

Ecological Challenges and Infrastructural Development in Nigeria: An Appraisal

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Abstract

Infrastructural development is no mean task as it is bound to be associated with hiccups, constraints and prospects. This study interrogated the challenges which face the development of infrastructures in emerging economies. Data was obtained from secondary materials comprised of books, journals, magazines, periodicals, newspapers, the internet, etc. The analysis followed the narrative textual case study (NTCS) approach while the social sustainability in development theory was adopted as the theoretical framework. Results reveal that quite a number of challenges slow down the rate of infrastructural development in Nigeria. The study recommended that efforts which succeed in identifying these challenging should be commended as such identification is the first step towards the head-on tackling of the challenges.

Keywords: Infrastructures, Development, Ecology, Identification

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Background to the Study

The infrastructure–environment nexus addresses the challenges of meeting the demand for infrastructure services while maintaining or improving the quality of the environment. Thus, at its semi-annual meeting in Manila in the fall of 2005, the Evaluation Cooperation Group (ECG), representing the independent evaluation department of the international financial institutions (IFIs), recognized the critical importance of the infrastructure–environment nexus. In this vein therefore, as development agencies pursue their effort to promote economic development in poor countries and improve the life of their people, they are warned to be cognizant of the need to ensure that development is achieved in ways that minimize the environmental damage or better still – improved environmental quality. This is nowhere more evident than in the intersection of the environmental concerns with the need for developmentally important infrastructure often referred to as infrastructure–environment nexus.

Infrastructures are vital components in the process of economic growth and social development. From the look of events, the next decades are likely to see an accentuation of two facets of infrastructures. On the one hand, they will prove a vital tool in resolving some of the major challenges faced by societies—supporting economic growth, meeting basic needs, lifting millions of people out of poverty, facilitating mobility and social interaction.

On the other, environmental pressures in the form of changing climatic conditions, congestion, etc., are likely to be on the increase turning spotlight firmly on the inherent tensions between the imperative for further infrastructure development and the quest for sustainability (Infrastructure to 2030, OECD, June 2006). A report on climate change by the United Kingdom's Economic Service (2006), commonly referred to as the Stern Review, and highlighted the importance of environmental risks inherent in world economic growth and development. This concern affects all countries and all populations. It highlights the fact that, “the most vulnerable---the poorest countries and populations, suffer earliest and most, even though they have contributed least to the causes of climate change” (United Nations, 2006).

Several factors explain why there has been limited progress in addressing the economic and environmental challenges of infrastructural service provision. These factors range from the fact that, economically, infrastructure is expensive and requires substantial upfront capital for benefits that are spread over time and, is plagued with difficulties of cost-recovery. In many countries, especially the poorer ones, the amount of investments needed is too staggering to bear. Again, infrastructure has often been mismanaged like many other services dominated by the public sector. Moreover, infrastructure has often borne the brunt of fiscal adjustments since the consequences of under-investment are only felt with a lag. Compounding these latest problems is the fact that data on the infrastructure availability and infrastructures spending is very limited. What does not get measured often does not get done.

On a final note, the threat of future climate change adds to the challenges of increasing infrastructure services while addressing more local concerns. Climate change also introduces the need to adapt infrastructure to the new, challenging and uncertain climatic conditions which add further to the challenges of development planning.

Statement of the Research Problem

Effective management of any crisis situation demands an orthodox/conventional approach to the solution of an issue of concern. Thus, problem identification constitutes the initial step to the solution of a problem. As a nation strives to develop, infrastructural development is an undisputable foundation. Yet, such infrastructural development is often bedeviled by certain challenges which should be identified. This study seeks to identify and evaluate the extent to which certain ecological factors constitute major hindrances to infrastructural development in a developing nation like Nigeria.

Objectives of the Study

This study has as its primary objective, the identification and evaluation of ecological factors which hinder the infrastructural development of developing country like Nigeria. Specifically, the study seeks to:

- a. Identify the factors which pose serious challenges to infrastructural development in Nigeria.
- b. Ascertain the extent to which such factors as identified, hinder the infrastructural development in Nigeria.

Research Questions

Answers will be provided to two questions which include:

- a. What factors constitute serious challenges to infrastructural development in Nigeria?
- b. To what extent do these factors hinder the development of infrastructures in Nigeria?

Literature Review

Conceptual Clarification

Infrastructure: Any investment on basic facilities which enhance growth and the development of the society constitute infrastructural development. The implication is that targeted investment in sectors such as agriculture, education and health can promote economic growth and help a very poor country to spring itself free from extreme poverty. For instant the United Nation's millennium project has re-emphasized the need for a 'big push' strategy in public investment to help poor countries break out of their poverty trap and meet the MDG challenge. The report argues that,

To enable all countries achieve the MDGs, there should be identification of priority in public investments to empower poor people and there should be built into MDG-based strategies that anchor the scaling – up of public investment, capacity building, resource mobilization, and official development assistance (Renzi and Levy, 2006).

Similarly, the World Bank (2015) reports that, “for a developing country to achieve a rapid poverty reduction objective, adequate investment in social infrastructure is necessary. Thus, governments are called upon to identify pro-poor sectors to expand their investment for economic growth and development. Infrastructural development, as a matter of fact, hinges on capacity building emanating from the process of economic growth which certainly reduce the level of poverty in a country.

Ecology: It is necessary to understand and differentiate the concept of ecology with reference to environment or the components of ecosystem. The term ecology was first proposed by a German Biologist Ernest Hackel in 1866. The word is derived from two Greek words (Oikos) that means house, a place to live and logos i.e. the study of. Therefore, ecology is the study of organism at home. Ecology is mainly concerned with biological connections and process of organisms, land, water, etc. It can be referred to as scientific study of the interaction that determines the distribution and abundance of organisms. The Webster's dictionary (n.d) posits that ecology is the totality or pattern of relations between organisms and their net environment. For Hackel (n.d), “it is the science of all the relations of all the organisms in relation to all the environment”. According to the United States Council on the Environmental Quality, “ecology is the science of the intricate web of relationships between living organisms and their non-living surroundings”.

Empirical Literature: Past and current works on the subject matter are hereby reviewed in a tabular form.

Table 1.

Surname of researcher/s Title/year of study Time frame of Research.	Geographical and content scope covered	Data sources and analytical Tools.	Findings/ Recommendations/ Conclusion
Ibimilum, & Ibimilum (2014), Environmental Challenges in Nigeria: Typology, Spatial Distribution, Repercussion and way forward	Nigeria: Geographical zones in Nigeria. The study probed into the different environmental challenges that are facing each geo-political zone of the country.	Secondary materials from various literatures provided the data for the study. It adopted the largely descriptive empirical literatures on prevention, reduction, management and mitigation of disaster	The paper provided the needed information about the spatial distribution of environmental challenges in the country. It advocated for the collaboration efforts of international organizations, government, non- governmental organization, environmental managers, futures leaders planners, technologist and other decision makers in halting the frequency, magnitude of the environmental challenges
Surname	Geographical etc.	Data	Finding
Akintoye and Adejuma (2014). Prospects for Achieving sustainable development through the millennium development Goals in Nigeria.	Nigeria: The study was carried out with a view to enhancing the understanding about the analytical content of sustainable development as well as sensitizing the Nigerian economy to key into the current wave of sustaining the global economy	The secondary sources provided the data while analysis was employed the content analytical mode.	The study find that in light of some of the environmental as well as socio-economic challenges permeating the Nigerian economy it is therefore, required that the Nigerian government concentrate on key areas that can help boost and sustain its developmental objectives.
Adenipekun (2013) sustainable rural infrastructural development in Nigeria within the context of vision 20: 2020	Nigeria: Specifically, the study was carried out to x-ray the position of rural infrastructure in some west Nigeria with a view to proffering strategies for improvement	Primary data was employed following responses to questionnaires administered on 200person.	The study found that through some roads are good in the area but much needs to be done to provide better facilitate the movement of goods and persons

Theoretical Framework

The study adopts Social Sustainability in Development Theory (Ruttan, 1991) 'Social – sustainability in a more fundamental sense, establishes the nexus between social conditions (such as poverty) and environmental decay. This theory identifies a negative linkage between sustained colonization, sustained poverty levels and sustained natural exploitation. There is a divergence of opinion in development theory whether 'environmental sustainability' is a pre-requisite of economic growth and poverty alleviation, or economic growth. An example is the United States which has been expanding the amount of its land area covered by trees

since the 1920s and actively managing its soils since the 1930s. These measures have greatly improved America's productivity in paper productions and foodstuffs since the Great depression. On the other Hand, some developing countries like Costa Rica, are jeopardizing their long term socio-economic prospects by engaging in rapacious resource depletion. "That loses of natural capital in these nations imperil social gains from improvement in financial, technical and human capital" (Repetto, 1992). This theory underscores the importance of environmental sustainability as a pre-requisite for development in its entirety. It suits the analysis in this paper hence, its adoption as the theoretical framework of this study.

Research Methodology

This study is a descriptive analysis of the ecological hindrances to infrastructural development in Nigeria. It employs the Narrative Textural Case study (NTCS) approach in its analysis juxtaposed in the social sustainability in development theory (Ruttan 1991) which underscores the needs for environmental sustainability as pre-requisite for infrastructural and any other form of development. The analyses proceed in the following orders:

Research Question One (1): What ecological hindrances infrastructural development in Nigeria?

According to Pearce and Barbier (2000), "The interplay between the environment and the economy remains at the heart of sustainable development" Hence it makes sense to believe that the unwise use of the natural environment due to ignorance, poverty, overpopulation and greed among others has led to the degradation of the environment. "The charges (degradation) occur as Nigeria attempts to adjust their seemingly endless wants and desires for food, shelter, recreation, infrastructural facilities and so on to the land and other resources available to them" Thus, environmental problems in Nigeria have been listed as resulting from urbanization, overpopulation, deforestation, desertification and pollution. An empirical evidence in support of the challenges posed by the above listed factors may be found in the study by Omofumwan and Osa-Edo (2008) which found that "though these wants and desires contribute to the development of the country, unwise use of the Land and its resources produce negative impacts on the environment.

Environmental problems in Nigeria are not restricted to any particular zone in the country. Okosudo and Omonzeje (2004:33), noted that, "Like harmattan fire, it cuts across all regions of the country – rural and urban". It also cuts across the different geographical zones of the country as depicted in the table below.

Table 2: Prevalent hazards in Nigeria

S/N	Natural	Man-made	Area most affected
1	Drought and desertification		Sudan-Sahel (Borno, Yobe, Jigawa, Kano, Bauchi, Adamawa, Katsina, 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, Akwalbom, Ebonyi states
4	Destructive storms		All states
5	Dust storms		Sudan-sahel Belt
6	Coastal Erosion		Lagos, Ondo, Delta, Rivers, Akwalbom, Bayelsa and Cross River states.
7	Earth tremors		South west 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		Wild fires	All states

Source: Siyanbade, 2006 (pp 18-19)

According to Joseph (2009:1), “calamity of different types and intensities affect nations all over the world”. In Nigeria, there are natural and anthropogenic calamities of different types, magnitudes and frequencies, hence the focus of much attention on environmental concern. The environmental concerns in Nigeria can be classified under broad titles of geologic, climatic and atmospheric, wildfire, disease, and biological agent. On the other hand, they can be grouped under the categories of natural and anthropogenic types based on their causes. Examples of natural hazards include earthquakes, avalanche, volcanic eruption, lahar and skin holes. Others are climate and atmospheric hazards like hailstorm, heat wave, blizzard, hurricane, katrina, tornado, hale storm, ice storm and magnetic storm. Good enough, natural hazards are not prevalent in Nigeria.

Research Question Two (2): What is the extent of hindrance to Nigeria's infrastructural development posed by the major factors identified?

As earlier indicated several environmental problems hinder development (infrastructure) in Nigeria. Mba, (2004) identified and classified such environmental problems to include, “ecological, poaching, and habitat loss, increasing desertification and soil erosion”. These are further subdivided into pollution, deforestation, global warming, and slum development. Nigeria's coastal regions are currently experiencing widespread contamination from petroleum exploration (gas flaring, oil spillage). The extent to which these factors affect

development efforts (infrastructures) are of varying degrees and are discussed as follows:

a. **Urbanization:** In Nigeria, this phenomenon is characteristic by city slums with serious environmental consequences. The problem is acute and exemplifies the inability of development efforts to keep pace with the rate of population growth. Environmental conditions in cities have gradually deteriorated due to the rapid growth of cities and the attendant inability of social services and infrastructures to keep pace with the rate of growth. The problem of refuse disposal is quite serious because of the rapid rate of generation of non-bio-degradable materials like plastics. Inadequate storm drains, dumping of refuse in drainage lines and construction of houses close to or even on the natural water channels have been identified as being responsible in that sequence for the increasing cases of flood in urban centers. "environmental problems associated with the increasing growth of urban slums, including overcrowding in squalid housing conditions, poor quality or unavailability of basic infrastructures, and even lack of access routes" (NEST, 1992).

b. **Overpopulation:** This is a major factor in all environmental related issues. Over population causes stress on the environment. "Environmental problems such as overpopulation, degradation, erosion, desertification etc. are caused by man's misuse of environmental resources" (Abumere, 2002). There are evidences everywhere of rapid decline in environmental quality and human living conditions by rapid increase in human numbers. Give such stressful conditions, "it will be easy for people to become so exigent, worrying only about what to get out of the environment for their own immediate needs and uses, without caring much for the consequences, especially for succeeding generations" (Mabogunje, 1983:13).

c. **Deforestation:** Deforestation is dangerous to man, animals and properties. It leads to erosion of the soil and storm, which can cause destruction of properties, crops and animals. When forests are cleared, the soil is exposed to erosion devastation, floods occur and rivers and lakes are filled up with silt. The water becomes dirty and impure for mankind. The removal of tree canopy (particularly the leaves) has effect on the rainfall of the area, as there is less leaf surface area for the transpiration of water, which in turn affects relative humidity of the atmosphere. The repeated cultivation of crops on cleared area of plants tends to exhaust the soil of its mineral content.

d. **Desertification:** Natural hazards such as drought and deposit by winds, are prime factors in the desertification process. Desertification is more pronounced in the northern parts of Nigeria where the Sahara has eaten deep into the once fertile land. The Lake Chad basin situated in the area is not left out of the desertification. Desertification is dangerous to man as it leads to famine, diseases, destruction of crops, livestock and man.

e. **Pollution:** Pollution can be categorized into three groups such as, aquatic or water pollution and land or surface area pollution as well as air or atmospheric pollution. The World Health Organization (WHO, 1990) defined air pollution as "limited to situation in which the outer ambient atmosphere contains materials in concentrations which are

harmful to man and his environment". Man's activity on the earth surface has largely degraded the quality of the lower atmosphere. According to Obajimi (1998), "in Nigeria, several rural towns that had in the past enjoyed fresh and dry air are currently experiencing pollution problems due to industrialization process and expansion in human activities".

Empirical evidence abound in attestation to the fact that people's attempts to adjust their endless desires and wants for food, shelter, recreation, infrastructural facilities and others on land and other resources available to them have resulted in the deterioration of urban and rural environmental quality in Nigeria. Isife (2012), suggests the redesigning of strategies and objectives of the Federal Environmental Protection Agency (FEPA).

Findings

Following the analyses in respect of research questions one (1) and two (2) above, the following revelations are hereby recorded:

1. The unwise use of the natural environment due to ignorance, poverty, over population and greed among others, has led to the degradation of the environment. This poses a serious challenge to the nation's effort of infrastructural development.
2. Nigeria's ecological problems emanate from urbanization and have been listed to include- overpopulation, deforestation, desertification, pollution, drought, flooding, erosion, oil spillage, etc.
3. The challenges of the environment to the development of infrastructures are not restricted to any particular zone but are spread across the six zones of the country.
4. The environmental challenges may fall into natural and anthropogenic calamities of different types, magnitudes and frequencies.
5. Natural ecological hazards are not prevalent in Nigeria.
6. The pressures of the population on the environment have created conditions in the cities which have deteriorated to the extent that rapid growth and attendant inability of social services and infrastructures to keep pace with the rate of growth is quite evident.
7. There are evidence everywhere of rapid decline in environmental quality and human living conditions by rapid increase in human numbers.
8. In Nigeria, several rural towns that had enjoyed fresh and dry air in the past are currently experiencing air pollution due to industrialization process and expansion in human activities.

Conclusion

Against the backdrop of the definition of ecology by Webster's dictionary (n.d) as "the totality or patterns of relations between organism and their environment," and given that infrastructures are the basic necessities (facilities) for the improvement of the living conditions of humans and the justification of the concern over the unacceptable degradation of the environment is easy to comprehend; such concern becomes more serious on the realization of the acute, pervasive and ever-increasing tendencies of the environmental challenges facing Nigeria. The effect of population on air, aquatic or water and on land has adverse consequences on health and economic activities.

Evidences (empirical and literary), abound on the increasing population pressure, the decline in levels of water tables and more airborne and water borne pollution from industries and domestic water. These pose great challenges to the nation's effort at infrastructural development.

Suggestions

Following the findings outlined above, the following suggestions have been advanced:

1. Government policies should focus more on measures at reducing poverty and ignorance.
2. The process of urbanization should be adequately articulated by government policies and planning based on statistics.
3. The nation's six geo-political zones should be adequately captured in government policies on environmental issues. In doing so, cognizance must be given to the peculiarities in zones
4. Since natural hazards are not common within the Nigerian environment, government policies should address with every dint of pragmatism, the man-made nature of the nation's ecological challenges.
5. The issue of air pollution must be tackled head-on.

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