

## **ACHIEVING SUSTAINABLE AGRICULTURE IN NIGERIA: A LAND-USE POLICY PERSPECTIVE**

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### **ABSTRACT**

Agriculture has changed dramatically, especially since the end of World War II. Food and fiber productivity soared due to new technologies, mechanization, increased chemical use, specialization and government policies that favored maximizing production. Sustainable agriculture refers to the ability of a farm to produce perpetually based on long-term effects of various practices on soil properties and processes essential for crop productivity, and the long-term availability of inputs. It integrates three main goals: environmental stewardship, farm profitability, and prosperous farming communities. These goals have been defined by various disciplines and may be looked at from the vantage point of the farmer or the consumer. This paper is an effort to identify the ideas, practices and policies that constitute our concept of sustainable agriculture.

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Keyword: Agriculture, Environment, Nigeria, Resource, Sustainability.

### **INTRODUCTION**

The importance of sustainability of agricultural production system is becoming a major concern of agricultural researchers and policy makers in both developed and developing countries. According to Yudelman (1987), we have always looked at the African problems mainly in the context of economic constraints. Yet, eroding soils, deteriorating rangeland, dwindling forests and falling water tables, results of environmental mismanagement, are testimonies to the related crisis of ecological degradation. Implementation of sustainable development therefore requires integrated policy, planning and social learning process. Its political viability depends on the full support of the people it affects through their government, their social institutions and their private activities. In relation to agriculture, sustainability means changing agricultural system so that farmers are able to produce indefinitely (Rodale, 1988). We therefore need to understand the inter-relationship of the sectors of the Nigerian economy so that we do not promote one development at the expense of another. Hence, sustainable development should be the overriding issue in future planning and this, among other requirements, demands adequate knowledge of sensitivity towards natural resources management. Nigeria has pursued with vigour the exploitation of her natural endowment with the purpose of maintaining its sustenance. Given the current international debt issues and associated problems; it has become increasingly difficult to generate enough resources required for sustainable socioeconomic growth without exerting increased

pressure on local resources for producing more food for local consumption and other agricultural products for export, in order to gain access to capital for further development. In order to meet its obligations to its people, the Nigerian government, in the face of the mounting adverse economic situation, has introduced some economic policies and programs. These policies and programs include the policy of self-sufficiency in food and raw materials production, self-employment, increased export promotion, rural development, and the privatization of public enterprises; all of which are contained in the structural adjustment program (SAP) (Titilola, 1987).

These policies and measures have undoubtedly put additional pressure on the natural environment, as additional resources are required to produce the output needed. Furthermore, since government has divested itself of responsibilities in many business enterprises as a result of SAP, including agriculture, less attention may be placed on social benefits. With increased emphasis on private economic costs and benefits, excessive exploitation of the environment is most likely to arise. We must however appreciate that agricultural resources on the nation are located mainly in rural areas and most of them are under the direct control and management of rural population who exploit them for their economic activities in such areas as crop production including fishing, livestock, and logging. Therefore, monitoring the interaction of rural exploitation and production activities in rural areas is important in national development effort for sustainable agricultural development.

This paper highlights how mismanagement or efficient management of environmentally derived resources can affect the attainment of the objectives of agricultural and rural development in Nigeria. The objectives are

- a) to assess the importance and the effects of the resource on agricultural and rural development in Nigeria;
- b) to assess the consequences of misuse of the environment;
- c) to suggest policies and strategies that will enhance a proper management of the environment objectives.

The theoretical background to this paper is based on the theory of natural resources' scarcity and its effect on growth and, partly, on the principles of natural resources conservation. The theory, which is credited to some classical economists like Malthus (1798), Ricardo (1821) and Mills (1963) holds the view that scarcity of natural resources would eventually lead to diminishing social and economic returns to human efforts and ultimately to stagnation, retardation and cessation socio-economic growth. Natural resource such as soil, water, and, vegetation, livestock and minerals are specific in type, location, quality and relationships to one another.

## **OBJECTIVES OF AGRICULTURAL AND RURAL DEVELOPMENT AND STRATEGIES REQUIRED FOR THEIR ATTAINMENT**

Agricultural development, a subset of economic development, implies a sustained increase in the level of production and productivity over a reasonable length of time and the subsequent improved wellbeing of farmers as reflected in their higher per capita income and standard of living. Rural development relates not only to a sustained increase in the level of production and productivity of all rural dwellers, including farmers, and a sustained improvement in their wellbeing, manifested by increasing per capita income

and standard of living, but also leads to a sustained physical, social and economic improvement of rural communities. In order to achieve the broad goals of agricultural and rural development, the Nigerian government usually focuses on specific objectives. While the attainment of specific agricultural goals encompasses the provision of adequate food, fibers and industrial raw materials, employment and foreign exchange generation, the goals of rural development embrace in addition a systematic improvement of the other institutional, physical and social infrastructures in such rural communities.

In an effort to attain these goals, several strategies have been adopted. For example, increased agriculture output may be attained through the following strategies;

- a) increasing the aggregate area under cultivation;
- b) increasing the productivity of cultivated land;
- c) using high yielding varieties of seeds;
- d) using irrigation to bring more land under cultivation;
- e) using more fertilizer;
- f) increasing the use of plant and livestock protection arrangements;
- g) adopting multiple cropping, thus increasing the total area cultivated. Furthermore, cottage industries development may be used as a strategy for rural industrialization.

Whichever strategy is eventually adopted usually derives its sustenance from the environment and such a strategy in turn affects the physical, chemical and socioeconomic structure of the environment. For example, the provision of infrastructures in rural communities requires the use of landscapes and other resources.

When these infrastructures are finally constructed, they alter not only the physical nature of the environment but also the relationship between resources as well as the aesthetic and economic value of the resources.

### **Role of the Environment on Agricultural and Rural Development**

The typical forms of agricultural related environmental degradation often observed in Nigeria are deforestation, and soil erosion. In few places, deforestation has been caused by the demand for new land for farming, building needs and timber harvesting and collection of non-tuber forest products; while erosion is caused by the farming systems adopted inappropriate road construction and maintenance methods associated with the farming systems. The impact of agricultural environmental degradation frequently transcends the agricultural areas. The general impact includes loss of flora and fauna, decline surface and underground's water supply and food security.

As stated earlier, agricultural production derive its existence from the use of land. Without productive land resources, no meaningful agricultural activity can take off. Similarly, profitable crop and livestock production can thrive only if the elements of sunshine, water and soil nutrients, as well as plant nutrients contained in chemical fertilizers are present in the right proportion and quality. Furthermore, increased agricultural and industrial output thrives best where a favourable man-made socioeconomic environment exists.

Natural resources must, therefore, be managed in ways to provide a basis for sustained development. In discussing the relationship between ecological deterioration and economic decline, Brown and Wolf (1985) reviewed evidence from soil scientists, agronomists, meteorologists and economists. The conclusion was that sustained overuse

of biological systems can set in motion changes that are self-reinforcing and in which each stage of deterioration hastens the onset of the next. At the final stage, however, biological production is destined to collapse. Families will no longer be able to provide enough food for themselves and livestock. A massive exodus from rural areas begins. Famine becomes widespread and peasants' lack of income is compounded by absolute shortage of food.

## **CONSEQUENCES OF THE MISMANAGEMENT OF THE ENVIRONMENT**

In spite of the acknowledged and important role of the environment in production and productivity in the agricultural sectors of the economy, adequate attention is not often given to the proper use of the environment in order to realize maximum benefits. This view stems from the contention that several activities inimical to the efficient use and exploitation of the environment are often embarked upon. Firstly, inappropriate farming systems and technologies leave the soil worse off. The traditional fallow system is currently proving inadequate for food and industrial raw materials production as a result of overpopulation. With over-population, the traditional fallow period required for the regeneration of the indestructible properties of the soil is shortened because of pressure on land. Similarly, increased demand for livestock products has inevitably resulted in overgrazing. Secondly, the desire to obtain mineral resources in the shortest possible time in order to realize adequate financial resources has resulted in the environmentally dangerous exploitation of mineral resources such as petroleum, tin and gold. Thirdly, certain government policies have also adversely affected the Nigerian rural environment. In particular, the absence of a policy compelling exploring and extracting industries to reinvest and repair the soil appears to be one area calling for attention. The same argument may also be advanced for other mineral mining activities.

The absence of adequate policies has adverse consequences on the environment and the performance of the agricultural and rural sectors. As stated earlier, resources are location and quality-specific. One area where misuse of the environment is obvious is in the reduction of the quality of the land resources. A shortened fallow period leads to both overgrazing and over cropping resulting in erosion, degradation and impaired quality. In extreme cases, where deforestation is unaccompanied by reforestation, desertification and a reduced quality of useable land result. Also, the

Sahara Desert alone has, during the past fifty years, invaded one million square kilometers of land along its southern fringes. Unfortunately, it is still rolling southward at the rate of six kilometers per year (NAP 2002). Given impaired or reduced soil quality and reduced productive land, agricultural production and productivity in particular are endangered. This invariably impairs the ability of farmers to realize their socio-economic objectives.

Mismanagement of the environment during the process of mining often leads to air, soil and water pollution. Cases of soil and water pollution by overflowing crude petroleum products are common knowledge in the oil producing areas. Such pollution adversely affects the ecosystems and micro flora leading to reduced crop, fish, livestock and wildlife production. With polluted air, water and soil, and hence food crop, fodder, fish and wildlife, human beings in general and rural people in particular are prone to ill health. Since health problems and productivity are incompatible, one cannot but expect

impaired agricultural and industrial levels of production and productivity. Lastly, in an effort to improve the physical and chemical qualities of the environment, scarce financial, human and physical resources need to be invested. For most developing nations, the required resources cannot be easily met, not only because such resources are scarce but also because there is acute competition for such resources from several competing needs. Furthermore, the resources required for the amelioration of the badly managed environment is often prohibitive in relation to the benefits derived from the excessive exploitation of the environment in the first instance.

In essence, mismanagement of the environment leads to a fall in production and productivity, a fall in the income generating capacity of the people and the nation, impaired ability of the economy to generate increased employment, inadequate industrial materials and lowered ability for investment in the economy. All these translate into lack of growth.

In a study on the economic effects of soil erosion in Nigeria Titilola, et. al (1996), it was established that the major factors thought to be responsible for erosion on Nigerian farms include ecosystem disequilibrium, rising population pressure on land and fragile and permeable soil.

## **RESOURCE MANAGEMENT IN AGRICULTURE**

Historically, natural resource base has been instrumental, in addition to human resources, for development purposes. The issue is critical especially where large populations and government revenue depend on agriculture and exploitation of resources. Local resource management, because of its holistic view of humankind within the biosphere and the awareness of human dependence on scarce natural resources, is in a position to reduce resource depletion, improve the environment, improve food self-sufficiency and hence improve the development of the societies. The economic implications of resource degradation include reduced wood fuel supply, increased time lost in wood fuel collection, increased prices of marketed biomass fuels, similar impact on the water supply, and reduced nutritional intake via reduced cooking activities. The impact indirectly extends to national and regional economics through reduced agricultural yield, increased rural-urban migration, and depletion of natural resource assets which are the basis of both indigenous and export industries (Pearce; 1988).

Factors giving rise to resource deterioration are complex. There are direct and indirect causes. Direct causes include land clearance for agriculture and other economic purposes, wood fuel harvesting in a non-sustainable fashion, overstocking of and overgrazing by animals due to improved animal care, inappropriate farming practices, i.e. fallow period shortened and loss of shelterbelt due to changes in social and economic conditions, population growth with its complex ramifications for urbanizations thereby generating high demand for urban fuel (and charcoal) and food which must come from rural and semi-rural areas. The most significant cause is the common ownership of land. Common property ownership leads to a situation in which each user tends to maximize her/his own self-interest, ignoring the effects of her/his actions on other users and the users cost of consumption. The common property argument is linked with the failure of the market to develop properly.

Government policies can also lead to misuse of resources. For example, tax policy, market control, relative fuel pricing, and land use control are just some of the complex policy choices that can indirectly affect resource use. Global awareness of the crisis concerning the conservation of biodiversity is now acknowledged following the United Nations conference on Environment and Development (UNCED) held in June 1992 in Rio de Janeiro, Brazil. At this conference, the role of indigenous knowledge and local people in environmental management and development were recognized and their significance for the conservation of biodiversity and sustainable development of natural resources was also noted. It is now also accepted that the economic fortunes of many developing countries is inextricably bound up in the state of their natural resources particularly with the quality, quantity and sustainable use of soil, water, forestry and agricultural product. Overexploitation of these resources, coupled with only limited appreciation of their complex interdependence has led to misuse and depletion of renewable resources. Use rates in most instances have been based on unsustainable practices. These various losses have great economic impact on individuals the nation.

The impact at the national level will include:

- a) reduced agricultural yield;
- b) added impetus for rural-urban migration;
- c) depletion of natural assets which are the basis of industrial activities both for local and export markets;
- d) reduces capacity for production, growth and employment;
- e) reduction of the income generating potential of the people;
- f) Increase in production costs.

### **Land Resource: Availability and Usage**

There are several agricultural resources but in this report, the implications of resource management for food production and food security are illustrated by focusing on the issue of land availability and usage. Land is perhaps the most important production input. Ownership affects land use, farming systems, institutional structures, ecological conditions, adoption and use of technology, food production and self-sufficiency, and overall wellbeing of the rural and urban population. Poverty and resource misuse is linked because of the pattern of land distribution, which often favors the rich class. The rich have access to land, which is less prone to degradation or erosion. In addition, the rich class has the economic resources to invest in and improve the land. However, poor farmers continue to till a marginal resource base despite increase in their number. In many countries, projected population increases superimposed on exiting land holding pattern will result in an incredible increase in poverty derived pressure on the environment with accelerated erosion, deforestation and desertification along with continued loss of the genetic resources need to provide steady stream of new seed varieties (Food 2000). Land use coupled with the effort of small farmers is the key instruments for achieving sustainable increases in yield and productivity. However, insecurity of tenure, especially among small-scale farmers, has been known to act as a disincentive to the conservation of resources, including reforestation and soil conservation projects. This is so because farmers are not willing to make necessary investments for which they may be unable to reap future benefits. Of all social reforms,

land distribution is perhaps one of the most difficult to initiate and see through but without it, resource conservation and hence food security and poverty elimination will not be met and sustained.

Resource policy planners have recently begun to recognize that many resource management systems embodied in the farming system that have persisted for years exemplify careful management of soil and water. In addition, such systems exemplify efficiency and a regenerative approach to agriculture development. The principles underlying local management systems can be utilized to develop new techniques that will preserve the land's capability and productivity even as population increases. One example is the continuous cultivation agro-forestry system of "alley cropping" which uses the local resource management principle of natural regeneration in a fallow. The method is a scientifically based but locally acceptable way of meeting the resources conservation needs of farmers in third world countries.

### **Agricultural Policy and Resource Use**

The impact of agricultural policies on food security, poverty reduction and resource management is important. Enduring agricultural policies on food security will undoubtedly depend on sustainable and productive resource base. Accordingly, therefore, the challenge today is how to increase productivity while enhancing the productive capacity of the natural resources base in sustainable manner. Accordingly, land and water degradation posed the most formidable threat to the resource base.

Henceforth, it is imperative to develop land and water management systems, which will reverse the current pressure on the environment. If Nigeria is to meet her food security challenge in the future, it will be necessary to marshal and utilize natural and human potentials in an efficient and effective way possible. Several attempts have been made in the past to provide program and projects dealing with such agricultural issues.

These attempts include (a) agricultural development projects (ADPs), (b) river basin development authority (RBDAs), and (c) national agricultural land development authority (NALDA). Current assessment of these effort which do not assign an overall positive signal points to the ecological problems alluded to by Olokesusi (1997) "urbanization, construction and industrial activities which are the engine of economic development but failed to manage the resultant negative externalities is threatening human health, environmental quality and productivity. These environmental problems can be decisive bottlenecks in the nation's sustainable development." Hence, the agricultural policies in vogue must be implemented with environmental consciousness. The food security of the century must be achieved simultaneously with environmental consideration.

Most agriculture policies have been growth oriented and their consequences have been ecologically blind". One critical issue for the future is how best to achieve the ecological goal of environmental equilibrium along with other goals. All forms of agricultural production affect the environment. The negative effects must however, be accounted for by finding how to input cost to the non-markets aspects of these externalities.

This cost must be identified, as failure to do this will allow the costs to appear in the form of several damages including damages to health, to land, to air, and to water.

Nigeria is rife with examples of failed agricultural projects whose huge environmental costs, initially neglected, have undermined the success of such projects. There are those who are of the opinion that concern for protecting the natural resource base for agriculture is a luxury that the poor agricultural sector especially in developing countries cannot afford given their food needs and poverty. The response to this opinion is that like all countries paying attention to the economic costs and benefits of agricultural production, Nigeria must also deal with environmental and resource costs.

In the interest of long-term development and national welfare, Nigeria must attempt to account for environmental costs. If Nigeria fails to do so, the development objectives of the agricultural policy, which cannot be divorced from the resource management objectives, will not be achieved. In Nigeria, the resource base is under pressure from increased use primarily because of the lack of effectiveness of institutions that are supposed to provide infrastructure and other measures to rectify land reform problems. These inadequacies together with incentive systems reinforced poverty and poverty derived pressure on the agriculture resource base.

## **POLICIES AND STRATEGIES TO ENHANCE THE UTILITY OF THE ENVIRONMENT**

Rational use of natural resources is the only means to maintain and improve human conditions. However, in the use of natural resources, one needs to appreciate the impact of one action on the resources and the society. Concern over the environmental aspects of natural resources use and management emanates from an unprecedented rate of population growth, rising income and per capital demand. These have, in recent years, been magnified by scientific and technological advances, which create new demands. In order to meet these new demands, Nigerian agriculture has been compelled to put additional pressure on the production system. Such pressures often exceed the capacities of the system to bear. What has therefore been advocated worldwide is the concept of integrated resource management. This means that in altering one element in the system for the purpose of deriving advantages, one should understand the impact of that alteration upon the remaining components of the system (United Nations, 1972). Also, one should carefully calculate what should be done to make the system, as a whole, as productive as possible or to prevent the benefits that the modification makes possible from collapsing because crucial natural links have been interfered with or terminated.

The achievement of this objective requires a series of concerted efforts and reorientation embodied in appropriate policies and programs. Some policies and programs are:

1. The formulation of agricultural development plans and policies, which take into cognizance the peculiarities of Nigeria farmers and environment so that all participants can make appropriate and commensurate contributions in maintaining environmental quality. Agriculture is an activity of general public interest, not only because it supplies food and raw materials but because it helps to conserve natural resources and the environment, provides employment opportunities, recycle wasted and serves to maintain and enhance the quality and attractiveness of rural areas.

Therefore, at the planning stage, an environmental impact assessment of development plans must be made in order to prevent harmful environmental effects in such areas as irrigation of farmland, dam construction and large-scale agricultural



development programs. The environment must be regarded as a given system in which agricultural development must take place and to which it must adapt. Until recently, the environmental implications of agricultural system were not of importance in the Nigeria agriculture.

2. Surveys of agricultural areas susceptible to environmental hazards should be periodically undertaken. Such surveys should include the collection and review of available surveys and inventories in order to identify specific sources of hazards.

The review should also include loss of soil productivity, depletion of grazing lands, rate of deforestation and the magnitude of the decimation of livestock by pest and diseases. Also of importance in the review are the inter-relationships between ecological conditions, types and intensities of land use and management practices.

By doing this, urgent action on conservation and protection will be logically and systematically devised. In order to enhance the utility of such survey along with the records so obtained, existing agricultural institutions should provide the necessary monitoring service. The case in point is illustrated by the agricultural and resource management systems of the eastern part of Nigeria. Previous environmental profile knowledge of the area could avert further disaster.

3. A heightened interest in farming systems in Nigeria makes necessary to initiate research in selected ecosystems in relation to the functioning and productivity of agricultural systems, the environmental effects of certain specific agricultural practices and inputs and the effects of pest control measures on the environment diversification. In addition, researchers should incorporate environmental considerations in their activities. The findings emanating from such activities will be of assistance in the design and experimentation of ecologically stable systems of land use and agricultural practices.

4. Exchange of information and experiences in agriculture should be based on similar ecological conditions especially with respect to climate and soil. The present agro ecological zonal arrangement of the National Farming Systems Research is ideal and should be utilized in exchanging information and experiences. Within this set-up, relevant and useful information will be made available to planners, farmers and extension agents on issues such as:

- a. soil characteristics, capabilities and limitations for different uses;
- b. agricultural practices suited to increased production and minimum environmental damage.

5. More training should be undertaken especially of resource users in Nigeria in which emphasis will be placed on the understanding of the vital role of agriculture to man's welfare and the importance of maintaining environmental quality in order to achieve this aim. Previous approaches to resources exploitation have all along been viewed only in economic terms. It is, however, not too early, in order to avoid the problems inherent in such approaches, to realize that man's welfare can be advanced with proper and rational use and management of resources. In the training effort, environmental problems likely to arise as a result of specific management practices, especially those relating to soil and pest control, must be emphasized. In addition, in order to prevent deforestation, knowledge of the limits of the carrying capacities of the rural resources under specific farming and grazing conditions must be highlighted.

6. Since local diversities exist in soil and climate, the availability of land use capabilities maps should serve as a basis for zoning and land use legislation. Measures will thus be

instituted to prevent misuse of cropland, misuse of agricultural inputs and careless disposal of agricultural wastes.

7. Government should consider granting incentives and assistance to agriculture related sub-sectors. Such measures will induce recipients to undertake necessary actions to prevent or correct environmental degradation caused by their activities.

## **SUMMARY AND CONCLUSIONS**

This paper argued that the self-sufficiency drive in food and raw material as well as the self-employment programs are most likely to put increased pressure on the resources of the Nigeria. The avoidance of adverse consequences, therefore, calls for deliberate actions to preserve and conserve the environment.

Unfortunately, however, several human activities, such as bush fallow, inappropriate technologies, overpopulation, transhumance, overgrazing, deforestation without adequate reforestation and profligate exploitation of mineral resources, are often not in tune with proper environmental management practices. The obvious result of these activities is the increasing inability of the environment to provide the necessary sustenance to agricultural and rural development programs because of erosion, desertification and pollution. To obviate the adverse effects of the misuse and possible mismanagement of the environment, certain recommendations were made. These include, inter alia, increased training and research, as well as the periodic surveys and inventories of environmental conditions in geographical locations most prone to environmental hazards.

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