

Environmental Challenges in Nigeria: Typology, Spatial Distribution, Repercussions and Way Forward

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Abstract

This study examines the types, spatial distribution, causes and consequences of environmental challenges in Nigeria. The article uses a conceptual perspective on environmental hazards and risks management to review and organize the largely descriptive empirical literature on prevention, reduction, management and mitigation of disasters. From this perspective, the study probed into the different environmental challenges that are facing each geo-political zone of the country. Furthermore, the paper provides the much needed information about the spatial distribution of environmental challenges in the country. In addition to this, the paper enumerates the causes and consequences of environmental challenges in Nigeria. To this end, the study advocates for the collaborative efforts of international organizations, government, non-governmental organizations, environmental managers, future leaders, planners, technologists and other decision makers in halting the frequency, magnitude and consequences of the environmental challenges.

Keywords: Adaptability, Awareness, Degradation, Ecosystem, Environment, Hazard.

1. Introduction

The terms challenge, problem, hazard, disaster and calamity sometimes are used interchangeably in environmental literature. Challenges refer to the existence of crises in the environment in such a way that it can cause damage to man or his environment. In essence, they are occurrences that are dangerous or potentially harmful to man and his environment (see Jay and Scott, 2011; Wright and Boorse, 2011; Mahatma, 2009; Enger and Smith, 2010; Hyde and Reeve, 2011; and Mary, 1995). For instance, Mary (1995) described an environmental challenge as any crisis event that surpasses the ability of an individual, community, or society to control or survive its consequences. He noted further that an environmental challenge can be said to be 'an unexpected accident resulting from natural or man-made factors (or a combination of both) that has a negative impact on the daily lives and living conditions of humans, flora and fauna'.

In his own perspective, Petters (1995) defined an environmental challenge as any form of harm, danger, peril or any risk of loss in the environment. He described it further as any situation in nature or in the environment which is destructive or probably detrimental to man or any other component of the environment. It results from the deterioration of environmental quality. Environmental degradation in our physical world has been going on for centuries as the human being began to find ways of living on this earth (Kwame, 2008:274). It emanates from natural processes as well as man-environment interaction. Chen (2005) posited that humankind currently faces significant global environmental problems including climate change, shortage of clean and accessible freshwater, ecosystem degradation, soil erosion, and biodiversity loss. The environmental problems are inter-related and inter-connected.

For example, there are interrelationships between biodiversity loss, desertification, erosion, loss of soil fertility, diseases outbreaks and climate change (see Jonathan, 2006; Rao, 2006; Joseph, 2009; Karen, 1996; and Botkin and Keller, 2012 for greater details).

Environmental challenges may be broadly grouped into major and minor types depending upon their potential to cause damage to human life and property (Joseph, 2009:1). Also, environmental challenges are classified under the broad titles of natural and artificial, based mainly on their mode of occurrence. Natural events occur suddenly and swiftly and consequently cause severe damage to the society and surrounding (Santra, 2011:560). Artificial challenges are influenced or induced by man. They have some elements of human error, negligence and or intent. The earth as an ecosystem, has a threshold or terminal borderline within which it can effectively absorb or withstand the impacts or effects resulting from circumstances within and without it, if dangerous deterioration and overstrain is to be avoided (Uche, 1995:9).

Nigeria is not left out in the spatio-temporal distribution of environmental challenges. Nevertheless, in term of frequency, anthropogenic challenges are more prevalent in the country. The socio-economic crisis of environmental challenges stems from man-environment interaction. In many cases, the socio-economic crisis is the result of development styles that destroy both human potentials and the environment (International Development Research Centre, 1993:17). In his own exposition, Jimoh (2000) argued that man-environment interaction emanates from the effort by man to meet his needs, and that allowances have never been made to accommodate possible environmental stress. Humans depend on the earth for their physical existence, general health and well-being (Siyabade 2007:3). However, in the process of harnessing environmental resources for the use and benefit of mankind, many calamities originate. According to Santra (2011), these hazards emerge from rapid increase in human population, significant rise in human use of resources, advancement in technology, the emergence of free-market economies, as well as poor attitude of people towards the environment.

Environmental hazards are not concentrated in any specific location. Likewise, they are not evenly distributed on the surface of the earth. Their occurrence, frequency, magnitude, and repercussions are determined by the causal factor(s). Hence, the spatial distribution of environmental disasters is determined by natural factors or the human processes prevalent in any environment. Likewise, the side effects of environmental calamities are determined by the causative factor, frequency, magnitude, space and time of occurrence among other influences. However, notable consequences of environmental challenges include loss of lives, loss of properties, loss of genetic resources, environmental degradation, loss of habitats, climate change and global warming, biodiversity loss, as well as epidemiological threat. Others are disturbance of human activities, reduction in ecosystem adaptability, impoverishment of communities that rely on environmental resources as their means of livelihood, as well as threat to Millennium Development Goals (MDGs).

There is total agreement throughout the world that any further environmental degradation should be effectively and completely checked (Pandey, 2008:370). Curbing environmental degradation requires the application of the four major elements of disaster management – prevention, mitigation, preparedness and relief. It also entails the management of the environment. In itself, environmental management means the careful understanding, planning and use of natural resources in order to ensure sustainable development (Ofomata and Phil-Eze, 2007:1). Above all, environmental management and disaster mitigation require sufficient education and awareness of the environment. We cannot expect people to act in appropriate way without the awareness of the problems, its causes, the impact on our daily life and the long range consequences (Asthana and Asthana, 2013:348).

The management of environmental challenges encompasses preparedness, mitigation, emergency response, medical response after disasters, support and assistance after disaster, as well as recovery following disasters. Efforts to ameliorate global environmental change should strengthen the capacity of people to sustainably use their natural resources according to their needs, skills and aspirations, within the context of an environmentally conscious lifestyle (IDCR, 1992:72). Disaster management is a strategy of achieving environmental sustainability. This requires development planning, transparency and accountability in natural resources management, community-based natural resources management, poverty reduction, as well as protection of human health. Other ameliorative strategies are environmental sanitation, risk management, risk assessment mapping, environmental monitoring, mitigation of climate change, promulgation and implementation of environmental policies, the use of alternative sources of power, as well as environmental impact assessment. All these require a collaborative effort of all the stakeholders in the environment. A little effort, a little care exercised by each individual in the society could eliminate the entire problem (Asthana and Asthana, 2013:348).

2. Typology Of Environmental Challenges In Nigeria

Calamity of different types and intensities affect nations all over the world (Joseph, 2009:1). In Nigeria, there are natural and anthropogenic calamities of different types, magnitudes and frequencies, hence, the focus of much attention on environmental concern. There is no issue in greater contention in Nigeria now than the environment; not even democracy (Dimuna and Dimuna, 2007:28). The environmental challenges in Nigeria can be classified under the broad titles of geologic, climatic and atmospheric, wildfire, disease and biological agents. On the other hand, they can be grouped under the categories of natural and anthropogenic types based mainly on their causative factors. Natural hazards are not as prevalent in Nigeria as anthropogenic hazards. Examples of natural hazards include geological hazards like earthquake, avalanche, volcanic eruption, lahar and sinkholes. Others are climatic and atmospheric hazards like hailstorm, heat wave, blizzard, hurricane Katrina, tornado, hale storm, ice storm, and magnetic storm. Other forms of natural hazards are tsunami, drought, mudslides and landslides, pest plagues, and desertification. Nigeria is spared of most of these calamities because of the favorable climatic and geologic trends of the country.

The most common environmental problems in Nigeria are anthropogenic in nature. They result from human interference (interaction) with the environment. They occur as a result of human intent, negligence, error or failure of human-made system. Anthropogenic hazards can be broadly classified under the titles of sociological, technical, transportation and others. Examples of sociological challenges are crime, arson, juvenile delinquency, civil disorder, terrorism, arms race, and war. Likewise, technical environmental challenges include industrial, structural collapse, power outage, fire, as well as hazardous materials. Challenges resulting from transportation emanate from road, air space rail, sea travel, and pipe lines. Other types of environmental challenges are pollution, air and water contamination, household hazards, overgrazing, overfishing, dangerous agricultural practices and household waste. Man-made problems of the environment are those problems created within the environment by man, as a result of the activities of man in the environment (Fatubarin, 2009:13). Man-made hazards in Nigeria are to a large extent, technology or culture dependent.

Human activities in Nigeria have also resulted into environmental challenges like biodiversity loss, oil spillage, bush burning, urban housing problem, water scarcity, as well as pollution (water, soil, air, marine, noise, thermal, radioactive and vehicular). Broader worries have also arisen about the environmental challenges of deforestation, urban flooding, destruction of aquatic habitats, over-exploitation of forest resources, illegal mining activities and dereliction, road transportation mishaps as well as solid waste problems (municipal, agricultural, industrial, hazardous radioactive and biomedical). Other forms of environmental degradation are desert encroachment, ozone layer depletion, global warming, poor environmental sanitation, unlawful exploitation of fossil fuel resources, oil spillage, gas flaring and many other challenges relating to oil exploration and production. The environmental challenges are aggravated by poverty and rapid increase in human population.

3. Causes of Environmental Challenges

Environmental challenges are caused mainly by natural forces and human influences, or a combination of the two. Natural causes of environmental challenges include climatic, geologic, atmospheric, disease, and biological factors. Coenraads (2009) identified the major causes of natural disasters as geological events, meteorological incidents as well as biological disasters. According to him, geological events are triggered by the inherent working of our planet while meteorological events are caused by the variations in global weather patterns and biological events are caused by actions of living agents. In a similar vein, Petters, (1995) submitted that while some natural disasters (e.g. Volcanic eruption, earthquake and hurricane) arise from earth's inherent instability, others (e.g. mudflow, landslides and flood emanate from mass displacement of earth's materials. Likewise, Wright and Boorse (2011) accounted for the causes of natural hazards under the categories of hydrological, meteorological and geological forces.

Anthropogenic challenges are caused mainly by human interference with the environment. Miller and Spolman (2009) identified population growth, wasteful and unsustainable resource use, poverty, as well as insufficient knowledge of how nature works as the major causes of environmental problems. Also, Ofomata and Phil-Eze (2007) identified the poor application of the principles of environmental management as a major cause of some of the environmental challenges in Nigeria. Human activities like agriculture, fishing, livestock rearing and hunting are mounting pressures on the environment.

Furthermore, other activities like mining and exploration for petroleum, land reclamation, overfishing, overgrazing, deforestation, hunting, as well as the use of pesticides and herbicides are responsible for many environmental challenges. Many problems concerning environment and biosphere are simply there because so many people contribute little bits and pieces to it, all of which put together assume enormous dimensions (Asthana and Asthana, 2013:348).

Madu (2007) submitted that the rapid growth in world population is a major cause of many environmental challenges. He noted that population size and rate of growth have led to the increase in the demand for food, clean water and energy increase. Consequently, the ability of the environment to meet some of these needs have become threatened. Moreover, poor people's reliance on natural resources, and the lack of alternatives to which to turn in times of stress have led to a high level of use which degrades the very asset on which their survival depends. For instance, road construction, timber harvesting, ranching, uncontrolled poaching and other human activities have led to the fragmentation of habitats and the subsequent disappearance of many species of flora and fauna. Other care-free attitudes of people towards the environment are urbanization and urban sprawl, industrialization, indiscriminate use of inorganic fertilizer, as well haphazard construction of buildings without regard to urban and regional planning laws and regulations.

Dilys et al. (2011) opined that environmental challenges result from imbalances, corruption and inequality. All these give the poor little access to economic wealth of the nation, hence, their over-dependence on environmental resources. The vices are also responsible for environmental crimes like war, terrorist attack, arson, vandalism and other human aggressions towards the environment. These environmental crimes are aggravated by poverty and rapid increase in human population. Enger and Smith (2010) submitted that environmental problems occur as a result of the uncontrolled interaction between humans and the natural world. Inadequate monitoring of the environment has aggravated some challenges beyond their thresholds. For example, environmental challenges like flooding, pollution and erosion are caused mainly by poor drainage system, building along river channels, breakdown of dams and embankments, as well as poor urban planning. Also, deforestation and desert encroachment are caused by pressure on land, cultivation along slopes, overgrazing, shifting cultivation and other dangerous agricultural activities. In all, the major causes of environmental challenges in Nigeria are natural forces, as well as uncontrolled human interference with the environment.

4. Spatial Distribution of Environmental Challenges in Nigeria

The concepts of space, spatial distribution, spatial interaction, spatial behavior, location and inter-linkages are used for the understanding of the causes and consequences of environmental challenges. Environmental problems in Nigeria are not restricted to any particular sector of the country. Like the harmattan wildfire, it acts across all regions of the country-rural and urban (Okosodo and Omonzejie, 2004:33). Also, it cuts across the different geo-political zones of the country (see table 1). Environmental scholars in the country have also classified the problems according to vegetal, climatic, coastal, Niger-Delta and oil producing areas (see Uche, 1995; Okosodo and Omonzejie, 2004; Dimuna and Dimuna, 2007; Ademiluyi and Solanke, 2004; and Ofomata and Phil-Eze, 2007). The different ecological zones of Nigeria are associated with peculiar human and economic practices and their attendant ecological and environmental problems (Okosodo and Omonzejie, 2004:34).

Nigeria is not spared of her own share of natural disasters (Fatubarin, 2009:116). The most common natural disasters in the country are desertification, landslides, flood, and erosion. These problems are distributed across the country based mainly on the prevailing geological, vegetal, hydrological or climatic condition. For instance desert encroachment is a major problem in the Sahel vegetation region of Nigeria. It is widespread in areas like Sokoto, Maiduguri, Birni-Kebbi and Damaturu. The problem is equally noticeable in the North Eastern part of the country. Associated problems of drought and vegetation loss are obvious in Kebbi, Sokoto, Kastina, Kano, Jigawa, Yobe and Borno States. Also, coastal erosion is peculiar to some states in the southern parts of the country. It is common in states like Lagos, Delta, Bayelsa, Akwa Ibom, Rivers and Cross Rivers. Likewise gullies are prominent in Anambra, Imo, Adamawa, Ogun, Akwa-Ibom, Cross Rivers, Benue, Abia, Bayelsa, and Ekiti State. Furthermore, the problem of flooding is prevalent along the banks of Rivers Gongola, Taraba, Ogunpa, Sontau and Donga. Other areas that are affected by flooding are the South East coastal plains, the Cross Rivers basin, the Eastern Scarp lands, and the Niger Delta. Likewise, urban flooding is ubiquitous in cities like Lagos, Ibadan, Port Harcourt, Calabar, Yenagoa, Ibadan, Asaba and Benin City (see Uche, 1995; Siyanbade, 2006; Petters, 1995; Ofomata and Phil-Eze, 2007; and Jimoh, 2000 for greater details).

The urban centers of the country are also characterized by unsightly city-scape pressure on natural habitats, urban aesthetics inadequate housing, collapsed buildings and poor environmental condition. Other problems that are peculiar to the urban centers are overcrowding, crimes, insecurity, outbreak of diseases, solid wastes, poor sanitation and hygiene, water scarcity, traffic congestion, and pollution of all types. Similarly, the rural areas are faced with the challenges of poor facilities for waste collection and disposal, dangerous agricultural practices, loss of farmland, soil erosion, inadequate sanitation, as well as insufficient amenities and social infrastructure. Moreover, the oil producing areas like Akwa Ibom, Cross River, Rivers, Abia, Bayelsa, Ondo, Delta, Edo and Anambra are characterized by the problems of oil spillage, siltation of water bodies, over fishing, land degradation, biodiversity loss, increased watershed instability, as well as extinction of rare species of flora and fauna. For the people in the Niger Delta, the major issues in contention today are environmental pollution and resource control (Dimuna and Dimuna, 2007:28). Other problems in the Niger Delta region are land degradation, oil spillage, flooding, erosion and reduction in soil productivity. Similarly, loss of soil fertility, bad land and dereliction are the major challenges in the mining regions of Jos, Enugu, Itakpe, Nkalagun and Ijoro.

5. Repercussions of Environmental Challenges

Effects of environmental challenges are complex and multi-dimensional. They vary from place to place and from time to time. They also differ according to their causative factor(s) intensity, event duration, severity, or the complexity of the process. Freeman et al. (2003) submitted that natural disasters can have more negative effects on man and his environment. Similarly, Cunningham and Cunningham (2006) submitted that environmental hazards are having widespread impacts on our world and the other organisms with which we share it. The consequences affect man, animals, properties and other components of the environment. They influence the physical, social, cultural, economic and wellbeing of man. Among the consequences of environmental challenges are biodiversity loss, fresh water degradation, climate change, stratospheric ozone depletion, land degradation, deforestation, and coastal degradation. Other aftermaths are climate change, hydrological upset, disease outbreak, and stratospheric ozone depletion.

Through inappropriate production processes and technologies, the Earth's resources are being exhausted and polluted at an accelerating rate (IDRC, 1992:17). Modern technologies of dam construction, mining, and highway engineering are doing more damages to the environment. The effects include stress (short term and chronic), neuropsychological impact, panic, anxiety, depression, loss of life, injury, and damage to infrastructure. Human activities are now so pervasive and profound in their consequences that they too affect the earth on a global scale in complex interactive and accelerating ways (Mahatma 2009:1). The severity of environmental problems in Nigeria has been documented by scholars like Petters, 1995; Franca, 2002; and Tyokumbur, 2010. They reported that the effects of environmental challenges in Nigeria include damage of infrastructure, loss of life, injury, loss of housing, loss of crops, breakdown of social order, disruption of communication, as well as epidemiological threat.

Environmental challenges are giving increasing concern to individuals, government and non-governmental organizations at local and global levels. For instance, desertification is responsible for the attendant depletion of resources base in the affected areas. It exacerbates poverty, brings about decline in soil fertility, and causes population displacement. Flooding causes aesthetic pollution of the environment, destruction of farm lands, damage to road pavement, as well as interruption of socio-economic activities. In the same vein, while pollution degrades the quality of the environment, soil erosion leads to reduction in farm productivity, loss of farm land, damage to road pavement and rail lines, as well as formation of badlands and gullies in mining and dereliction cases. The consequences of desert encroachment include climate change, loss of vegetal cover, soil depletion, crop failure and displacement of the population. In the same vein, ozone depletion and global warming are the outcomes of arson, burning of waste, bush burning and associated environmental crimes.

6. Addressing Environmental Challenges In Nigeria

The Nigerian environment not only plays a vital role in life support system, it particularly provides the basic resources for virtually all socio-economic activities in the country (Nwachuckwu, 2002:1). Nevertheless, the life-support system has been subjected to series of devastations as a result of natural catastrophes and human activities. In order to save the environment from further degradation of the rich and exhaustive resources, it becomes inherent to address the challenges so as to be able to achieve environmental sustainability.

Overcoming environmental challenges demands the enhancement of agricultural production without compromising the natural ecosystem, strengthening of local governance for biodiversity, management of environmental resources (land, water, minerals, energy, forest wealth and biodiversity), as well as management and control of hazards. Other environmental management techniques are the conservation of wildlife, biodiversity, energy, and population resources.

Raven, Berg and Hassenshall (2010) submitted that the elements that contribute to addressing environmental problems include scientific assessment, risk analysis, public education and involvement, political action and long term evaluation. However, they opined that solving environmental problems rarely proceeds in such a straight forward steps. Nevertheless, the five stages represent an ideal approach to systematically address environmental problems. Subsidiaries of this approach include the conservation of natural resources, pollution abatement, control of bush fires, planned industrial development, evaluation and monitoring of radioactivity, as well as resource sharing. Addressing environmental challenges requires the role of the government (at national, state and local levels), non-governmental organizations, and community based organizations, as well as individuals. It also necessitates the collaborative efforts of international organizations, law enforcement agencies, academics and technocrats, the youth, the press as well as national and multi-national companies.

Hazard control process is concerned with recognizing, evaluating and eliminating/mitigating hazards that occur because of human errors and physical deficiencies in the environment (Jain and Rao, 2011:298). Natural events cannot be prevented from occurring but their impacts can be reduced if effective measures are taken in order to depress their severity, frequency and impacts. Strategies of mitigating the effects and/or coping with the impacts of natural challenges include proper and sound environmental education, environmental monitoring with the use of satellites, geographical information systems and remote sensing techniques, government legislations, re-introduction of species, disaster forecasting and mitigation, as well as environmental risk assessment and mapping. On the other hand, the management of man-induced challenges requires poverty alleviation, control of population growth, recycling of materials and resources, reduction of arms race, as well as women empowerment.

The mitigation of anthropogenic challenges has to do with the type, cause(s), and consequences. For instance, curtailing man-induced desertification requires measures like irrigation farming, agro-forestry, rotational grazing, and prevention of illegal felling of trees, controlled use of wood as source of fuel and energy, as well as afforestation and re-afforestation programmes. Also, man-influenced flooding can be controlled through channelization and regular clearance of drainage channels, urban planning, sustainable waste management, as well as environmental sanitation. In like manner, control of soil erosion takes the form of cover cropping, contour ploughing, controlled grazing, terracing, and creation of shelter belts. In all, disaster management is all-encompassing. It entails respect and care for the environment as well as periodic environmental impact assessment.

7. Conclusion

The continued existence and well-being of all living things, plants and animals depend to a large extent on the ability of man to enhance, protect, conserve, and manage the natural resources in the environment. These life supporting means are threatened by natural and anthropogenic challenges or a combination of the two. In Nigeria, different challenges are associated with various climatic, vegetation, and geologic zones. Also, there are disparities between urban problems and those of the rural areas. Specific problems like oil spillage, coastal erosion, flooding and pollution are also rampant in the oil producing areas. The human induced challenges are aggravated by high population growth rate, poverty, unemployment and over-reliance on natural resources. The effects include health hazards, global warming, ozone layer depletion, climate change, pollution, environmental degradation, over-exploitation of natural resources as well as reduction in ecosystem complexity and diversity. Major solutions to the environmental challenges in Nigeria are environmental education, governance of nature, formulation and implementation of stronger laws or/and penalties, as well as the use of environmentally sound technology for the monitoring of the environment.

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Table 1: The Prevailing Hazards in Nigeria

S/N	HAZARDS		AREA MOST AFFECTED
	Natural	Man-made	
1.	Drought and desertification		Sudan-sahel Belt (Borno, Yobe, Jigawa, Kano, Bauchi, Adamawa, Kastina, Zamfara and Kebbi States).
2.	Flooding		Coastal belt, flood plains of major rivers, cities with inadequate drainage.
3.	Catastrophic soil erosion		Enugu, Anambra, Imo, Abia, Ondo, Ekiti, Akwa-Ibom, Ebonyi States.
4.	Destructive Storms		All States.
5.	Dust Storms		Sudan-sahel Belt.
6.	Coastal Erosion		Lagos, Ondo, Delta, Rivers, Akwa-Ibom, Bayelsa and Cross River States.
7.	Earth Tremors		South Western States.
8.	Pest Invasion		All States.
9.	Human disease epidemic		All States.
10.	Animal disease epidemic		All States.
11.		Dam Failure	Niger, Borno, Sokoto etc.
12.		Building collapse	All States.
13.		Oil Spillage	Niger Delta.
14.		Land, water and air transport accident	All States.
15.		Bomb Explosion	Lagos.
16.		Civil strike	Lagos, Kaduna, Kano, Taraba, Benue etc.
17.		Fire Disaster	All States.
18.		Wildfires	All States.

Source: Siyanbade, 2006 (pp 18-19).