The threat of climate change to Nigeria’s economy and food systems is compounding Nigeria’s fragility risks. Deteriorating crop yields and poor agricultural capacity continue to fuel a growing dependency on food imports. With its estimated population of 180 million projected to balloon to 400 million by 2050, Nigeria’s food security challenge requires urgent attention in order to avert a major food crisis.
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NIGERIA’S CLIMATE CHALLENGE

Extreme weather patterns – fiercer, longer dry seasons and shorter, more intense rainy seasons – are exacerbating challenges confronting communities. The nature of these impacts vary from place to place but the net effect is the depletion of environmental and food resources in every part of the country.

They have nothing to do. The fisherman cannot fish anymore. The farmers cannot farm anymore.

Dr. Micheal Egbebike, Ameritek Engineering
Rapid desert encroachment is contributing to escalating conflict between farmers and herders resulting in food insecurity.

The shrinking of Lake Chad over the past 40 years has led to poverty and displacement of farm and fishing communities factors which experts believe contributed to the rise of Boko Haram.

The Sahel region is a major producer of livestock, cereals and crops rich in plant protein.
High intensity rainfall has resulted in floods causing DEATH and DESTRUCTION.

In Southeast Nigeria, heavy downpours have accelerated erosion, destroying land and fertility of soil, forcing members of affected communities to RELOCATE.

Along the coast, communities are being displaced as a result of rising sea levels.

The Niger Delta loses 0.6 sq km yearly to coastal erosion.

Coastal fresh water fish are threatened by salinization.

You go to Brass, you go to Odioma, Kulama, you see the same thing. Ocean encroachment. Eating up the land. And they told me that about 7 poles of electric lines have just gone into the ocean.

Morris Alagoa
Environment Rights Action
FOOD SECURITY IN NIGERIA’S CHANGING CLIMATE

CLIMATE PROJECTIONS

Precipitation - 2050

- 41% higher intensity rainfall
- 20% stable rainfall
- 25% uncertain
- 14% less rainfall

Average Surface Temperature

- Northern Nigeria will be most affected
  - Expected to be 2 degrees higher in 2050

Sea Level Rise - 2100

- 3.2 million could be displaced
- 1.4 metres could be displaced
- 18,000 sq km could be flooded
NIGERIA’S VULNERABILITY TO CLIMATE CHANGE

Out of 181 countries surveyed, Nigeria is considered 58th most vulnerable and the 22nd least ready country to adapt. Vulnerabilities include exposure, sensitivity and adaptive capacity. An estimated 25% of Nigerians live in the coastal region - a hub for economic activity and source of 90% of foreign income.

The ocean levels are going to rise substantially for Nigeria. A good portion of Lagos is going underwater.

Peter Jenkins Co-Founder, Pandrillus Foundation
Nigeria is the most populous country in Africa and seventh most populous in the world.

Projected Population Growth

<table>
<thead>
<tr>
<th>Country</th>
<th>Population (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1.409B</td>
</tr>
<tr>
<td>India</td>
<td>1.339B</td>
</tr>
<tr>
<td>USA</td>
<td>324.5M</td>
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<tr>
<td>Indonesia</td>
<td>264M</td>
</tr>
<tr>
<td>Brazil</td>
<td>209.3M</td>
</tr>
<tr>
<td>Pakistan</td>
<td>197.2M</td>
</tr>
<tr>
<td>Nigeria</td>
<td>191M</td>
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</table>

EXPOSURE

Projected Flood Hazard

Coastal Nigeria, Niger, Benue, Gongola and Sokoto floodplains and flat low-lying areas near Lake Chad are most vulnerable, especially during periods of heavy rainfall.

5.38 children born per woman

By the year 2050, we will be well over 400 million. It is mind boggling. H.E. Olusegun Obasanjo, GCFR
Nigeria will be particularly sensitive to climate impacts due to the following factors:

**Food Import Dependency**

- **19.2%** of cereals consumed in Nigeria are imported (FAO)

**Agriculture Capacity**

- A drastic drop in oil incomes since 2014 and near 50% devaluation of the naira highlighted the risk of dependence on imports.
- Less than 1% of arable land equipped with irrigation
- 6.7 tractors/agricultural machinery per 100sq km of arable land

Food accounts for 17% of the value of all merchandise imports (World Bank)
9 dependents for every 10 adults of working age in Nigeria

Age Dependency Ratio

1. NIGER 111.78
2. MALI 101.46
3. UGANDA 100.63
4. CHAD 99.43
5. DEM. REP. CONGO 97.05
6. ANGOLA 97.27
7. SOMALIA 97.05
8. TANZANIA 93.02
9. MOZAMBIQUE 92.92
10. THE GAMBIA 91.80
11. BURKINA FASO 91.56
12. ZAMBIA 90.78
13. BURUNDI 90.12
14. MALAWI 89.65
15. TIMOR-LESTE 89.61
16. CENTRAL AFRICAN REPUBLIC 89.25
17. NIGERIA 88.9

18.8% Unemployment (2017)

Nigeria has the 17th highest age dependency ratio in the world (2016)
Trade and Transport Infrastructure

Only 15% paved roads

Rated 2.45/5 (average) by the World Bank Development Index

Medical Staff

0.38 physicians/1,000 population

Expenditure on healthcare

3.7% of GDP
Farmers can’t store food because there is no electricity or storage systems. Nnimmo Bassey, HOMEF

Dam Capacity

Nigeria ranked 64/116 countries in the world

278m$^3$ per capita

Electricity Access

61% of rural households not connected to the grid

54% (13 hours per day)

International Environmental Conventions

Paris Agreement signed but not domesticated in national and subnational legislation
FOOD SECURITY IN NIGERIA

Despite significant natural resources and a per capita GDP of over $2,000, economic inequality remains a challenge for Nigeria. 61% live on less than a dollar a day and 69% live below the relative poverty line. The highest proportion of poor people live in the Northeast, Northwest and rural parts of the country.

At current growth rates, feeding that population is our next big challenge.

Ken Saro Wiwa, Jnr., Nowhere to Run
According to the Economist’s Global Security Food Index (GSFI) which measures risks to food security in countries, regions and around the world, Nigeria is ranked 92 out of 113 countries.

Nigerians living below poverty line

69%
Most of the rural population farms on a subsistence scale, using small plots and depending on seasonal rainfall. A lack of infrastructure further exacerbates poverty in rural areas by isolating farmers from needed inputs and profitable markets.

Of an estimated 71 million hectares of cultivable land, only 5% is permanent cropland; only 7% is irrigated.

Key Sources Of Protein In the Nigerian Diet

Cereals
- Wheat
- Sorghum
- Maize
- Millet

Legumes
- Cowpeas
- Beef
- Milk
- Fish
Protein Intake

Nigeria is barely meeting the minimum recommended protein intake for the average person, with little room to absorb shocks in supply.

- Significant risk of under-nourishment
- Current daily protein intake 57g/capita
- Recommended daily minimum 56g/capita

Energy supply derived from cereals, roots & tubers

54% Nigerian Average
59% Global Average

Average Value of Food Production

Our food production sector is relatively small and currently shrinking

Nigeria

United States

QUALITY AND DIVERSITY OF DIET

Protein is the least affordable and scarcest macro-nutrient. Decreasing protein intake means that good quality food is becoming less available on the average Nigerian plate, driven by reduced plant protein from 58 g/day to 47g/day.

Recommended daily minimum 56g/capita

57g/capita

Nigeria

United States

$204

$673

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Access to food in Nigeria is severely hampered by poor infrastructure. Food production centers are disconnected from markets. Facilities for bulk transport of food products are limited. As a result, food produce rots on the farm or during transportation.

Perishable foods take three to four days to get to the market.
Amara Nwankpa, Shehu Musa Yar’Adua Foundation

- Road density: 21km/100sq km
- Rail network lethargic and limited - 3,505 km
- Avg annual freight: 77million metric tons per km
Food Inflation rose to 19% in 2018 from 10% in 2013

Households affected by the shock of increase in food prices nearly doubled from 6.3% in 2013 to 12.4% in 2016

Economic Access

High inequality in access to sufficient food means that an estimated 8% of the population are undernourished.

Undernourishment

9.2 million (2006)

14.3 million (2016)

Number of undernourished Nigerians increased by 5.1 million in 10 years

9% eat one meal per day

27% eat 2 meals per day

19.6% Households Nationwide
Southeast highest with 34.3%

NOI Polls (2017)
FOOD SECURITY AND GENDER EQUALITY

Women play a significant role in agriculture, but they are not afforded the same access to opportunities as their male counterparts.

It is unfortunate that women contribute so much to agriculture but don’t necessarily get to decide what happens to the money.

Mira Mehta, Tomato Jos
Globally
Approximately 70% of agricultural workers, 80% of food producers, and 10% of those who process basic foodstuffs are women. They are also responsible for 60 to 90% of rural marketing.

Nigeria
Women constitute up to 60% of the farming population and are responsible for most of the actual farm work.

We can’t go far unless we have empowerment of women in the agriculture sector.
Dr. Akinwumi Adesina, AFDB
MEETING DIETARY ENERGY REQUIREMENTS

Nigeria is the continent’s leading consumer of rice, one of the largest producers of rice in Africa and simultaneously one of the largest rice importers in the world.
RICE

Rice is the staple food for half the world’s population – more than 3.5 billion people depend on rice for at least 20% of their daily calories.

Species Grown in Nigeria

- **Ofada Rice**
  - Generic name to describe rice produced and processed in Southwest Nigeria.
  - Popular due to its unique taste and aroma.
  - Short grain, robust rice with brown stripes.
  - First introduced in Ogun State.

- **Abakaliki Rice**
  - Generic name to describe rice produced and processed in Ebonyi State.
  - Long grain, translucent rice.
  - Popular due to its nutritional content and similarity in quality to foreign rice.

- **Faro 44**
  - One of the most distributed rice varieties in the Nigerian rice sector.
  - Grown by over 6 million farmers.
  - Grains come in different sizes ranging between 3mm and 5.5mm.

**Why is Rice Important?**

- Generates more income for Nigerian farmers than any other cash crop in the country.
- Grows quickly with few inputs compared to maize.
- Rice straws are used for livestock feed, decreasing methane emissions from ruminants. They are also used as fuel, thatch and industrial starch.
- An important staple food and a major source of carbohydrates.
Rice Value Chain Challenges and Climate Vulnerability

1. Input

- Poor quality seeds
- Less than 10% of suitable area is under cultivation

2. Production

- Lack of irrigation infrastructure
- Low utilization of fertilizer and pesticides
- Climate Threat: Increased frequency of pests and crop diseases
- Low level of mechanization

3. Value Chain

1. Input
2. Production
3. Processing
4. Marketing
5. Consumption

4. Marketing

- High transportation costs
- Lack of transportation infrastructure
- Product losses due to rotting in transit

5. Consumption

- 7.9 million MT consumed annually (40kg per capita)
A lot of seeds in Nigeria are not able to produce at optimal capacity.

P. J. Okocha, P. S. Nutraceuticals Int’l Ltd.

**VALUE CHAIN INTERVENTION**

Rukubi Rice Outgrowers Scheme, Nasarawa State
OLAM Nigeria supported by Federal Government, CBN, IFAD and USAID.

- 4,017 outgrowers producing 11,250 of paddy rice
- Average profit per farmer Previous: $70 to $100/ Ha
  Now: $300 to $500/ Ha
- Seeds developed with West African Rice Development Association
- Integrated mill producing 36,000 MT milled rice per annum

Wholesale costs twice that of Thailand

Storage risks high

Almost entirely parboiled rice

Low agricultural productivity

Takes 5-10 years to develop a rice farm of meaningful scale

Most rice mills are non-operational or under-utilized

Milling cost in Nigeria is 2.5 times that of Thailand

Significant crop and income losses

Poor power supply

High cost of energy

Wholesale costs twice that of Thailand

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CASSAVA

Cassava is an important economic sustenance crop for Nigeria. It grows throughout the year, making it preferable to seasonal crops such as yam, beans or peas. Cassava roots are processed into a wide variety of granules, pastes and flours or consumed freshly boiled or raw.

Displays an exceptional ability to adapt to climate change with tolerance to low soil fertility, resistance to drought, pests and diseases.

Poses minimal storage challenges as roots can remain underground for long periods, even after they mature.
Why is Cassava Important?

- An important source of income for smallholder farmers.
- Sustains 600 million people across the world.
- High in calories and essential vitamins such as foliates and thiamine.
- Used as food, feed and fuel.
- Responds well to fertilizer application.
- Grows year-round even on marginal land.
- Requires little water to grow.
- Climate resilient crop that thrives in poor soil.

Species Grown in Nigeria

Collaborative effort between the International Institute of Tropical Agriculture (IITA) and the Nigerian Root Crops Research Institute (NRCRI)

- Potential yield of 49 - 53 Metric Tons per Hectare
- Resistant to major pests and diseases including mosaic disease, bacterial blight, anthracnose, mealybug, and green mite
- High quality cassava flour
- Drought resistant

UMUCASS 42 and UMUCASS 43

- Most commonly grown variety in Southwestern Nigeria
- Reddish petiole, cream coloured stem, clear white flesh
- Maximum yield: 14 Metric Tons per Hectre
- Limited resistance to Cassava Bacterial Blight

Odongbo
Cassava Value Chain Challenges and Climate Vulnerability

1. Input
- 90% consumed locally
- Limited use of fertilizers
- Planted mostly on farms less than one hectare
- Little or no mechanization

2. Production
- Yield – 9.1 MT/ha
- Global yield – 11.8 MT/ha
- Limited economies of scale – growers dispersed, and harvests are typically small (12-15MT average)
- Soil erosion destroying land in key cultivation areas

4. Marketing
- Imbalance between supply and demand
- Fuel and industrial demands competing with food demand

5. Consumption
- Climate change presents higher risk of damage to transportation routes

Value Chain Intervention
- Cassava Bread Fund
- Bank of Industry
- Intervention for processors and bakers to prevent post harvest losses.
- Substitutes up to 20% of wheat flour with cassava flour.
Increased incidence of pests
Poor power supply
High cost of energy
Low level of mechanization
Limited knowledge of high yield varieties
Limited use of fertilizers
Soil erosion destroying land in key cultivation areas
Planted mostly on farms less than one hectare
Little or no mechanization
Increased risk of crop loss to flooding
Yield – 9.1 MT/ha
Global yield – 11.8 MT/ha
Limited economies of scale – growers dispersed, and harvests are typically small (12-15MT average)

1. Input
2. Production
3. Processing
4. Marketing
5. Consumption

Climate change presents higher risk of damage to transportation routes
Changing diet preferences resulting in decline in consumption of roots and tubers

VALUE CHAIN INTERVENTION
Cassava Bread Fund
Bank of Industry
- Intervention for processors and bakers to prevent post harvest losses.
- Substitutes up to 20% of wheat flour with cassava flour.
PLANT PROTEIN SUPPLY

In Nigeria, demand for wheat products is projected to grow at an annual rate of 10% - requiring accelerated local production. For decades, gaps in production have been countered by imports.
Wheat is the most common cereal available across the world and is in higher demand in recent years due to its nutritional benefits.

**Why is Wheat Important?**

- Most widely grown cereal crop and a staple food for more than 35% of the human population.
- Second most important food crop after rice.
- Leading source of plant protein. Contains more protein and calories than maize or rice.
- Nutritious and easy to store. Can be processed into a variety of foods.

**Protein content can be as high as 15%**

**Species Grown in Nigeria**

- **NORMAN BORLAUG AND REYNA-28**
  - Improved wheat varieties launched in 2014
  - Developed by Lake Chad Research Institute (LCRI)
  - Both have potential yields of 5-6 metric tons per hectare
  - Both are heat-tolerant and drought-resistant varieties

- **ATILLA GAN ATILLA**
  - Launched in Nigeria in 2008
  - Has potential yield of 3.5-4 tons per hectare
Wheat Value Chain Challenges and Climate Vulnerability

1. Input

- 600,000 hectares of land suitable for cultivation in Nigeria. Only 10% under cultivation.
- 1% of Nigerian farmland is irrigated.
- Changing rainfall patterns
- Lack of irrigation
- Inadequate Infrastructure

2. Production

- Climate Threats
  - Rain dependent
  - Reduction in viable area for cultivating floating wheat
- Nigeria produces 60,000 metric tons of wheat per year (1.4% of consumption).
- Average yield 1 MT per hectare.
- 148,000 registered wheat farmers in Nigeria.
- Low agricultural productivity and crop diseases
- Frequency of pests increased
- Low level of mechanization
- High cost of energy
- Poor power supply

3. Processing

- Wheat milling capacity utilization is 50%.
- Average capacity 3.5 million MT is estimated at 8.

4. Marketing

- Most infrastructure located near ports vulnerable to sea level rise and flooding.
- Insufficient silo capacity - can only hold 30% of annual demand.
- Wheat distributors import an estimated 4.2 million MT per annum ($3bn).
- 13th largest importer of wheat in the world.
- A good proportion of wheat is consumed in Nigeria as bread.
- Lack of robust transportation infrastructure.
- 15% tariff on wheat grain, 65% tariff on wheat flour.
- Most bakeries use wood-fired ovens.
- Rapid growth in per capita consumption - 50% between 2000 to 2014.
3. Processing

Decline of 17% since 2013 and 55% since 1997

Climate Threats
- Increased frequency of pests and crop diseases
- Low agricultural productivity

- Poor power supply
- High cost of energy
- Low level of mechanization

Wheat milling capacity is estimated at 8 million MT

Average capacity utilization is 50%

- Poor milling capacity utilization resulting in higher costs
- Millers only have one month storage capacity

- Insufficient silo capacity - can only hold 30% of annual demand

5. Consumption

- Wheat consumption in Nigeria is 4.3 million metric tons
- Nigeria is the 2nd largest consumer in Africa

Climate pressure on global wheat supply could result in:
- Increased cost of wheat imports
- Increased import dependence
- Higher food prices

Rapid growth in per capita consumption - 50% between 2000 to 2014

VALUE CHAIN INTERVENTION

CBN Anchor Borrowers Programme
N200bn loan scheme for smallholder farmers engaged in the production of wheat among other commodities to:

- Improve access to capital and reduce level of poverty among smallholder farmers
- Increase capacity utilization of processing plants
- Transition smallholder farmers from subsistence to commercial production levels
- Reduce food imports
Traditional farming has been overwhelmed by changing weather patterns, out of date methods and a significant increase in the demand for food.

Farmers are not sure when the rainy season starts and when it ends. This affects the planting and harvesting cycles.

Nnimmo Bassey, Health of Mother Earth Foundation
Cowpeas (Beans)

Cowpeas are an indigenous legume grown extensively throughout sub-Saharan Africa. Nutritious and inexpensive, cowpeas serve as a source of protein for both rural and urban consumers in Nigeria.

Why are Cowpeas Important?

- Major income earner for smallholder farmers.
- Rich source of essential nutrients. 25% protein and 64% carbohydrates.
- Protects and insulates the soil from erosion, evaporation and weeds.
- Leaves and seeds improve livestock feed conversion ratio and decreases methane emissions from ruminants.
- Contributes to soil fertility by restoring nitrogen. Improves inter-cropping and reduces greenhouse gas emissions and need for synthetic nitrogen fertilizers.
- High protein content makes it a good alternative to meat.

Species Grown in Nigeria

- Developed by scientists from the International Institute of Tropical Agriculture (IITA), Ibadan, in collaboration with IAR, University of Maiduguri, and Agricultural Development Programmes of Borno, Kaduna, Kano, and Katsina States.

  (Sampea 11) 80% yield advantage over local varieties and combined resistance to septoria leaf spot, scab and bacterial blight, as well as nematodes, and tolerance to Nigeria’s strain of Striga.

  (Sampea 12) Dual-purpose cowpea variety. Medium-to-large brown seeds with a rough seed coat, preferred characteristics for commercial production in Northeast Nigeria.

- Developed by the Institute for Agricultural Research, Ahmadu Bello University, Zaria.

  Heat and drought resistant. Sampea 8 matures in 55 days while Sampea 10 is Striga resistant and matures within 60 to 65 days.
Cowpea Value Chain Challenges and Climate Vulnerability

1. Input

- Conflict has reduced annual production by 40% between 2012 and 2016
- Limited access to drought resistant varieties
- Frequent misapplication and abuse of pesticides

2. Production

- Nigeria’s production is mostly manual and dependent on smallholder farmers and SMEs
- Irrigation infrastructure required to make cultivable land area suitably productive

3. Processing

- Poor power supply
- High cost of energy
- Limited access to advanced processing machinery
- Manual processing (thrashing) destroys seeds

4. Marketing

- Limited availability of bulk storage facilities
- High storage risk due to pest and environmental factors - Estimated 80% of production is lost to pests (weavils) during storage
- Poor transportation infrastructure

5. Consumption

- Climate Threat
- Increased damage to transport infrastructure

- 23kg
  - Annual per capita consumption

Reduction in protein consumption is driven primarily by dwindling supply of plant protein.

- International Institute of Tropical Agriculture (IITA) in collaboration with Agricultural Development Projects
- Introduction of high yield seed varieties (IT89KD-288 (now SAMPEA-11) and IT89KD-391 (now SAMPEA-12)
- SAMPEA-11 – Dual-purpose cowpea variety with large white seeds and a rough seed coat
- SAMPEA-12 – Dual-purpose cowpea with medium-to-large brown seeds and a rough seed coat
- Distribution: Nationwide (Initial test locations include Borno, Kaduna, Kano, Kastina)
- Highly acceptable to consumers
- Increased yield of at least 80% over local varieties
- Seeds are more resistant to pests and tolerant to parasitic weeds

Increased risk of pesticide poisoning.

Con/f_lict has reduced annual production by 40% between 2012 and 2016.

Increased damage to transport infrastructure.

Traditional methods include individual household, medium scale and industrial processing.

Limited and expensive storage facilities.

Climate Threat
- Increased frequency of pest infestation
3. Processing

- Dependence on weather for drying
- Traditional methods include individual household, medium scale and industrial processing
- Limited and expensive storage facilities
- Poor power supply
- High cost of energy
- Climate Threat: Increased frequency of pest infestation

VALUE CHAIN INTERVENTION

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- Misapplication and abuse of pesticides increases health risk during consumption
- Reduction in protein consumption is driven primarily by dwindling supply of plant protein
- Increased risk of pesticide poisoning

CONFLICT has reduced annual production by 40% between 2012 and 2016

Increased damage to transport infrastructure

Climate Threat

- Limited access to advanced processing machinery
- Manual processing (thrashing) destroys seeds

INCREASED RISK OF PESTICIDE POISONING

Limited access to drought resistant varieties

Limited availability of bulk storage facilities

High storage risk due to pest and environmental factors - Estimated 80% of production is lost to pests (weavils) during storage

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Annual per capita consumption: 23kg

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SOURCES OF ANIMAL PROTEIN

Fish is the primary source of protein for 22.5 million people in the Niger Delta.
A large number of families earn their living from fishing, fish farming, fish processing and marketing.

Why is Fish Important?

- **High in nutrients such as protein, iodine and omega-3 fatty acids essential for body growth and brain function. Also an important source of vitamin D.**
- **Lowers risk of heart disease, strokes, protects vision in old age and reduces asthma in children.**
- **Most traded food commodity in the world.**
- **Can be used as a fertiliser and soil conditioner.**
- **Nigeria is the largest market for fish meal in Africa.**

Species in Nigeria

- **Carp**
  - Costs less to rear compared to other fish.
  - Spawns naturally in fishponds.
  - Highly resistant to disease and tolerant to diverse temperature conditions.
- **Tilapia**
  - Cultivation originated in Northern Nigeria in 1959.
  - Production can average 3,000kg per hectare.
  - Grows at a rate of 0.5kg per month in warm waters.
- **Catfish**
  - Freshwater species originated in Africa.
  - Long and thick body.
  - Easily cultivated in small ponds or reservoirs.
  - Suitable for reproduction within one year.

**Nigeria requires over 2.6m metric tons of catfish. Current production capacity is 40%. So the market is there.**

Idowu Ayodeji, IITA Youth Agripreneurs
Fish Value Chain Challenges and Climate Vulnerability

1. Input

- Total production ~1 million MT per annum
- Fisheries sector accounts for 2% of GDP
- 67% of production is artisanal
- Aquaculture contributes 30% of production

2. Production

- Asian trawlers illegally fish in West African waters
- Estimated loss of $1.6bn annually
- Fishermen experiencing reduced volume of catches
- Oil spills destroy mangrove swamps which are spawning grounds for fishes
- Aquaculture is capital intensive

3. Processing

- Fish farming is not profitable for most farmers
- Aquaculture is capital intensive

4. Marketing

- Poor bulk transportation
- Most wholesalers prefer smoked or dried fish
- Spoiled fish sometimes smoked to mask rot
- Lack of adequate cold storage infrastructure

5. Consumption

- 3.2 million MT of fish consumed annually
- An estimated 66% of annual consumption is imported
- Per capita consumption 10kg per annum (global average 21kg)
Lack of access to storage facilities
Seasonal scarcity due to dependence on supply from fishermen affects pricing
Lack of adequate cold storage infrastructure
Poor bulk transportation
Fishermen experiencing reduced volume of catches
Fish farming is not profitable for most farmers
Aquaculture is capital intensive
Poor power supply
High cost of energy
Wholesale smoking of fish contributes to deforestation
Increased damage to transport infrastructure results in delayed deliveries and loss of perishable fish products
Total production ~1 million MT per annum
Fisheries sector accounts for 2% of GDP
67% of production is artisanal
Aquaculture contributes 30% of production
Oil spills destroy mangrove swamps which are spawning grounds for fishes
Asian trawlers illegally fish in West African waters
Estimated loss of $1.6bn annually
Flooding of fish farms in low lying areas leading to loss of produce
Drying up of rivers and lakes leading to loss of catch
Rise in temperature affects pond water pH value and resulting aquaculture productivity

Rising domestic demand as a result of:
Rapid population growth
Increasing per capita fish consumption

VALUE CHAIN INTERVENTION

Cross River State Gov’t
- Growth Enhancement Support for fisheries
- Provision of fingerlings and fertilizers to farmers

European Union
- €50m fund for sustainable fisheries development and marine security for West Africa

Bayelsa State Government
- Provision of equipment for 4,000 fishermen
BEEF & DAIRY

Beef and milk are important sources of animal protein in the Nigerian diet. Decreasing water and pasture for livestock and outdated methods of animal husbandry have resulted in growing domestic supply challenges.

The grasslands of Nigeria can barely support 40% of Nigerian livestock. Expanding cultivation, climate change and degradation of range lands have depleted the grassland resources that Nigeria used to have.

Saleh Momale, Pastoral Resolve
95% of the cattle population is raised by pastoralists who move herds over thousands of miles to find pasture. This system often results in weight loss, low yields and high morbidity rates.

### Why is Beef Important?

**One of the best sources of protein, iron, zinc, and vitamins A, B and D.**

**Cow dung can be used as fertiliser, soil conditioner and an alternative for fossil fuels.**

**Major driver of economic growth and source of income for farmers and butchers.**

**Lagos State is the largest consumer of Nigerian beef.**

#### Supply growth rate per annum

1.8%

#### Demand growth rate per annum

5.1%

### Species in Nigeria

- **White Fulani**
  - Most widespread, representing 37% of the national herd.
  - Provides much of the beef consumed in Nigeria.
  - White coat and height of approximately 130 cm.
  - Tolerant to heat and adaptable to local conditions.
  - Triple purpose - fattened for beef, used as draught animal or for milk production.

- **Sokoto Gudali**
  - Represents 32% of the national herd.
  - Light grey coat colour.
  - Produces an average of 1,500 kg of milk per lactation cycle.

- **Red Bororo**
  - Represents 22% of the national herd.
  - Burgundy coloured coat with long, thick horns.
  - Adapts well to arid and semi-arid conditions.

- **N'Dama**
  - Medium-sized compact body with lyre-shaped black-tipped horns and no hump.
  - Adapts well to high temperature and humidity conditions.

- **Muturu**
  - Dwarf West African Shorthorn, commonly called Muturu in Nigeria.
  - Generally black, or black and white.
  - Compact body with a straight back, broad head and no hump.
Beef Value Chain Challenges and Climate Vulnerability

1. Input

- 95% of cattle raised by pastoralists
- Over 450 gazetted grazing routes and reserves

- Pastoralist grazing results in weight loss, low yields and high morbidity rates
- Limited access to veterinary services

2. Production

- Estimated 19.7 million cattle in Nigeria
- Estimated annual beef production 381,000 tons
- Domestic supply growth 1.8% per annum

- Average slaughter weight – 250 kg (US, Brazil and Australia – 450 kg)

3. Processing

- Population and urbanization pressures driving uncontrolled expansion of farming into cattle grazing routes

4. Marketing

- An estimated 50,000 meat wholesale and retail businesses in Nigeria
- Average turnover $160k/annum
- Dairy market - $1.7b estimated total revenue per year
  Annual growth rate of 7.2%

5. Consumption

- Limited facilities to transport livestock or fresh meat to local markets

- 360,000 tonnes of beef consumed annually. Per capita consumption estimated at 8kg per year (global average 42kg)

- 1.3 billion litres of milk consumed annually. Per capita consumption estimated at 7 litres per annum (global average 30 litres)
3. Processing

- 7.5 million cattle slaughtered annually
- Only 4 standard abattoirs
- Most dairy processors reconstitute imported milk powder to produce liquid milk
- Lack of cold storage infrastructure
- Lack of meat and dairy processing infrastructure
- Limited facilities to transport livestock or fresh meat to local markets

Local breeds can produce 1 litre per day. An average Holstein Friesian cow produces 50 litres per day.

Nnali Shekari, Integrated Dairies Ltd.

Milk production estimated at 600 million litres per annum

VALUE CHAIN INTERVENTION

Adamawa State Government
Allocation of 72 grazing reserves to cater for 1.5 million cattle in 2016

Rico Gado Feeds
- Feed mill in Yola and Abuja
- Locally sourced quality fodder
- Capacity to produce 50,000 metric tonnes of assorted animal feeds annually
AN ESSENTIAL VEGETABLE CROP

Ask any Nigerian who makes the best jollof rice, and you have a long animated discussion that usually ends with Nigeria or Nigerian mothers crowned as champion. But ask what may happen when there’s no rice or tomato to make jollof, and you may be met with silence.

The tomato factory needs to buy tomatoes at $80-100 per ton. Nigerians can’t produce at that cost. The average yield per hectare is 5-7 tons while the global average yield is 35 tons per hectare.

Mira Mehta, Tomato Jos
Tomatoes are one of the most important vegetable crops grown in Nigeria. A condiment in most dishes, they are also an inexpensive source of vitamins.

### Why are Tomatoes Important?

- **An antioxidant and healthy source of vitamins A, B and C.**
- **Helps reduce blood pressure and protects against indigestion, kidney disease, diabetes and many forms of cancer.**
- **Contributes to a healthy, well-balanced diet rich in minerals, essential amino acids, sugars, dietary fibres, iron and phosphorus.**
- **Grows quickly and is easy to cultivate in a variety of soil types.**
- **Nigeria is the 14th largest producer in the world. 60% of farmers are small-scale.**

### Species Grown in Nigeria

<table>
<thead>
<tr>
<th>Species</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roma VF</td>
<td>Oval shape with good shelf life. 126 days to mature - can be grown year round.</td>
</tr>
<tr>
<td></td>
<td>Not susceptible to cracking.</td>
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<tr>
<td></td>
<td>Common in Northern Nigeria. Potential yield of 30-35 tonnes per hectare with</td>
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<tr>
<td></td>
<td>seed rate of 0.04-0.6kg.</td>
</tr>
<tr>
<td>UC82B</td>
<td>Good shelf life. 125 days to mature - can be grown year round.</td>
</tr>
<tr>
<td></td>
<td>High yield of 30-35 tonnes per hectare with seed rate of 0.4-0.6kg/hectare.</td>
</tr>
<tr>
<td>Beske</td>
<td>Popular local variety cultivated in Okene, Kogi State. Oval shape with folded-in</td>
</tr>
<tr>
<td></td>
<td>base. Yield of 5-7 tonnes per hectare.</td>
</tr>
<tr>
<td>Hausa Grade 1</td>
<td>Predominantly cultivated in Kano State. Oblong shape with pointed tip. Yield</td>
</tr>
<tr>
<td></td>
<td>of 5-7 tonnes per hectare.</td>
</tr>
</tbody>
</table>
Tomato Value Chain Challenges and Climate Vulnerability

1. Input
- Chemical fertilizers used in 90% of tomato cultivation
- Most farmers are smallholders, limiting commercial production
- Lack of infrastructure
- Low quality seeds

2. Production
- Most seeds, fertilizers and pesticides are not produced in Nigeria making them cost prohibitive to farmers
- Nigeria is the 14th largest producer of tomatoes in the world
- Total production 1.8 million MT per annum
- Reduced access and delayed delivery of quality seeds

3. Processing
- 1.4 million MT imported annually as concentrated tomato paste
- Lack of infrastructure to support bulk deliveries

4. Marketing
- 12 commercial tomato processing companies
- Only 6 are functional
- Lack of infrastructure to support bulk deliveries
FOOD SECURITY IN NIGERIA’S CHANGING CLIMATE

3. Processing

Inadequate pest and weed control
Dependence on rain for water supply

We have 40% post harvest losses in the country. Why should we produce tomatoes that go to waste because we don’t know how to process them?

Ngozi Okonjo-Iweala, Global Commission on the Economy and Climate

5. Consumption

80% of processed tomato products in urban markets are imported

Climate Threats
Increased import dependence
Higher product prices
Yearly price inflation between April and July due to seasonal scarcity

VALUE CHAIN INTERVENTION

Rockefeller Foundation - Yieldwise Food Waste Initiative
- $130m initiative
- To reduce post-harvest losses by 2030
- Develop better agronomy skills in post-harvest loss management
ENSURING FOOD SECURITY IN NIGERIA’S CHANGING CLIMATE

Responding to climate threats requires collective action. Government must provide leadership by creating and championing a framework with clear goals, roles and responsibilities. Platforms for engagement with key stakeholders are required to achieve climate readiness, improve decision making, develop strategies and ensure implementation.

For us to protect our ecosystem, to tackle global warming and to keep our food diversity, we need to support agriculture that works in harmony with nature.  

Nnimmo Bassey  
Health of Mother Earth Foundation
Challenges to Nigeria’s Climate Readiness

1. Difficult business environment – stifling innovation
2. Poor governance – particularly with respect to controlling corruption
3. Limited social development

Recommendations for Climate Readiness in Agriculture

- Improve governance and stakeholder engagement
- Establish knowledge and information services
- Develop climate-smart agricultural strategy and implementation framework
- Build community level capabilities
- Provide information and accounting systems

If we invest in the young population of Nigeria, the sky is the limit.
Amina Mohammed, Deputy Secretary-General, United Nations
To be food secure, we must be climate resilient. There is no time. We must ensure that every person, every day, no matter who or where is guaranteed safe, sufficient and nutritious meals.

**Food Security in Nigeria’s Changing Climate**

1. **Improve Governance and Stakeholder Engagement**

   - Designate lead ministry or inter-ministerial body to manage and coordinate climate readiness activities with clear decision-making processes and transparency.
   - Make sure institutional roles are clearly defined.
   - Create and sustain platforms for stakeholder engagement and consultation, including the private sector.
   - Ensure inclusion of affected and vulnerable groups, such as smallholders, indigenous communities and women.

2. **Establish Knowledge Base and Information Services**

   - Assess vulnerability and adaptation needs of farmers and agricultural sector.
   - Classify agricultural production systems according to adaptation needs and mitigation opportunities.
   - Identify options and priorities for climate-smart agriculture, including reduction of agriculture greenhouse gas emissions.
   - Make climate information services available and accessible to farmers and other agricultural decision makers.
   - Analyse and reform current land-use practices and legislation to support climate-smart agriculture.
   - Ensure social and environmental impacts of climate-smart agriculture programmes are anticipated before they are scaled up, particularly for vulnerable groups.
### 3 DEVELOP CLIMATE-SMART AGRICULTURAL STRATEGY AND IMPLEMENTATION FRAMEWORKS

- Formulate vision and goals for the agricultural sector.
  - Ensure buy-in from stakeholder groups
  - Balance food security, adaptation and mitigation and the need to meet United Nations Sustainable Development Goals
- Ensure climate-smart agriculture interventions are analysed for social and biophysical suitability.
- Identify and pursue priority interventions that reduce vulnerability.
- Ensure projects are viable and sustainable.
- Make provisions for programme monitoring and improvement.

### 4 BUILD COMMUNITY LEVEL CAPABILITIES

- Make credit available to rural farmers who implement climate smart practices.
- Establish and improve access to seed banks with high yield seeds.
- Provide effective technical support and agricultural extension service.
- Galvanize private sector and rural farmer organizations, including women and youth, to support innovation, learning and implementation of climate smart agriculture practices.

### 5 PROVIDE INFORMATION AND ACCOUNTING SYSTEMS

- Establish criteria and measurable indicators for resilience, climate change mitigation and food security.
- Create monitoring systems for climate threats and vulnerability assessments.
- Develop a national system to measure, monitor, report and verify GHG emissions and multiple-benefit indicators relevant for agriculture, in coordination with other monitoring activities.
Words are sweet but they can not take the place of food.

Igbo Proverb
Swallow: Food Security in Nigeria’s Changing Climate addresses the issue of food security in Nigeria brought on in part by our changing climate inadequate infrastructure and traditional agricultural practices. Produced by Jacqueline Farris, Director General of the Yar’Adua Foundation and Directed by Dan McCain of Core Productions, the documentary features inspiring stories and explores opportunities and solutions to our food security challenge.