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ENVIRONMENTAL HEALTH IMPLICATIONS OF URBANIZATION AND ECOLOGICAL DEGRADATION OF WATER RESOURCES IN NIGERIA

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ABSTRACT

The environment, including the air, soil, water, vegetation and other facets constitute an essential life support system on which man depends. The environment which hitherto was subjected only to natural changes with little or no negative impact in its constituents is now being subjected to tremendous amount of pressure, both in terms of what is put into it and what is drawn out of it, thus endangering the health and livelihood of man and undermining sustainable development. Though the world is already seeing the grave effects of degraded environment induced by man on earth ecosystem, the most serious impacts of these abuses will be on future generations if man today refuse to factor-in, the concept of sustainability in his interaction with the environment. This study is being undertaken in order to highlight the implications of man's actions on the environment for the purpose of sustainable development. This is germane because the link between environmental health and sustainable development needs to be emphasized in other to develop policies which are not only complementary in these areas, but are also mutually beneficial both at national and global levels.

Keywords: Environment, Watershed, Urbanization, Degradation, Hazard.

INTRODUCTION

Environmental health factors refer to those conditions, outside the body that affects a person's wellbeing. It represents different conditions in man's ecosystem such as air, water and food qualities, waste disposal, hazardous substances, housing condition amongst others. It includes the indirect effects of industrial disruption as well as degradation of the global system on which the health of the planet depends. Environmental health studies are germane for a better understanding of ecosystem protection and the relationship between the environment and human health. According to WHO (1993) environmental health comprises those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social, and psychological factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling, and preventing those factors in the environment that can potentially affect adversely the health of present and future generation. Because environmental health aims to protect not only present but also future generations, it is very much in line with the concept of sustainable development (Hashim and Hashim 2012).

Furie and Balbus (2012) listed three areas where environmental health can be of help in the achievement of sustainable development objectives, these according to them include:

i. supporting efforts to reduce modifiable environment exposure that perpetuate poverty in low and middle income countries.
ii. characterizing the environmental impacts of existing industries, technologies and land-use patterns that are harmful to human health; and,
iii. foreseeing potential unintended health effect of 'green' technologies, industries and human activities that will evolve out of effort to promote sustainability.

This paper is being written to fulfill the first objective. The impact of environment health hazard can be both acute in nature, such as incidence of water borne disease resulting from domestic usage of polluted water after flood event as well as devastating such as loss of agricultural land to gully erosion.

It is a well-known fact that clean water is absolutely essential for healthy living. Though its adequate supply in good quality is a basic need for all human beings, it has been observed that billions of people worldwide are deprived of this valuable resource (WHO; 1992). Akinbamijo (2007) pointed out that lack of safe and sufficient water supply stand as a major determinant of environmental health, especially in third world countries.
Fresh-water resources worldwide are not only threatened by poor management, but also by ecological degradation.

The main source of fresh water pollution can be attributed to discharge of untreated waste, dumping of industrial effluent and runoff from agricultural fields; problems which have been encouraged over the years by industrial growth, urbanization and increasing use of synthetic organic substances. While the developed countries suffer from problems of chemical discharged into water bodies, the developing countries are faced by pollution problem induced mainly by untreated waste water and agricultural runoff into water bodies.

In polluted water according to Faniran (1991) lurk organisms, most of which are invisible to the naked eye, which have caused more sickness and death than all the wars, famines and natural hazards known to man. According to him, these are the pathogenic bacteria, viruses and protozoa which still constitute the scourge of the human race in many developing countries including Nigeria. While the developing countries are putting serious efforts in the management of their pollution level, the developing countries are lagging behind in getting control over their major pollution sources, hence the gradual deterioration of their environment (WHO/UNEP, 1991). According to Akinbamijo (2007), water and environmental sanitation related hazards are endemic in Nigeria while the Federal Office of Statistics (2007) report shows that only 55 percent of Nigerians have access to public water, Brown (2003) indicated that there are more people in the third world hospitals owing to water borne diseases than any other cause. According to Furie and Balbus (2012) environmentally mediated diseases often take their greatest toll among the most vulnerable population, thus impending economic growth where it is most needed.

The impediment of good environmental health by water however does not only result from pollution activity alone, but can be a product of degradation activities induced by water such as flooding, sedimentation and soil erosion. These degradation activities illustrate man's failure in the management of his environment. Their occurrence most times is associated with heavy losses of life and property.

ENVIRONMENTAL HEALTH CHALLENGE OF WATER IN NIGERIAN ENVIRONMENT

Nigeria is located within the tropical zone of Africa between longitudes $2^0\ 49^1$ and $14^0\ 37^1$ east of Greenwich Meridian and between latitudes $4^0\ 16^1$ and $13^0\ 52^1$ north of the equator. The country is well drained by a close network of rivers and streams (Figure I).

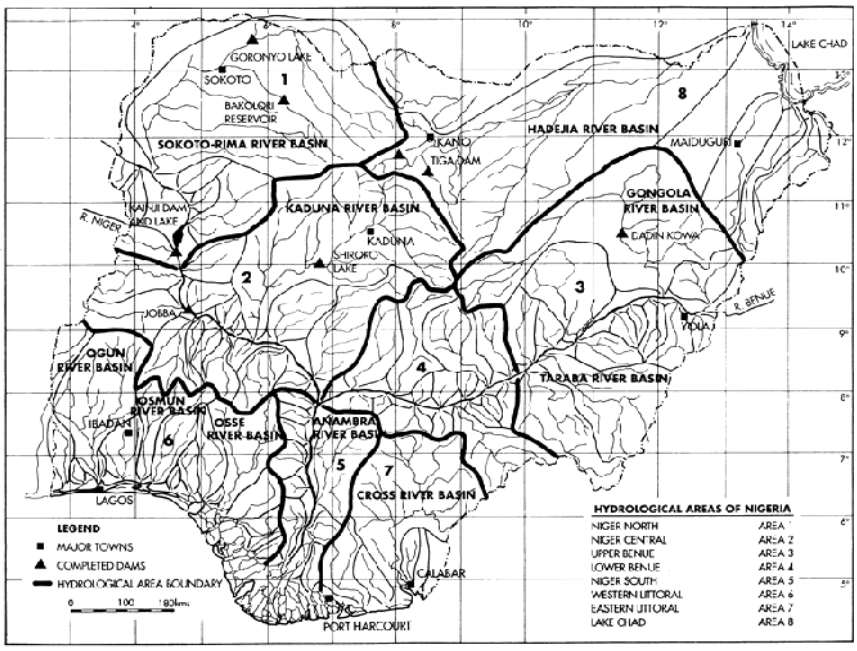

Fig. 1. Hydrological]Map of Nigeria

Source: Cooperate Document Repository, FAO (1993)

Approximately 10,812,400 hectares representing 11.5% of its 94,185,000 hectares surface areas is covered by water. The land area of Nigeria can be delineated into eight broad ecological zone, the climate characteristics of which are summarized in Table 1.

Table 1: Ecological Zones and Climatic Characteristics of Nigeria

	Wet Season(s)				Mean Monthly Temperature(^{0}C)		
Zone	Area %	Rainfall (mm p.a.)	Type	Number of Rainy Days	Max.	Mean	Minimum
Ultra Humid	2	Above 2000	Extended	300-3500	32	28-25	23
Very Humid	14	1,200-2000	Biomodal	250-300	33	28-24	21
Humid	21	1,100-1,400	Biomodal	200-250	37	30-26	18
Sub Humid	26	1,000-1,300	Unimodal	150-200	37	30-23	14
Plateau	2	1,400-1,500	Biomodal	200	31	24-20	14
Mountain	4	1,400-2000	Unimodal	200-300	36	29-14	5
Dried Sub Humid	27	600-1000	Unimodal	90-150	39	31-21	12
Semi-Arid	4	400-600	Unimodal	90	40	332-33	13

Nigeria watersheds are however being severely affected by the destructive influence of environmental health hazards. These hazards manifest inform of flooding (Oriola, 1995; Akintola, 1994; Ologunorisa and Abawua, 2005; Ologunorisa, 2006; Iroye, 2008; 2013), soil erosion (Floyd, 1965; Ofomata, 1965; 1991; Jimoh, 2000), sedimentation (Oyegun, 1980; 1982; Jimoh, 1994; 1997; Jimoh and Ishola, 2009; Iroye and Jimoh, 2015) and pollution (Akinbamijo 2007; Kolawole et al., 2008; Aboyeji, 2013; Iroye, Olanrewaju and Oyelakin 2014). According to Alwan (2010) non communicable diseases, many of which have linkage to the environment, are the leading cause of mortality worldwide and their contribution to total mortality is rising in the face of shifting disease risk factors. They account for nearly 45 percent of the overall disease burden in low and middle income countries (LIMCs) with those in labour force having a fair share of the percentage. Preventing diseases related to avoidable environmental exposures thus lends a powerful economic argument for sustainable development.

Sediment pollution of Nigeria water bodies is a serious and widespread problem; this is as a result of accelerated soil erosion and people's poor attitude towards refuse disposal. Iroye, (2008) observed that as a result of urban growth accompanied by high pollution density, waste generation and disposal has become a serious issue of concern in most Nigeria cities. People dump refuse into flowing whenever it rains. This action does not only pollute the water bodies but also encourages flooding and erosion processes.

Erosion, just like pollution is a major environmental health hazard confronting mankind, not only in Nigeria but globally. According to Pimentel (2006), soil around the world is being swept and washed away 10 to 40 times faster than it is being

replenished, destroying cropland. According to him, soil erosion remains the second only to population growth as the biggest environmental problem the world faces. As a result of erosion over the past 40 years, 30 percent of the world's arable land has become unproductive; thus, acting against sustainability in arable agricultural production. Soil erosion does not only affect agricultural production, it also impacts both air and water quality within an environment. In high rainfall areas in Nigeria, especially where the vegetation cover has been removed, accelerated soil erosion has incurred huge damage to the soil (Ofomata, 1965;1991, Floyd, 1965).

The degradation of Nigeria watersheds which are occurring at an increasing and alarming rates are being accelerated by human induced factors such as increased agricultural activities, civil construction works, reckless deforestation, drainage blockage, poor water management, urbanization and increased population pressure on the land amongst others. Water Supply and Sanitation Interim Strategy Note of Federal Government of Nigeria (2000) observed that nothing concrete has been done to address degradation problems in Nigeria. According to the report, previous and current government program in the country have only centered on water resources development, while its management has not been given adequate attention. Though decree 101 was issued in 1993 empowering the Federal Ministry of Water Resources to oversee management of the nation's water resources, little has been achieved over the last two decades since the decree was promulgated. The water resources master plan which was prepared for the country with Japanese support in 1994 also achieved little or nothing in terms of water management. Though Nigeria has adopted the river basin approach to water resources development since the early 1970s, the country has failed to accept the logic of the drainage basin as being set up not only for water resource development, but also for total environmental planning and management (Clapp, 1965; Faniran, 1972; 1980; 1989; 1991).

Other reasons for the failures in water resources management in Nigeria may not be unconnected with lack of coordination among the agencies concerned, inappropriate regulation and data problem. The Federal Ministry of Water Resources, with the support of World Bank and DFID, is now developing a water resources management strategy for Nigeria. The purpose of WRMS according to Water Supply and Sanitation Interim Strategy Note of FGN (2000) is to launch a process of defining an effective framework of water resource management policies, strategies, institutional structures and investment at the international, national, state and local levels; and to build capacity within the public and private sectors for cross-sectorial water resource management at the federal, state and local levels. The process according to the report is being designed to ensure wide participation of the civil society as stakeholders.

Inadequate intervention and neglect to control the degradation processes within the country have contributed in no small way to the magnitude of environmental health problem being currently witnessed in Nigeria watersheds. Effective and efficient watershed management is a prerequisite for reduction in environmental health hazards. Watershed management involves coordinated use and integrated management of land, water, vegetation and other physical resources and activities within the country. Watershed management will ensure minimal soil erosion, minimal impact on water yield and quality among others.

URBANIZATION AS A FACTOR OF ENVIRONMENTAL HEALTH HAZARD IN NIGERIA

Urbanization is the process of shifting from a rural to an urban setting. It is a product of social, economic and political development leading to concentration and growth of cities, changes in landuse and transformation of settlement from rural to urban. Urbanization process is having an increasing impact on hydrology and health of the Nigerian environment. According to Iroye (2008) urbanization process is one of the anthropogenic ways by which the theoretical operation of the hydrological cycle is distorted. Jones (1977) observed that its consequence effect is on catchment runoff pattern resulting mainly from paved surfaces.

Urbanization effect on catchment runoff begins with the clearing of natural surface (vegetation), which are subsequently replaced with artificial surfaces (impervious fronts). This action usually leads to reduction in soil infiltration capacity; hence, rainstorms which are incapable of generating runoff in countryside could produce flood within the city area. Such floods when they occur do impede environmental health through pollution and disruption of livelihood and social infrastructural facilities.

Though rate of urbanization is increasing in both the developed and developing countries; rapid urbanization, particularly the growth of large cities and the associated problems of inadequate social services pose a formidable challenge more in developing countries. Available statistics shows that more than half of the world's 6.6 billion people live in urban areas, crowded into less than 3 percent of the earth's surface (Angotti, 1993; UNEPA, 1993). According to United Nations (2003), the proportion of the world's population living in urban areas, which was less than 2 percent in 1800 increased to 50 percent in 2000 and is expected to reach 65 percent by 2030. The report further observed that more than 90 percent of the excepted growth will be concentrated in cities in developing countries.

Although urbanization can be regarded as a driving force for modernization, economic growth and development, there is increasing concern about its effects on expanding cities, particularly on environmental health which to a great extent affect human health and livelihoods. According to United Nations Conference on Environment and Development (1992) report, the implications of rapid urbanization for water supply, and disposal of waste, both solid and liquid that the cities produce are staggering. According to Ejaro and Abubakar (2013), rapid urbanization, if left unchecked based on the experiences of many developing countries, often leads to increase in poverty, crime unsecurity and consequently, unsustainable development.

However, UN Habitat Report (2013) observed that the dynamism of cities represents a major sustainable development opportunity. According to the report, by getting development right, cities can create jobs and offer better livelihoods, increase economic growth; improve social inclusion; promote the decoupling of living standards and economic growth from environmental resource use; protect local and regional ecosystem; reduce both rural and urban poverty; and drastically reduce pollution. Sound urban development will thus accelerate progress towards sustainable development goals, including the end of extreme poverty. The sad thing however is that, mistakes made in managing urban growth are very hard to undo; they are usually difficult to alter for many decades. Without adequate management and investment, slums may expand and cities may fail to generate the jobs necessary to improve livelihoods. As a result of these, inequalities, exclusion and violence will increase thus making the goals of sustainability unachievable.

In Nigeria, the dramatic effects of rapid urbanization on environmental health are very clear, not only in the cities but also in the peri-urban areas of the country. In many locations, it has drastically reduced the number of people with access to clean drinking water; it has reduced the quality of several water courses, with pollutant levels higher than the World Health Organization's standards (Ajibade, 2004; Eletta, 2007; Agbaire and Obi, 2009; Kanu and Achi, 2011). Pesticides from urban agriculture, residues from sawmill and manufacturing industries, wastewater from urban drains and leakages from municipal dump sites pollute drinking water sources. The unhealthy environment and the overcrowded housing in most urban centres in Nigeria also expose the residents to numerous environmental health hazards. According to US Habitat Report (2013), cities are home to extreme deprivation and environmental degradation. Iroye (2015) observed that due to boom in construction industry induced by population increase and urbanization, illegal and excessive mining are being carried out in the river bed of tributary channel of River Asa in Ilorin. This action according to him has reduced the quality of river water and has also depleted the groundwater level in the wells close to the river banks. Other noticeable effects of in-channel mining induced by urbanization in the area according to him include destruction of aquatic and riparian habitats through large scale changes in channel morphology and damages to bridges and other social infrastructure.

Though, cities acts as nodes through which development occur, rapid urbanization process possess particular risks that affect sustainable livelihoods of millions of people in Nigeria. The wide range of effects of rapid urbanization in in the country includes deforestation, soil erosion, water pollution and destruction of watersheds and wetlands. All these activities degrade the Nigerian environment and increase the environmental health risks of the residents.

SPATIAL PATTERN OF ENVIRONMENT HEALTH HAZARDS IN NIGERIA

Environmental health challenges of water and hydrology in Nigeria are numerous. Such problems are however more acute in some places than others. While environmental health hazard of flood impact sustainable development through damage to properties, destruction of crops and livestock and deterioration of health conditions resulting from waterborne disease; soil erosion affect sustainability in agricultural production. It destroys agricultural lands by creating a gaping deficit between nutrients added and nutrients taken from soil. These situations which make farmers to produce consistently low crop yields ultimately impede their sustainable livelihoods. Spatial distribution of environment health hazard in the country can be described thus:

Flooding: This occurs throughout the country in three forms of coastal, river and urban flooding. Coastal flooding in Nigeria usually occur in the low-lying beets of mangrove and fresh water swamp along the coast. River flooding occurs in the flood plains of the larger rivers, while sudden, short lived flash floods are associated with rivers in the inland areas, where heavy rainfall can transform them into destructive torrents within a short period of time. A few examples of this flood type are those or River Ogunpa (Ibadan) in 1982 and 1984; River Okun (Ilorin) in 1991 and River Sokoto in 2012.

Urban flooding prevalent in cities located on flat topography. In places where they occur, there is usually little or no provision for surface drainage. Where adequate surface drainage exists, they are most times blocked with municipal wastes, refuse and eroded soil sediments. Pavement of urban surfaces due to urbanization process to a great extent encourages this

type of flooding. Ilorin, Ibadan, Port-Harcourt, Markurdi, Yenagoa, Sapele, Benin and Lagos are few examples of settlements that have witnessed this flood type in recent years.

Erosion: Though soil erosion mainly results from rain water action (detachment, transportation and deposition); this environmental health hazard is being encouraged and accelerated by anthropogenic factors of agricultural practice, construction activities, deforestation and bush burning in Nigeria. Erosion comes in three different forms of rill, sheet and gully. Rill erosion which is the cutting of tiny channels on the land by running water is observable in any rainfall receiving natural surface without vegetation. Sheet erosion which is the loss of large area of surface soil especially on a flat land and in places which are also devoid of vegetation by almost even blanket flows of surface or near surface water also occurs nationwide. This erosion type is least perceived because of its deceitful slow progress. Gully erosion which is relatively permanent on steep-sided water course is moderate in most state but severe in some. Ofomata (2002) identified active gully erosion sites in Nigeria to include Angulu-Nanka, Obioma, Nsukka, Alo, Nnobi, Nnewi, Olu Ozuitem, Abirriba, Ohafia, Uruala, Amucha and Uyo, all located in south-eastern part of the country. According to him, other areas such as Heipang in Plateau state, Zaria, Ankpa and Auchi have smaller scale of gully erosion. In 1994, over 2000 active gully sites were identified nationwide with some extending over 300 meters long, 50 meters wide and 20 meters deep. Anambra and Enugu states alone accounts for over 800 active gully complexes while Imo State have over 350 gully sites (Efe and Aruegodore, 2003).

Apart from the above enumerated erosion types, coastal and marine erosion are also common in Nigeria: According to Okude and Ademiluyi (2006) widespread shoreline erosion is occurring in Nigeria; in some places, the rate of shoreline retreat is so rapid that it can correctly be regarded as alarming (Ibe, 1988). States where coastal and marine erosion can be found in Nigeria include Akwa-Ibom, Bayelsa, Rivers, Ogun, Ondo, Delta, Cross river and Lagos state which recorded a celebrated case in 1993 where the surging waves of the Atlantic Ocean eroded the Bar beach, compromising the environmental health of Victoria Island residents.

Pollution: Agricultural practice through the use of pesticides and fertilizers form the main source of environmental pollution. However, disposal of solid wastes, especially in urban centres and hazardous wastes from industrial areas also represent major sources of pollution in Nigeria. Galadima et al., (2011) listed water pollutants in Nigeria to include pathogens, silts and suspended solid particles such as soils, sewage materials, disposed foods, cosmetics, automobile oil, chemicals, abattoir wastes construction debris and eroded materials from rivers banks and water ways. Though pollution problem generally exist everywhere in Nigeria, the problem is more acute in urban centres when compared with rural areas.

CONCLUSION

The interaction of man with the environment in Nigeria has left an indelible mark on the nation landscape. Although, residents in the country are currently witnessing grave impacts of environment health hazards induce by pollution, sedimentation, soil erosion, urbanization, all which underline efforts to alleviate poverty; the irony of the case is that, greater impacts of these hazards will be on future generation if the current rate of environmental degradation is not checked. Unfortunately however, these environment mediated hazards are registering their greatest impacts among the most

vulnerable; impeding economic growth where it is most needed, thus making the goal of sustainable development difficult to achieve. Healthy population is a prerequisite for productive and creative society; it is in turn needed for sustenance of national development. Uncontrolled and unsustainable development that overexploit natural resources and degrades the environment is indeed the major cause of environment health problems.

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