and improve livelihood conditions for the vulnerable, especially women and children.
- Improving farming systems research within capacity the National Agricultural Research System (NARS) to enable and support the implementation climate friendly agriculture in Nigeria.
- vi. Revamping extension services, including building new capacity for evidence-based assessment and management of climate risk for resilience in the agriculture sector.

#### **RELEVANT NARF PRIORITY ACTIONS**

#### (a) Research

- Engage extension services and farmers in the research process to enable farmers to help set a
  research agenda informed by their needs, to maximize practical field testing of climate-resilient
  practices and technologies, and to accelerate channels for adoption and up-scaling
- ii. Improve crop and grazing land management to increase soil carbon storage.
- Restoration of cultivated peaty soil and degraded lands and improve cultivation techniques, particularly for rice, to reduce nitrous oxide emissions.
- iv. Composting of organic waste; controlled wastewater treatment; recycling and minimization; bio-covers and bio-filters to optimize methane oxidation.
- v. Expanded rainwater harvesting; water storage and conservation techniques; water reuse; water desalination; water-use and irrigation efficiency to reduce water stress and vulnerability to climate change.
- vi. Improve nitrogen fertilizer application techniques to reduce nitrous oxide emissions.
- vii. Improve land management such as erosion control and soil protection through tree planting.
- viii. Assess invasiveness of alien species and resilience of the eco-systems to mitigate biodiversity threats and loss of important and useful native plant species.
- ix. Techniques for reduced feed wastage, and non-conventional animal feeds such as new fodder crops and fish feeds such as maggots.
- x. Soil and water management: water runoff control soil erosion control, water harvesting and storage for irrigation, improvement in soil organic matter content, enhancement of soil structure, and increase in soil biodiversity.
- xi. Improvement of post-harvest management and value addition.
- xii. Breeding for the following climate resilient traits: drought-resistant varieties, heat-resistant
- xiii. varieties, insect and pest resistant varieties, and early maturing varieties.
- xiv. Breeding for high resource use efficiency, i.e. crops that perform well under low soil fertility and low soil moisture regimes.
- xv. Improve understanding of different farming systems in their social, agro-ecological, governance and economic contexts and how farmers experience these conditions, their access to resources and their actions to secure their production against climatic hazards.
- xvi. Put farmers at the centre of research on climate resilience in agriculture, with farmers as the experimenters with climate-resilient technologies and practices.
- xvii. Use existing farmers' organisations, within and beyond the Fadama programme, as the institutional mechanism for putting farmers at the centre of research on climate resilience.
- xviii. Seek avenues to connect researchers with large-scale producers.
- xix. Strengthen extension agents particularly the ADPs through materials and capacity to pass climate smart technologies to farmers and give adequate feedback to researchers.
- xx. Develop effective methods to integrate climate resilience into Agricultural Research Outreach (AROC) villages for easy transfer of research findings to farmers.

#### (b) Agroecology Related Activities

- i. Shift of the sowing/planting date (1 month earlier or later than the traditional calendar) deriving from increased access to improved weather forecasts.
- ii. Conservation/organic agriculture practices, including manure and residues management.
- iii. Use inorganic fertilizers; application should be tied to weather forecasts.
- iv. Enhanced rain water harvesting.
- v. Conservation of feeds in the form of hay making, haylage, crop residue processing and conservation.
- vi. Educate pastoralists on feed conservation.
- vii. Reseeding of all gazzeted grazing reserves.
- viii. Development of stock route and watering points.
- ix. Increase the area of cultivated land under irrigation.
- x. Promote indigenous practices for sustainable water use in agriculture.
- xi. Intensify water resources conservation campaign and practice, to reach out to the farming communities.
- xii. Reduce water used in irrigation by changing the cropping calendar, crop mix, irrigation method, and areas cultivated.
- xiii. Supporting SLM research and dissemination of best practices and techniques.
- xiv. This is to promote the creation of additional knowledge to support SLM interventions.
- xv. Improving and strengthening SLM knowledge management, monitoring and evaluation and information dissemination.
- xvi. Adopt ecosystem approach to adaptation measures and practices.
- xvii. Prevent encroachment on particularly sensitive areas both on Land and in the sea.
- xviii. Implement integrated approaches to land management e.g., sustainable land management (SLM) practices such as agro-forestry and conservation agriculture that can significantly increase yields while delivering better environmental outcomes. These technologies would also enhance farmers' resilience to climate variability and change.





## 6. National Policy on the Environment (2017)

The goal of the National Policy on the Environment is to 'ensure environmental protection and the conservation of natural resources for sustainable development'. Its strategic objectives include:

- securing a quality of environment adequate for good health and well being;
- promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems;
- promoting an understanding of the essential linkages between the environment, social and economic development issues;
- encouraging individual and community participation in environmental improvement initiatives;
- raising public awareness and engendering a national culture of environmental preservation;
   and
- building partnership among all stakeholders, including government at all levels, international institutions and governments, non-governmental agencies and communities on environmental matters.

There is no specific reference to agroecology. There are only a few policy statements that may be used to indirectly reference agroecology.

## RELEVANT POLICY STATEMENTS TO AGROECOLOGY IN VARIOUS THEMATIC ISSUES

#### Climate

- i. Mainstream climate change into all sectors of the national economy.
- ii. Promote evidence-based research in climate change.
- iii. Raise awareness on climate change mitigation and adaptation opportunities among various stakeholders at all levels.

#### Land Resources and Land Use

- i. Apply modern and indigenous soil defence and restoration techniques and sustainable land management practices, including dune fixation, windbreaks, dykes, biological and agroforestry.
- ii. Promote awareness and active participation of communities in land management, particularly rehabilitation of degraded lands, programmes.
- iii. Promote active involvement of communities in the practices of sustainable land management.

#### Livestock and Fishery

- i. Conserve the genetic diversity found in existing domesticated plants and animals and their related wild species;
- ii. Identify and use wild species and genetic diversity to improve livestock productivity and adaptability in the face of environmental change;
- iii. Minimize the adverse impacts of agricultural practices on agro-ecosystems and natural ecosystems;
- iv. Establish policy incentives (e.g. tax breaks, subsidies) so that farmers will retain some areas managed with traditional techniques where necessary to maintain genetic diversity;

#### **Semi-Arid Ecosystems**

- i. Adopt an integrated approach to address, bio-physical and socio-economic aspects of desertification and drought in the semi-arid ecosystem.
- ii. Promote efficient measures for productive and sustainable resource management and establish drought early warning systems in the semi-arid area of the country.
- iii. Promote measures to minimize pastoralists- farmers' conflicts and introduce youth empowerment programmes as a means of tackling insurgency.
- iv. Integrate public awareness and education on management of land and water resources in the semi-arid ecosystem.
- v. Strengthen national and state institutions towards implementing sustainable agricultural practices and effective tackling of land degradation problems.

#### Soil

i. Promote and support eco and organic farming so as to maintain soil fertility.



## 7. The Agriculture Promotion Policy (2016)

The Agricultural Promotion Policy (APP – 2016 – 2020) is a strategy that focuses on solving the core issues at the heart of limited food production in Nigeria. The main policy thrust of the strategy centres on treating agriculture as a business and as key to long-term economic growth and security, while factoring climate change and sustainability of the use of natural resources (land and soil, water and ecosystems) for increased agricultural production and to make agriculture more climate-smart and resilient. The Policy has a section devoted to climate smart agriculture, which directly addresses the relevance of agroecology to climate change mitigation and adaptation.

### **Policy Thrust**

The following are the main policy entry points of the APP that have direct and indirect bearings to agroecology:

- i. Boosting public awareness through advertising of importance of climate smart agriculture.
- ii. Improving the management of land, water, soil and other natural resources.
- iii. Strengthening institutional linkages and partnerships for ensuring climate smart agricultural governance, policies, legislations and financial mechanisms.
- iv. Carrying out environmental impact assessment on major agricultural projects.
- v. Creating broad public and stakeholder awareness on Climate Smart Agriculture.
- vi. Facilitating soil map to improve land use and management practices.
- vii. Increasing the adoption of global best practices on climate change, including the aspects of adaptation, mitigation and carbon credit.

## 8. National Forest Policy (2019)

The main objective of the National Forest Policy is the achievement of sustainable management of forests and forest resources that would ensure sustainable increase in the economic, social and environmental benefits for the present and future generation.

## **Potentially Relevant Policy Thrusts**

- i. Support sustainable **agro-forestry** practices in off-reserved areas to enhance food and nutrition security, climate change resilience, rational use of resources, economic empowerment and poverty reduction.
- ii. Encourage a wider adoption of agro-forestry at field level in the management of forest areas, especially in buffer zones and enclave communities, and in farming system

## 9. National Biodiversity Strategy and Action Plan (NBSAP – 2016)

The purpose of NBSAP is to foster a Nigeria with healthy living environment where people live in harmony with nature and sustain the gains and benefits of biodiversity, integrating biodiversity into National programme aimed at reducing poverty and developing a secure future in line with the principle of ecological sustainability and social equity.





### **Potentially Relevant Action**

# Sectoral Actions: Mainstreaming Biodiversity into National Development, Poverty Reduction and Climate Change Plans:

- Integrate biodiversity issues into national development policies relevant to poverty reduction and climate change mitigation and adaptation in the forestry, food and agriculture, commerce and industry, environment, health, and education sectors of the economy;
- ii. Review policies, plans and budgets in the key sectors of the economy that need to
- iii. change to support improved biodiversity management;
- iv. Create awareness to policy and decision makers on the economic implications of
- v. improved biodiversity management;
- vi. Influence Lawmakers to make/review laws relevant to biodiversity management for
- vii. sustainable economic development;
- viii. Enhance the understanding of key personnel of sectoral stakeholders with capacity to influence budgets to support projects that would improve biodiversity management and create climate resilient ecosystems to reduce poverty and climate change impacts;
- ix. Influence the creation of a network of stakeholders to enhance integrated biodiversity management through participatory planning, knowledge sharing and capacity building across all levels of government;
- x. Establishment of an Inter-Agency Committee to develop sustainable financing mechanism to generate revenues for biodiversity programmes;
- xi. Integration of biodiversity education into national curricula at all levels so that at least 30% of Nigeria's population is aware of the importance of biodiversity to the ecology and economy of the country.

### 10. Vision 2020

Fundamental to Nigeria's Vision 20:2020 (Economic Transformation Blueprint) are two broad objectives – optimizing human and natural resources to achieve rapid economic growth, and translating that growth into equitable social development for all citizens. These aspirations are defined across four dimensions:

**Social Dimension:** A peaceful, equitable, harmonious and just society where every citizen has a strong sense of national identity and citizens are supported by an educational and healthcare system that caters for all, and sustains a life expectancy of not less than 70 years

**Economic Dimension:** A globally competitive economy that is resilient and diversified with a globally competitive manufacturing sector, that is tightly integrated and contributes no less than 25% to Gross Domestic Product

**Institutional Dimension:** A stable and functional democracy where the rights of the citizens to determine their leaders are guaranteed, and adequate infrastructure exists to support a market-friendly and globally competitive business environment

**Environmental Dimension:** A level of environmental consciousness that enables and supports sustainable management of the nation's God-given natural endowments to ensure their preservation for the benefit of present and future generations.



#### **Policy Thrust**

The agricultural sector of the Vision that was intended to be transformed into a profitable and sustainable sector that will be characterised by modern agricultural techniques and practices which will be greatly enhanced by technology, is the most relevant to agroecology.

#### **Relevant Actions:**

- i. Increase the yield/ productivity of agricultural produce and export of processed agricultural products;
- ii. Renew emphasis on the production of raw materials for agro-allied and agro-based manufacturing/ processing companies;
- iii. Attract investments for large scale and mechanised production and processing of agricultural produce in which Nigeria has a comparative advantage;
- iv. Give priority to agricultural produce that serve as inputs to processing plants (e.g. citrus fruits, pineapple);
- v. Achieve a three-fold increase in agricultural productivity and a six-fold increase in the size of the nation's irrigated land;
- vi. Intensify agricultural research using modern sciences of biotechnology and nanotechnology as well as increasing the number of specie-mandated livestock research institutes to produce high yielding, disease resistant seedlings and species of livestock and fishery;
- vii. Develop and adopt machineries and technologies appropriate for small, medium and large-scale farms;
- viii. Enhance agricultural extension delivery system to facilitate the enlightenment of farmers and to achieve mass acceptance and adoption of modern technology in farming, along with the adoption of improved research findings by increasing the number of extension officers and adequately building their capacity;
- ix. Drastically reduce post harvest losses by encouraging and attracting investments in basic storage facilities and primary processing of farm produce;
- x. Achieve an appreciable development of the nation's agricultural sector, by adequately producing the needed inputs for agro-allied and agro-based industries to transform the nation's agriculture industry into a key driver of economic growth;
- xi. Rehabilitate and complete existing irrigation projects, establish new ones across the nation and provide incentives for the development of new community-based and privately initiated irrigation projects;
- xii. Significantly enhance the level of production, adoption and utilisation of appropriate technology and mechanisation for small, medium and large-scale farms;
- xiii. Utilise home-grown technology, promote greater use of biotechnology tools in selection and breeding of crops, livestock, fisheries and forestry;
- xiv. Promote the use of 'green' technology to ensure sustainable agricultural production; a safe and clean environment and adopting the use of natural rivers and/or stream flow; solar and wind to generate electricity to power agricultural equipment such as irrigation pumps;
- xv. Create a new generation of farmers, by incorporating modern technology, especially ICT (e.g. farmer information call service), incentives (scholarships, grants, soft loans), and professionalising agriculture to attract youths and new graduates into agricultural production, processing and marketing in order to sustain agricultural growth through the entire agriculture value chain.





### 11. Economic Review and Growth Plan (2017-2020)

The ERGP is a blueprint for recovery in the short term and a strategy for sustained growth and development in the long term. Its main objective is to restore economic growth while leveraging the ingenuity and resilience of the Nigerian people. It intended to boost growth in the agriculture sector by expanding crop production and the fisheries, livestock and forestry sub-sectors as well as developing the value chain, using irrigable land and river basin infrastructure effectively to enable year-round climate-resilient agricultural production.

### **Relevant Policy Thrust**

- i. Setting up a one-stop shop for small farmers and commercial farms (one per Local Government) to encourage the use of high-yield and disease-resistant seedlings;
- ii. De-risking agricultural lending by expanding the scope of the NIRSAL through sufficient and timely funding, and enhancing the regulatory function of the Nigerian Agricultural Insurance Corporation (NAIC);
- iii. Opening up a minimum of 100,000 hectares of irrigable land through the 12 River Basin Development Authorities by 2020 to enable year-round agricultural production;
- iv. Expanding the use of dams for commercial farming and aquaculture.



