

# Relevance of Science and Technology on Environmental Commons: the Nigerian Experience

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**Abstract-** *A journey through Nigeria, either by road, air, or rail shows a scintillating environment fully endowed with abundant of resources, from a rich ecosystem through rich mangrove and rain forests to plateau, mountain vegetation interspersed with rivers, lakes in different climatic regions and in different stages of utilization and management. All these influence man's existence but the extent of their influence on him depends on his capabilities to transform the applicable environment. Man applies science and technology in his quest to satisfy his day to day needs. Man will necessarily succumb to the dictates of environmental fallouts, if man is ill-equipped. With the necessary skills and knowledge and right application of the tools. It is on this premise that this study examines man and his physical environment, his application of science and technology to transform this environment to meet his immediate needs, the impact on it's environment and it's influence on man setting useful environmental laws and strategies for the way forward are then discussed. This study also deals with the laws, which helps to manage the environment for better wage and improve the living condition of man and nature via the waste management methods.*

**Keywords:** *scintillating environment fully endowed utilization and management, laws and strategies.*

## I. INTRODUCTION

The degradation of the environment constitutes a threat to human survival and man has been responsible for this, concerted efforts to arrest the environment degradation did not commence *until 1972*, when the international community worked out a global sensitization and management strategy in Stockholm. This consequently, resulted in the establishment of United Nations Environment Programme (UNEP). Nigeria has passed through various political regimes, some vicious while others are just dictatorial and indifferent. The growing population in Nigeria has accelerated in the recent past largely because of huge advances in science and technology. Science and technology in this regard is the application of scientific knowledge to explore and exploit practical object for the benefit of mankind. The on giving worldwide integration has produced a whole series of consequences – economic, political cultural and environmental (Awake, 2002). The British incursion into Nigeria, brought about strange pattern of surplus generation, appreciation, distribution and utilization. In that colonial era, the nature of science and technology was such that it promoted the objectives of western values and lifestyles but had a serious negative impact on Nigeria socio-economic, political and environmental structure post colonial Nigeria had influx of multinational corporations into the country with their

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concomitant exploitative tendencies and their usual strategies of decapitalization of the country's economy through the repatriation of the profit, dividends, fees, royalties etc. Our physical environment, which surroundings is made up of air, land, water vegetation, and animals. It affects every aspects of our lives, the work we do, the clothes we wear, the food we eat and even the way we behave towards another, our occupation depends on the environment in which we live, and what type of vegetation found there, Agwu, *et al.* (2000). A large proportion of the medicines now in use, for example, were developed from tropical plants through science and technology. Through the advent of science and technology, industrial nations like Nigeria, depends on oil and it's products. Think of heating oil, greases, waxes, asphats, and the items made from petrochemicals, aircraft, automobiles, boats adhesives, paint, polyester clothes, sneakers, toys, dyes, aspirin, deodorant, make up, recording discs, computers, television, telephone etc.

## II. ENVIRONMENTAL DAMAGE

The social and environmental cost of oil production have been extensive. They include destruction of wildlife and biodiversity, loss of fertile soil, pollution of air and drinking water, degradation of farmland and damage to aquatic ecosystems, all of which have caused serious health problems for the inhabitants of areas surrounding oil production. Pollution is caused by gas flaring, above all, ground pipelines leakage, oil waste dumping and spills. Approximately 75% of gas produced is flared annually causing considerable ecological and physical damage to other resources such as land/soil, water and vegetation. Gas flares, which are often times situated close to villages, produce "soot which is deposited on building roofs of neighbouring villages". Whenever it rains, the soot is washed off and the black ink-like water running from the roofs is believed to contain chemicals which adversely affect the fertility of the soil. Without fertile soil, indigenous lose their mode of survival and are faced with the crisis of food shortage.

## III. GOVERNMENT EFFORT TO PROTECT OUR ENVIRONMENT

The establishment of Federal Environmental Protection Agency (FEPA), 1998 and upgrading it to an autonomous federal ministry of environment with regard to environmental governance is the priority that government has given to environmental issues.

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The priority is informed by the realization that no amount of effort at developing the economy and social structure can suffice to achieve any meaningful success without taking cognizance of the management of our environment and our people. Government efforts and responses to these problems may be classified into four main categories namely:

### Legal and Institutional Policy Framework

Government took a bold step in 1984 to introduce the monthly environmental sanitation day and in 1988 the Federal Environmental Protection Agency (FEPA) was established. In 1992, FEPA's mandate was expanded by decree 50 to cover conservation of natural resources and biological diversity.

### Capacity Building and Institutional Strengthening

Capacity building in the area of environment was pursued in number of initiatives on public awareness, training, institutional strengthening and infrastructural development and through the establishment of non-governmental organizations concerned with the environment. FEPA's capacity building initiatives have included:

- (i) Assistance to all states of the federation for the establishment and strengthening of State Environmental Protection Agency (SEPA's), initiation and co-ordination of the development of State Environmental Action Plans (SEAPs),
- (ii) Training of state environmental managers on specific environmental management issues,
- (iii) Institutional strengthening of selected universities to serve as centre of excellence on specific environmental management, and
- (iv) Organization of various sectoral workshops, seminars for other agencies, non-governmental organizations (NGOs) and community-based organizations.

### Private Initiatives

Over the past 15 years, there have been welcome developments of several local NGOs activities in environmental and ecological conservation. They include the National Conservation Fund (NCF), which is affiliated to World Wildlife Foundation Internet (WWF), Friends of the Environment (FOE) and Forestry Association of Nigeria. These organizations have been bale to attract considerable inflow of counterpart funds to support environmental projects in Nigeria.

### Collaboration with International Organizations

In recognition of the importance of cooperation with other nations, of the world for the effective protection of the global environment, the government has over the years ensured that collaboration with the international community in the area of the environment, such collaborative efforts have resulted in positive contributions to the development of appropriate policies, legislation, action plans and programmes at regional and international levels. A number of internal environmental conventions have been signed and/or ratified as a result. There are several sources of funds for environmental protection activities. One percent of the federation account is set aside for the amelioration of ecological problems such as oil erosion and flood control,

desertification, drought and general environmental control (refuse, solid waste, water hyacinth, industrial waste). This amount was recently increased to 2 percent and paid into a special fund. The government has established a 3 percent of the revenue accordingly from crude oil in the country to tackle some ecological problems through the Oil Mineral Producing Areas Development Commission (OMPADEC) now Niger Delta Development Commission (NDDC), non-governmental organizations and the private sector also provide financial assistance for conservation efforts. Several environmental financial assistance initiatives from such agencies like the World Bank, UNEP, UNEP, FAO, IUCN, UNICEF and DB cover such problems as desertification control, capacity building and so on. But aside from the above efforts on the part of government there exist constraints to implementation.

Some of the constraints to implementation include:

- (a) uncoordinated legislation on environmental and natural resources conservation in Nigeria,
- (b) inadequate enforcement,
- (c) funding – inadequate public awareness,
- (d) lack of appreciation and involvement in environment related issues in development,
- (e) top-down approach in rural development projects – insufficient popular participation in project design and implementation, and
- (f) political influences which distort environmental programmes.

The Bureau of Private Enterprise and Federal Ministry of Environment recognize that timely and consistent incorporation of environmental and social dimensions into the privatization process will bring necessary improvement and financial benefits, and that environment, health, safety and social risks and impacts will be appropriately managed and subsequently reduced. The Privatization Environment Handbook (PEH) communicates the environmental and social principles of the BPE operations to its staff, customers, general public and the World Bank Group to include:

- (a) priority of preventives actions aimed at avoiding further environmental degradation and social disruption,
- (b) environmental, occupational health and safety due diligence is applied to each project,
- (c) support and enhancement of effective public and private sector environmental and social institutional framework,
- (d) promotion of sustainable and efficient use of renewable and non-renewable natural resources, and
- (e) application of population pays principles whenever possible and establishment of transparent allocation of responsibility and liability for environmental damage.

## IV. ENVIRONMENT AND MAN

Environment could conquer and be conquered by man through natural and anthropogenic agencies.

The natural agencies include changes in climate leading to desertification and flooding, the effects of running water, wind and breaking waves which induce accelerated rate of soil erosion. This physical or natural agency, which exerts reasonable influences on man and his activities, greatly determines man's choice for settlement sites, agricultural and commercial activities. Others include his health, sports, transportation and communication. These influences of the physical environment on man are referred to as environmental determinism (Ezema, 1993). On the other hand, man modifies his physical environment like the atmosphere, the vegetation of places, reliefs of different areas, water bodies of various magnitudes, to enable him engage meaningfully in agriculture, petroleum, mining, infrastructural development and urbanization, man's intellectual capabilities to apply science and technology to conquer the environment give rise to what is referred to environmental possibilism (Ezema, 1993). It is at the juncture of environmental possibilism that this work delves; bearing in mind the utility of science and technology by man to conquer his physical environment; the prospects and the problems, aim, strategies for the way forward by the usage of scientific tools. Man and his environment are inseparable and the relationship between them are intimate and dynamic. Man's application of science and technology to affect the quality of his environment also affects the quality of man's life. The evolution of science and technology in this regard greatly affects man's life. Harvey (2005) observed that American cities have experienced a significant transformation of the built environment, which he described as the restless formation, and reformation of the geographical landscape. According to Harvey, this restlessness is to be seen principally as an outcome of the tensions and contradictions associated with capitals, perpetual struggle to create a social and physical landscape in his own image and requisite to its own needs at a particular point in time. The application of science and technology in the environment of state capitals have developmental impact in the areas of residential buildings, transportation and infrastructural facilities, influx of multinational corporations, agricultural development, urbanization and industrialization, mining activities and immigrants pollution. On the other hand, development impacts from science and technology on the environment usually generate a lot of externalities that are inimical to human existence as well as the aesthetical qualities of the areas concerned. Baba (2004) seems to have summed up the influences of science and technology on the environment when he submitted that vigorous urbanization process in Nigeria as well as the industrialization process present peculiar environmental problems including the generation of huge quantities of domestic wastes; increasing quantities of gaseous effluents from transportation, domestic heating and industries, increasing sound from traffic industries, homes etc.

#### V. EFFECT OF URBANIZATION AND INDUSTRIALIZATION ON THE ENVIRONMENT

Science and technology has impacted so much on the environment that urbanization has come to be associated

with the agglomeration of human settlement for reasons which range from protection from invasion of hostile neighbours to availability of resources for exploitation and development. Urbanization leads, among other things to removal of vegetation and the establishment of land uses like road, roof-top, sewers parking spaces etc. Oruwari (2000), these land uses considerably reduce ground water recharged with the attendant increase of surface run-off. Gregory and Milling (1971) affirm that the construction of houses and related civil engineering works tend to increase sediment generation and yield in a drainage basin, in addition to urbanization effects on physical environment, NEST (2004) asserted that the high population densities, as a result of application of science in reducing mortality rate, has generated over 9 million tones of solid waste in the year, 1983.

#### VI. ENVIRONMENTAL DEGRADATION BY MINING ACTIVITIES

Application of science and technology in the Nigerian environment has successfully aided the discovery of such minerals as gold, clay, iron ore, tin, salt, soil petroleum, natural gas, coal, limestone, lead, zinc, sand, feldspar, diamond, sapphire, gemstones, tantalite, marble, zircon, columbite and uranium. Some of these are yet to be exploited on a commercial scale, quite few minerals like coal, tin, limestone, iron ore, sand, columbite, marble, natural gas and petroleum have being exploited on commercial scale in the country well over two decades. Associated with petroleum development is the problem of spillage on environment, which has devastating consequences on marine life and wildlife. One effects includes: de-vegetation, lost of drinking water, destruction and reduction of agricultural activities, loss of recreational and aesthetic value of water bodies and other devastating effects on the local communities Fajuyigbe (2007). Gas flaring from refineries often release contaminants into the atmosphere thus: bringing about the thermal pollution of the air, land and water. The combustion of petrol, diesel and other crude oil derivations results in the pollution of the atmosphere near the ground with carbon dioxide and carbon monoxide gas. The later is quite harmful particularly along the Buoy Streets of Lagos, Port Harcourt and Ibadan where the level generated by car engines could be as high as 400 ppm at peak periods, Folorunsho, (2005). It is on record that the oxygen carrying capacity of human body is decreased by 29% which is equivalent to the loss of at least half a litre of blood and hence subjecting traffic wardens. Motorists and pedestrians using such environment to a considerable health risk (NEST, 2004). Castells, (2004) states that the large scale quarrying of marble, sand and limestone has left the environment with burrow pits and paddeck reminiscent of the lunar landscape of steep sided mounds and multi-coloured ponds or lakes. Aside the hazards of the lakes bring breeding grounds for diseases, carrying vectors, general deaths of children and adults from drowning have been reported.

### VII. IMPACT OF AGRICULTURAL DEVELOPMENT ON THE ENVIRONMENT

Agriculture here refers to crop cultivation and pasteurization. Under crop cultivation, the wide ranges of scientific technologies for improving bumper harvest have had injurious impacts on the environment. For instance, the introduction of scientific chemical fertilizer has led to increasing demands on land for cropping which, consequently, has led to the exhaustion of the soil with the attendant effect of wind and gully erosion. On the other hand, Igbozuruike (1978) has rightly pointed out that pastoralism results in overgrazing following the tramping effects of the hooves of cattle on soil which pulverize the soil and renders it susceptible to sheet and wind erosion.

### VIII. THE EFFECTS OF ENVIRONMENTAL LAWS

The laws described above are to help the environment, deal with waste stream in order to make it better for human and nature. The waste stream will consist of domestic garbage and yard wastes to industrial, commercial, and construction refuses. Waste stream materials would be valuable resources if they were to mixed with other garbage. Collecting and dumping processes mix and crush everything together, making separation an expensive and sometimes impossible task. In a dump or incinerator, much of the value of recyclable materials is lost (Castells, 2000). There are different ways to manage the environment for better usage and improve the living condition of human beings and nature. Waste management stresses the need for the reduction, reuse and recycling of wastes caused by man activities on earth before destruction or finally, secure storage or wastes. There are different ways of waste management namely: open dumps, ocean dumping, landfill, incineration and resources recovering, recycling, composting, reuse etc. Open unregulated dumps are still the predominant method of waste disposal in most developing countries. The giant third world mega cities have enormous garbage problems most of these torrents of wastes were left in giant piles, exposed to the wind and rain as well as rats, flies and other vermin. Thousands of people live and work on this heap of refuse by sorting for edible or recyclable materials not minding the health hazards. Many municipal refuse, industrial waste, sewage and sewages sludge are dumped in the ocean. Cubic metres of dredge spoil, much of the highly contaminated are disposed of at sea. Landfills where solid waste disposal is regulated and controlled is encouraged in order to decrease smells and litter, and to discourage insect and rodent populations. Landfill operators are required to compact the refuse and lower it everyday with a layer of dirt. This method helps to control pollution, but dirt fill also takes up as much as 20 percent of landfill space. Incineration and resource recovery are used to burn the wastes in the incinerator where the heat is derived by burning garbage can produce steam used directly for heating buildings or generating electricity. Recycling is the reprocessing of discarded materials into new, useful products. It is a better alternative to either dumping or burning wastes because it saves money, energy, raw materials and land space, while also reducing pollution.

Recycling also encourages individual awareness and responsibility for the reuse produced. It could cut our waste volumes drastically and reduce the pressure on disposal systems. It also reduces energy consumption and air pollution. Composting is the biological degradation or breakdown of organic compost resulting from this process makes a nutrient-rich soil amendments that end water retention, slows soil erosion, and improves crop yield. Composting is a good way to convert waste vegetable scraps, and other organic materials into useful garden mulch. Mix everything together, keeps it moist and well aerated, and in a few weeks, you will have rich, odour-free mulch. Most hazardous waste is recycled, concerted to non-hazardous forms, stored, or otherwise disposed of on site by the generators; chemical companies, petroleum refiners and the large industrial facilities, so that it does not become a public problem.

### IX. CONCLUSION AND RECOMMENDATION

In the light of the environmental commons, that have been raised, the following are offered, appropriate governmental agencies should be developed to legislate and institutionalize machinery for managing them efficiently. This will go a long way in controlling spatial disorganization, deterioration and dilapidation that is plaguing our urban environment (Mabogunje, 1978). Political decision-makers should incorporate the will power to effect planning requirements in urban development. Planning is apposite ambition and essentially future oriented action directed towards the goal of creating a more congenial environment for man in the world by properly and purposefully harnessing our human and natural resources (Udoesien, 2003). Various planning authorities should be empowered to carryout occasional demolition of certain categories of grievously offending structures (Udoh, *et al.*, 2002). Indiscriminate, uncontrolled and unorganized location of filling stations should be relocated to suburbs of the city to allow for environmental quality. Efforts should be made to reduce the amount of waste generated from commercial establishments, like multinational corporations. With our present incapability for efficient recycling technology, the ongoing advanced science and technology in communication network should incorporate source reduction of solid wastes and pollutants as well as efficient disposal techniques that could promote urban sustainable development. There should be a formulation of urban environment conservation policy. A promotion of the use of inexpensive technological and natural processes to maintain and preserve a sound ecosystem of the cities. There is the need for Nigeria to redress the existing major environmental problems by evolving appropriate strategies for afforestation, erosion control, and biodiversity conservation. Government intensity efforts to combating desertification and mitigating the effects of drought. Focus should be placed on sustainable use of oil and gas resources and human settlements. Effective industrial pollution management should be engraved in our national legislation.

Management of municipal solid wastes and control of the menace of water hyacinth infestations should be encouraged.

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