

Food and Environmental Sustainability Nexus: A Key to Economic Development in Nigeria

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Abstract

One of the most important challenges of man at all times has been to obtain enough food to meet not only the present demands of the family, but essentially its availability and accessibility at all times for a healthy life. The developmental policy goals in Nigeria among other things include: to ensure that the nation produces food to the extent that there is enough food per capita and at affordable prices and to reduce threats on the environment, the source of our natural capital. But it is certain that the quest for food security requires the continuous dependency on the environment. Soil degradation, soil erosion, deforestation and extinction of some animals are some of the consequences of this misuse of the environment. This paper underscores the importance of sustainable food productivity in Nigeria. This concern is not only born from the challenge of food security but also from the important link between sustainability in food production and environmental sustainability given the present global environmental challenges. The paper argues that it is possible to achieve sustainable food production that will also conserve the environment, that development of environmental friendly technologies and practices accessible to and effective for farmers will mitigate environmental depletion and also open up great economic opportunities. It further provides evidences for these claims. This paper therefore calls for an inward look again by mainstreaming sustainable agriculture at our national levels.

Key Words: Environmental Sustainability, Sustainable Food Production, Natural Capital, Economic Opportunities

INTRODUCTION

Food is a basic necessity of life that has shaped the course of man's endeavour throughout history. The basis of food production is agriculture. According to Omotesho *et al.* (1995), the ultimate objective of agricultural production is to get agricultural products to the consumers in the form that will be useful to them. The Food and Agricultural Organisation (FAO) report in 2013 confirmed that 98.6% of agricultural outputs are food items. Over time, agricultural activities have become more intensive and productivity has risen due to new technologies and government policies that favour product maximisation. Since the 1960s precisely, aggregate world food production has grown by 145% (Pretty, 2007). Over the same period, the world's population has grown from three billion to about 7.2 billion currently and will increase to 9.6 billion in 2050 according to the United Nations projections. To feed this increasing population, there ought to be continuous increase in agricultural activities to produce food at least to match food demand at any point in time.

Certainly, the physical environment is the foundation upon which agriculture and indeed every economic activity are carried out. It provides the soil and land which are the basis for enhanced food production and provide vital ecosystem services such as maintaining water cycle and biodiversity and absorbing carbon dioxide. Although agriculture has transformed the earth's capacity to support human life, it is worrisome that in efforts to increase food production, the physical environment and natural resources are destroyed. The long-run result of environmental degradation could be earth's inability to sustain human life. Such degradation on a global scale could imply extinction for humanity.

Thus, the current challenge facing agriculture is not just to produce sufficient food to meet growing world's demand but a more urgent need to curtail the damage on the environment. Now, food production means more than expansion of food supply. It also encompasses social, economic and ecological consideration such as infrastructure, storage, waste reduction and improving and preserving water quality. Therefore at every man's contact with the environment, efforts should be made towards the just use of our natural capital especially the non-renewable resources.

Bearing these in mind, this study attempts, with respect to the Nigerian economy, to survey food production in the country with a view of assessing the food security situation, agricultural practices the agric- environment impact assessment in the country.

MATERIALS AND METHODS

Secondary data were used for the study. The data were sourced from the Central Bank of Nigeria, Nigeria Bureau of Statistics, The Food and Agricultural Organisation and the World Bank. A descriptive quantitative method was employed in the study thus, tables and graphs were used to estimate and analyze the data relationships.

RESULTS AND DISCUSSIONS

The Food Production Situation in Nigeria

Nigeria's agricultural sector. Nigeria is the most populous country in the sub Saharan African and occupies an area of about 923768 square kilometres. With a population of about 170 million, it is the 7th most populous country in the world. The economy is largely agrarian and has about 79 million hectares of arable land of which only about 32 million hectares are cultivated. The rural smallholders, mostly subsistence producers, account for 80% of all farm holdings. Nigerian agriculture is characterized by considerable regional and crop diversity.

The trend of the share of agriculture in the GDP shows a long-term decline from 60% in the early 1960s through 48.8% in the 1970s and 22.2% in the 1980s (NBS 2010). More recent statistics by the World Bank in table 1 also shows that the value added by the agricultural sector as a percentage of the gross domestic product is still low, from 42.7 percent in 2003 to 32.71 percent in 2007. And an average annual growth rate of 7% which is less than the 10% capacity to ensure food security.

Table 1. Contributions of the agricultural sector to the Nigerian GDP (2003-2007)

Year	Agric. Value added as % of GDP	% of total annual growth
2003	42.7	7
2004	34.2	6.3
2005	32.75	7.1
2006	31.99	7.4
2007	32.71	7.4

Source: FAO, 2013

This decline could partly be explained by the decline in the rural population over these years. For instance, the FAO statistics shows that rural population decline from 59.68% in 1997 to 48.76% in 2012; employment in the sector also shows that the role of Nigerian women in food production is increasing, from 34.52% in 1997 to 40.31% in 2012 (FAO, 2013).

On its diversity, Nigerian agriculture features tree and food crops, forestry, livestock and fisheries (NBS 2010). In 1993, crops (the major source of food) accounted for about 30% of the Gross Domestic Products (GDP), livestock about 5%, forestry and wildlife about 1.3% and fisheries accounted 1.2% (NBS, 2010).

The Nigerian food equation. The Nigerian food equation is defined based on the new driving forces of world food situation. This includes income growth, globalization, urbanization, high energy prices and climate change. These factors transform food consumption, production and market in Nigeria. For incisive analyses of food production sustainability by way of demand and supply equations, data between 1961 and 2011 will be presented to give a picture of the situation. Food production index in Nigeria in the period under review shows a growing trend. Nigeria's population grows equally. When food production index (supply) is compared with growth in population (demand) in Table 2 and Figure 1 below, it is observed that the demand always exceeds the supply.

Table 2. Trends of food sustainability indices for Nigeria		
Year	Food production index	Population(million)
1961	22.51	46.14
1971	29.88	57.45
1981	29.45	75.72
1991	55.02	98.08
2001	80.78	126.0
2011	104	164.19

Source: World Bank, 2013

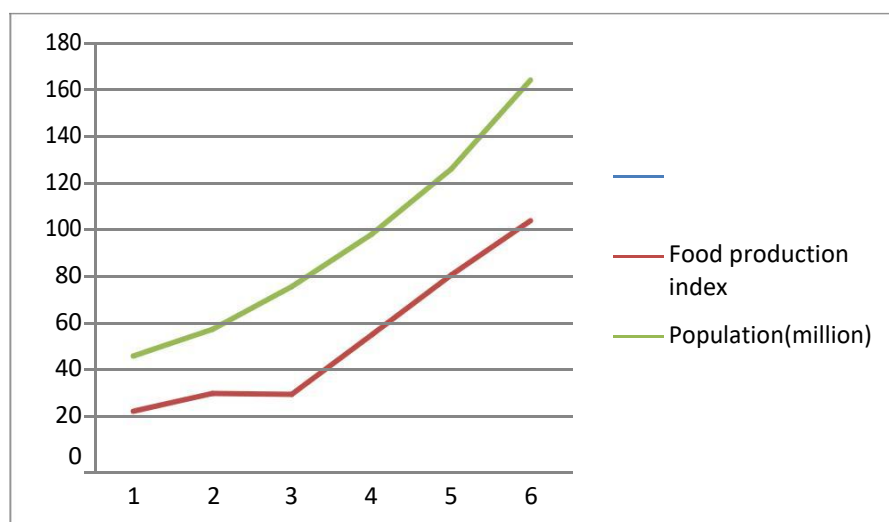


Figure 1. Trends in food production index and population growth in Nigeria (1961-2011)

It is more disturbing that in the face of the worrisome trend projected in figure 1, unemployment rate in the country is increasing more than the rate of growth in population. An analysis of the data on unemployment rate and population growth rate from 2006 to 2010 shows that although the two indicators are increasing over the period, the growth in unemployment was faster. This represents more pressure on food supply which ideally raises food prices.

Table 3. Trends of population growth and unemployment rates (2006-2010)

Year	Population growth rate (%)	Unemployment rate (%)
2006	2.9	12.3
2007	3.2	12.7
2008	3.2	14.9
2009	3.2	19.7
2010	3.2	21.1

Source: Central Bank of Nigeria Annual Report, 2011.

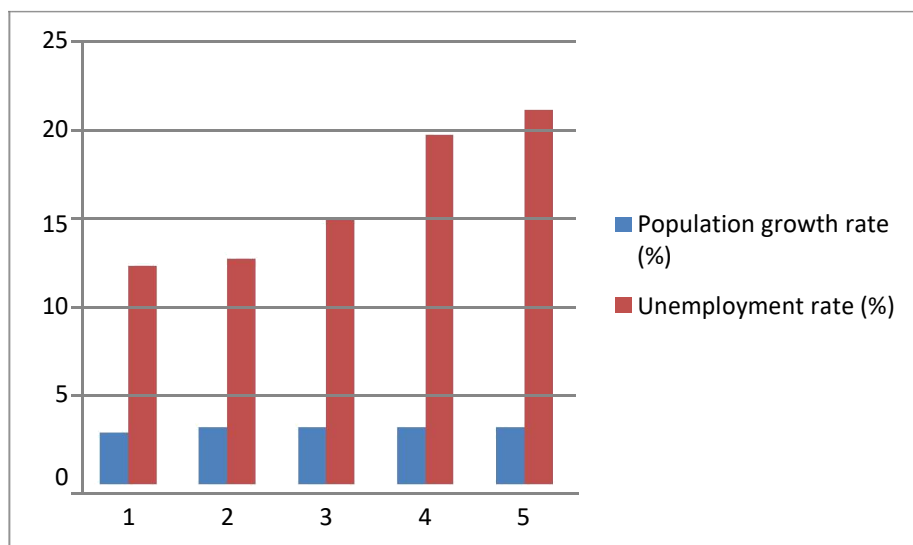


Figure 2. Trends of population growth and unemployment rates (2006-2010)

Food trade in Nigeria. The decline in agricultural production in Nigeria which has mostly been attributed to diverted attention to crude oil exploration brought about a distortion of the labour market. The distortion in turn produced adverse effects on the production levels of both food and cash crops. As food production could not keep pace with its increasing population, Nigeria began to import food and also lost its status as a net exporter of such cash crops as cocoa, palm oil, and groundnuts. The Nigerian food trade in figure 2 depicts an increasing trend of food importation to augment local food production. This is an ugly trend in the face of growing population.

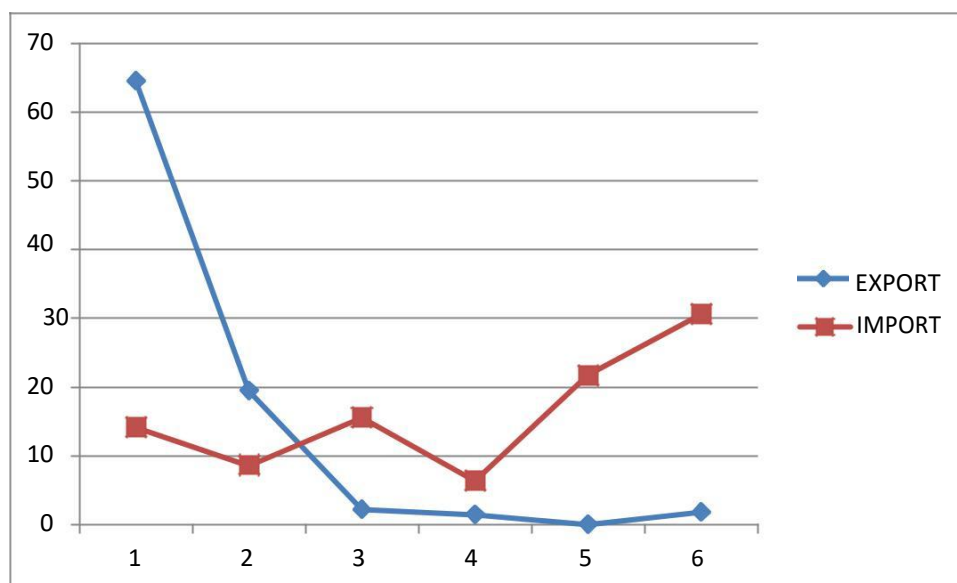


Figure 3. Trend of the Nigerian food trade from 1962 to 2011
Source: World Development Indicators, 2013

This is opposite of what is obtained in some other African countries such as Kenya and Madagascar, where export of food items have constantly maintained a higher trend than the import for more than two decades now (UNDP, 2012).

Factors Constraining Food Production Performance in Nigeria

The problems constraining the performance of Nigeria's agriculture are summarized as follows.

Technical constraints. Technical constraints include the high incidence of pests and diseases, inadequate infrastructural facilities, dependence on unimproved inputs, and rudimentary technology. Others are inadequate extension services, an inefficient inputs supply and distribution system, and high environmental hazards.

Resource constraints. A major problem of agricultural labor supply arises from the increasing migration of able-bodied youths from rural to urban areas. There are also the problems of low agricultural labor productivity, increasing population pressure on land as well as a declining quality of land. Rate of land improvement is low because of the low rate of capital investment by the predominantly traditional farmers.

Socio-economic constraints. The major socioeconomic problems that constrain Nigeria's agriculture include inefficient marketing arrangements and lack of legally enforceable ownership and control rights over land.

Organizational constraints. Agricultural production is predominantly in the hands of a multitude of small-scale, unorganized farmers scattered across the country. Lack of organization, coupled with the dispersed nature of farm settlements, hinders the participation of farmers in agricultural and rural development.

Internal shocks. Shocks due to natural disaster and civil unrest have continued to hit the system. In the most recent times, conflict relating to 'Boko Haram' is continuing to displace populations, disrupt food production, marketing and other trading activities, and reduce income levels. Besides, due to last year's flooding, households who were hitherto farmers have become market dependant.

Government policies. Since independence, not less than fourteen different agricultural development policies have been implemented (for instance, the River basins, the Green revolution and Operation Feed the Nation to mention but a few) but no lasting result has been achieved. Oil revenues and the associated Dutch disease have often been used to explain this.

Potentials for Sustainable Food Production in Nigeria

The areas of potentials to produce food sustainably are several; in this study the following will be reviewed as they have an impact on sustainable food production:

Large farming population. A lot of foods imported into Nigeria come from countries with a smaller number of farmers; but agriculture is the main occupation of the majority of Nigerian people. This being so, if the farmers have adequate inputs and technology, their levels of production will increase tremendously.

Wide diversity in agricultural ecologies. Agro ecologically, Nigeria is one of most endowed nations in Africa. With vegetation spanning the rain forest to the frontiers of the Sahara desert; about 45 million hectares of unused cultivable land, the range of biodiversity and the possibility for production of most crops known on earth exist abundantly. If these advantages are exploited purposefully, no individual would lack adequate quantity and quality of food for a healthy and productive life.

Large economy. Nigeria has one of the largest economies in Africa, with a large producer and consumer base. Furthermore, being one of the largest producers of crude oil, there is a possibility for resource shift. Some of the returns from the sale or export of crude oil can be diverted into agriculture so as to develop the sector towards sustainable food production.

Research and extension capability. There are research institutes in each of the six agro ecological zones of the country. The locations of these institutes are informed by the need to develop the diversity of agricultural products. With such a good potential, it is not difficult to say that if the right policies and implementation practices are ensured, Nigeria will be able to produce enough food for domestic consumption as well as for strategic reserve.

Democratic dispensation. Good governance will obtain good policies, proper priorities and a people-centred administration in Nigeria. One valuable benefit Nigeria has from democracy is that the international isolation of the military era is now over. The benefits of globalization and access of technology from developed nations is now easily accessible.

Having reviewed the potentials of Nigeria, it is clear that the avenues remain unexploited. All stakeholders need to take stock and rededicate themselves to the task of replanning agriculture.

Food, Agriculture and the Environment

The first and the seventh Millennium Development Goals are- the eradication of extreme poverty and hunger, and ensure environmental sustainability respectively. The close link between these two goals means that the achievement of the rest of the goals depends on how countries are able to achieve these two goals. United Nations progress report on the Millennium Development Goals for 2012 thus stressed that environmental sustainability is the foundation of the natural resources base and ecosystem, which must be managed in ways that sustain human population, meeting their food requirements and other environmental, social and economical needs.

On the other hand, the Environmental Performance Index 2008, identified the complete elements of agriculture as- protecting natural habits in agricultural landscapes, environmental management for agricultural production needs, sustainable human livelihoods from agro-ecosystems, and environmental management of the full food-fibre value chain. The key indicators to use in developing environmental parameters for agriculture are: degradation of land, pollution of water and air green house gas emissions soil degradation, biodiversity, and land use change.

Overall agri-environmental indicator results over the last 10-20 years in Nigeria have been mixed. Available data indicator results in table 4 suggest that pollution levels are relatively high (*e.g.* nitrogen and pesticide loadings in water) and that various environmental risks persist (*e.g.* soil erosion, water resource depletion).

Table 4. The trend of agri-environmental impact assessment for Nigeria from 1990-2010

Year	Agricultural nitrous emissions(% of total)	Agricultural methane emissions(% of total)	Annual fresh water withdrawal,agriculture(% of total annual)
1990	81.59	33.79	53.71
2000	77.39	30.20	53.71
2005	76.74	30.99	53.71
2010	79.23	40.51	53.71

Source:World Bank, 2013.

Although there are no data for fertilizers use in Nigeria, the negative impacts are known. Nigerian agriculture also contributes to a small extent to global warming through bush burning. More elaborately, the Environmental Performance Index (EPI) rank of 2012 on 132 countries showed that Nigeria ranked 119 with a score of 40.1%. The performance indicators were based on ten policy categories and country's performance as summarized in table 5.

Table 5. Nigeria's environmental performance profile

Level of Aggregation	Performance	
	Score	Rank
	40.1	119
Environmental Burden of Disease	12.7	130
Water (effects on human health)	11.2	125
Air pollution (effects on human health)	29.6	124
Air pollution (ecosystem effects)	62.6	20
Water resources (ecosystem effects)	27.1	78
Biodiversity and Habitat	52.7	81
Forestry	33.3	120
Fishery	30.5	37
Agriculture	66.7	26
Climate change	60.0	41

Source: www.epi.yale.edu

The performance profile of the country shows that there is a negative relationship between the economic growth and development trend and environmental sustainability.

Sustainable Development, Environment and Food Production

The term, sustainable development was lucidly used in 1983 at the World Commission on Environment and Development (WCED), popularly referred to as the Brundtland Commission. Todaro and Smith (2003) have argued that a development path is sustainable, if the stock of overall capital assets remains constant or rises overtime.

Agriculture has been identified as the human economic activity with the highest negative impacts on the environment. Therefore, any result oriented effort towards sustainable development must start with sustainable agricultural practices. Schematically, the link between sustainable development, sustainable food production and a sustainable environment can be represented in a Venn diagram as shown in Figure 4.

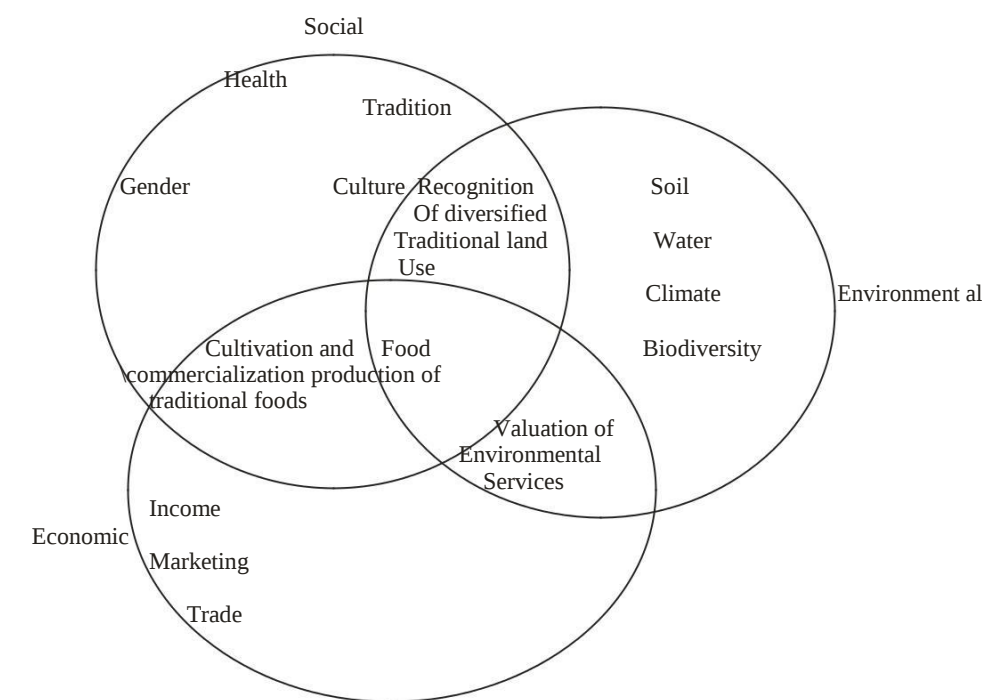


Figure 4. Visualizing sustainability
Source: Adapted from Deutsche Bank Research, 2009

The different roles and functions of food production and its inescapable interconnectedness with the environment and socio-economic outcomes can be seen in figure 4. Food production ties together concerns for the carrying capacity of natural systems with the economic and social challenges facing humanity towards sustainable development. It shows that sustainable food production is a key to environmental sustainability, economic and social safety.

CONCLUSION AND RECOMMENDATIONS

We tried to survey food production in Nigeria with a view of assessing the food security situation, agricultural practices and the agric- environment impact assessment in the country and here we can draw certain conclusions.

1. Despite the neglect since the early 1970s, agriculture still remains the major occupation in Nigeria with more than 90% of the agricultural output accounted for by rural small-scale farmers.

2. This neglect of agriculture has changed the country's status from a net exporter to a net importer of food items.
3. The role of the rural women in agriculture is increasing by the day and the millions of small farms they cultivate and livestock they rear play crucial role when it comes to equity and poverty reduction.
4. Besides agricultural practices are to a large extent not sustainable.

While it is critical to boost food production, the systems for producing and distributing food in the country will also need to change along three lines: more sustainable (more considerate use of resources), more equitable- to enable access and entitlement to food and more resilience – to help mitigate the impacts of shocks and stresses (such as extreme weather events or civil and ethnic unrests). Bearing these in mind, the following recommendations are made:

1. The research institutes should intensify efforts to educating farmers on choice of improved varieties, judicious use of chemical fertiliser together with locally adapted organic fertiliser and appropriate combinations of crops (e.g. cereal-legume, like maize-soybean); and promote organic practices (e.g. use a cover crop like spring onions as natural pest control, use of composts), that can be as productive as industrial farming, but far more sustainable.
2. The central role of women in the agricultural economy needs to finally be recognized and reflected in the policies.
3. With the unused cultivable land advantage and labour potential in the country, there is clearly considerable scope for increasing production limits thus reversing the trend in the country's food trade.
4. Sustainable food-chain infrastructure should be put in place to reduce wastes
5. Expanding growth in aquaculture around the country could bring major benefits. Technical advances in hatchery systems, feeds and feed-delivery systems, and disease management could all increase output.

Overall, there is no one-size-fits-all farming method, as each region in the country has its own optimal (green) ways to boost food production. With proper inclusion of the rural smallholder's food availability and incomes will boost and thus generating demand for locally produced goods and services? This will ultimately result in broad-based socio-economic development in rural communities while conserving our environment for future generations.

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