

## **A Peep into the Problems of Environmental Pollution that pose Constraints to Sustainability of Agriculture in Nigeria**

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### **Abstract**

*Since the Stockholm Conference on the Environment in 1972, concern for the environment and protection of its quality has been an important issue in international policy and the affairs of man. However, in Nigeria, deforestation and habitat changes have continued to cause severe erosion, desertification, land degradation and declining biodiversity etc. Thus forests which hitherto protected the soil, provided needed biological resources, social benefits, and environmental services, are fizzling out steadily, lands are drying out, flooding has become more frequent and devastating owing to the onset of Global Warming, and the complex problems of Oil Spills, continuous Gas Flaring in Crude Oil-producing areas, Green House Gases, etc. continue to stare us in the face. For more than 2 decades now, the Nigerian nation has been grappling with the task of food security, food efficiency, public health issues, scarcity of industrial raw materials, and the detrimental side-effects of her agricultural development. This paper discusses the causative factors of the resulting dangerous trend, and proffers some solutions to the nagging problems, in order for Nigeria to achieve sustainable development which aims at accelerating agricultural and economic development, and yet conserve and enhance her stock of environmental, human, and physical capital without extremely negative consequences to future generations.*

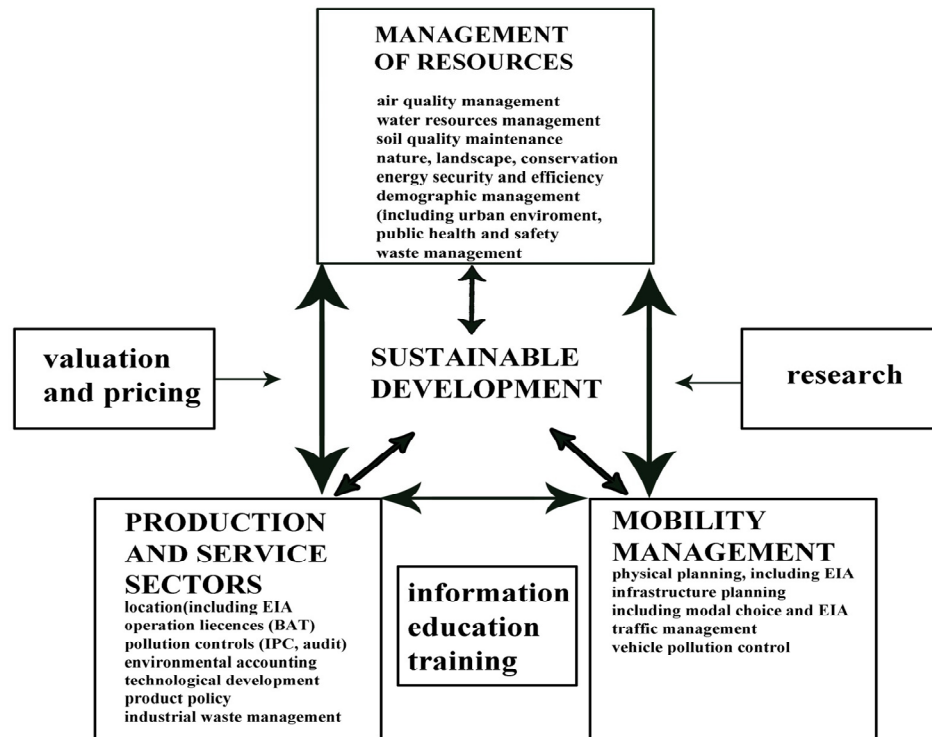
**Key Words:** Environmental Pollution; Sustainable Agricultural Development; Renewable Resources; Nigerian Agriculture.

### **Introduction**

As far back as 1962, Rachel Carson published *Silent Spring* which awakened the awareness of the whole world about the environmental degradation caused by the indiscriminate application of the insecticide, DDT, dichlorodiphenyltrichloroethane, whose Technical Product is a waxy solid at room temperature, of low vapour pressure. DDT has a serious food-chain effect, it leads to atmospheric contamination upon volatilization and it is known to be neurotoxic. According to Hassall (1990), DDT was, for decades, found to be effective against a wide variety of noxious agricultural, forestry, and medical insect pests. The Americans were ingesting about 0.184ppm DDT per day and had, 12ppm (plus about 12ppm DDE) in their body fat. The approximate LD<sub>50</sub> of DDT to rats is 200-300 mg/kg body weight. The beginning of the

debate about the environment and the economy is usually attributed to Rachel Carson, while the influential environmental publication entitled *The Limits to Growth* by Meadows *et al.* (1972) was very popular and germane to the debate.

The term “Sustainable Development”, defined as, “meeting the needs of the present generation without compromising the needs of future generations” (Anon. 1987), as a concept, has been aptly discussed and illustrated by Glasson *et al.* (1995) as follows:



**A FRAMEWORK FOR SUSTAINABLE DEVELOPMENT (AFTER GLASSON *et al.* 1995)**

Thus sustainable development targets the acceleration of economic development in order to conserve and enhance the stock of environmental, human, and physical capital in a serene and wholesome environment that allows all living organisms to thrive, grow, reproduce, and disperse in their unpolluted habitats within the overall environment, without jeopardizing the interests of future generations.

In the United States, David Landes, Professor Emeritus of History and Economics at Harvard University, published a book entitled, *The Wealth and Poverty of Nations* (1999) In this masterpiece, he drew attention to certain ridiculous, if not racist claims of some schools of thought as follows: e. g. that there are definite connections between the physical environment and human activity, attributable to geography, culture etc; that everywhere the standard of living is low, the span of life is short; that most underdeveloped countries lie within the tropical and semi-tropical zones between the Tropic of Cancer and Tropic of Capricorn; that nature, like life, is unfair, unequal in its favours, that nature’s unfairness is not easily

remedied; that civilizations could be classified hierarchically and the best assigned to favours of climate. All of these reveal the deep-seated bias with which some have approached the problems of development in other climes, and their reluctance to admit the vast differences in the initial conditions that today's poor countries grappled with, compared with the pre-industrial phase of more advanced countries!

In another book by Thirlwall on Growth and Development with special reference to developing economies (1994), the author, stressing the role of agriculture in development, remarked that the agricultural sector of developing countries was dominant, and that such factors as the physical attributes of land (topography, fertility, etc.), the land tenure system, the ratio of labour to land, and the extent of natural resource endowments, are likely to exert a major influence on the speed of development as determinants of the pace of agricultural advance and the pace of industrialization, based on a healthy agricultural sector, or the exploitation of indigenous resources. According to him, geographical factors, including the nature of the land, and natural factors such as weather and terrain, must be included in any list of reasons drawn up in answer to such questions as: why have some countries developed earlier than others? or why have some countries remained in a traditional or transitional state longer than others? These are pertinent questions for serious-minded nationals, but in practice, even the leaders of a number of developing countries do not appear to give such a serious thought if any at all, not to talk of many teeming masses who are not bothered!

### **The Environment and Development**

According to Thirlwall (*loc.cit.*), the environment renders certain support services to the economy including: life support; supply of natural resources; absorption of waste products, and supply of amenity services. The environment provides a biological, chemical, and physical system that enables human life to exist. This system includes, for example, the atmosphere, river systems, soil fertility, and a diversity of plant and animal life. These environmental services are essential to life, and they are consumed by households and the community. Should drastic reductions of any of these services occur, as a result of, for example, adverse weather, pestilence, drought, disease outbreak, climate change, massive floods, green house gases, depletion of the ozone layer, indiscriminate forest exploitation etc., there could be catastrophic consequences for life in the form of calamitous famine, drastic decimation of the populace, reduced life expectancy etc. The Environment also provides raw materials for the industries, and energy for economic production and household activities. For example, firewood, a product of the forest, is still used by the majority of Nigerians for domestic cooking. These resources are either renewable or non-renewable. Solid minerals are non-renewable while forest products and fishery resources for example are renewable, in which case they can be used in a sustainable manner.

It is important to note that if renewable resources are used excessively, or they are mis-managed, they can be lost completely, as in desertification that follows uncontrolled deforestation. It is possible to replenish the stock of a renewable resource, i.e. it is used sustainably, but the use of a non-renewable resource reduces the finite stock of the resource forever. The environment absorbs the waste products of economic and household activities through a process of "Sink Function"/"Recycling" which allows much of such wastes to be disposed of safely. However, there are certain wastes which are not easily absorbed and

disposed of safely, e.g. heavy metals and long-lived radioactive materials. Other suitable arrangements must be made for such hazardous wastes. It is important to note that the natural breakdown of effluents in the sea, and rivers, will not result in serious pollution as long as the discharges are below stipulated threshold levels. But discharges that exceed stipulated threshold levels will definitely bring about rapid increases in pollution. The functions of the environment may be competitive. For example, excessive discharges of waste materials into the Oceans are known to reduce their capacity to provide a habitat for fish stocks. Alternatively, environmental functions can be complimentary. For example, appropriate forestry policies can provide a sustainable source of timber as a natural resource function, and reduce soil erosion, as an improvement in the function of life-support.

### **Nigeria's Main Environmental Problems**

Major environmental problems that stare Nigeria and Nigerians in the face include the following:

- Indiscriminate deforestation and land degradation; bush burning; over-grazing; soil and gully erosion; intensive agriculture.
- Air pollution; gas flaring; toxic industrial emissions from steel factories, fertilizer industries, and industrial gas emission by aluminum factories; incineration of waste products and plastics etc.; green house gas effects etc.
- Water pollution; industrial effluents containing organic, acidic, and inorganic pollutants; waste chemicals; heavy metals; aquatic weed development on waterways.
- Garbage dumps and solid wastes near aquifers; blockage of drainages.
- Loss of biodiversity; reduction of habitats and particular niches in the environment.

### **Brief historical background of Nigeria's present deplorable situation**

During the Colonial Era in Nigeria, Environmental Protection was not a priority, and this is understandable. The environment was serene, forestry plantations were established, and "greenery" characterized the landscape nation-wide. Agriculture was essentially at the Peasant/Subsistence Level, with the family as the Labour Force. The production of Cash Crops (e.g. cocoa, timber, oil palm, cotton, groundnut etc.) was emphasized over and above food crops (e.g. yams, cowpea and beans, cassava, maize, rice, guinea corn, millet etc.), as all efforts were geared towards adequate production of raw materials to feed the overseas-based factories (e.g. textile). The total quantity of food produced at the subsistence level was still enough to feed the populace as at that time, leaving some extra, which the rural women sold to provide some cash income. Later on, as the populations rose steadily, there occurred food deficits, and we are still bogged down with the nagging problem owing to non-existent, inappropriate, or inconsistent government policies as well as poor implementation of projects and programmes. Worse still, with the advent of crude oil, agricultural productivity declined steadily, and in spite of various *ad hoc* schemes, programmes, and slogans such as "Green Revolution", "Accelerated Food Production", Agricultural Development Projects (ADPs) the Nigerian Nation, with a Land Mass of 923, 768 Square Kilometres, and an estimated Population of between 180 and 200 million, has been, either in a "Quagmire", or "Walking-the-Tight-Rope", as Nigeria is listed among the countries facing acute air pollution problems, and battling with all sorts of degradation of the landscape and other serious challenges such as: deforestation, desertification, water pollution, water deficits, gas flaring, public health challenges, food deficits, unimaginable and excessive food imports, and poor living standards.

The reasons for this deplorable situation include inefficient or inappropriate supervision and funding, as well as policies that were either ill-conceived, mis-directed, ill-motivated, lacking in focus, or aborted without reason. The scenario is even further compounded by the onset of Global Warming. It is therefore not surprising that Popoola and Olaniyan (2010) reported that Nigeria is presently rated among the 25 poorest countries in the world in spite of her enormous natural and human resources. It is a popular view that this paradox poses some pertinent questions such as: Why has Nigeria been generally ineffectual in utilizing her resources to improve the health, welfare, and development of her citizenry? Why has Nigeria lagged behind countries like Malaysia, Indonesia, India, China, Brazil, and Singapore that were at about the same level of Development with her, five decades ago? Nigeria could boast of several visionary and accomplished leaders who had contributed tremendously towards the virile development of several countries in Africa and Asia. A case in point is that of Malaysia, a country that obtained their Foundation Stock of Oil Palm Seedlings from the Nigerian Oil Palm Research Institute, Benin-City in Nigeria, and eleven years after, with serious “home work” in Malaysia, they became one of the world’s greatest and foremost exporters of Palm Oil while Nigeria is yet to produce enough palm oil for her ever increasing human population. The Nigerian rural populace are still wallowing in abject poverty and the old Yoruba slogan, “*Oba l’agbe*” i.e. “The Farmer is King” can hardly be rehearsed any longer in the rural communities, who have since realized that the typical urban elites and the politicians had been such deceitful predators all along! Must the rural populace be forced by circumstances to continue to accept that their world must always endure chronic malnutrition, despair, starvation, and abject poverty? What a shame! In my considered opinion, however, The consolation of recent is that the Nation has more or less sighted a “Green Light” at the end of a tortuous tunnel, and is on the path of recovery!

### **Causes of Environmental Pollution in Nigeria**

The study and reports of Environmental Pollution and Environmental Protection and related issues in Nigeria have formed the subject of extensive reviews. Examples of papers that have addressed related issues include: Pollutants, and Terrestrial and Aquatic Ecosystems (Akeredolu and Badejo, 2000; Badejo and Van Straalen, 2000) ; Sensitization of the Public (Matanmi, 2009); Insects and Sustainable Management of Forest Resources (Matanmi, 2013); Global Warming and Climate Change, (Adeyewa, 2000; Matthew, 2008; Ana and Fakunle, 2010); Degradation of Soils (Okoya and Asubiojo, 2009); Land Use Emissions (Momodu *et al.*, 2008); Illegal Tree Felling/ Deforestation (Badejo *et al.*, 2008); Chemical/River Pollution (Anyam, 1990; Obasi *et al.*, 2009); Case Study of Urban Wastes (Ilevbare and Adesanya, 2009); Industrial Effluents and Underground Water Quality (Jeje *et al.*, 2009); Sustainable Erosion Control (Gbadegesin and Raheem, 2012); Sustainable Flood Management (Akintola and Ikwuyatum, 2012); Environmental Radioactivity and Public Health (Farai, 2012); Meteorological Hazards (Ayoade, 2012); Issues in Environmental Law (Okorodudu-Fubara, 2013); Environmental Impact Assessment (Asimea, 2010; Ivbijaro, 2012) etc. A few of the causes of air and water pollution in these publications are summarized below:

### ***Indiscriminate deforestation***

In the natural setting, the forests contain an enormous variety of plants, animals, and micro-biota. In the midst of such biological diversity, the creatures of the Rain Forest for example have adapted, over the ages, to special circumstances. The scientists must have thought of these endowments, as they regard the Rain Forest the world's largest reservoir of genetic traits, and farmers can always fall back on these wild strains of food crops e.g. cocoa, coffee, oil Palm etc. to resist epidemics of insect infestations, plant disease outbreaks, etc. Yet the price of genetic diversity of the rain forest is their relative vulnerability, in that no two of them are the same, not even parts of the same forest, and the destruction of even a small area can result in the extinction of uncounted species! The canopies of vast rain forests as in Plate 1. do pump oxygen into the atmosphere, even though they at the same time consume about the same oxygen through the decay of organic matter, as they produce through photosynthesis, the harvests we reap. They also protect the aquifers and water basins, and have an effect on rainfall, indiscriminate exploitation of our forest resources, clearing of forests for agricultural and other purposes, burning of timber, adds to carbon dioxide in the atmosphere, causes global temperature to rise, causes erosion, forest degradation as well as "acid rain". Hence all the effort in educating the public about the dangers of indiscriminate forest exploitation (see Plates 3 – 5 and Adeyewa, 2000; Badejo *et al.*, 2008; Cunninghaam and Cunningham, 2006; Matthew, 2008; Matanmi, 2009; Ana and Fakunle, 2010; Ibviaro and Akintola, 2012).

### ***Air pollution***

Large urban agglomerations inevitably lead to air pollution, in-door, as well as out-door. This is a clearly pernicious problem especially because of the human and animal health implications. Sources of air pollution include: occasional natural disasters e.g. volcanic eruption; industrial explosions and fires; gas flaring in oil-producing communities; toxic emissions from iron-smelting factories; Lead poisoning through mining explosions, cement factories; vehicular emissions and fumes from automobiles, (Plates 6 – 11) which are good illustrations of air pollution, the devastating effects of which has already been reported by Akeredolu and Badejo, 2000; Ayoade, 2012; Farai, 2012; Houten, 1972; Matthew, 2008; Momodu *et al.*, 2008, and Yakubu, 2008. Types of Air Pollutants include: Sulphur Dioxide (SO<sub>2</sub>), Hydrogen Chloride (HCl), Ammonia (NH<sub>3</sub>), Chlorine (Cl). Ozone (O<sub>3</sub>), Carbon Monoxide (CO), Lead (Pb), Carbon Dioxide CO<sub>2</sub>), Nitrous Oxide (N<sub>2</sub>O), Methane (CH<sub>4</sub>), and Hydrocarbons (HC). Air pollution is also known to cause extinction of sensitive flora and vegetation, health risks, depletion of the ozone layer, acid rain, and climate change and global warming. Air pollution can be abated by discharging chemical wastes into the air through fume chambers, ensuring complete fuel combustion in internal combustion engines, locating industries, incinerators, and dump sites far away from residential areas, and reducing vehicular emissions through National Vehicular Emission Control Programme (NVECP), implemented by NESREA (Ivbijaro and Akintola, 2012).

### ***Water pollution***

The main sources of water pollution are: industrial effluents containing organic and inorganic pollutants, waste chemicals, heavy metals such as Mercury, Cadmium, Lead, etc. which flow into lakes, rivers, coastal areas, and through groundwater sources. through leachates, nitrogen etc. resulting from fertilizer application, faecal droppings of farm animals (cattle, poultry) etc.

Another major source of water pollution is: garbage dump accumulations which permit toxic heavy metals, organic acids etc. to leach onto underground water (the aquifer) (Plates 5 and 12 – 20). Plate 14 illustrates the impedance of water flow, resulting from the blockage of drainages, itself leading to the dumping of all sorts of solid wastes into the watercourse!

It is also very important to note that polluted untreated water causes serious water-borne diseases such as diarrhoea, hepatitis, gastro-enteritis, trachoma etc. the puddles, stagnant water, etc that are rich in nitrogenous substances also predispose to the massive build-up of mosquito populations, notorious vectors of malaria, yellow fever, dengue fever etc. Plates 13 - 16 show the water-course which a community dammed downstream but which was progressively covered by invading aquatic weeds, that are known to impede water flow, and result in the secretion of toxic chemicals by algae and aquatic weeds (Cunningham and Cunningham, 2006; Carson, 1962; Anyam, 1990; Obasi *et al.*, 2009; Jeje *et al.*, 2009; Farai, 2012).

### **Way out of this impasse**

The subject matter of Environmental Pollution is so broad and complex, that one could probably propose a few suggestions, none of which is really new, but all of which would require much more seriousness on the part of all stakeholders, and the political will to ensure all of the needed legislation, effective administration and financial support, to actualize the comprehensive environmental conservation of the entire Nigerian Landscape for the common good. The suggestions are as follows:

- ✓ In order for Nigeria to be able to achieve in full the objectives of Sustainable Development that includes environmental serenity, it is considered imperative that we stress the lifting of people's standard of living by improving their health and education and economic empowerment opportunities by conserving and enhancing the stock of environmental, human, and physical capital, without making future generations worse off as a result of persistent pollution of the environment and environmental degradation.
- ✓ The only way to achieve this laudable objective, in my considered opinion, is to strengthen considerably the Federal Ministry of Environment and further sustain the cause of Environmental Laws, nationally, and internationally, using Eminent Legal Experts. There cannot be any efficient Comprehensive Environmental Policy for Nigeria, to ensure the optimum exploitation of our Human and Natural Resources and keep our Landscape environmentally-friendly, without appropriate Legislation, and Enforcement of the Rule of Law in respect of the overall Nigerian Environment.
- ✓ Critical Problems of the Production and Management of: Oil and Gas, Commercial, Industrial, and Mining Pollution; Proper Management of Agricultural and Industrial Wastes and Toxic Emissions, Checking Water Contamination and Urban and Rural Environmental Degradation, all have to be addressed as National Emergency.

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**CANOPIES OF RAIN FORESTS  
PUMP OXYGEN INTO THE  
ATMOSPHERE  
(SOURCE- NATIONAL GEOGRAPHIC,  
VOL. 163, 1983).**



**INDISCRIMINATE LOGGING  
WITHOUT COMMENSURATE AFFORESTATION  
(PHOTOCREDIT, B. A. MATANMI).**



**BURNING OF ACCUMULATED SAWDUST  
AFTER LOGGING LEADS TO ORGANIC ACID  
PRODUCTION AND WATER POLLUTION  
(PHOTOCREDIT, B. A. MATANMI).**

**GULLY EROSION CAUSED BY  
AGRICULTURE'S SHIFTING  
CULTIVATION  
(SOURCE, F. A. O., 1983)**



**BURNING OF TIMBER IN  
CLEARED FORESTS (SOURCE,  
NATIONAL GEOGRAPHIC, VOL. 163, 1983).**



**MOUNT ST. HELEN VOLCANIC  
ERRUPTION DEVASTATES 300 SQ. MTS .  
OF LAND AND BIOTA.  
(SOURCE- NATIONAL GEOGRAPHIC,  
VOL. 161, 1981).**





**SMELLY UNSTOPPABLE  
FLOODS, MUDFLOWS AND  
DEGRADATION OF LAKES.  
(IBID., 1981).**

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**TYPICAL GAS FLARING IN THE  
NIGER DELTA REGION OF NIGERIA  
(SOURCE, YAKUBU (2008)).**



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**IRON-SMELTING FACTORY AS SOURCE OF MAJOR  
AIR POLLUTANTS (PHOTOCREDIT, B. A. MATANMI).**



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**TOXIC EFFLUENTS DEPOSITED INTO  
WATERWAY (CUNNINGHAM AND  
CUNNINGHAM, 2006).**



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**TOXIC FUMES EMANATING FROM IRON-SMELTING  
FACTORY IN SOUTHWESTERN NIGERIA.  
(PHOTOCREDIT, B. A. MATANMI).**



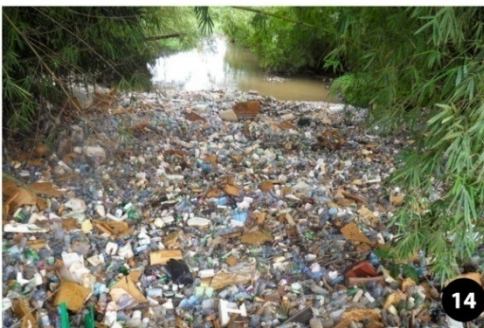
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**WATERCOURSE LEADING TO A DAM  
(PHOTOCREDIT, B. A. MATANMI).**



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**CARBON MONOXIDE PARTICULATES  
IN POORLY-VENTILATED KITCHENS-  
(SOURCE- CUNNINGHAM & CUNNINGHAM, 2006).**



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**WATERCOURSE IMPEDED BY EROSION-DUMPING  
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**WATERCOURSE NEARLY COVERED BY AQUATIC WEEDS (PHOTOCREDIT, B. A. MATANMI).**



**WATER POLLUTION OCCASIONED BY FARM ANIMALS (PHOTOCREDIT, B. A. MATANMI).**



**WATERCOURSE COMPLETELY COVERED BY AQUATIC WEEDS (PHOTOCREDIT, B. A. MATANMI).**



**POLLUTION OF AQUIFER OCCASIONED BY CATTLE IN CRAAL DESTINED FOR SLAUGHTER (PHOTOCREDIT, B. A. MATANMI).**



**SOURCE OF POLLUTION OF AQUIFER BY ACCUMULATED POULTRY DROPPINGS (PHOTOCREDIT, B. A. MATANMI).**

