



SOCIETY FOR AGRICULTURE, ENVIRONMENTAL RESOURCES AND MANAGEMENT (SAEREM)

7TH INTERNATIONAL ANNUAL CONFERENCE SAEREM/JOS2024

BOOK OF ABSTRACTS OF CONFERENCE PROCEEDINGS,

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

DATE: 11th- 15th November, 2024

VENUE: Federal College of Forestry, Jos Plateau State, Nigeria

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Central Planning Committee

Prof. I. Onimawo – Chairman-In-Council

Prof. Stephen Ibitoye - Deputy Chairman-In-Council

Prof. M. A. Sule

Prof. Ani Nkang

Prof. K. H. Ogbonda

Prof. Ibisime Etela

Prof. O. M. Adesope

Dr. C. M. Tasié

Dr. A. Muhammad

Dr. E. E. Nyong- Secretary General

LOCAL Organizing Committee

Dr. K. I. Okeke-Agulu – Chairman;

Dr. Walter John

Barr. Irene Useni

Musa Ismail

Theophilus Magwen

Moji Adebayo-Charles

Dr. Mudi Anayib -- Secretary

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

AN ADDRESS BY THE CHAIRMAN -IN -COUNCIL, PROFESSOR IGNATIUS AKHAKHIA ONIMAWO PhD, FNSN, FIND, FSAEREM

OFFICE OF THE VICE-CHANCELLOR, AVE MARIA UNIVERSITY PIYANKO, ABUJA;
onimawoig@gmail.com

Ladies and gentlemen, I welcome you all to this conference holding in the tourism town of Jos. The theme of this year's conference 'Climate Action, Effects of Fuel subsidy removal on agricultural production and Agro-allied industries, food security, sustainable fisheries, biodiversity/Soil conservation and agricultural resources' addresses so many aspects of Agriculture and food security. I have therefore decided to title my address thus:

IMPACT OF CLIMATE CHANGE ON FOOD SECURITY

The reality of climate change and frequency of its unpleasant consequences constitute significant threats to human lives across different regions of the world. The adverse outcome of climate change has necessitated global concerns and efforts at mitigating its effects as well as advocacy for measures that would restrict human actions that induce climate change. Climate change refers to changes in the mean variability properties of the climate, which persists over an extended period of time, typically within decades or longer. Climate refers to the atmospheric condition of a particular location over a longer period. The climatic condition is the long-term summation of the atmospheric elements such as solar radiation, temperature, relative humidity and precipitation and their variations over a long period. A persistent departure from the mean or/and variability properties of the climate is referred to as climate change. The main cause of the climate change experienced in the present time is the human expansion of greenhouse effect (IPCC, 2014). Human beings progressively utter the concentration of greenhouse gases and aerosols, both of which influence the climate (Enete, 2000). The greenhouse gasses produce greenhouse effects and global warming that follows it.

Global warming which has been a persistent manifestation of climate change is caused by the trapping of heat radiated from earth towards the space by greenhouse gases such as nitrous oxide (N₂O), Carbon dioxide (CO₂), methane (CH₄) and chlorofluorocarbons (CFCs). These greenhouse gases in their natural occurrences serve to keep the earth's atmosphere warm enough for living organism including plants and animals. However, human industrial and agricultural activities have led to expanded emissions of these gases into the atmosphere thereby resulting to an expanded greenhouse effect which brings about increase in mean atmospheric temperature otherwise known as global warming. Human activities such as burning of fossil fuels, coal and oil have led to high concentration of carbon dioxide in the atmosphere. Also, clearing of land for agriculture and industrial processes have to a lesser extent contributed to greenhouse effect. The emissions of chlorofluorocarbons (CFCs), which are synthetic compounds that have industrial origin have contributed to the destruction of the ozone layer thereby contributing to global warming.

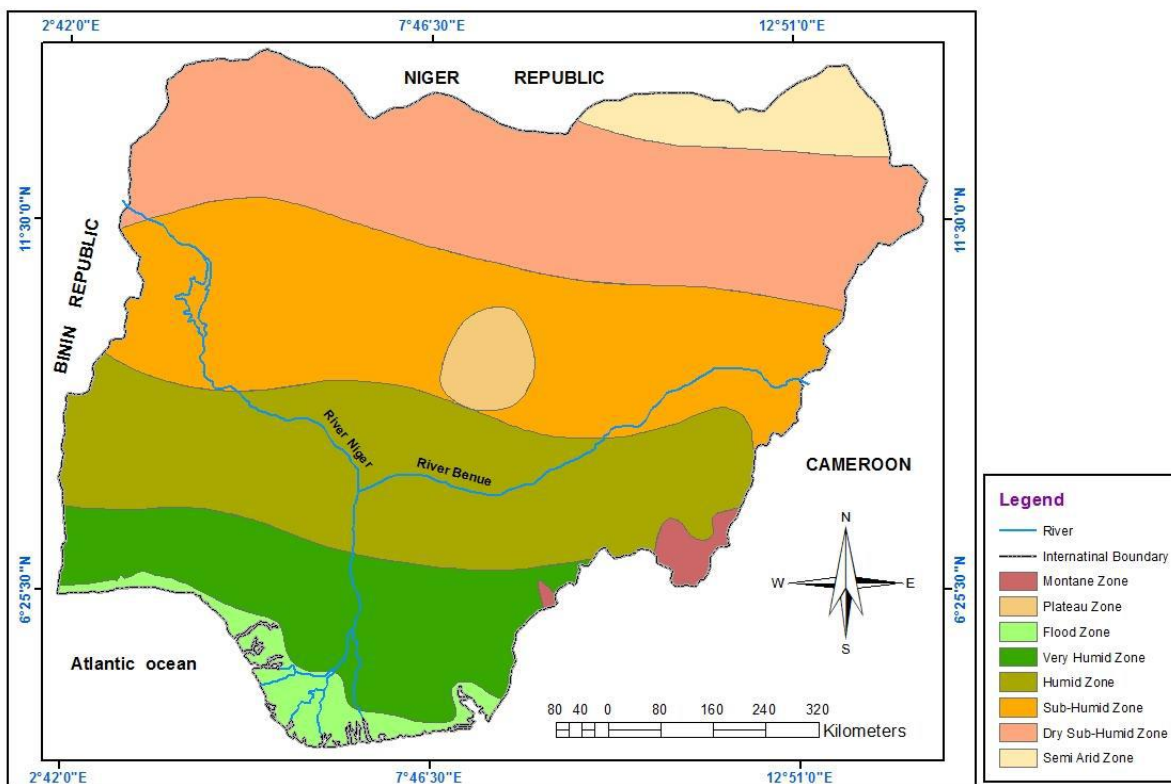
Similarly, the changes in the natural composition of the greenhouse gases expand the greenhouse effects thereby making the earth to become warmer. The warmer condition of the earth's atmosphere results in increases evaporation and precipitation that varies across the regions. The greenhouse effect also brings about the warming of the oceans resulting to partial melting of glaciers and ice sheets which results to rising sea level. Research has shown that high concentration of atmospheric carbon dioxide has positive and negative effects on crop yield. Some category of crops according to findings does well under this condition while others do not. Climatic conditions such as floods, droughts and extreme temperature are some of the consequences of climate change. These conditions have led to crop loses and has threatened the livelihood of farmers as well as poses food security challenges overtime, to some states, especially in developing countries. The threats posed by climate change on human security have generated global concerns leading to some global initiatives and measures aimed at regulating human activities that induce global warming. The Kyoto protocol for instance was aimed at regulating the emissions of greenhouse gases through industrial processes in the countries of the world.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Nigeria is not shielded from the rest of the world in terms of the effect of climate change. The outcomes of climate change have been felt across the vegetative regions of the Nigeria. Research has shown that climate change is increasingly becoming a major threat to agricultural productivity in Nigeria. Some previously well drained agricultural plains have become flooded in recent times, also the increasing aridity of the Sahel and Sudan savannah belts have adverse effects on agricultural activities in the region (Ojo and Adebayo, 2012). Other outcomes of climate change such as heavy precipitation, abnormal onset and cessation of rainfall, rising temperature and alteration in relative humidity have negative consequences on agricultural activities and food systems in Nigeria. This alteration has led to disruption in the seasonal pattern of food production and distribution, thereby creating shortfall in supplies which bring rising food prices and limited access to food (Oyinloye et al., 2018).

Evidences of Climate Change in Nigeria

Nigeria, with a vast land space of 923,768 sq km, spanning across different climatic regions (see Figure 1) is understood to be highly vulnerable to climate change. There is no gain saying the fact that the country is threatened with extinction by a myriad of environmental problems, especially those triggered by climate change. Indeed, each of the 36 States and the Federal Capital is beset by one climate change problem or the other.



Source: ODNRI

Fig. 1. Nigeria' Agroclimatological Zones

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

There is desert encroachment and extreme droughts in the northern states as well as serious problems of flooding and erosion in the littoral southern states which are mingling to threaten Nigeria with shrinkage and collapse. Increasing climate uncertainties, sheet erosion, gully erosion, periodic flooding, biodiversity depletion, agricultural land degradation and general decline in yields of agricultural produce are now common norms in the country. All of these are both direct and indirect consequences of climate change and affects the entire 220m population whose major occupation is agriculture, which, before the discovery of oil, accounts for about 80% of the country's GDP and currently accounts for 90% of the non oil export earnings and climate dependent.

In northern Nigeria today, drought in April and May, which is accepted as normal, prevents timely land preparation and tillage. It further delays sowing and broadcasting of seeds as well as affects the transplanting of other crops. As drought extends into early June, it destroys all crops and harvests become very poor. Inadequate rains through July to October cause severe hardship to the entire country. This trend is further compounded by the fact that most of the large-scale irrigation projects are moribund. Increasing climatic uncertainties are additional threats in these drought-prone areas and also some of the major factors in risk averseness. It forces farmers to depend on low-input and low-risk technologies. Shunning new technologies to derive maximum gains during favourable seasons delays recovery after disasters. Even government investments made for poverty reduction are often lost within these high risk areas of northern Nigeria due to the persisting impacts of climate change, thus, further undermining development efforts and aggravating poverty. For subsistent farmers, who constitute more than 75% of the farming population and who find adjustments to climate change as a costly option due to the required investments, they resort to disposing or mortgaging their assets and eventually emigrating. High intense rainfall as forecasted in the southern part of the country has resulted in increased flooding and sedimentation of floodplains, making them less productive. The encroaching salinity due to sea level rise has further degraded the meagre agricultural areas. Other array of threats by the adverse impacts of climate change in Nigeria include those evident in water resources and supplies (dwindling), health (unpredictable), energy (erratic), transportation (unreliable), education (in distress), recreation and tourism (in shambles), geographical boundaries of agro-ecosystems as well as species composition and performance (changing).

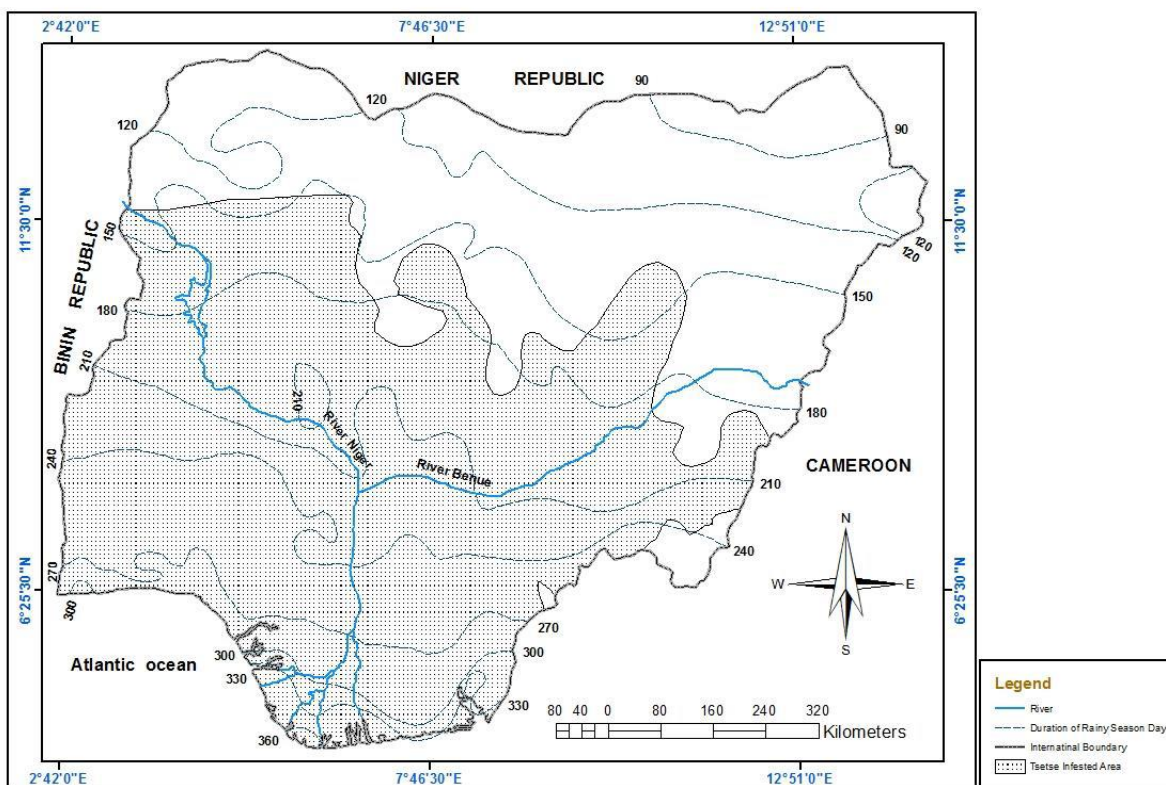
Other non-economic resources such as biodiversity, air and water quality are also affected by adverse impacts of climate change. For example, many of the country's plant resources are diminishing as traditional herbalists now have to do with inferior alternatives. Migratory pattern of fish stocks have changed markedly, just as the catch has declined. Prominent animal species such as rodents, reptiles, birds and fishes and other marine organisms that were a primary source of protein for millions of citizens especially in the south are being endangered.

FOOD SECURITY: The World Food Summit of 1996 defined food security as existing “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”. Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. The USDA opined that “food security for a household means access by all members at all times to enough food for active, healthy life. Food security includes at a minimum, i. The ready availability of nutritionally adequate and safe foods, and ii. An assured ability to acquire acceptable foods in socially acceptable ways (i.e. without resorting to emergency food supplies, scavenging, stealing, or coping strategies)”. Food security is built on three pillars: □ Food availability: sufficient quantities of food available on a consistent basis.

Food access: having sufficient resources to obtain appropriate foods for a nutritious diet. □ Food use: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation. Food security is a complex sustainable development issue, linked to health through malnutrition, but also to sustainable economic development, environment, and trade. There is a great deal of debate around food security with some arguing that: □ There is enough food in the world to feed everyone adequately; the problem is distribution. □ Future food needs can – or cannot – be met by current levels of production. □ National food security is paramount but no longer necessary because of global trade. □ Globalization may – or may not – lead to the persistence of food insecurity and

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

poverty in rural communities. Notwithstanding the above, the number of people without enough food to eat on a regular basis remains stubbornly high throughout the world. The figure is put around >800 million people and is not falling. More than 60% of the world's undernourished people live in Asia, while 25% live in Africa. The population of those who are hungry, however, is higher in Africa (35%). In Nigeria, the Ministry of Agriculture has estimated that 65% population is food insecure despite the fact that more than half of all employments depend on agriculture, reason being that, 90% of the produce comes from small rain-fed farms of few hectares, constrained by poor infrastructure, drought/flooding, pests and little access to credit. Many of the farmers are unable to meet their subsistence .



Source: ODNRI

Fig. 2. Nigeria' Profile of Agricultural Potentials

Climate change has a profound impact on food security, affecting it through various interconnected channels:

1. **Crop Yields:** Changes in temperature, precipitation patterns, and the frequency of extreme weather events can reduce crop yields. For instance, heat stress can impair the growth of staple crops like wheat, rice, and maize. Increased CO₂ levels might boost plant growth in some cases, but this effect is often outweighed by negative impacts such as droughts and heatwaves.
2. **Soil Quality:** Climate change can lead to soil degradation through increased erosion, reduced fertility, and changes in soil moisture levels. This can make it more difficult to grow crops and maintain healthy agricultural lands.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

3. **Pests and Diseases:** Warmer temperatures and shifting weather patterns can expand the range and increase the number of pests and plant diseases. This can lead to greater crop losses and increased use of pesticides, which can have further environmental and health impacts.
4. **Water Resources:** Changes in precipitation and increased evaporation due to higher temperatures can affect water availability for irrigation. Regions that depend heavily on irrigation may face shortages, leading to reduced agricultural productivity.
5. **Livestock:** Heat stress and changes in feed availability can negatively affect livestock health and productivity. This can lead to reduced meat, milk, and egg production, impacting food supply and prices.
6. **Fisheries:** Ocean warming, acidification, and changing currents can impact fish populations and marine ecosystems. This can affect the availability of seafood, which is a crucial protein source for many people around the world.
7. **Food Prices:** Reduced agricultural productivity and increased demand due to population growth can drive up food prices. This can make food less affordable for many people, particularly in developing countries.
8. **Economic and Social Impacts:** Food insecurity can lead to economic instability and social unrest, particularly in regions where people are heavily reliant on agriculture. Displacement due to climate impacts can also exacerbate food security issues as people move to areas with more favorable conditions.

Addressing these impacts involves a combination of mitigation strategies to reduce greenhouse gas emissions and adaptation measures to build resilience in food systems. This might include developing drought-resistant crop varieties, improving water management practices, and supporting sustainable agricultural practices. Considering the huge agricultural potentials in Nigeria government has embarked on a lot of mitigation programmes

The government on its part, as counter measures, through policy formulations have been responding to the challenges via mobilization and sensitization campaigns, enhancing small irrigation schemes, subsidies in inputs etc. The Academics have also been contributing to these counter measures through relevant research efforts and innovations in the fields of aquaculture, apiculture, livestock management/breeding/nutrition, crop improvement, water resources conservation, soil conservation etc.

. Climate Change Mitigation Measures for Improved Crop Production

Climate change mitigation involves measures that reduce the amount of emission or enhance the absorption capacity of greenhouse gases. Measures which could enhance the mitigation of climate change and encourage the crop production include; carbon sequestration, use of bio-energy, farm level mitigation approaches.

P. Carbon Sequestration

Sequestration activities enhance and preserve carbon sinks and include practices that store carbon through crop

Linkages between crop production and climate change. Land management “best practices” such as no-till agriculture, or slow the amount of stored carbon released into the atmosphere through burning, tillage and soil erosion. Sequestered carbon is stored in soils, resulting in increases in soil organic carbon (SOC). There is a report that sequestration accounts for 89 percent of the technical mitigation potential in agriculture compared to 11 percent for emission abatement. The “best” management practices in agriculture such as reducing the amount of bare fallow, restoring degraded soils, improving pastures and grazing land, irrigation, crop and forage rotation, and no tillage practices can raise SOC. Sequestration of carbon thus, addresses the build of GHG in the atmosphere that contributes to climate change.

2. Bio-Energy

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

The production of liquid fuels from dedicated energy crop, such as grains and oilseed is to be re-examined in response to concerns over the environmental sustainability of continued fossil fuel dependence. The potential of bio-fuels to reduce carbon emissions, however, is highly dependent upon the nature of the production process through which they are manufactured and cultivated. A shift in this direction is capable of reducing the emission of carbon thereby keeping climate change problem low to support the production of food crops in Nigeria.

3. Farm Level Mitigation Approaches

Improved management practices that reduce on-farm emissions and enhance crop production include livestock manure management, fertilizer management, avoidance of bush burning, minimum tillage among others.

4. Livestock and Manure Management

Methods to reduce methane emissions from enteric fermentation include enhancing the efficiency of digestion with improved feeding practices and dietary additives. The efficacy of these methods depends on the quality of feeds, livestock breeds and age, and whether the livestock is grazing or stall-fed. A study observed that developing countries provide lower quality feed to livestock, which raises the emission rate per animal over that for developed country herds.

In livestock manure management, cooling and using solid covers for solid tanks and lagoons, separating solid from slurry, and capturing the methane emitted are relevant techniques. In developing countries in general and Nigeria in particular, applying this sort of manure management may be difficult as animal excretion happens in the field. Composting manure should be alternatives to reduce emissions.

5. Fertilizer Management

Improving the efficiency of fertilizer application or switching to organic production can decrease the amount of nutrient load and N₂O emissions. However, overall benefits would need to be weighed against the potential impact on yield. It was also revealed that fertilizer reductions of 90 percent in rain-fed maize field have been shown to reduce yield by 8.4% and 10.5% over the baseline in Brazil and China respectively. Furthermore, lack of access to soil nutrients needed for improving the quality of degraded soils is a hindrance to achieving food security in many parts of the developing world. Adequate consideration should be given to food security index in efficiency of fertilizers application or organic manure usage to ensure that the technique does not add to the national food insecurity question.

6. Avoidance of Bush Burning

Bush burning as a traditional practice of clearing the farm land contributes to the emission of GHGs such as CO₂ and CH₄ which adds to the atmospheric stock of gases thus, increasing global climate change. There is need to abolish the practice of bush burning and the emission of gases that result from the process. This could be achieved through clearing and raking of the grasses with the use of farm tools or alternatively allowing the grasses to decompose and increase the fertility of the soil. A soil that is fertile would ensure the release of nutrients for better production of crops. Equally, prohibition and punishment of defaulting farmers could serve as a deterrent to others in the habit of bush burning thus, reducing the atmospheric stock of CO₂ and CH₄.

7. Avoidance of Deforestation

Deforestation is the cutting down of trees without replacement for urban development, or erection of buildings causes disequilibrium in the carbon-oxygen balance in nature. This imbalance leaves substantial amount of CO₂ in the atmosphere which adds to the global stock of GHGs that fuel climate change problems affecting crop production. A

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

shift from this practice through legislation and enlightenment can improve the carbon-oxygen balance thus reducing the stock of CO₂ in the atmosphere. Low emission of CO₂ reduces global climate change and its attendant effects on crop production. In addition the new business of charcoal export has heightened deforestation and at the same time increasing CO₂ emission in the process of converting the felled wood to charcoal.

- P. Adoption of Appropriate Tillage Practices: Tillage operations of farmers speed up the release of stored soil organic carbon into the atmosphere that contribute to global climate change. The adoption of appropriate tillage operations such as zero or minimum tillage can sequester soil organic carbon and reduce its release to the atmosphere to add to the existing stock of gases. Good tillage practices further check soil erosion and associated dangers thereby conserving soil nutrients for greater yields of crops which would in turn address the food insecurity of the nation

THANKS FOR YOUR ATTENTION

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

KEYNOTE SPEAKER

Keynote Speech presented at the 7th International Annual Conference of Society for Agriculture, Environmental Resources and Management- (SAEREM) holding at Forestry Research Institute, Jos, Plateau State, Nigeria 11-15th November, 2024.

Addressing the Naira's Free-fall in the Wake of Energy Subsidy Removal: A Policy Roadmap for Nigeria's Agricultural development under democracy.

MUHAMMAD AHMAD MAKARFI, *PhD*

PROFESSOR OF AGRICULTURAL ECONOMICS

(Former Nigerian Ambassador to the Federative Republic of Brazil)

Protocols

Distinguished Guests, Esteemed Colleagues, Ladies and Gentlemen,

1. It is an honour for me to be invited to address you today at **the 7th International Annual Conference of Society for Agriculture, Environmental Resources and Management (SAEREM) holding at the Forestry Research Institute, Jos, Plateau State**, on a topic of great significance to our nation's future: "Addressing the Naira's Free-fall in the Wake of Energy Subsidy Removal: A Policy Roadmap for Nigeria's Agricultural development".
2. The topic of the day, anchored by SAEREM with clear objectives on agriculture and environmental resources utilization and management, at Forestry Research Institute, is most timely and apt. This is attested by the attendance of highly knowledgeable, skilled professionals and students to the conference.
3. Personally, it the conference reminds of two events in my life. The first is my appointment at Institute of Agricultural Research, A. B. U. Zaria where I started my academic career as Assistant Research Fellow and Lecturer with the Department of Agricultural Research, Rural Sociology and Extension. The scope, depth and outputs generated by the research Programmes in Farming Systems, Cereals, Irrigation, Agricultural Engineering and so forth captures the essence of research and development enabled me appreciate the critical role agriculture plays in shaping the future of our nation. The second experience is when I led Africa Group of Ambassadors, on behalf the Dean, to the Amazon Cooperation Treaty Organization (ACTO) headquarters in Brasilia. ACTO is an intergovernmental organization formed by the eight Amazonian countries: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela, which signed the Amazon Cooperation Treaty (ACT), becoming the only socio-environmental block in Latin America. It aims to intensify collaboration and share knowledge on the main issues confronting the planet: Climate Change, Biodiversity loss and gain and Pollution. To seek and establish collaboration between ACTO and African countries in order to build capacity to deal with the challenges of biodiversity and climate change facing South America, Caribbean and Africa countries. Their enviable desire to seek and establish collaboration between ACTO and African countries in order to build capacity to deal with the challenges of biodiversity and climate change in the spirit of South- South cooperation touched the minds of all those present. It encouraged many of us to seek for linkages and collaborative research to advance the conservation of environmental resources.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

4. It is my pleasure to note that the lead paper at this conference is going to be presented by erudite Dr Zacharia Buba Yaduma Ph D, who doubles up as the Chief Host of the Conference. An erudite Speaker, celebrated administrator and professional. I am confident he will do justice to themes, running through agriculture, climate action, effects of fuel subsidy on agriculture, agro-allied industries, food security, sustainable fisheries, biodiversity, conservation and agricultural resources.
5. I therefore, praise the organisers for providing yet another platform for the promotion of dialogue amongst academics, professionals, experts, NGOs, business and corporate executives, public affairs managers etc. on contemporary development issues in Nigeria, Africa and beyond. As we navigate the complexities of the 21st century, it is imperative that we keep abreast with developments around us so that Nigeria's economy and security landscape could be timely, monitored, evaluated and appropriate actions taken to ensure sustainable growth and better livelihoods for the citizens.
6. Today, I will discuss how free fall of the Naira interlinked in a complex relationship removal of energy subsidies is impacting of the livelihoods of Nigeria's and the urgent need to address them, given the quantum of the victims. Proposed solutions revolve around understanding the nature of the relationship and the innovative agricultural practices that are suitable to bolster our resilience; and support policy shifts along desired directions for a prosperous and secure future for Nigerians.
7. Meanwhile, please join me to specially ubterrann the struggle of the victims of terrorism, *kidnappings, abductions, banditry around Nigeria where the insecurity is assuming serious dimensions. Similarly, for survival of the Indigenous guardians of our Forests, in the Congo Basin of Africa, The Amazons of South America and all over the planet. Wildfires, oil drilling, and illegal mining are pushing the the forest dwellers, especially in the Amazon to the very edge of survival. Scientists warn that if 20-25% of the forest is lost, the entire ecosystem could collapse into a dry savanna. Indigenous guardians are the forest's last line of defence, and together we can help keep them safe. Bear in mind, life matters.*

xi | P a g e

P.2 Introduction

8. My respected colleagues, Ladies and gentlemen, permit me to share some thoughts on the pronouncements made by our President His Excellency Bola Ahmed Tinubu during his inauguration as the new President on the 29th May, 2023.
9. These pronouncements, namely the removal of energy subsidies and the floating of the Naira are major policy reversals that have profound effects on the state of Nigerian economy especially, the agricultural sector and the citizenry. These two factors affect every aspect of Nigerian life and, as students and stakeholders in the Nigerian state, it is necessary for us to understand the full implications.
10. As farmers, the specific effect on the agricultural sector is worrisome since it affects our livelihoods and that of future generations. It is in this context that we review the state of agricultural sector, some developmental changes going on as a result of the new policies to help unravel the rather, complex relationships between them. We can identify opportunities and threats that spring up, the accompanying adjustments needed to achieve intended outcomes for our survival and continuity. Actions and suggestions to relevant stakeholders for the way forward will be offered.

P.2 Theoretical Framework

Ladies and Gentlemen let us first, understand the implications of energy subsidy removal and the depreciation of the naira. It is essential to ground the analysis in relevant economic theories. Two key theories provide the foundation for this discussion: the theory of subsidies and the theory of exchange rates.

P.2.2 Theory of exchange rates

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

The theory of exchange rates is central to understanding the depreciation of the naira in the context of subsidy removal. According to the Purchasing Power Parity (PPP) theory, exchange rates between two countries should adjust to reflect changes in price levels, with currencies of countries experiencing inflation, depreciating relative to others. Nigeria's overreliance on oil exports and the mismanagement of foreign exchange reserves have contributed to a decline in the value of the naira, particularly as global oil prices have fluctuated.

1.1.2. Theory of subsidies

The economic theory of subsidies suggests that government intervention in the form of financial aid to producers or consumers is intended to lower the cost of goods or services. In the context of energy subsidies, governments typically provide financial support to energy companies, allowing them to offer products like fuel or electricity at below-market prices. This intervention is often justified by the need to ensure affordability for the population, particularly in developing economies where energy poverty is prevalent and the desire for industrialisation and growth is high. Though, this also happens in most developed economies. (Koutsoyiannis,1979)

However, subsidies can lead to inefficiencies in the market by distorting price signals. In the case of Nigeria, the government's long-standing fuel subsidy program has led to a situation where energy prices do not reflect the true cost of production, leading to overconsumption, inefficiency, and waste. Furthermore, subsidies represent a significant fiscal burden on the government, diverting resources away from other critical areas of the economy. The removal of subsidies is thus seen as a necessary corrective measure to restore market efficiency and reduce fiscal deficits.

The removal of energy subsidies, while necessary for fiscal discipline, can lead to inflationary pressures as fuel prices rise. This inflation can further weaken the naira, creating a vicious cycle where the currency's depreciation drives up import costs, leading to more inflation. In the context of Nigeria, where many goods, including fuel, are imported, the depreciation of the naira has compounded the negative effects of subsidy removal on the cost of living.

1.3 Historical context of energy subsidies in Nigeria

This review examines the historical context of energy subsidies in Nigeria, their impact on the economy, and the theoretical and conceptual frameworks that explain the interaction between subsidy removal and currency depreciation. It also delves into the current administration's policies on subsidy removal, the challenges posed by the free fall of the naira, and potential strategies for mitigating these issues. The paper concludes with recommendations for sustainable economic reform, focusing on balancing fiscal responsibility with social equity in a democratic context.

Energy subsidies have long been a point of contention in Nigeria, with successive governments grappling with the economic, social, and political implications of their removal. The removal of energy subsidies, touted as a necessary measure to free up government revenue for development projects, has triggered inflation, diminishing purchasing power, social unrest, and a free fall of the naira in the foreign exchange market.

1.4 Conceptual Framework

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

The conceptual framework for this research review integrates the relationship between energy subsidies, fiscal policy, inflation, and exchange rate depreciation. At the center of this framework is the idea that energy subsidies represent a distortionary fiscal policy that creates inefficiencies in the economy. These inefficiencies, in turn, lead to a misallocation of resources, reduced competitiveness, and a strain on government finances.

The removal of energy subsidies is conceptualized as a corrective fiscal policy aimed at restoring market efficiency and reducing the fiscal deficit. However, this policy comes with significant short-term costs, including inflation and currency depreciation, as prices adjust to market levels. The free fall of the naira, driven by both structural weaknesses in the economy and the inflationary effects of subsidy removal, exacerbates these challenges by increasing the cost of imports and reducing the purchasing power of Nigerians.

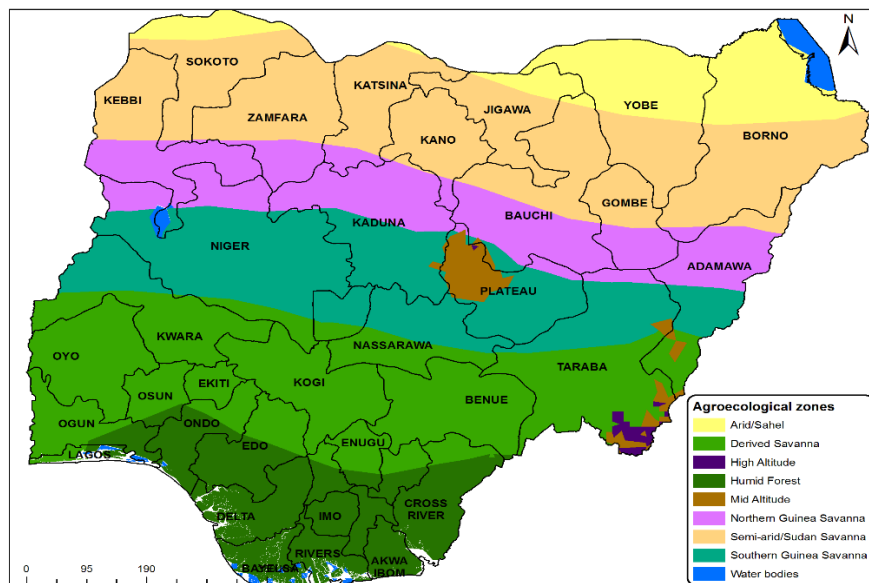
The conceptual framework also highlights the role of the democratic government in managing this transition. In a democratic context, where public opinion and social welfare are critical considerations, the government faces the challenge of balancing economic reform with the need to maintain social stability. The framework thus integrates fiscal policy, monetary policy, and political economy considerations, emphasizing the need for a coordinated response that addresses both the economic and social dimensions of subsidy removal and currency depreciation.

2.0 Role of the agricultural sector in Nigeria's socio-economic development

11. The roles, performances and capacities of the agricultural sector are well documented (World Bank, 2023, Idachaba, 2004) It has been the key driver of the Nigerian economy: provides food, feeds and fibre as well employment for over 70% of the active population and raw materials for local industries. It also contributes over 24.7% of the GDP. Further, the sector is key to reducing unemployment, alleviating poverty, and supporting Nigeria's broader developmental goals. The Nigerian government has increasingly emphasized agriculture in an effort to diversify the economy away from oil dependency, with limited success as, Nigeria's food import figures continue to increase, to meet up with domestic demand. For Instance, between 2016 and 2019, the country's cumulative agricultural imports stood at N3.35 trillion, which is four times higher than the agricultural export of N803 billion within the same period (World Bank, 2023). This is in spite of the abundant natural endowments , resourceful people ,favourable weather conditions Nigeria enjoys. Historically, at Independence in 1960 it relies on domestic food production for all its food needs. See Figure 1

Figures 1: Agroecological zones of Nigeria

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.



12. Through agribusiness promotion and value-added production, agriculture drives industrial development. It is also essential for food security, with staple crops like maize, cassava, rice, and yams being widely produced and consumed locally, reducing reliance on food imports and creating opportunities for agro allied industries. A study reveals a glimpse at the 10 most cultivated food crops of each geopolitical zones reveal good potential for drastic improvements in productivity and total output if few techniques, access finance and infrastructure is improved by 25-50% across board. See Table 7 for selected five crops as at 2022 and projection to 2030.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

1 Presents Table 7 Production and consumption of major food commodities per capita

Table 7: Current (2022) and Forecasted (2030) Production and Consumption per Capita Kg business as usual

| 2022 | Rice | Maize | Groundnut | Tomato | Cassava |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Nigeria Population | 219,000,000 | 219,000,000 | 219,000,000 | 219,000,000 | 219,000,000 |
| Current production (tons) | 9,444,920 | 13,624,990 | 4,760,000 | 3,698,170 | 58,955,080 |
| Current consumption per capita (kg) | 43.13 | 76.90 | 21.74 | 16.89 | 269.20 |
| Land used HA | 4,666,380 | 6,271,970 | 3,970,180 | 1,817,880 | 11,434,820 |
| Yield MT/ha | 2.02 | 2.45 | 1.20 | 2.03 | 5.16 |

| 2030 | Rice | Maize | Groundnut | Tomato | Cassava |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Nigeria Population | 265,000,000 | 265,000,000 | 265,000,000 | 265,000,000 | 265,000,000 |
| Projected production (tons) | 12,691,540 | 16,840,820 | 5,933,470 | 5,155,910 | 64,992,970 |
| Projected consumption per capita kg | 47.89 | 63.55 | 22.39 | 19.46 | 245.26 |
| Land required | 6,185,540 | 6,882,430 | 5,027,320 | 2,904,830 | 16,111,880 |
| Yield MT/ha | 2.05 | 2.45 | 1.18 | 1.77 | 4.03 |

| Difference | Rice | Maize | Groundnut | Tomato | Cassava |
|--------------------------------------|------------|------------|------------|------------|------------|
| Nigeria Population | 46,000,000 | 46,000,000 | 46,000,000 | 46,000,000 | 46,000,000 |
| Additional projected Production | 3,246,620 | 3,215,830 | 1,173,470 | 1,457,740 | 6,037,890 |
| Additional consumption per capita kg | 4.77 | -13.35 | 0.66 | 2.57 | -23.94 |
| Additional Land required | 1,519,160 | 610,460 | 1,057,140 | 1,086,950 | 4,677,060 |

13. Agriculture central for poverty alleviation, especially for smallholder farmers who form the bulk of Nigeria’s producers. With improved access to technology, markets, and services, these farmers can boost productivity, income, and living standards
14. Agriculture also ensures food security for Nigeria’s rapidly growing population, which is expected to reach over 400 million by 2050 at the current rate of growth. Local farmers produce the bulk of food consumed, though food security remains a challenge due to climate change, insecurity, poor infrastructure, and limited access to financing for smallholder farmers.

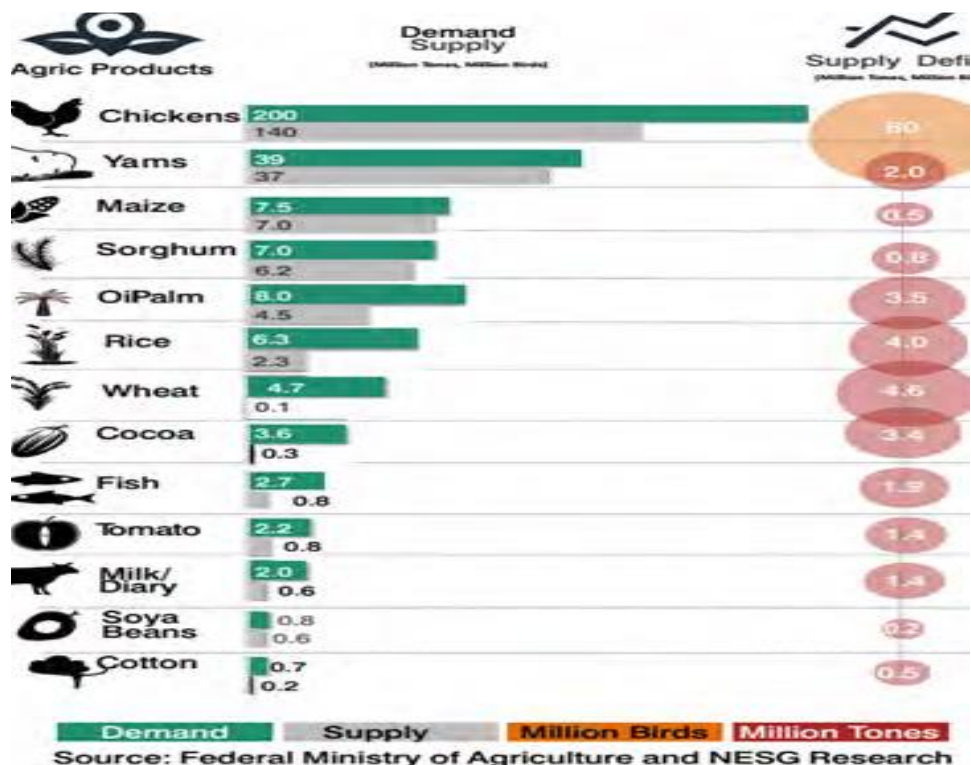
3.2 Challenges of the Agricultural sector in Nigeria

15. The agricultural sector faces many challenges that threaten its productivity and growth. First, climate change, disrupts traditional farming practices, worldwide. Inconsistent weather patterns, harsh temperatures conditions, droughts, floods, and storms are making it harder for farmers to maintain consistent yields. Droughts leads to

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

water shortages, while excessive rainfall causes soil erosion and crop damage, significantly affecting food security. This food deficit chart shows Food Demand and Supply Deficits in 2016, indicating the historical gap in Agricultural Productivity to meet domestic demand. See Figure II

See Figure II : Demand and Supply of key food commodities in Nigeria in 2016.



16. Resource degradation is another critical issue. Agriculture relies heavily on natural resources such as soil and water, but unsustainable farming practices, including overuse of chemical fertilizers and deforestation, have led to soil fertility loss and water contamination. Improper irrigation further exacerbates the degradation of these vital resources, making lands less productive over time; this is the case with the Kano River Project, situated at Kadawa and Kura LGA, Kano State. Similar problems exist in many large-scale surface irrigation schemes
17. In many regions, insecurity poses a serious threat to agricultural activities. Farmer- pastoralist conflicts, terrorism, and banditry disrupt farming operations, force farmers to abandon their land, and damage supply chains. This not only reduces agricultural production but makes it difficult for farmers to access markets for critical inputs like seeds and fertilizers and disposal of the farm produce.
18. The adoption of modern technology in agriculture is also limited. While advances in mechanization, precision farming, and digital tools have the potential to transform agricultural practices, many farmers are unable to access or afford these innovations. The lack of infrastructure, training, and financial support further hampers technological progress in the sector.
19. Poor Land Tenure System: Nigeria's agricultural sector faces challenges such as poor land tenure system, low level of irrigation farming.
20. Post-Harvest Losses: Nigeria experiences significant post-harvest losses, estimated to range between 5% and 20% for grains, 20% for fish and aquaculture, and 50% to 60% for tubers, fruits, and vegetables. (FAO, 2024)

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

21. Limited access to finance by Smallholder farmers who struggle to access credit facilities, with only 10% having access to single-digit interest loans for production; processing firms and distributors also pose a serious constraint at critical periods. Similarly finance for acquiring new technologies are in short supply.

Agriculture, therefore, remains central to Nigeria’s socio-economic progress, offering pathways to employment, economic growth, food security, and environmental sustainability. By adoption of modern farming techniques, expanding value chains, improving access to finance and training, Nigeria can fully harness its agricultural potential for a prosperous future (Yusuf, 2024).

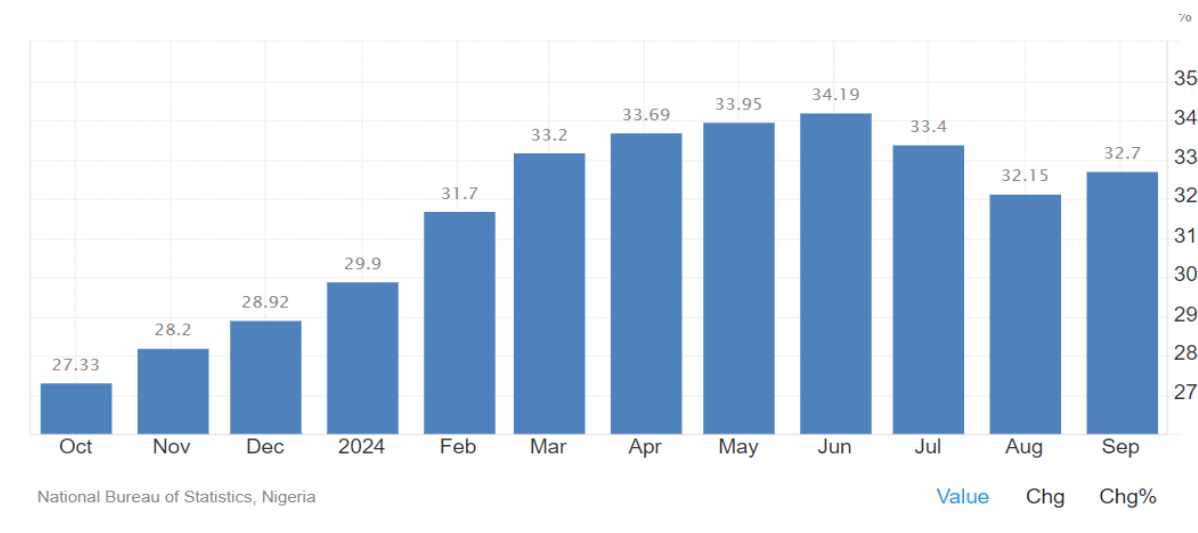
4.0 Indicators of the effects of Naira’s free-fall and subsidy removal.

From the very day of the announcements domestic supply chains were stifled. Prices of petroleum products, transportation by road, air and rail were jerked up. Price increased from

22. In 2024, Nigeria’s **food inflation** surged to 35.41%, reaching a peak in April 2024 highs of 40.5% while the number of food-insecure Nigerians increased significantly to over 100 million. The sector enjoys substantial subsidies, along with all others, on energy costs and other forms of support which sudden withdrawal led to inaccessibility to key inputs and services for production and processing. See Figure I

23. The Manufacturers Association of Nigeria (MAN) and the report of the World Bank on Nigeria’s industrial sector point to closure of many factories while other operation below capacity due to the surge in cost of energy which increased cost of production and distribution of their products. Up 30% decline were reported while many skilled workers lost their jobs.

Figure III showing Inflation rates in Nigeria OCT 2023- SEPT 2024.



Nigeria’s **food imports** have surged to a 5-year high in the first quarter of 2024, despite the government’s efforts to boost local food production. The country spent a whopping N920.54 billion on food imports from January to March 2024, which is a 95.28% increase from N471.39 billion in the same period last year (National Bureau of Statistics, 2024). In fact, the NBS Foreign Trade Statistics report shows that the value of food received into the country through maritime, planes, vehicles and other mediums surged 29.4 percent from N711.4 billion expended in Q4 2023.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

“The major agriculture goods imported in Q1 2024 included durum wheat (not in seeds) from Canada with N130.26 billion and Lithuania with N98.63 billion.” (NBS, 2024).

24. Food Insecure Nigerians have risen from 28million pre-COVID to over 100 million in 2024. In January 2024, Nigeria’s food inflation surged to 35.41% from 33.9% in December 2023. The number of food-insecure Nigerians increased significantly, from 66.2 million in Q1, 2023, to 100 million in Q1, 2024 (WFP, 2024), with 18.6 million facing acute hunger and 43.7 million Nigerians are showing crisis-level or above crisis level hunger coping strategies as of March, 2024 (NESG, 2024)
25. Clearly, the sudden removal of subsidy has triggered a lot of structural and operational dislocations for the major actors along agricultural value chains that have profound effects on the economy and its ability to perform its key role stated earlier. Measures to address these could include:
26. Innovative agricultural practices: Addressing the growing challenges posed by climate change, increasing population, dwindling resources, and the need for environmental sustainability, demand change in traditional farming methods. Thus, issues like soil degradation, water scarcity, and pest resistance are making it difficult for conventional practices to meet the demands of modern agriculture. This has led to an urgent need for new approaches that can improve productivity while minimizing environmental impact.
 - a. Precision agriculture, involves the use of technologies such as GPS, sensors, drones, and satellite imagery, tools that enable farmers to closely monitor crop health and optimize the use of resources like water and fertilizers. Wide adoption and applying these inputs only where they are needed, reduces waste and improves efficiency.
 - b. Techniques like conservation tillage, crop rotation, agroforestry, and organic farming help maintain soil health, prevent erosion, and promote biodiversity. These methods are designed to minimize the use of chemical inputs and reduce the environmental footprint of farming.
 - c. Similarly, climate-smart agriculture has emerged as a crucial strategy. The approach seeks to increase agricultural productivity and resilience while reducing greenhouse gas emissions. Farmers adopting climate-smart practices may use drought-resistant crop varieties, integrated pest management, and water-efficient irrigation systems to cope with changing weather patterns and resource constraints.
 - d. Urbanization and limited access to arable land have led to innovations like vertical farming and controlled environment agriculture (CEA). These methods allow crops to be grown in stacked layers or controlled indoor environments, maximizing space and resources. Vertical farming is especially useful in urban areas, where land is scarce, and it allows for year-round production of fresh produce.
 - e. Advances in biotechnology and the development of genetically modified organisms (GMOs) have also played a significant role in agricultural innovation. Crops engineered to resist pests, diseases, and environmental stresses can improve yields and reduce the need for chemical inputs, making farming more sustainable and productive.

5.0 Results and Discussion

5.1 Historical context of energy subsidies in Nigeria

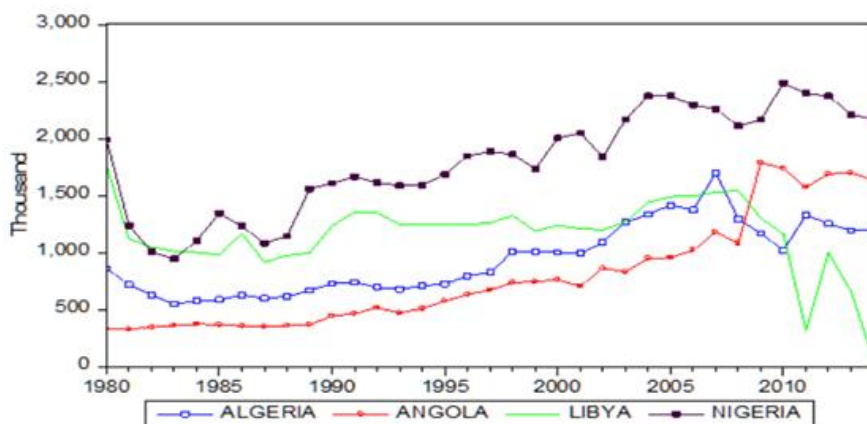
27. Nigeria’s energy subsidy program has a long history, dating back to the 1970s when the government sought to shield citizens from the volatility of global oil prices. At the time, Nigeria was a major oil exporter, and the government’s revenue was heavily dependent on oil exports. The subsidies were justified as a means of redistributing the country’s oil wealth to its citizens, ensuring that even the poorest Nigerians could afford fuel and electricity.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

28. Over time, however, the subsidy program became a significant drain on government resources. According to a 2020 report by the World Bank, Nigeria spent over \$5 billion annually on fuel subsidies, representing a significant portion of the national budget. This spending crowded out investment in critical infrastructure, education, and healthcare, contributing to the country's slow economic development.
29. Meanwhile Nigeria being a key member of OPEC is expected to respect the Organizations regulations to sell petroleum products uniformly on the prevailing international prices. As a result, see the trend in four African members of OPEC namely Algeria, Angola, Libya and Nigeria. See Figure IV & V.

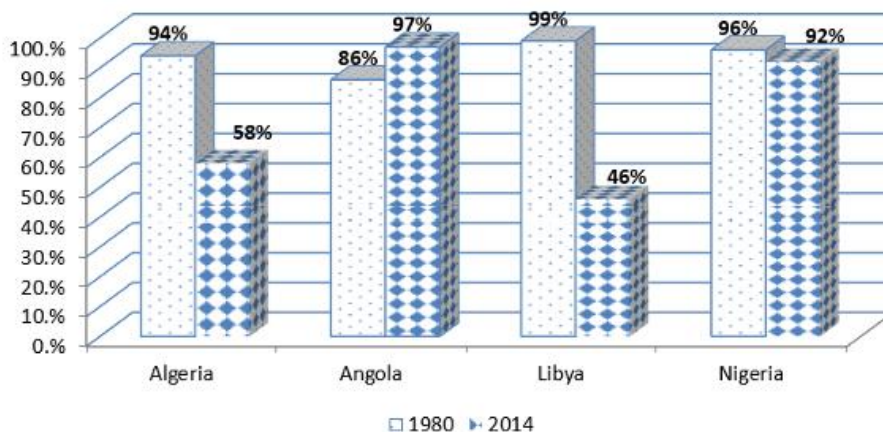
Figure IV : Export of Crude from African OPEC member countries 1980-2010

due to the political conflict and insecurity in the country that caused Libya unable to produce and meet the quota allocated by OPEC.



Source: OPEC Annual Statistical Bulletin (2015)

Figure 1 Exports of Petroleum Products of African OPEC Members (1,000 b/d)



Source: OPEC Annual Statistical Bulletin (2015)

Figure 2 Percentage of Petroleum Exports Per Total Exports

1 Figure 1 for Exports of petroleum products from African OPEC member countries

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

30. Despite several attempts to remove or reduce subsidies, successive governments have faced stiff opposition from the public and labour unions, leading to widespread protests and strikes. The most notable of these was in 2012 when the government of President Goodluck Jonathan attempted to remove fuel subsidies, leading to the 'Occupy Nigeria' movement. This was repeated even recently by NLC to protests on non-implementation of agreements on subsidy, minimum wage. This forced the governments to partially reinstate the subsidies, highlighting the political sensitivity of the issue. The current administration has not bulged or succumb to pressure to review. Palliatives were however, rolled out to cushion their effects.

5.2 The impact of subsidy removal on the economy

31. The removal of energy subsidies is often seen as a necessary step to restore fiscal discipline and promote economic growth. In theory, subsidy removal should lead to more efficient resource allocation, as prices reflect the true cost of production. This should encourage investment in the energy sector, leading to increased supply and lower prices in the long run. So far, the FDI attracted to Nigeria as a result of these measures are yet to register their impacts on the economy. However, more debts from IMF and World Bank were secured or on the pipeline. See Figure III.

32. However, in the short term, the removal of subsidies can have significant negative effects on the economy. In Nigeria, the removal of fuel subsidies has led to a sharp increase in the price of fuel, which in turn has driven up the cost of transportation, food, and other goods. This has contributed to inflation, reducing the purchasing power of Nigerians and increasing the cost of living.

33. The inflationary effects of subsidy removal are compounded by the depreciation of the naira. As fuel prices rise, the demand for foreign exchange to import fuel increases, putting further pressure on the naira. The Central Bank of Nigeria (CBN) has struggled to stabilize the currency, with the naira losing over 30% of its value in 2023 alone. This depreciation has made it more expensive for Nigeria to import goods, leading to higher inflation and a further decline in living standards. As at October,2024 the Naira depreciation has worsened. From exchange rate of US\$1= N460, it has now reached US\$1= N1650.

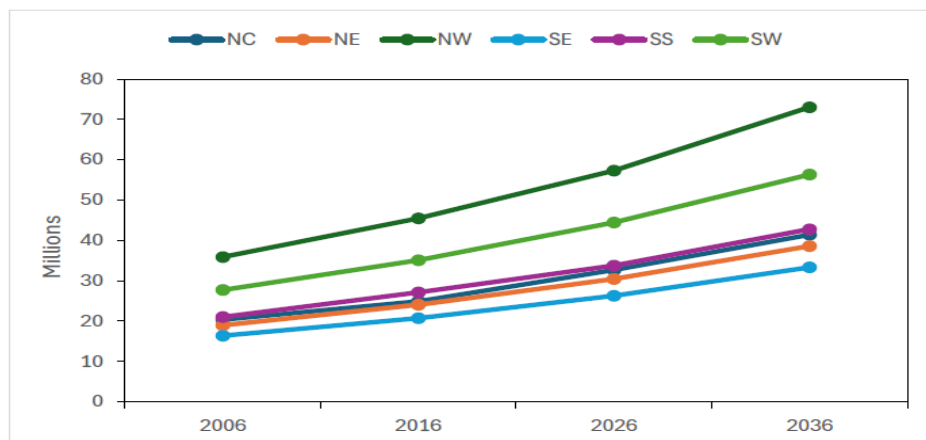
5.3 The role of the democratic government

34. The current democratic government, led by President Bola Tinubu, has taken steps to remove energy subsidies as part of a broader economic reform agenda. In 2023, the government announced the full removal of fuel subsidies, citing the need to reduce the fiscal deficit and free up resources for development projects. This move was welcomed by International financial institutions like the International Monetary Fund (IMF) and the World Bank (WB), which have long advocated for the removal of subsidies.

35. The removal of subsidies has led to widespread public discontent, with many Nigerians protesting the higher cost of living and access to basic needs. The government has attempted to mitigate the social impact of subsidy removal by introducing social welfare programs, including cash transfers to vulnerable households. However, these programs have been criticized as insufficient, with many Nigerians struggling to cope with the rising cost of fuel and food, especially for a country battling to feed over 230 million people projected to reach over 400 million by 2036. See Figure II. The figure gives the population of each of Nigerias six geopolitical zones and the projected populations by 2036 at current population growth rates.

Figure IV. The population of Nigeria's six geopolitical zones and the projected populations 2006- 2036, at current population growth rates.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.



36. The democratic nature of Nigeria’s government adds a layer of complexity to the subsidy removal debate. Unlike authoritarian regimes, which can implement unpopular policies with little regard for public opinion, democratic governments must balance economic reform with social stability. The government’s ability to manage the fallout from subsidy removal will depend on its ability to communicate the long-term benefits of the policy while providing short-term relief to those most affected.

6.0 Conclusion and Recommendation

1. The removal of energy subsidies and the free fall of the naira represent two of the most significant economic challenges facing Nigeria, today. While the removal of subsidies is necessary to restore fiscal discipline and promote long-term economic growth, it has also led to short-term inflationary pressures and a decline in living standards. The depreciation of the naira has compounded these challenges, making it more difficult for Nigerians to afford basic goods and services.
2. The current democratic government must navigate through these challenges carefully, balancing the need for economic reform with the need to maintain social stability and cohesion. This will require a coordinated response that includes fiscal discipline, exchange rate management, and targeted social welfare programs. Thus, government must engage in a broader dialogue with stakeholders to build consensus around its reform agenda and ensure that the benefits of subsidy removal are shared equitably across society.
3. Nigeria’s future lies in economic diversification, better governance, and engagement of both kinetic and non-kinetic approaches to tackling insecurity as well as embracing innovative best practices in agriculture. This could be the best way to overcome currency fluctuations and building a more resilient and prosperous economy.
4. Similarly, National and International platforms for trade need to be activated. AfCTA, ECOWAS, South-South Cooperation for peace should be engaged to reap the benefits of economic cooperation and networking.
5. **Removal of trade barrier and strengthening AfCFT** is key. Africa imports over US\$100 billion worth of food annually and Nigeria is the largest importer. The grains come mainly from Ukraine and other countries. At the same time, African countries like Ethiopia, Zimbabwe and others produce surplus grains including wheat. However, the highest tariff is imposed on imported grains among African countries by sister African countries at 65% for food items among ourselves. This denies intra-African trade with consequent prohibition or creating artificial barrier on trading even when sister African countries are starving next-door and have to trade in US Dollar. On the other hand, the aim of AfCFTA is to ease business among African countries by removing barriers to smooth flow of goods and services, ubterra cost of doing business and economically integrate the various communities for mutual benefits of the Region and African States.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

6. In conclusion, while the removal of energy subsidies and the depreciation of the naira present significant challenges, they also offer an opportunity for Nigeria to reset its economic trajectory and build a more sustainable and equitable future. The way forward will require bold leadership, careful planning, and a commitment to both economic reform and social justice.

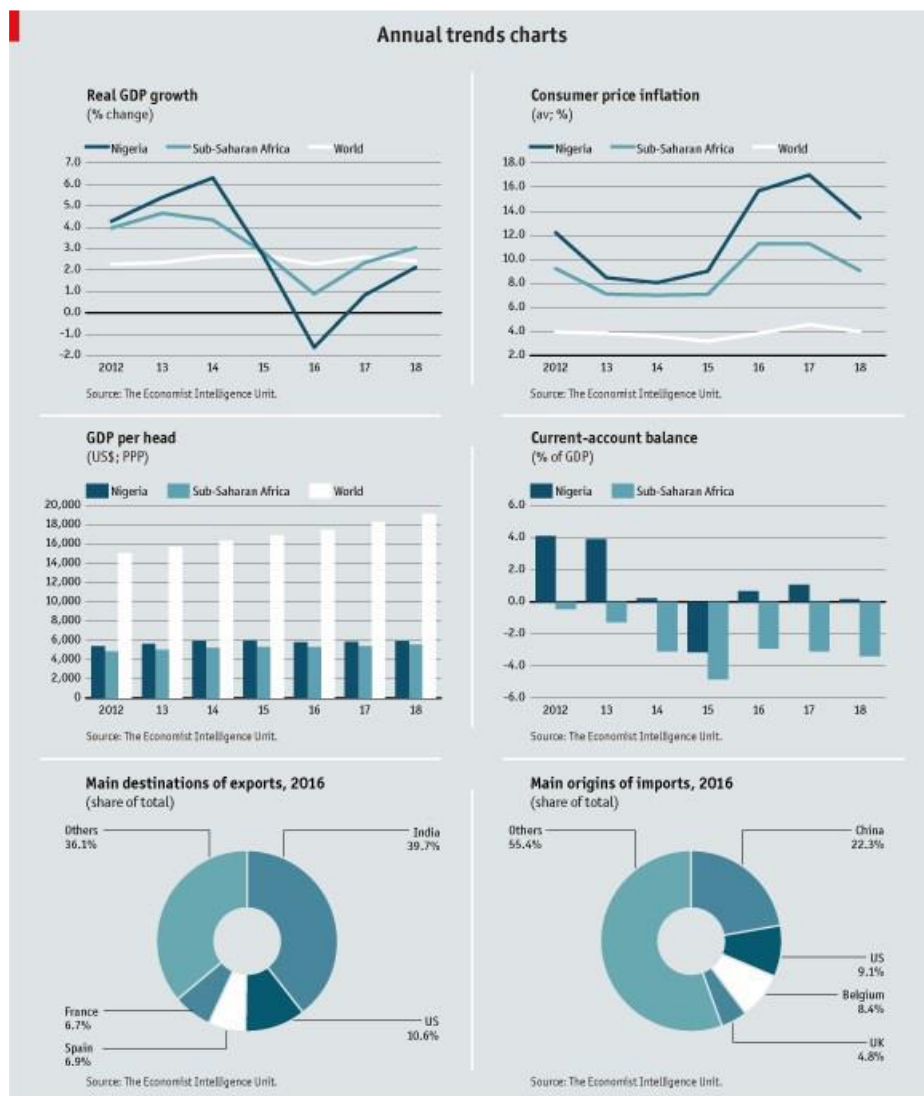
6.2 The way forward

7. The way forward for Nigeria in addressing the challenges posed by subsidy removal and the free fall of the naira requires a multifaceted approach.
8. First, the government must prioritize fiscal discipline by ensuring that the savings from subsidy removal are reinvested in critical sectors like infrastructure, education, and healthcare. This will help to build public trust in the government's reform agenda and demonstrate that the removal of subsidies is in the long-term interest of the country.
9. Second, the government must work to stabilize the naira by addressing the structural weaknesses in the economy that have contributed to its depreciation. This includes diversifying the economy away from oil exports, improving foreign exchange management, and encouraging investment in the non-oil sector. The CBN should also adopt a more flexible exchange rate policy, allowing the naira to adjust to market conditions while intervening when necessary to prevent excessive volatility.
10. Third, the government must strengthen social safety nets to protect the most vulnerable Nigerians from the negative effects of subsidy removal. This could include expanding cash transfer programs, improving access to affordable healthcare, and providing targeted subsidies for essential goods like food and transportation.
11. Finally, the government must engage in a broader dialogue with stakeholders, including labour unions, civil society, and the private sector, to build consensus around the need for subsidy removal and economic reform. This will help to reduce the risk of social unrest and ensure that the government's policies are seen as legitimate and fair.

REFERENCES

1. Drinkwater, L. E. & Buck, L. E. Chapter 1: Introduction to the application of systems approaches to agriculture. (2005).
2. Food and Agriculture Organization of the United Nations (FAO) .“Climate-Smart” Agriculture Policies, Practices and Financing for Food Security, Adaptation and Mitigation, FAO. Viale delle Terme di Caracalla 00153 Rome, Italy. www.fao.org/climatechange climate-change@fao.org. accessed 14th October, 2024.
3. Food and Agriculture Organization of the United Nations FAO. FAOSTAT-Resources-Land. (Food and Agriculture Organization of the United Nations, 2011).
4. IFOAM (2012) Submission from IFOAM to the HLPF on Climate Change and Food Security.
5. Idachaba, F. S. (1980). Food Policy in Nigeria: Towards a framework of Analysis, Agricultural Research Bulletin, Vol. 1 No. 1, pp. 1-47, Faculty of Agriculture and Forestry, University of Ibadan, Nigeria.
6. Khan, S. A., Mulvaney, R. L., Ellsworth, T. R. & Boast, C. W. The Myth of Nitrogen Fertilization for Soil Carbon Sequestration. *J. Environ. Qual.* 36,1821 (2007).
7. Koutsoyiannis, A (1979)Modern Microeconomics, Second edition Macmillan Publication Press HongKong Pg 65 PP581.
8. Montgomery, D. R. Soil erosion and agricultural sustainability. *Proc. Natl. Acad. Sci.* 104, 13268 (2007).
9. Nigerian Economic Summit Group (NESG), (2024). Status of Food Security: Dimensioning the Crisis, Policy Options and Strategic Responses I 2024. Accessed October 23rd ,2024. NESG | www.nesgroup.org | All rights reserved
10. Shehu G. Ado (2013) Agriculture: Panacea for Nigeria’s Economic Recession. Invited Paper presented at the 22nd Ummah Convention held at Sultan Muhammad Maccido Institute for Qur’an and General Studies, Sokoto, April 15-17, 2017, 30pp shehuga@gmail.com, shehugado@auk.edu.ng
11. United Nations Environment Programme (UNEP). (2013) The emissions gap report.
12. Tubiello, F. N. et al. The FAOSTAT database of greenhouse gas emissions from agriculture. *Environ. Res. Lett.* 8, 015009 (2013).
13. Smith, P. et al. Greenhouse gas mitigation in agriculture. *Philos. Trans. R. Soc. B Biol. Sci.* 363, 789– 813 (2008).
14. United Nations Conference on Trade and Development (UNCTAD) (2013). Trade and Environment Review, wake up before it is too late: Make agriculture truly sustainable now for food security in a changing climate.
15. Rockström, J., John, W., Gretchen, D., Andrew, N., Nathaniel, M., Line, G., Hanna, W., Fabrice, D., Mihir, S., Pasquale, S., Charlotte, F., Nuhu, H., Olcay, U., Jeremy, B., Lindiwe, S., Jimmy, S. (2017). “Sustainable Intensification of Agriculture for Human Prosperity and Global Sustainability.” *Ambio*, **46(1)**, 4–17.
16. Tilman, D., Balzer, C., Hill, J., & Befort, B. L. (2011). “Global Food Demand and the Sustainable Intensification of Agriculture.” *Proceedings of the National Academy of Sciences*, **108(50)**, 20260–20264.
17. World Bank. (2016). *Promoting Climate-Smart Agriculture in Nigeria: CSA Profiles*. Available at: <https://climateknowledgeportal.worldbank.org/>
18. YUSUF, B. D. (2024) [Innovative agricultural practices for resilience building in Nigeria’s economy and security landscape. Keynote Address at the 9th Annual Conference of crop science Society of Nigeria held at Faculty of Agriculture, Bayero University, Kano](#)
19. <https://www.statista.com/statistics/1134510/production-of-milled-rice-in-nigeria/> accessed Oct 23rd, 2024
20. <https://rentechdigital.com/smartscraper/business-report-details/nigeria/rice-mill>
21. <https://knoema.com/atlas/Nigeria/topics/Agriculture/Domestic-Supply-Processed/Maize-processed> accessed Oct 3rd, 2024
22. <https://www.trade.gov/country-commercial-guides/nigeria-agriculture-sector> accessed Oct. 3rd, 2024

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.



CONSERVATION OF FORESTS AND WILDLIFE IN NIGERIA: THE PIVOTAL ROLE OF COMMUNITY ENGAGEMENT

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

ZACHARIA BUBA YADUMA *PhD*
DIRECTOR GENERAL/CEO
FORESTRY RESEARCH INSTITUTE OF NIGERIA, IBADAN

Abstract

Nigeria is a nation blessed with abundant natural resources in diverse forms and strategic locations, including expansive forests and a rich array of wildlife species. However, these invaluable ecosystems are constantly faced with threats such as deforestation, poaching and habitat loss. Preserving Nigeria's natural heritage is crucial for maintaining biodiversity and supporting the livelihoods of local communities. The article highlights the importance of forests and wildlife conservation in Nigeria, emphasizing the country's remarkable biodiversity and the essential services these ecosystems provide. It delves into various threats jeopardizing these resources, including deforestation, illegal wildlife trade, climate change and unsustainable land use practices. Recognizing the pivotal role of community engagement, the article explores how local communities can be empowered to participate in conservation efforts. By leveraging their intimate knowledge of the land and traditional practices, communities can contribute to monitoring, reforestation, and the development of tailored conservation strategies. The article presents case studies of successful community-led conservation initiatives in Nigeria, such as the Okwangwo Division of Cross River National Park, the Niger Delta Mangrove Restoration Project, and the Yankari Game Reserve initiative. These examples demonstrate the positive outcomes that can be achieved when local stakeholders are actively involved in preserving their natural resources. However, the article also acknowledges the challenges faced in fostering community engagement and ways to mitigate these barriers. Strategies to overcome these barriers, such as awareness programs, collaborative partnerships and incentive schemes, are discussed as crucial for the long-term success of conservation efforts in Nigeria.

Keywords: biodiversity, wildlife, conservation, community engagement

Introduction

Nigeria, a nation blessed with an abundance of natural resources as well as diverse forests and wildlife that are crucial to the delicate balance of its ecosystems. However, these valuable resources are constantly faced with threats such as deforestation, poaching, and habitat loss, which jeopardize their long-term survival. Recognizing the importance of preserving Nigeria's natural heritage, the role of community engagement has emerged as a pivotal component in the country's conservation strategies. Forests and wildlife conservation is the preservation, maintenance, sustainable utilization, restoration and enhancement of all species, breeds and strains of a variety of forest resources (plant and animal) especially those of economic, scientific and cultural interest to mankind for agriculture either at present or in the future (FAO, 2009). Community participation is the employment of local people to mobilize their people to make decisions, manage their resources and control the activities that affect their lives. Natural resources are of immense benefit to humanity as man depends on various forest and wildlife species for food, fuel, fibre, medicine and raw materials for a host of manufacturing purposes. The contribution of local communities in the conservation of forest has been recognized by the international community. Agarwal (2001) argued that any effort to rehabilitate the environment must rely on village members and not the government officials to do the job, because rural people already have the knowledge. Not only does this knowledge include information about different species of animals and plants, their behaviour and uses, as well as information about the way in which different aspects of the forest ecosystem inter-relate. Local people play an important role in the maintenance of forest resources. Depending on a number of historical, social and ecological factors, indigenous communities amass an extraordinary core of knowledge about how to manage the forest and utilize it sustainably. Agarwal (2001) therefore, maintained that community participation will enable the government and nongovernmental organizations to explore and exploit these local wisdom and initiatives to better conserve and manage the forest According to him, when local people participate, they will contribute their wealth of knowledge about nature to the conservation process, but where they are excluded from the forestry development process, then their contributions and experiences are either lost or left unharnessed. Plucknett (2006) observed that community participation in forest conservation has several positive effects. Some local people maintain mixed species pastures and thereby ensure food for their flock even during period of climate stress.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

The significance of forests and wildlife conservation in Nigeria

Forests and wildlife conservation are crucial for Nigeria's ecological, economic, and social well-being. Forests play a vital role in regulating the climate, supporting biodiversity, and providing essential resources for the local population. Forests act as natural carbon sinks, absorbing and storing vast amounts of carbon dioxide, which helps mitigate the effects of climate change. They also regulate rainfall patterns, preventing soil erosion, and maintain the water cycle, ensuring a reliable supply of freshwater. Additionally, forests are home to a diverse array of plant and animal species, many of which are endemic to Nigeria. Protecting these habitats is crucial for preserving the country's rich biodiversity and ensuring the survival of endangered species.

Forests also provide essential goods and services for the local communities. They offer a source of food, timber, and medicinal plants, supporting the livelihoods of rural populations. Sustainable forest management practices can also generate economic opportunities, such as ecotourism and the production of non-timber forest products. Conserving these natural resources ensures that they can be enjoyed and utilized by present and future generations. Beyond their ecological and economic significance, forests hold immense cultural and spiritual value for many Nigerian communities. They are often seen as sacred spaces, with certain trees and animals holding deep cultural and religious significance. Preserving these natural landscapes is crucial for maintaining the cultural heritage and identity of local populations.

Community Engagement: The Key to Conservation Success

Community participation in the conservation of forests and wildlife play a vital role in environmental management and sustainability. Involving local communities in the management and conservation of forests resources and wildlife creates incentives for them to become good custodians of these resources. This inclusiveness is more likely to build a conservation ethic where people understand that involvement in the conservation of resources is crucial (Sam et al., 2014). The involvement of community members in the conservation of resources is considered the best alternative, especially in the face of the gradual extinction of forest and wildlife resources (Sam et al., 2014). Community participation helps in the conservation of forests and wildlife and reduces threats that could undermine proper management. Some roles of community participation in the wild include: monitoring resources, protecting forests from illegal hunting (poaching) and bush burning, reducing the level of poverty, increasing wildlife habitat, improving water and air quality, increases productivity as well as income to all involved, increased community vitality, pride, identity and cohesiveness, decrease human disturbance, provision of health benefits such as reduced levels of anxiety, aggression and conflict resolution. Other benefits include tourism, recreational use, spiritual and cultural significance, genetic resources preservation, wildlife habitat protection and watershed protection.

The Importance of Community Involvement

Community engagement is a fundamental approach to achieving successful conservation outcomes in Nigeria. Local communities possess intimate knowledge of the land and its species, making them invaluable partners in conservation initiatives. Empowering local communities to manage and protect their natural resources fosters a sense of ownership and accountability, which enhances the effectiveness of conservation strategies. Engaging local communities is paramount to the success of forest and wildlife conservation efforts in Nigeria and by increasing local awareness and participation, conservation initiatives can harness the collective efforts of the people to protect these essential ecosystems for future generations. Additionally, the incorporation of traditional ecological knowledge held by these communities can offer sustainable solutions tailored to local contexts.

Empowering Communities: Strategies and Approaches

Empowering communities in the conservation of forests and wildlife is a crucial aspect of sustainable environmental management in Nigeria. Some of several strategies and approaches to achieve this goal include:

- **Environmental Education Programs:** Implement educational initiatives in schools and community centers focusing on the importance of biodiversity, ecosystem services, and sustainable practices is a key approach to empowering communities for conservation and sustainable development.
- **Participatory Planning:** Involve community members in decision-making processes related to conservation projects to ensure their voices are heard and local knowledge is utilized.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

- **Promotion of Alternative Livelihoods:** Encourage practices such as agroforestry, ecotourism, and sustainable fisheries that lessen reliance on forest exploitation.
- **Access to Microfinance:** Provide small loans or grants to support community members in starting eco-friendly businesses, such as handicrafts that utilize non-timber forest products.
- **Strengthening Land Tenure Rights:** Advocate for policies that formalize land rights for indigenous and local communities, enabling them to manage and benefit from forest resources.
- **Supporting Local Governance:** Empower local institutions to enforce conservation laws and regulations, offering training in biodiversity management and conflict resolution.
- **Promote Community-Led Ecotourism:** Encourage communities to develop ecotourism initiatives that highlight their cultural heritage while generating income and awareness for conservation efforts.
- **Mobile Apps for Monitoring:** Introduce mobile technology for communities to report wildlife sightings, illegal activities, and forest changes, thus engaging them in wildlife monitoring.
- **Remote Sensing and GIS:** Train community members in using Geographic Information Systems (GIS) for mapping and planning conservation areas.
- **Conducting Periodic Assessments:** Collaborate with communities to assess biodiversity and ecosystem services, placing value on forests and wildlife beyond timber and game benefits.
- **Integrating Indigenous Knowledge:** Incorporate traditional ecological knowledge in biodiversity assessments and conservation planning to enrich strategies and improve outcomes.
- **Recognition Programs:** Develop recognition systems for communities that successfully implement conservation practices, such as awards or certifications.
- **Mediation Training:** Provide training in conflict resolution techniques to address disputes over resource use, ensuring collaborative and peaceful practices among community members.
- **Building Trusting Relationships:** Foster trust between communities, local governments, and conservation entities to reduce tensions and promote joint conservation efforts.

By employing these strategies, communities in Nigeria can take active roles in conserving their forests and wildlife, leading to sustainable development and improved livelihoods.

Roles of Local Communities

Local communities play a crucial role in conservation initiatives, leveraging their intimate knowledge of the land and its species. They are often the first to observe changes in wildlife populations and ecosystem health, providing critical data to guide conservation priorities. Indigenous and traditional knowledge held by these communities offer valuable insights into sustainable land management and wildlife protection.

Community members can participate in conservation efforts in various ways, such as:

- Forest monitoring and patrolling to protect wildlife and prevent illegal logging and poaching.
- Cultivating community nurseries to facilitate reforestation and restore degraded lands.
- Collaborating with organizations to develop and implement conservation plans tailored to local contexts.

Benefits of Community-Based Conservation

Engaging communities in conservation strategies offers numerous benefits that extend beyond biodiversity preservation, including:

- Empowerment and capacity building of local stakeholders
- Generation of economic opportunities through sustainable livelihoods
- Preservation of cultural heritage and traditional practices
- Mitigation of conflicts over resource use through increased dialogue and cooperation

Successful Case Studies

Community-led conservation initiatives have been crucial in protecting biodiversity and ecosystems in Nigeria, including areas like Okwangwo Cross River National Park, the Niger Delta, and the Yankari Game Reserve. Here are case studies from these three initiatives:

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

1. Okwangwo Cross River National Park

i. Background

Okwangwo is part of the Cross River National Park, which is one of the most biodiverse areas in Nigeria. It is home to endangered species such as the Cross River gorilla.

ii. Community engagement approach

- **Eco-Guards Program:** Local communities were trained to become eco-guards, enabling them to monitor and report illegal activities like poaching and illegal logging in the park. This initiative helped rebuild trust between park management and local communities.
- **Community Forestry Initiatives:** The park management involved local tribes in sustainable forest management practices. Communities participate in resource management decisions and share benefits from eco-tourism ventures, enhancing their economic incentives to protect the park.

iii. Outcomes

- Increased local participation in conservation efforts, leading to a reduction in poaching and illegal logging.
- Improved community livelihoods through eco-tourism initiatives, such as guided tours and cultural experiences linked to the park.

2. Niger Delta Restoration Project

i. Background

The Niger Delta is known for its rich biodiversity but has faced severe environmental degradation due to oil extraction and neglect of natural resources. The restoration project aims to reclaim and protect the ecosystem while engaging local communities

ii. Community engagement approach

- **Restoration of Mangroves:** The project involves local communities directly in reforestation efforts, particularly the planting of mangroves, which are crucial for biodiversity and preventing coastal erosion.
- **Livelihood Enhancement Programs:** Training programs were implemented to teach alternative livelihoods that are less damaging to the ecosystem, such as aquaculture and sustainable fishing practices. Communities receive support for eco-friendly agriculture.

iii. Outcomes

- Successful restoration of degraded areas with visible increases in mangrove coverage and a resurgence of wildlife.
- Enhanced community resilience through diversified livelihoods, leading to increased income and reduced dependence on environmental degradation.

3. Yankari Game Reserve Initiative

i. Background

Yankari Game Reserve is one of Nigeria's premier wildlife reserves, known for its diverse fauna and natural hot springs. In the past, the reserve faced challenges related to poaching and habitat destruction due to local communities' activities.

ii. Community engagement approach

Community-Based Tourism: The reserve engaged local communities by allowing them to provide services to tourists, including guiding, accommodation, and selling crafts. This helped communities see direct benefits from tourism.

Conservation Awareness Programs: The reserve implemented educational outreach to raise awareness about wildlife conservation and the importance of protecting biodiversity, fostering conservation-minded attitudes among locals.

iii. Outcomes

- Increased wildlife populations due to the reduction in poaching fueled by community involvement in tourism and conservation.
- Long-term economic benefits through community investments in education and health facilitated by income earned from tourism-related activities.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

These case studies illustrate the effectiveness of community-led conservation in different ecological contexts across Nigeria. By empowering local populations and creating economic incentives for conservation, these initiatives have helped protect biodiversity while improving community livelihoods. Strengthening partnerships and enhancing community capacities are essential for sustaining these positive outcomes.

Overcoming Challenges: Addressing Barriers to Community Engagement

Community engagement in conservation efforts is not without its challenges. Economic and social barriers, such as poverty, population pressure, and cultural attachment to ancestral lands, often hinder the effective participation of local communities. Some of the ways in fostering a robust community-based conservation in Nigeria are as follows:

- i. **Integration of diverse knowledge and values:** There is a need for a more pluralist approach that recognizes and integrates the different understandings, meanings, and values that various stakeholders (local communities, conservation authorities, etc.) have towards biodiversity, the environment, and nature. This "fusion knowledge" can help develop locally appropriate and adaptive resource management practices.
- ii. **Inclusive and deliberative decision-making:** finding a fair and just means of including the plural values, knowledge, and interests of different stakeholders in the decision-making and management processes is key to an improved community based conservation. This requires moving beyond passive or coercive forms of participation and applying deliberative inclusionary processes that allow for learning, negotiation, and collective action.
- iii. **Transforming conservation institutions:** creating new, flexible, and adaptable institutions for conservation and development that can manage complex ecological systems and accommodate diverse stakeholder interests and values is a key step in encouraging and sustaining community based conservation. These institutions must work across different scales, link global and local interests, and evolve based on principles of social learning to cope with ecological and social complexity.

Addressing these challenges requires a nuanced approach that takes into account the unique circumstances of each community.

Strategies for Successful Community Engagement

To overcome these barriers, strategies should focus on education, collaborative partnerships, and the implementation of incentive programs. By empowering communities through capacity-building initiatives, fostering multi-stakeholder dialogues, and providing tangible economic incentives for sustainable practices, conservation efforts can gain the necessary support and buy-in from local populations.

Conclusion

The conservation of Nigeria's forests and wildlife is a complex undertaking that requires a holistic approach. By placing community engagement at the heart of conservation strategies, Nigeria can harness the invaluable knowledge and commitment of its people to protect its natural heritage. To achieve this, community-based conservation policy should be implemented to the letter in a bid to curb environmental degradation and promote community involvement. The Community members should be involved in the planning, conservation of natural resources and be empowered by providing alternative means of livelihood for local people to reduce over-dependence on environmental resources. Through collaborative efforts, awareness-raising, and the creation of sustainable economic opportunities, communities can become active stewards of their environment, ensuring the long-term preservation of Nigeria's biodiversity for generations to come

References

Agarwal, C. U., (2001). Sustainable forest management. *Ecology* 4(1):111-118.

Cormier-Salem, M. C., Dunham, A. E., Gordon, C., Belhabib, D., Bennis, N., Duminil, J., Egoh, B. N., Elahamer, A. E. M., Moise, B. F. E., Gillson, L., et al. (2018). Status, trends and future dynamics of biodiversity and ecosystems underpinning nature's contributions to people. In IPBES (2018): The IPBES regional assessment report on biodiversity and ecosystem services for Africa (pp. 131- 206).

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Dawson, N., Coolsaet, B., Sterling, E., Loveridge, R., Nicole, D., Wongbusarakum, S., Sangha, K., Scherl, L., Phan, H.P., Zafra-Calvo, N., et al. (2021). The role of Indigenous peoples and local communities in effective and equitable conservation. *Ecology and Society*, 26(3), 19.

Food and Agricultural Organization. (2009). *A forester's guide for community involvement in upland conservation*. Rome: FAO.

New York, Geneva. Brooks, T. M., Akçakaya, H. R., Burgess, N. D., Butchart, S. H. M., HiltonTaylor, C., Hoffmann, M., Juffe-Bignoli, D., Kingston, N., MacSharry, B., Parr, M., et al. (2016). Analyzing biodiversity and conservation knowledge products to support regional environmental assessments. *Scientific Data*, 3(1), 160007. doi:10.1038/sdata.2016.7

Plucknett, P. J., (2006). *Development of social forestry in Nigeria*. Ibadan: Hedimo-Litho Press.

Sam, I. E., Nnaji, E. S., & Etefia, T. E. (2014). Level of community participation in the conservation of natural resources in Akamkpa local government area, Southern Cross river state, Nigeria. *IOSR Journal of Research & Method in Education*, 4 (4):30-35.

LEAD PAPER

Fraction of Non-Renewable Biomass (Fnrb) Assessment for Nigeria

Prof. Ani Nkang FNES, FSAEREM, FIIA

Faculty of Science, Arthur Jarvis University, Akpabuyo, Calabar, Nigeria

ABSTRACT

When replacing biomass feedstock cannot keep pace with consumption, it becomes a non-renewable biomass source (NRB). If more wood is harvested than the landscape can replace, as is often the case in Nigeria and other developing countries where people rely heavily on fuelwood and charcoal, harvesting is not sustainable and tree cover will

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

*decline over time. The fraction of non-renewable biomass (Fnr_b) measures the relative amount of wood harvested above the landscape's natural regeneration rate. The present Fnr_b assessment for Nigeria is based on the Clean Development Mechanism Tool 30 using international and local data sources (Forest Reference Emission Level for Nigeria, data from the Federal Department of Forestry, FAO). An Fnr_b value of 72.5% was computed for the country. This value is more than the current default value of 30% adopted by the CDM and suggests rapid depletion of accessible biomass. This indicates that large percentages of wood harvest are non-renewable, and successful interventions can claim high emission reductions. It was assumed in this study that the only renewable biomass nationally was 'Demonstrably Renewable Biomass', using data for forests within protected areas. Recent reports indicate that this approach overestimates Fnr_b because the available renewable biomass is underestimated as fuelwood sourced from lands other than protected areas is not included. This notwithstanding, projects aiming to reduce household biomass consumption through cookstove projects should be promoted to mitigate uncontrolled **fuelwood** collection practices among most rural communities, which can cause massive degradation of ecosystems and a decline in biodiversity.*

INTRODUCTION

Biomass energy is derived from organic material from living organisms, such as plants and animals. [Common biomass materials used for energy include plants, wood, and waste.](#) Biomass can be a source of renewable energy. Biomass feedstocks include wood and crops such as maize or sugarcane. If the biomass feedstock is not replenished as quickly as it is used, the biomass energy then becomes a non-renewable energy source. This contradicts the widely held notion that biomass energy is renewable. For example, [biogas](#) from landfill sites become depleted with the rotting of the organic matter. Also, since there is a growing promotion of recycling to reduce man-made waste (e.g. food waste, paper, plastics, etc.), these biomass types are becoming depleted and are therefore non-renewable.

Fraction of non-renewable biomass (Fnr_b)

Carbon emission is the release of **carbon** compounds (-greenhouse gas **emissions**, the main contributors to climate change) into the atmosphere. In contrast, **carbon footprint** is **the carbon dioxide emissions associated with a person or entity's activities and consumption.**

To determine emission reductions, it is necessary to calculate the fraction of non-renewable biomass (Fnr_b). Fnr_b measures the relative amount of wood harvested above the landscape's natural regeneration rate. Interventions that support transitions to more efficient cooking practices can reduce forest degradation and climate-warming emissions because trees that would have been harvested if the intervention had not been introduced remain standing. The Fnr_b is a critical input for calculating emissions reductions, especially from clean cooking interventions. *Clean cooking* is when a system meets the emission rate targets in the World Health Organization (WHO) guidelines (2014). It entails the use of cleaner fuels and energy-efficient modern stoves instead of traditional biomass or polluting fuels. Clean cooking reduces fuel needs and thus reduces the burden on families for fuel wood collection/sales and improves health.

Thus, Fnr_b allows for comparison of intervention and non-intervention scenarios in the carbon market while considering variables like woodfuel demand sources and land cover change. Most of **Nigeria's** rural communities rely heavily on **fuelwood** collection for their livelihood, which has a vital role in sustaining the people's livelihoods and well-being. The fraction of non-renewable biomass (Fnr_b) measures the relative amount of wood harvested beyond the landscape's natural regeneration rate. If more wood is harvested than the landscape can replace, as is the case in

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Nigeria and other developing countries where households and communities rely heavily on fuelwood and charcoal, harvesting is not sustainable, and tree cover will decline over time (Fig. 1). This leads to landscape degradation and may also contribute to long-term deforestation.

Promoting clean cooking systems can reduce climate-warming emissions and forest degradation from the increased standing stock of trees. The reduced emissions generate carbon credits for clean cooking projects. Locations with higher Fnr_b values (meaning larger percentages of wood harvest are non-renewable) have the potential for greater emissions reduction (UNFCCC 2023).

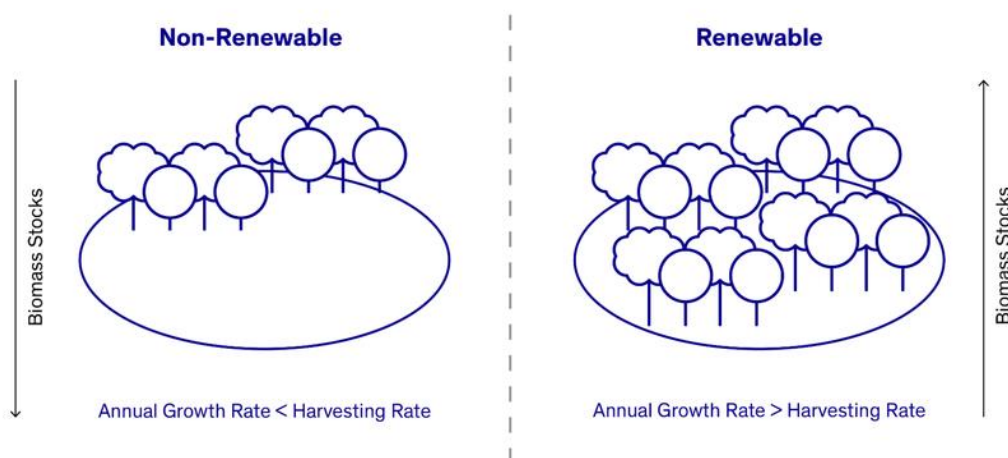


Figure 1. Harvesting in a sustainable manner that does not exceed an area's annual growth rate is viewed as renewable, as woody biomass stocks will remain constant or potentially increase; whereas harvesting at a rate that exceeds an area's annual growth rate is non-renewable, as it would lead to a decline in woody biomass stocks. Fnr_b values close to 90% suggest rapid depletion of all accessible biomass in an area (Gwin et al., 2023)

METHODOLOGY FOR ASSESSMENT OF Fnr_b

The present Fnr_b assessment was based on Clean Development Mechanism (CDM) Tool 30 at the national level based on international and local data sources (Forest Reference Emission Level (FREL) for the Federal Republic of Nigeria, Federal Department of Forestry in FAO 2015, 2020). This approach for calculating emission reductions primarily relies on country-specific default values (or a similar tool for project-specific assessments) estimated by the Clean Development Mechanism and United Nations Framework Convention on Climate Change (UNFCCC), and approved by a locally designated national authority.

The Fnr_b can be determined for the country, a project activity, or a program of activities (PoA). The NRB assessment approach provided in CDM (UNFCCC) methodology AMS-II.G was used. This option is based on the concept of Demonstrably Renewable Woody Biomass (DRB). The applicable equation is:

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

$$f_{NRB} = \frac{NRB}{NRB + DRB} \quad (1)$$

Where:

f_{nrb} *Fraction of nonrenewable biomass (fraction or %)*
NRB *Nonrenewable biomass (t/yr)*

DRB *Demonstrably renewable biomass (t/yr)*

The *f_{nrb}* is estimated at the national level since the available data on forests are more accessible, complete, and accurate at the national level. The value of *NRB* can be derived from:

- The Total Annual Biomass Removals *R*, approximated by the quantity of woody biomass used annually in the country in the absence of the project activity;
- The proportion of *R* that is demonstrably renewable (*DRB*) and non-renewable (*NRB*).

Where:

$$NRB = R - DRB \quad (2)$$

R *Total annual biomass removals (t/yr)*

The Total Annual Biomass removal for the country was calculated as the sum of the Mean Annual Increment in biomass growth (*MAI*) and the Annual Change in Living Forest Biomass stocks (ΔF). The annual biomass removals (*R*) was calculated as the sum of the two:

$$R = MAI + \Delta F \quad (3)$$

Where:

MAI *Mean Annual Increment of biomass growth (t/yr)*

ΔF *Annual change in living forest biomass (t/yr)*

The Mean Annual Increment of biomass growth (*MAI*) was calculated as the product of the extent of Forest (*F*) in hectares in the country and the country-specific Growth Rate (*GR*) of the Mean Annual Increment:

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

$$MAI = F \times GR \quad (4)$$

Where:

F *Extent of forest (ha)*

GR *Annual Growth rate of biomass (t/ha/yr)*

The Demonstrably renewable biomass (DRB) was calculated as the product of the Protected Area extent of Forest (PA) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$DRB = PA \times GR \quad (5)$$

Where:

PA Protected Area Extent of Forest (ha)

The Fnr result obtained at the national level is 72.5 % as described in Table 1 below.

Table 1: National Fnr result for Nigeria

| Data Symbol | Parameter | Value | Unit | Information Source |
|-------------|---|--------------|---------|--|
| | Total Land Area of Country | 91,077,000 | Ha | Global Forest Resources Assessment 2020 Report Nigeria, Rome 2020 |
| F | The extent of forest in the country (Ecological zones: Derived savanna, Guinea savanna, Sudan Sahel, Lowland rainforest, Mangrove swamp, and Montane Forest). | 22,280,358 | Ha | National Forest Reference Emission Level for the Federal Republic of Nigeria (Global Forest Resources Assessment 2020 Report Nigeria, Rome 2020) |
| GR | The growth rate of biomass | 3.43 | t/ha/yr | (Default GR value for Nigeria 3.43t ha ⁻¹ yr ⁻¹) (CDM-WG 37 th Meeting Report Annex 14). |
| MAI | Mean Annual Increment in Biomass Growth | 76,421,627.9 | t/yr | Calculation (MAI= F x GR) |
| ΔF | Annual change in living forest biomass | -9,961,910 | t/yr | Calculated using an annual change of 163,310 ha using an average C |

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

| | | | | |
|------------|--|--------------|------|---|
| | | | | density of 61 t C ha ⁻¹ (FRELs Nigeria FAO 2015, 2020). |
| R | Total annual biomass removals | 66,459,717.9 | t/yr | Calculation (R=MAI+ ΔF) |
| PA | Protected terrestrial areas (Forest area within Pas + forest areas with long-term management plan) | 5,331, 840 | Ha | Global Forest Resources Assessment 2020 Report Nigeria, Rome 2020; (FAO2015; knowledge.unccd.int/sites/default/files/Id n., pdf file) |
| DRB | Demonstrably renewable biomass | 18,288,211.2 | t/yr | Calculation (DRB=PA x GR) |
| NRB | Non-renewable biomass | 48,171,506.7 | t/yr | Calculation (Total annual removals I- Protected area growth (DRB). |
| Fnr | | 72.5% | | Using data for forests within Pas. |

Validated default Fnr values are absent at the national level in Nigeria.

DISCUSSION: Since 2020, the country-specific defaults originally approved by the CDM and UNFCCC are no longer permitted for use in CDM projects. The default country-specific Fnr values have expired (CDM/UNFCCC 2023). The [United Nations Framework Convention on Climate Change](#) is now promoting [research](#) to establish updated fraction of non-renewable biomass (Fnr) values.

The present Fnr assessment is based on CDM Tool 30 at the national level. An Fnr value of 72.5% was computed for the country. This value is slightly less than the previous global country default value of 85% and more than the current default value of 30% adopted by the CDM (Gwin et al., 2023). *Fnr values close to 90% suggest rapid depletion of all accessible biomass in an area (Gwin et al., 2023).* Such Fnr values indicate that large percentages of wood harvest are non-renewable and successful interventions can lay claim to higher emission reductions (Ghilardi and Bailis 2024). Conversely, lower values of Fnr indicate that smaller percentages of wood harvest are non-renewable, and interventions can claim fewer emission reductions. It was assumed in this study that the only renewable biomass nationally was ‘Demonstrably Renewable Biomass’ (DRB), using data for forests within protected areas. That is biomass originating from protected areas such as wildlife reserves, national parks, and community-protected forests. This implies that all biomass in other land areas that are not explicitly sustainably managed is considered non-renewable. Recent reports suggest that this approach overestimates Fnr because the available renewable biomass is underestimated as fuelwood sourced from lands other than protected areas is not included; when in fact renewable and non-renewable conditions can exist in many contexts.

The updated Fnr values for woodfuel interventions in Nigeria are estimated at 39% or 44% for urban Fnr for the current decade (2020-2030) (Ghilardi and Bailis 2024). The higher value of 72.5% determined in this study suggests the need for further analysis of the sources of data used in TOOL 30 and the application of new calculation methodologies introduced by UNFCCC. The lower Fnr values may compensate for a projected decrease in woodfuel demand. This notwithstanding, the uncontrolled **fuelwood** collection practice among most rural communities can cause massive degradation of ecosystems and a decline in biodiversity. Also, the burning of woodfuel can have damaging health effects. Projects aiming to reduce household biomass consumption include improved cookstoves. Cookstove projects distribute stoves that are cleaner or more efficient than traditional technologies so that people require fewer woodfuels for cooking and thus carbon emissions are reduced or avoided.

References:

CDM-WG 37th Meeting Report Annex 14.

CDM (2008): Methodological tool: Calculation of the fraction of non-renewable biomass Version 01.0 Clean Development Mechanism Tool 30, United Nations Framework Convention on Climate Change (UNFCCC).

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

CDM/UNFCCC (2023) <https://cdm.unfccc.int/DNA/fNRB/index.html>

FAO (2020): Global Forest Resources Assessment Report 2020, Nigeria. 2020. Available online: <https://www.fao.org/3/cb0037en/cb0037en.pdf>.

FAO (2015): Global Forest Resources Assessment 2015, Forest reference emission levels for the Federal Republic of Nigeria: A jurisdictional approach focused on Cross River State, Federal Department of Forestry, Federal Ministry of Environment, Nigeria.

FAO (2015): Global Forest Resources Assessment 2015. Food and Agriculture Organization, Rome, Italy.

[Ghilardi A and Bailis R \(2024\) Updated FnrB values for woodfuel interventions. Available online: https://cdm.unfccc.int>Sunset_CMS_ControlledSlots..._Report_on_Updated_FnrB_Values_20_June_2024.pdf](https://cdm.unfccc.int>Sunset_CMS_ControlledSlots..._Report_on_Updated_FnrB_Values_20_June_2024.pdf)

Gwin K., Lavelle M. and Ramesh K (2023): The critical factor driving over-crediting risk in cookstove projects. [fnrb: the Critical Factor Driving Over-crediting Risk in Cookstove Projects/BeZero Carbon](https://bezerocarbon.com/insights/why-fnrB-is-critical-in-our-assessment-of-household-devices-projects). Available online: <https://bezerocarbon.com/insights/why-fnrB-is-critical-in-our-assessment-of-household-devices-projects>

UNFCCC (2023). UNFCCC posts FnrB update research for public comment. Available online: <https://cleancooking.org>news>unfccc-posts-fnrB...>

TECHNICAL SESSION (ABSTRACTS) FOR THE 7TH INTERNATIONAL SAEREM/JOS2024 CONFERENCE

| S/N | TOPIC/AUTHOR(S) | REMARKS |
|--------|--|----------------------------|
| KNS/01 | <i>Addressing The Naira's Free-Fall In The Wake Of Energy Subsidy Removal: A Policy Roadmap For Nigeria's Agricultural Development Under Democracy.</i> MUHAMMAD AHMAD MAKARFI, <i>PhD</i> ; PROFESSOR OF AGRICULTURAL ECONOMICS; (Former Nigerian Ambassador To The Federative Republic Of Brazil) | KEYNOTE SPEAKER |
| LS/002 | Conservation Of Forests And Wildlife In Nigeria: The Pivotal Role Of Community Engagement Zacharia Buba Yaduma <i>PhD</i> , Director General/CEO; Forestry Research Institute Of Nigeria,Ibadan | LEAD SPEAKER |
| LS/003 | Fraction Of Non-Renewable Biomass (FNRB) Assessment For Nigeria Prof. Ani Nkang FNES, FSAEREM, FIIA | LEAD PAPER |

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

| | | |
|---------|---|-----------------------|
| SIC/001 | Effects Of Climate Change and Adaptation Practices on Smallholder Farmers Activities in Coastal Communities in Ondo State. *IBIDAPO, I. And ALE, A. B. | SAEREM/JO S24/TSA/001 |
| SIC/002 | Involvement of Farmers in Agro-Tourism Activities in Ondo State: Remedial Approach to Fuel Subsidy Removal. ALE, ADEJUMOKE BOSEDE & IBIDAPO, IRANOLA | SAEREM/JO S24/TSA/002 |
| SIC/003 | Relative Abundance and Distribution of Some Selected Artiodactyla in Borgu Sector of Kainji Lake National Park, Nigeria S. O. ADEDOYIN, J. I. ALFA And O. D. POPOOLA | SAEREM/JO S24/TSA/003 |
| SIC/004 | Simulation Of The Removal Of Fuel Subsidy And The Performance Of Agricultural Sector In Nigeria. BABANNANA, Sani | SAEREM/JO S24/TSA/004 |
| SIC/005 | Performance Of Broiler Starter Fed Diets Containing <i>Parkia Biglobosa</i> Stem Back Powder As Replacement To Antibiotics. Harande, I. S. ^A , Dabai, A.S. ^A , Yusha ^U H. ^B , Hassan A.U. ^A , Ibrahim, N.T. ^A , Khadija, U.Z. ^C And Fakai, M.H. ^C | SAEREM/JO S24/TSA/005 |
| SIC/006 | Growth Performance of Indigenous Rabbits (<i>Oryctolagus Cuniculus</i>) Fed With Graded Levels of <i>Gmelina Arborea</i> Leaf Meal. Dabai ¹ , S.A. Tanko, S.M ¹ , and Harande I. S. ¹ | SAEREM/JO S24/TSA/006 |
| SIC007 | Climate Change Mitigation Strategies: Socio-Economic And Constraints Of Poultry Farmers In Southern, Nigeria * Nyong, Eteyen , Odimba Victoria Onyekachi, *Melford, Smart **Iliyasu I. Zuru ,***Ibrahim Bala, Abdulkadir B. Farouk | SAEREM/JO S24/TSA/007 |
| SIC/008 | Assessing The Impact Of Educational Interventions On Prostate Cancer Screening Awareness And Attitude Among Farmers Who Use Agro-Chemicals In Rural Nigeria . Jemisenia, John Oluwaseyi, Agada, Sunday Adole ¹ And Ntat, Felix Habila | SAEREM/JO S24/TSA/008 |
| SIC/09 | Investigation On The Effect Of <i>Sacoglottis Gabonensis</i> On Blood Glucose, Body Weight And Behavioural Changes Of Mice Exposed To Non-Nutritive Sweeteners During Gestation Period. Aruchi, Wekhe-Emenike, Adetutu Olubunmi Obulor And Regina Chike Orlu. | SAEREM/JO S24/TSA/09 |
| SIC/010 | Incidence of Fetal Calf Wastage in Cattle Slaughtered in Jalingo Abattoir. MOHAMMED, Murtala Kyari | SAEREM/JO S24/TSA/010 |

¹ Corresponding Author

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

| | | |
|---------|--|--------------------------|
| SIC/011 | Rhythmical activity of aqueous extract of <i>Pentaclethra macrophylla stem bark</i> in New Zealand white rabbit bucks. * ¹ Fatoba T. A and ² Aturu O. T | SAEREM/JO S24/TSA/011 |
| SIC/012 | Varietal Effects and Associated Mycoflora on the Shelf Life of Groundnut Paste Preserved with some Botanicals. Okogbule, F.N.C., Oteri V. O., Oporum J. I., Ifegwu M. K And Akinido C.E. | SAEREM/JO S24/TSA/012 |
| SIC/013 | Rural Livelihoods Diversification: An Avenue To Manage Poverty And Climate Changes Effects. Evidence From Northern Nigeria. ¹ Mamman, B. Y., ¹ Abdulsalam, R.Y., ¹ Adeleke, E. A., ² Kundiri, M. M And ¹ Sanyinna, B. S. | SAEREM/JO S24/TSA/013 |
| SIC/014 | Incidence Of Gastrointestinal Parasites In Chickens Slaughtered In Bali Metropolis Market. Gilbert Edward Vadule | SAEREM/JO S24/TSA/014 |
| SIC/015 | The Growth Performance Of Broiler Chickens Fed Maize, Sorghum And Their Combinations. Haruna Shuaibu, Y.E. Waba And Abdullahi J.K. | SAEREM/JO S24/TSA/015 |
| SIC/016 | Rise in Cost of Tractor, Its Parts and Its Effects on Health and Welfare of Traction Animals: Moses Gani Umaru And Oche Sunday Gabriel | SAEREM/JO S24/TSA/016 |
| SIC/017 | Survey on the Performance of Indigenous Chicken Production A Study of Wukari Local Government Area of Taraba State; Jibrin Jaafaru | SAEREM/JO S24/TSA/017 |
| SIC/018 | Effects of Different Species of Mycorrhiza on the Growth and Development of Two <i>Solanum Lycopersicum</i> L. (Tomato) Varieties, Wumi Esther Adelegan | SAEREM/JO S24/TSA/018 |
| SIC/019 | Effects of Socioeconomic Characteristics on Local Rice Processing in Wukari Local Government Area, Taraba State. Nakang Mikailu Kpawama | SAEREM/JO S24/TSA/019 |
| SIC/020 | Intervention Rate and Constraints between Institutions on Climate Refugees in Orashi, Niger Delta Region: Coockey, A.T. And Unaeze, H.C. | SAEREM/JO S24/TSA/020 |
| SIC/021 | Comparative Analysis of Carbon Sequestration in Mangrove and Rainforest Ecosystems in Cross River, Nigeria. Ononyume, Martin Ogheneriruona And Edu, Esther Aja Bassey | SAEREM/JO S24/TSA/021 |
| SIC/022 | Monitoring Deforestation in Yankari Game Reserve Using High Resolution Satellite Imagery. Toma Buba | SAEREM/JO S24/TSA/022 |

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

| | | |
|---------|---|--------------------------|
| SIC/023 | Utilization Of Mobile Phone In Sourcing Agricultuiral Information Among Maize Farmers In Bali Local Government Area Taraba State Danladi Muhammad Muhammad | SAEREM/JO S24/TSA/023 |
| SIC/024 | The Effect of Artemeter-Lumefantrine and Antioxidant Interactions on Selected Kidney Function and Haematological Biomakers of Toxicity in Albino Wister Rats. Ugor, M. A., Eteng, M. U., Duke, D. N, Elot, K. N., Oko, B. O. | SAEREM/JO S24/TSA/024 |
| SIC/025 | Seasonal Evaluation of Performance of Cucumber in Response to Climate Change in Okitipupa a Rainforest Zone of Nigeria. Titilayo O Oladitan | SAEREM/JO S24/TSA/025 |

Seasonal Evaluation of Performance of Cucumber in Response to Climate Change in Okitipupa a Rainforest Zone of Nigeria

Titilayo O Oladitan

Dept of Crop, Soil and Pest Management

Olusegun Agagu University of Science and Technology Okitipupa, Ondo State Nigeria.; Email: ditanbimpe@gmail.com

Abstract

Solving the problem of climate change on food production and security is one of the biggest challenges faced by most developing nations. These regions are particularly vulnerable to climatic change because of their dependence on rainfed agriculture, low levels of agro-technology skill, human and physical capital, inequitable land distribution and poor infrastructure.

The study was devoted to assess the crop-climate factor relationships in cucumber production, one of the most rated consumed vegetable crops of high nutritional and economic value over two seasons in a rainforest zone. The aim is to identify the climatic factor contributing to the productivity, and to search for adaptation strategies relevant to small holder farmers in the face of a changing climate and extreme weather and the consequences on food production and security.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Cucumber field was established at onset of first modal (March-July) and second modal rainfall (August -December). Planting dates were implemented to determine the best date and season with respect to growth and fruit yield, also to identify the sowing season which boosted and improve yield and quality of fruit harvest, in Okitipupa, Nigeria. The results suggest that the adaptation management models of planting season is a valuable tool in assisting optimum production of cucumber in the humid ecological zones and might be applicable to other agricultural production areas in Nigeria. The integrating knowledge of management practices can be used to estimate crop growth and yield and useful information in the prediction of future production and planning responses to future climate change.

Keywords: *Tomato, Climate change, Management, Sowing Dates Humid Zone.*

Varietal Effects and Associated Mycoflora on The Shelf Life of Groundnut Paste Preserved With Some Botanicals

Okogbule, F.N.C., Oteri V. O., Oporum J. I., Ifegwu M. K and Akinido C.E.

Department of Applied and Environmental Biology, Rivers State University, Port Harcourt, Nigeria; abebefortuneokogbule@gmail.com.

Abstract

Research on the varietal effects and associated mycoflora on the shelf life of groundnut paste preserved with some botanicals was conducted in the Botany Laboratory of the Rivers State University, Port Harcourt, Nigeria. Three varieties of groundnut were used namely Sam nut 21, Sam nut 23 and Sam nut 24. Six plant materials comprising three different three seeds samples viz: *Aframomum melegueta*, *Monodora myristica* and *Piper guineense* were used for the study. The samples were aseptically treated and sundried for three days and crushed into powder. 10 grams of the groundnut paste was weighed and varying concentrations of the powdered seed samples were added to the pastes and labelled accordingly. The treated groundnut paste samples were allowed to store in the laboratory and their proximate compositions tested for a period of six months on a monthly basis to determine the effects of the applied plant materials. Powdered *Monodora myristica* indicated no significant difference in ash, protein, Iron, phytates and tannins across the different varieties. A significant reduction was observed in lipids, calcium, phosphorous, potassium, Thiamin, Niacin and Vitamin A, while all other parameters such as moisture, fibre,

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

carbohydrate, Sodium, Vitamin C, significantly increased at ($p < 0.05$) across the different varieties. Powdered Alligator pepper indicated no significant difference in ash, protein, Iron, sodium, oxylate, tannins and polyphynols across the three different species. A significant reduction was observed in lipids, calcium, magnesium, potassium, Niacin, carotenoids and Vitamin A, while all other parameters such as moisture, fibre and carbohydrate significantly increased at ($p < 0.05$) across the three different species. Powdered ewhuru seed indicated no significant difference in ash, protein, Iron, phytates, tannins and polyphynols across the three different species. A significant reduction was observed in lipids, calcium, phosphorous, potassium, Thiamin, Niacin and Vitamin A, while all other parameters such as moisture, fibre, carbohydrate, Sodium, Vitamin C, lignants etc. significantly increased at ($p < 0.05$) across the three different species. The result from this work revealed that the addition of the various plant materials to groundnut paste generally increased the shelf life Of groundnut paste during the Six months of study. Five fungal pathogens were found to cause spoilage of groundnut paste viz: *Aspergillius niger*, *Aspergillius flavus*, *Fusarium oxysporum*, *Penicillium italicum* and *Candida tropicalis*.

Key Words: Groundnut paste *Afromomum melegueta*, *Monodora myristica* and *Piper guineense*, Proximate Composition.

Assessing the Impact of Educational Interventions on Prostate Cancer Screening Awareness and Attitude among Farmers who use Agro-Chemicals in rural Nigeria

Jemisenia, John OLuwaseyi, Agada, Sunday Adole² and Ntat, Felix Habila

Department of Sociology & Anthropology, University of Nigeria Nsukka

Department of Agricultural Extension and Management, Federal College of Forestry, Jos

Department of Agriculture Economics and Extension, Faculty of Agriculture, University of Jos; john.jemisenia@gmail.com

Abstract

This study investigated the effectiveness of educational interventions in enhancing awareness of prostate cancer screening among farmers exposed to pesticides in rural communities in Benue State, Nigeria. Using quasi-experimental approach, a sample of 120 farmers who mixed or applied pesticides participated in pre- and post-intervention surveys following educational workshops

² Corresponding Author

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

focused on prostate cancer risks and screening importance. Results indicate a significant improvement in participants' awareness and attitudes towards prostate cancer screening post-intervention, with pre-intervention surveys revealing low awareness and misconceptions. The findings underscore the efficacy of tailored educational approaches in addressing knowledge gaps and promoting health-seeking behaviors among farmers. Recommendations include sustained educational campaigns, training for healthcare providers, and improved access to screening services in rural areas, highlighting the need for policymakers to prioritize occupational health regulations in agriculture to minimize pesticide exposure and facilitate early detection of prostate cancer.

Keywords: Educational interventions, Farmers, Benue, Arrest, Prostate cancer

The Effect of Artemeter-Lumefantrine and Antioxidant Interactions on Selected Kidney Function and Haematological Biomarkers of Toxicity in Albino Wister Rats

Ugor, M. A., Eteng, M. U., Duke, D. N, Elot, K. N., Oko, B. O.

Abstract

The effect of artemether-lumefantrine and antioxidant interactions on selected Kidney and Haematological Biomarkers of toxicity in albino Wistar rats was investigated. Fifty five albino Wistar rats grouped into eleven study groups of five rats per group and subjected to various treatments for seven days. Group 1 was administered with distilled water only (control); group 2 administered with artemether-lumefantrine alone with dose of 8mg/kgbw. Groups 3, 4 and 5 were administered Vitamin C, E and Garlic with dose of 5.8mg/kgbw, 5.7IU/kgbw and 7.2mg/kgbw respectively, concomitantly at the start of artemether-lumefantrine treatment. Groups 6, 7 and 8 were administered Vitamin C, E and Garlic with similar doses respectively midway into artemether-lumefantrine treatment. Groups 9, 10 and 11 were administered Vitamin C, E and Garlic of similar doses respectively at the end of Artemether-Lumefantrine treatment. Antioxidant groups administered concomitantly at the start of artemether-lumefantrine treatment showed a significant ($p < 0.05$) increased in body weight, RBC, WBC Na^+ and Cl^- while Cr, K^+ HCO_3^- and

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

urea showed reduction ($p < 0.05$) compared to artemether-lumefantrine treated group. Antioxidant groups treated mid-way with artemether-lumefantrine showed an increased ($p < 0.05$) RBC Na^+ and Cl^- while WBC Cr, K^+ HCO_3^- reduced compared to artemether-lumefantrine treated groups. Moreover, antioxidant groups treated with artemether-lumefantrine at the end of treatment, showed decrease ($p < 0.05$) in Hb, Cr, Urea, K^+ (for Vitamin E), WBC, HB (for Vitamin C and Garlic); but an increase in HB, Na^+ , K^+ , HCO_3^- , Cl^- (for Garlic). There were mild alterations in some of the kidney function parameters in all the groups. The results obtained suggest the role of antioxidant in alleviating the negative effects caused by artemether-Lumefantrine. Of the three antioxidants used, Vitamin E and Garlic were effective, but Garlic was more potent.

Keywords: Malaria, Artemether-Lumefantrine, antioxidants Garlic, Vitamin E.

Effects of Climate Change and Adaptation Practices on Smallholder Farmers Activities in Coastal Communities in Ondo State

*Ibidapo, I. and Ale, A. B.

Dept. Agricultural Science, Adeyemi Federal University of Education, Ondo

(*corresponding author: ibidapo68@gmail.com)

Abstract

This study examined effects of climate change and adaptation practices on activities of smallholder farmers in coastal communities in Ondo State. Multistage sampling technique was used to select one hundred and sixty-five (165) smallholder farmers in the coastal communities for the study. Semi-structured questionnaire was used to gather socio-demographic information, farm and livelihood activities of the smallholder farmers. Data collected were analysed with descriptive statistics and logistic regression analysis. Results shows the mean age of smallholder farmers was 47.3 ± 7.6 years, 53.5% were male and 54.3% were married with mean household size of 8.0 ± 3.0 members and 45.4% had primary education. The livelihoods activities of the smallholder farmers included; crop production, fishing, non-farm activities and handcrafts. Climate change leads to loss in crops and income, decline in fishing, among others. Challenges facing the smallholder farmers included; flooding and erosion, excessive rainfall, increase in heat and variations in temperature, migration of people, reduction in fishing activities, among others. The logistic regression analysis revealed that, age, education, non-farm income, access to information and credit access were the significant variables influencing coastal farmers' awareness of climate

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

change in the location. It was recommended that education, access to credit and information should be encouraged among smallholder farmers in coastal communities.

Keywords: Climate change, adaptation practices, coastal communities, smallholder farm

Utilization of Mobile Phone in Sourcing Agricultural Information among Maize Farmers in Bali Local Government Area Taraba State

Danladi Muhammad Muhammad

Department of Agricultural Technology Federal Polytechnic Bali, Nigeria

Email: Danlad05@yahoo.com ,

Abstract

The Purpose of the study was to examine Utilization of mobile phone for Sourcing Agricultural information among maize farmers in Bali local Government Area Taraba state, Nigeria. The specific objective of the study were to Identify the Socio-economic characteristics of the farmers, examine frequently use of mobile phone for Agricultural information, Identify the constraints associated with used of mobile phone among respondent for Agricultural information. Sixty (60) maize farmers were randomly selected for the study. Data were collected using structural questionnaire and analyzed using descriptive statistics (frequency, pacentage and also likert scale) was used. The result of the study shows that majority (44%) of the respondent were married and (55%) were male. Findings of the age 30% of the respondent were below age of forty five years with mean age of 40 years. Forty five percent have more than 10 years in farming experience, it is also found that (88%) of the respondent afford to buy mobile phone, while (55%) can earn less than 1 million income per year. The study concluded that maize farmers in the area uses mobile phone for sourcing Agricultural information. The major constrain faced by maize farmers in the study area are unstable power supply, poor network service. Government and stakeholders should provide enable environment for mobile uses for Agricultural development. National grid should extend to the area for improvement of the live hood and increase maize production for better of the farmers in the area and Nigeria at large.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Key Words: Utilization, Agricultural information, Maize Framers, Mobile Phone

Monitoring deforestation in Yankari Game Reserve using high resolution satellite imagery

Toma Buba

Department of Ecology, Faculty Science, Abubakar Tafawa Balewa University, P.M.B 0248, Bauchi. E-mail: tomabuba@gmail.com

Abstract

In Nigeria, Protected Areas have been deforested, degraded, encroached and converted to other land uses. It has been reported that Yankari Game Reserve (YGR) is facing increasing pressure from the neighboring communities, due conversion of the forest into arable lands and built environments. This study was aimed to determine and quantify vegetation change at 5 km buffer zones inside and outside the YGR between the year 2014 to 2024 using satellite imagery. The imagery used was the *Normalized Difference Vegetation Index* (NDVI) derived from *Surface Reflectance* of the Harmonized Landsat Sentinel-2 (HLSL30 of v2.0). The result revealed that the vegetation significantly ($\alpha = 0.05, p = 0.00$) decreased both outside and inside the YGR from 2014 to 2024. Outside the YGR, the mean NDVI value in 2014 was 0.57, which significantly higher than that of 2020 (0.53), which was in turn significantly higher than that of 2024 (0.33). While inside the YGR, the mean NDVI values for 2014, 2020 and 2024 were 0.66, 0.57 and 0.33

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

respectively. These values were also all significantly ($\alpha = 0.05, p = 0.00$) different. The information revealed by the results of this study is crucially important in predicting future scenario of vegetation change in YGR and alert the stakeholders to be more proactive in protecting the game reserve.

Involvement of Farmers in Agro-Tourism Activities in Ondo State: Remedial Approach to Fuel Subsidy Removal

Ale, Adejumoke Bosede & Ibidapo, Iranola

Department of Agricultural Science,,Adeyemi Federal University of Education, Ondo

e-mail: alesefunmi@gmail.com

Abstract

Government policies have been known to impact Agricultural production either directly or indirectly. One of such is fuel subsidy removal with its palpable hardship on the populace. Farmers will have to develop coping strategies which includes diversification into several other income generating activities. One of such is Agro-tourism, a type of rural tourism that allows the tourist to visit farms and experience a farmer's daily life for a fee. This is why the study investigated the awareness and involvement of farmers in agro-tourism activities in Ondo State. A multistage sampling technique was used to sample a total of 120 farmers using a structured questionnaire to elicit their responses. The findings revealed that majority of the respondents were aware of agro-tourism and its potential as an income-generating activity. It also revealed the involvement of the respondents in agro-tourism activities which are; direct sales of fresh agricultural products ($\bar{x} = 3.48$), sales of value added food products ($\bar{x} = 3.28$), sales of farm/ ranch promotional items (shirts, aprons, mugs) ($\bar{x} = 2.79$), story-telling ($\bar{x} = 2.77$), crop tours ($\bar{x} = 2.71$), while the least activity

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

involved in by the farmers was giving overnight accommodation ($\bar{x} = 1.89$). The constraints to their involvement identified by the respondents were inadequate accommodation facilities, unstable government policies, infrastructure challenges and funding. It was recommended that agricultural extension should provide capacity building on agro-tourism for farmers.

Key words: Agro-tourism, Fuel, Subsidy

Comparative Analysis of Carbon Sequestration in Mangrove and Rainforest Ecosystems in Cross River, Nigeria.

Ononyume, Martin Ogheneriruona and Edu, Esther Aja Bassey

Department of Plant and Ecological Studies, University of Calabar, P.M.B 1115, Calabar, Nigeria. E-mail: martinononyume@gmail.com

Abstract

Tropical forests, despite covering less than 10% of Earth's land surface, are vital for biodiversity, carbon sequestration, and climate regulation. This study evaluates carbon pools in Nigeria's Great Kwa River mangrove forest and Cross River National Park rainforest. Field and laboratory analyses assessed canopy closure, biomass, and carbon and nitrogen stocks. Statistical analysis revealed soil carbon as the dominant carbon stock in mangroves (89.80%), while aboveground biomass was highest in rainforests (50.36%). The mangrove's CO₂ equivalent was 1,553.51 Mg, compared to the rainforest's 831.73 Mg. These findings underscore the importance of conserving these ecosystems for their significant carbon sink capabilities and climate regulation roles.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Investigation on the effect of *Sacoglottis gabonensis* on blood glucose, body weight and behavioural changes of mice exposed to non-nutritive sweeteners during gestation period.

Aruchi, Wekhe-Emenike, Adetutu Olubunmi Obulor and Regina Chike Orlu.

Department of Animal and Environmental Biology, Rivers State University, Port Harcourt, Nigeria. Email: aruchi.wekhe-emenike@ust.edu.ng

Abstract

Aspartame, sucralose and acesulfame k are common artificial sweeteners in food and drugs industry. They are used to duplicate the effect of sugar in taste by diabetics and calorie conscious people. Some researchers have linked their consumption to health problems such as systemic diseases, behavioural and cognitive effect amongst others. A total of 16 female mice (mean weight 18.6 ± 2.32 g) divided into four groups were used in this study. Group A received no sweeteners or *S. gabonensis*, B received 50mg of sweeteners only, C received 50mg of sweeteners and 250mg/kg/bw of *S. gabonensis*, D received 250mg/kg/bw of *S. gabonensis* only for 8 weeks. Results show that group A and D had significant ($p < 0.05$) decrease in blood glucose concentration with 7.27 ± 3.53 mmol/L and 8.22 ± 1.87 mmol/L respectively compared to group B and C with 9.12 ± 1.03 mmol/L and 8.22 ± 1.87 mmol/L. There was significant ($p < 0.05$) increase in body weight in groups A 32.60 ± 7.34 g and B 31.38 ± 4.53 g compared to groups C, 22.45 ± 15.49 g and D, 24.00 ± 14.71 g. Gestation length was between 19 and 20 days for the different groups and the behavioural changes such as climbing, running, nesting and restlessness were observed in all the groups. The administration of *S. gabonensis* did not alter gestation length and behavioural changes during gravid period in experimental animals but altered the blood glucose concentrations. However, administration of *S. gabonensis* is recommended for individuals who are at the risk of

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

developing high blood glucose concentration and increased body weight as it has shown modulatory effect on blood glucose and body weight gain.

Key words: body weight, behavioural changes and gestation

Intervention Rate and Constraints between Institutions on Climate Refugees in Orashi, Niger Delta Region

Cookey, A.T. And Unaeze, H.C.

Department of Agriculture Economics and Agribusiness Management

University of Port Harcourt; E.Mail: cookeytammy@gmail.com

Abstract

The study was conducted to analyze the Intervention rate and constraints between Institutions on Climate Refugees in Orashi, Niger Delta. The Objectives of the study were; to ascertain the rate of intervention between public and non-governmental Organizations on climate refugees and to identify the constraints encountered by institutions and the respondents in the study area, The Hypothesis postulated for the study was There is no significant difference in the rate of intervention between public and Non-governmental institutions in the study area. Data were collected using Cross Tabulation and Descriptive statistics and the Student T-test was used to present and analyze the data. The findings revealed that on the rate of intervention between public and non-governmental organizations on climate refugees, the respondents received stimulus packages, training, and incentives more from governmental organizations than non-governmental organizations, going further 99% of the climate refugees opined that Insecurity and poor coordination of activities were major constraints encountered by them. Furthermore, the Student T test analysis proved that there is a statistically significant difference between the means of governmental organizations and Non-governmental Organizations at a 95% confidence level. It was recommended that Institutions should provide options and the autonomy to choose whether and where they will be relocated is essential to realizing ethically acceptable responses and the

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Government should design a multi-sectorial approach so as to build the capacity of Institutions in order to address the issue of climate refugees.

THEME: Effects of Fuel Subsidy removal on Climate Action, Agricultural Production and Agro Allied Industries, Food Security, Sustainable Fisheries, Biodiversity/Soil Conservation and Agricultural Resources.

Effects of Socioeconomic Characteristics on Local Rice Processing in Wukari Local Government Area, Taraba State.

Nakang Mikailu Kpawama

Department of Crop Production Technology. Federal Polytechnic Bali.

mikanakang@yahoo.com

Abstract

This conference paper investigated the effects of socioeconomic characteristics on local rice processing in Wukari Local Government Area (LGA) of Taraba State, Nigeria. Rice processing is a critical component of the region's agricultural economy, providing livelihood opportunities and contributing to food security. A simple random sampling technique was employed to select a total of 86 rice processors. Primary data were collected for the study through structured questionnaire administered to rice processors in the study area. Analytical tool adopted for the study include; descriptive statistics and multiple regression analysis. The result of showed that majority (63.95%) of the rice processors were females while 36.05% were males. The age of the respondents between 31-40 years with 33.72% ranked the highest, while those greater than 61 years with 10.47% was the least. Majority (67.44%) of the respondents were married while 8.14% were single. Result on household size shows that greater proportion 39.53% of the respondents has the highest frequency at the range of 7-9 persons while 15.12% were least. The result of educational level shows that majority (35.56%) completed tertiary education while (12.79%) had no formal education. Also that most (41.86%) of the respondents had reasonable years of experience ranging between 21-30 in the study area. Multiple regression analysis shows that coefficient of determination was 91.7% while gender, marital status, education, household size and experience were positively signed and statistically significant. The major constraints limiting the rice processing were insufficient capital, source of paddy rice, cost of processing inputs, poor processing method and insufficient power. Therefore, the following were recommended; they include; Extension agents should be made available and credit facilities provided.

Effects of Different Species of Mycorrhiza on the Growth and Development of Two *Solanum lycopersicum* L. (Tomato) Varieties

Wumi Esther Adelegan

Department of Science Laboratory Technology, Federal Polytechnic Ugep, Cross rivers State

wumiadelegan@fedpolyugep.edu.ng

Abstract

This study was carried out to investigate the effects of inoculation of four different mycorrhizal fungi (*Glomus clarum*, *Glomus mossea*, *Glomus deserticola* and *Gigaspora*) and their combination on the growth and development of two varieties of *Solanum lycopersicum* L. The experiment was designed in a complete block design for 2 accessions of tomato, 6 treatments, 2 controls and 5 replicates of which the best three replicates were chosen. The experiment was conducted in university of Ibadan for 8 weeks. Data were collected on the growth and developmental parameters (number of leaves, number of branches, stem girth, plant height, leaf area, dry shoot and root weights) and physiological parameter (relative water content and leaf chlorophyll content). Data obtained were subjected to one way Analysis and Duncan multiple range test for multiple comparisons at $p \leq 0.05$. Plants treated with combined inocula produced an increase in growth and development statistically higher than plant treated with single inocula. However, the combination *G. clarum* + *G. mossea* was most effective on kerewa variety while *G. deserticola* + *Gigaspora* on royal variety. These results suggest that the use of double inocula could be convenient than single inocula but attention should be given to the effectiveness and aggressivity of the species or strains to be combined.

Climate Change Mitigation Strategies: Socio-Economic and Constraints Of Poultry Farmers In Southern, Nigeria

* Nyong, Eteyen , Odimba Victoria Onyekachi, *Melford, Smart **Iliyasu I. Zuru ,***Ibrahim Bala, Abdulkadir B. Farouk*Department of Agricultural Economics and Extension, Akwa Ibom State, University, Nigeria.

**Department of Agriculture Technology, Akanu Ibiam Federal Polytechnic, Unwana-Afikpo, Ebonyi State

***Department of Agric. Economics and Ext, Federal University of Agricultural Zuru, Kebbi State Nigeria

***Department of Crop Science, Federal University of Agricultural Zuru, Kebbi State Nigeria

Email : eenyong16@gmail.com

Abstract

The study focused on Climate Change Mitigation Strategies: Socio-economic and Constraints of Poultry Farmers in Southern, Nigeria. A three stages sampling procedure was used to randomly select one Hundred and Twenty-four respondents that was used for the study. Primary data was collected using questionnaire. Data collected were analyzed using descriptive statistics and multiple regression analysis. Result revealed that majority (56.5%) of respondents was male while 43.5% were female. Majority (72.6%) were married, 16.5% single 4.8% divorced while 6.5% were widow(er). About 83.9% were educated. The average age, farming experience, household size and farm size were 42 years, 9 years, 5 persons and 380 birds, respectively. Majority (53.2%) had no access to extension services, while 46.8% had. Most (77.4%) respondents were engaged in off farm income while 22.6% were not. All respondents (100%) were members of cooperative and other farmers union. Majority (96.8%) had no access to credit while 3.2% had. Result of the multiple regression analysis showed that adoption of climate change mitigation strategies were influenced by house hold size, off farm income, group membership, education attainment, extension contact and farm size. The major constraints were high transportation cost, inadequate capital, high cost of feed, high market charges and lack of facilities. The study recommended that policies that will enhance educational attainment and asses to extension should be pursuit.

Keywords: Climate Change, Mitigation, Strategies, Adopted, Determinant

Rise in Cost of Tractor, Its Parts and Its effects on Health and Welfare of Traction Animals

Moses Gani Umaru, Oche Sunday Gabriel

Department of Animal Health and Production, school of Agricultural technology Federal polytechnic Bali. Department of Bioresource Development center, National Biotechnology Development, Agency Abuja. Email: ganimoses57@gmail.com

Abstract

*Animal traction is still the cheapest means of energy, that is easily accessible for Agricultural production. In addition, it is the commonest means of tillage in Taraba state. Consequently, rise in cost of tractor, its parts, increased the demand for animal traction because most farmers can't afford the cost of tractors resulting to pressure on traction animals, causing stress, fatigue, ill-health conditions and death of traction animals. It was observed that, reasons such increase in parts of tractors, its parts by the importers, whole sellers and retailers within the country, which is said to be associated with rise in dollars. Two hundred questionnaires were distributed alongside personal interview to the 8 of the 16 LGA of Taraba state aimed at investigating the effects of increase in cost of tractors and its parts on health and welfare of traction animals all returned filled. the questions covered traction activities of 3 farming seasons (2021, 2022, 2023). Data generated were keyed into the computer and analyzed using descriptive statistics as contained in statistix 9.1 statistical package for scientist and Engineers. The findings were presented in tables and graph. Table one presented the demography of the respondent under the effects age, gender, marital status and household size. *Significant ($P < 0.05$) The findings according to table 3. showed that the animals suffered from fatigue, ill-health and death or salvage (slaughter). caused by use of underage animals, overworking, use of force and fewer animals to do much jobs. It was recommended that, more animals should be employed, avoid overworking and use of underage animals, adopting proper health and husbandry management. If these recommendations are adhered to it will promote good welfare which is in line with one-health goal. Healthy Humans, Animal and Environment.*

Keywords: Animals-traction, Health, Parts, Tractors, Welfare

Survey on the Performance of Indigenous Chicken Production A Study of Wukari Local Government Area of Taraba State

JIBRIN JAAFARU

Department of Animal Health And Production Technology, Federal Polytechnic Bali, Taraba State; Email 52565256j@gmail.com

Abstract

A survey on the performance of indigenous chicken production was carried out in wukari local government area of Taraba state. A total of one hundred questioner were structure and administered of which 87 were filled and return while 13 were unable to retrieved. The results of the study shown that the majority of respondent are female which represent (62.35%) this show the gender balance in house income distribution the overall average age of the respondent were 40 years which represent (55.29%) this average age indicate the present of active labor force which have positive impact on chicken production. The result of the study indicate that chicken farming is commonly practiced as a sideline activities and non of the respondent specialized in this activities however, benefit of chicken farming in the context of smallholder farmer were multi-faceted in the study area, in ranking the result shown that sale of live bird as source of income was the first most important function of rearing chicken which represent (56.4%) followed by egg hatching for breeding/replacement stock (33.6%) meat production for home/festivities usage (10%) management practiced of the study study area shown that majority of the respondent practiced semi-intensive system (59.5%) managed mainly on scavenging with conditional feed supplementation, extensive system (29.5%) and intensive (11%), however, all the farmers practiced supplementing feeding system and use home grown crops. The result of the study also shown that the average age of male at first mating and female at first egg were 5 and 6 months, respectively. The number of clutch per hen per year, eggs per clutch and total eggs produced per hen per year were 3 and 36 at average of 12 eggs per clutch respectively. The hatchability and survival rate of chicks were (75.19%) and (56.51%.) majority of the chicken farmers in the study area had the culture of selecting chicken for replacement stock. Body size, plumage color, body conformation, comb type, egg production performance and responsiveness to predators were the major means of selection. Chicken diseases and predators were considered to be the largest threat to chicken production. The survey indicated low productivity of indigenous chickens; hence appropriate interventions particularly on the improvement of breed, health care, housing, and feeding are required. Therefore, efforts need to be made to improve the productivity of chickens in sustainable way through a holistic approach in services like health, husbandry, research, extension, training and credit interventions.

Keywords: *Chicken, indigenous disease predators, performance*

Incidence of Gastrointestinal Parasites in Chickens Slaughtered in Bali Metropolis Market

Gilbert Edward Vadule

**Department Of Animal Health and Production Technology, Federal Polytechnic Bali,
Taraba State, Nigeria.**

Abstract

A study on the gastrointestinal parasite of local chickens slaughtered in some selected popular eating centres in Bali market was conducted. A total of 50 faecal samples from the intestinal tract, of already slaughtered chicken were examined using wet mount methods to view the presence of gastrointestinal parasites. Samples of chicken examined were positive (infected). The species implicated were, local chicken (94%) Broiler (2%). The gastrointestinal parasites discovered were (96%). In all the faecal samples examined for sexes, 23 (42%) males and 27 (52%) females were infected with gastrointestinal parasite. The high prevalence of gastrointestinal parasite as observed in this area has a strong relationship with their mode of feeding and living conditions which will lead to reduced body weight, decreased egg production and deaths thus affecting the meat quality and nutrient content of the chicken.

Key words: incidence, Gastrointestinal, parasites, chickens, slaughtered, Bali

Rhythmical activity of aqueous extract of *Pentaclethra macrophylla* stem bark in New Zealand white rabbit bucks

*¹Fatoba T. A and ²Aturu O. T

Olusegun Agagu University of Science and Technology, Okitipupa.

¹Department of Animal Production and Health

²Department of Biological Sciences, ;*Corresponding author ta.fatoba@oaustech.edu.ng

Abstract

The use of medicinal plants in recent times has necessitated the research activities in many countries to determine the consequences of consumption. *Therefore, this work is designed to investigate the effects of Pentaclethra macrophylla on heart rate using male New Zealand white rabbit. Twenty weaned male New Zealand white rabbit average weight $560 \pm 23.4g$ and Pentaclethra macrophylla stem bark were procured from natural site for the study. The bucks were randomly allotted into five (5) treatments (control, T1, T2, T3 and T4) consists of four (4) bucks and were fed ad libitum with concentrate and supplemented with forages and clean water served regularly. The results revealed that animals in the treatments groups had higher values for heart rate, respiratory rate and rectal temperature than the control but are insignificant different ($p>0.05$). I concluded that the consumption of Pentaclethra macrophylla produced insignificant effect and safe. The results of this study justify the use of the seed as condiment in cooking at homes.*

Key words: aqueous extract, heart rate, medicinal plants, Pentaclethra macrophylla, stem bark

Incidence of Fetal Calf Wastage in Cattle Slaughtered in Jalingo Abattoir

MOHAMMED, Murtala Kyari

Department of Animal Health & Production Technology, Federal Polytechnic Bali, Taraba State, Nigeria.; mmkyari@gmail.com,

Abstract

This study was conducted to assess the prevalence of calf fetal wastage in cow slaughtered in jalingo abattoir, in order to address a research vacuum related to this topic; the study investigations took place from June to July 2024. A cross-sectional survey was carried at the slaughterhouse. For each visit, the number of cattle slain, the number of pregnant cows slaughtered, and gestational ages (stage of pregnancy of the dam, and estimated by crown-rump length) of the fetuses were recorded. From June to July 2022, records of calf fetal wastages resulting from slaughtered pregnant cows were collected daily between 6:00 am and 11:00 am. Before animal slaughtering, the sex was recorded. The pregnancy status of the cows was first determined by visual assessment and palpation of the exposed uterus after slaughtering and then confirmed by dissecting the uterus of any suspected gravid cow. Fetuses' sex was determined by exploring external genital organs. On the other hand, age was estimated based on the fetus crown-rump length and weight using weighing scale. The data obtained were analyzed using descriptive analysis, such as simple averages and percentages. During the investigation, a total of 2361 cattle were slaughtered. The number of slaughtered females was 1399(59%); among them, 151(6.4%) were pregnant. These results attested that slaughtering pregnant cows constitute a strong constraint on cattle industry development in Nigeria. Urgent measures, such as adequate enforcement of legislations on routine veterinary examinations at slaughterhouses as well as livestock owner's sensitization, are required to avoid selling pregnant cows during calving season are required.

Keywords: fetal wastage, cows, pregnant, slaughtered, Abattoir.

The Growth Performance of Broiler Chickens Fed Maize, Sorghum and their Combinations.

Haruna Shuaibu, Y.E. Waba and Abdullahi J.K.

Department of Animal Health and Production Technology, The Federal polytechnic Bali.Taraba State Nigeria.; *Email:harunashuaibu300@gmail.com*

Abstract

Poultry production plays important role for the nutritional security of a small and marginal farmer. Though poultry industry contribute significantly to national earing in Nigeria. This study was conducted to investigate the effect of dietary replacement of maize with sorghum on the growth performance of broiler chicken in a 42days feeding trials. One hundred and thirty five (135) unisex broiler chicken weight averagely 366.13g were randomly allotted to three (3) experimental diet. The design consisting of 45 bird replicated three (3) times with 15 bird per replicate. The treatment T1 which is control contain (100% maize), treatment T2 (50% maize and 50% sorghum). The maize and sorghum served as the major energy source in broiler diets. Feed and drinking water were provided ad libitum . The result show that there were significant ($P < 0.05$) differences in the final live weight and overall weight gain. Treatment T3 (50% maize + 50% sorghum) recorded the highest final live weight (2247.40g). However, the highest overall weight gain (2107.90g) also observe in treatment T3 with (50% maize + 50% sorghum). There were no significant ($P > 0.05$) different in daily feed intake, daily weight gain and feed conversion ratio among all the treatment. These suggest, that maize could be replaced by low-tannin sorghum without adverse effect on growth performance in broiler diets.

Keywords : Dietary , ad libitum , Broiler , nutrition

Relative Abundance and Distribution of Some Selected Artiodactyla in Borgu Sector of Kainji Lake National Park, Nigeria

S. O. Adedoyin, J. I. Alfa and O. D. Popoola

Department of Forestry and Wildlife, Prince Abubakar Audu University, Anyigba, Nigeria
Correspondence Author: adedoyin.so@ksu.edu.ng

Abstract

Artiodactyla are one of the groups of wildlife species being hunted the most. The study examined the relative abundance, population structure and distribution of *Syncerus caffer*, *Hippotragus equinus*, *Phacochoerus africanus* and *Kobus kob* and also recommended some conservation steps for the existing population of the selected artiodactyla in Kainji Lake National Park. Four 4 km × 3 km transects were laid in four out of the six main vegetation communities with a total effective study area of 48 km². The results showed that *Hippotragus equinus* had the highest number of individual species sighted in both wet (126) and dry (133) seasons. Riparian forest woodland habitat harboured the highest population of the selected artiodactyla in both wet (86) and dry (90) seasons. Overall, the total number of the selected artiodactyla population in both wet and dry seasons were 279 and 293 respectively. The relative abundance of *Hippotragus equinus* in both wet and dry seasons, were 2.31 ± 0.83 group km⁻² and 2.77 ± 0.88 group km⁻² respectively. *Phacochoerus africanus* had the least relative abundance in both wet and dry seasons, which were 0.29 ± 0.08 group km⁻² and 0.17 ± 0.05 group km⁻² respectively. Due to the dwindling population of the selected artiodactyla, their identified home ranges should be improved on by providing basic requirements such as vegetation improvement and regular anti-poaching activities needed for their survival.

Keywords: Artiodactyla, Relative Abundance, Distribution, Kainji Lake National Park,

Performance of Broiler Starter Fed Diets Containing *Parkia biglobosa* Stem Back Powder as Replacement to Antibiotics

Harande, I. S.^a, Dabai, A.S.^a, Yusha”u H.^b, Hassan A.U.^a, Ibrahim, N.T.^a, Khadija, U.Z.^c and Fakai, M.H.^c

^a*Department of Animal Science, College of Agriculture, Federal University of Agriculture Zuru, Kebbi State, Nigeria.*

^b*Department of Agric Economics and Extension Services, College of Agriculture, Federal University of Agriculture Zuru, Kebbi State, Nigeria.*

^c*Department of Crop Science, College of Agriculture, Federal University of Agriculture Zuru, Kebbi State, Nigeria.*

*Corresponding Author: ibrahimshuaibuharande@gmail.com

Abstract

The research was carried out in the Department of Animal Science, College of Agriculture, Federal University of Agriculture Zuru, Kebbi State, Nigeria. To determine the performance of broiler starter fed diets containing *Pakia biglobosa* stem back as replacement to antibiotic was evaluated in a four weeks experiment. Day old chicks birds were share into four (4) treatment and each treatment replicated five times with ten (10) birds per replicate. Feed intake, body weight gain and feed conversion ratio were determined and compared. The result indicated that final body weight, body weight gain and feed conversion ratio shows that there is no significant difference ($P>0.05$) between all the treatment. It is concluded that feeding birds with diets containing *Parkia biglobosa* stem back as replacement to antibiotics at the starter phase improve growth performance.

Keyword: Performance, broiler starter, *Parkia biglobosa*, stem back powder, replacement, antibiotics

Growth Performance of Indigenous Rabbits (*Oryctolagus cuniculus*) Fed with Graded Levels of *Gmelina Arborea* Leaf Meal.

Dabai¹, S.A. Tanko, S.M¹, and Harande I. S,¹

¹*Department of Animal Science, Federal University of Agriculture Zuru Kebbi State, PMB 28, Zuru Kebbi– Nigeria.. Corresponding Author: saidualiyudabai2014@gmail.com*

Abstract

The study was conducted within 49 days at Rabbitry research unit of the Department of Animal Science, Kebbi State University of Science and Technology, Aliero. The aim is to determine the effect of feeding graded levels of *Gmelina arborea* leaf meal on the performance of weaner rabbits, also the proximate composition of the experimental diets containing 10%, 20% and 30% inclusion level of GLM was also determined. A total number of 24 weaner rabbits of initial average live weight of 0.65-0.70kg (650-700g) in a completely randomized Design (CRD) were recorded. The means were separated using Duncan multiple range test (DMRT). The treatments consists of four (4) experimental diets; A (control), B (10% GLM), C (20% GLM) and D (30% GLM) respectively. Results shows that there were no significant differences ($P>0.05$) between the rabbits fed the GLM and control diets as well in all the performance measurement considered. In terms of proximate composition of the experimental diets, there were significant differences in almost all the organic composition of the diets with treatment D and C having the highest composition. There is only insignificance in ash contents of the experimental diet. It was concluded that GLM could be added up to 30% or more in rabbit's diet without any adverse effect on performance.

Keywords: Growth, Rabbit, Gmelina, Graded Level and Leaf Meal

Rural Livelihoods Diversification: An Avenue to Manage Poverty and Climate Changes Effects. Evidence from Northern Nigeria

¹Mamman, B. Y., ¹Abdulsalam, R.Y., ¹Adeleke, E. A., ²Kundiri, M. M and ¹Sanyinna, B. S.

¹Department of Agricultural Economic and Agribusiness Federal University Dutse, Jigawa State Nigeria

²Department of Agricultural Extension and Rural Development Federal University Dutse, Jigawa State Nigeria; Email. Mamman.by@fud.edu.ng

Abstract

This study was conducted to assess livelihood diversification as a strategy for managing poverty and climate change effects in Northern Nigeria. The justification for the research hinges on the fact that more knowledge about the extent and nature of rural livelihood diversification to manage poverty and climate change effects among rural farming household is required for effective designing and implementation of poverty and climate change effects reduction policy and strategies. Multi-stage sampling techniques consisting purposive and random sampling were used in selecting 220 farming household who were interviewed using structured questionnaires by. The analytical tools employed include descriptive statistic, Simpson diversification index, FGT model and Probit regression models. The result shows that the mean age of 40 years and mean household size was 12 persons. Crop production and livestock rearing remain the main source of livelihood. With regard to types of crops produced in the study area Maize, Rice and Tomato were reported as the major crops type produced in the study area. Regarding livestock, cattle and small remnants, Poultry especially goats, Sheep, Chicken and Ducks were reported to be common in the study area. Climate extremes and insecurity have significantly disrupted their agriculture dependent livelihoods, and income sources. The result of SID of the farming household shows that 51.6% had high livelihood diversity and 48.4% had low livelihood diversity scores. The FGT model revealed the poverty level of the farming household which shows that 60.3% of the farming household were poor while 39.7% were non poor. The poverty depth was -0.35 for the poor and 0.53 for non-poor. The severity of poverty index for the poor is 0.78. Farming household livelihood diversification also significantly influence poverty status. It is therefore recommended that since the study observed that the incidence of poverty had slightly drop from 64.1% to 54% as a result of diversification among the non-poor farming household. Therefore, farmers should be encouraged to diversify their economic activities to earn more income to be able to increase their income base so as to cover their expenditure on consumption and social obligation. This can be achieved through creation of enabling socio-economic environment that will generate employment opportunity for the farming household.

Keywords: Income diversification, Poverty Status, Small-Holder, Employment and Livelihood

Simulation of the Removal of Fuel Subsidy and the Performance of Agricultural Sector in Nigeria

Babannana, Sani

Department of Crop Production, Federal Polytechnic, Bali, Taraba State

Gmail: babannanasani@gmail.com

Abstract

Energy plays an important role in the production process of any output in an economy as it is a key input. Its effectiveness is crucial to economic growth and development of any sector in an economy. This is because all economic agents including households and all sectors require energy to function and contribute meaningfully to overall growth. As a low-income country with a high dependence on foreign trade, successive governments in Nigeria have taken several steps to reform the energy sector which includes the removal of subsidy in order to diversify the economy so as to boost domestic market and reduce over-dependence on crude-oil exports. To better understand the nexus, this study analyzed the response of the agricultural sector to the removal of subsidy in Nigeria, given its strategic role as a critical sector. Using vector autoregressive mode (VAR), The results provided evidence that a complete or one shot removal of fuel subsidy is more favorable in terms of better performance of the agricultural sector as many of the key macroeconomic variables increased under the complete removal simulation scenario. It is recommended that a one shot removal of fuel subsidy will strengthen the agricultural sector performance and outputs, even though prices will move up in the short term. The long term benefits to the sector when funds are allocated to infrastructural and technological development will support overall growth and enhance food security in Nigeria.

Keywords: Subsidy Removal, Agriculture, Nigeria, VAR