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Climate Change and Challenges of Environmental Sustanability in Lagos State, Nigeria

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Abstract
The rate at which the climate is changing is a constant challenge to issues of environmental sustainability in Nigeria and other nations of the world. This is because, a sustainable development is not possible when the resources (natural and artificial) and other valuable elements of the city are constantly been challenged without an appropriate breeding space to replenish. This paper through an elucidating literature review examines the issues of climate change and its attendant problems. It assesses some anthropogenic factors threatening sustainability in the built environment such as urbanization, deforestation, population explosion, industrialization, global warming and investigates into the challenges which climate change pose to the sustenance of environmental sustainability in Lagos state, Nigeria. The paper identifies the need to widen professional orientation and training of relevant stakeholders, a constant and regular re-orientation programme for citizens against wrong environmental attitude and mass campaign for awareness on issues of climate change in order to cope with these challenges.
Keywords: Anthropogenic, climate change challenges, environmental attitude, environmental sustainability, global warming

INTRODUCTION

Climate change is now widely recognised as an important global problem expected to have adverse impacts on both the natural and human environment (IPCC, 2007). These are particularly becoming more severe in the under-developed and developing countries (Small and Nicholis, 2003). Today, humankind's activities are altering the world's climate. There are increases in the atmospheric concentration of energy-trapping gases, thereby amplifying the natural "greenhouse effect" that makes the earth inhabitable. These greenhouse gases (GHGs) comprise, principally, carbon dioxide (mostly from fossil fuel combustion and forest burning), plus other heat-trapping gases such as methane (from irrigated agriculture, animal husbandry and oil extraction), nitrous oxide and various human-made halocarbons. In February 2006, the Inter-governmental Panel on climate change (IPCC) reported that recent changes in the World Climate have dissembled impacts on physical and biological systems. Since most of the warning trend over the last 50 years is attributable to human activities, it is evident that these modifications to the climate both on local and global scale are likely to continue.

However, scientists have predicted an increase in global mean temperature of between 10^0C and 20^0C by the year 2025 as a result of enhance green house effect (IPCC, 2001). The consequences of the rise in the mean global temperature among others will bring distortions to human comfortability in the built environment. The environment becoming extremely warmer/colder as the case may be, leading to issues of drought, increase environmental diseases, sea level rise, severe storms and floods and many other discomforts to human settlement. As a result of the aforementioned problems, there will be severe threat to sustainability in the built environment. Sustainability is a state of dynamic equilibrium achieved by taking responsibility for balancing long-term economic, environmental and social factors (Newman and Kenworthy, 1999).

In the literature, sustainable development is most commonly divided into three dimensions: economic, social, and environmental. These dimensions are often referred to as the "three pillars of sustainable development. However, the focus of this paper will be on the aspect of environmental sustainability. Climate change has remained a huge factor threatening sustainability in the built environment. Studies have shown that for the past few decades, anthropogenic factors likes urbanization, deforestation, population explosion, industrialization and the release of greenhouse gases are the major contributing factors to the depletion of the ozone layer and its associated global warming and climate change (DeWeerdt, 2007; Odjugo, 2007).

This study therefore aimed at analysing the challenges of climate change and its effects on the environmental sustainability of Lagos state, Nigeria. This paper provides answers to some bordering questions such as: (1) what are the attendant problems to climate change? (2) How has climate change been affecting environmental sustainability in Lagos state, Nigeria? The study was carried out through the use of library search methods; these include searching for relevant documents and research articles from peer reviewed journals over the internet, gathering and collating relevant information from published and unpublished articles, consulting journals database resources like the Hinari initiatives and others freely available on the internet and personal desktop research. Information gathered were reviewed, discussed and presented descriptively with appropriate recommendations and conclusion.

2.0 REVIEW OF RELEVANT LITRATURE

2.1 Climate Change and its Attendants Challenges

The Intergovernmental Panel on Climate Change (IPCC), a body set up in 1988 by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP) to provide authoritative information about climate change phenomenon, produced enough evidence in their first report in 1990 to show that climate change is a reality and that it is being caused by anthropogenic activities (Uyigue and Agho, 2007). The biggest factors of present concern are the increase in carbon dioxide (CO_2) levels due to emissions from fossil fuel combustion, followed by an aerosol (particulate matter in the atmosphere) which exerts a cooling effect. Other factors, including land use, ozone depletion, animal agriculture and deforestation also impact climate (Angela, 2007). IPCC 2001 concluded that by increasing the concentration of greenhouse gasses, man has a discernible influence on climate, expected to be a long-term phenomenon affecting the environment in the forthcoming decades or even centuries (Paul and Dirk, 2004).

Since the industrial revolution, humans have increasingly altered the global carbon cycle and the rising concentration of atmospheric carbon dioxide (CO_2) has become a growing concern (Parry et al., 2010). Cities play an important role in the global carbon cycle, emitting large amounts of CO_2 due to energy consumption, transportation, and land conversion from natural or semi-natural ecosystems into built environment (Churkina, 2008; Svirejeva-Hopkins et al., 2004). This global industrial revolution has brought with it divers kind of challenge to the environment. Very noticeable among this is the extreme weather events (both cold and hot) which have caused havoc to lives and properties in recent years (Dipeolu and Fadamiro, 2013).

2.2 Concept of Sustainable Development and Its Origin

As a term, 'sustainable development' first came into use during the early 1980s. It gradually replaced earlier concepts such as the eco-development approach discussed during the 1970s, which focussed on scientific principle rather than political applicability and thus had limited potential to gain widespread acceptance (Church and Young, 2001). Sustainable Development's recent role as an integrative catch-phrase, then, originates from its adaptation in the UN-initiated Brundtland Report 'Our Common Future' (WCED 1987) and its subsequent elevation to a guiding principle during the 1992 Rio de Janeiro Conference on Environment and Development (UNCED), when 180 nations signed a protocol named Agenda 21 that encompasses it. The relative success of the concept appears to lie in its openness and capability to be interpreted to the needs of each proponent group.
According to the World Commission on Environment and Development (WCED), a sustainable development is that which meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Spiekermann and Wegener, 2003). In consonance to this, Fadamiro and Atolagbe, (2006) opined that the sustainability of the natural environment includes less depletion of natural resources, pollution and consumption of energy. The concept of sustainability has emerged from a global political process that has tried to bring together, simultaneously, the most powerful needs of our time. These include: the need for economic development to overcome poverty; the need for environmental protection of air, water, soil, and biodiversity, upon which we all ultimately depend; and the need for social justice and cultural diversity to enable local communities to express their values in solving these issues (Newman and Kenworthy, 1999).

2.3 The Sustainable Urban Environment

Sustainable urban development is essential to enhance the quality of life of the citizens and to decrease the impact of cities upon resources outside the urban context (Odjugo 2007). Ahern (2011) opined that the extent to which the 21st century world will be “sustainable” depends in large part on the sustainability of cities. This consequently infers that the extent to which the present cities will be sustainable also depend on the sustainability of the neighbourhoods within the cities. In their views, the United Nations Population Fund (UNPF-2007) defines a sustainable city as “a city where achievements in social, economic, and physical development are made to last”. It has a lasting supply of the natural resources on which its development depends. A sustainable development occurs only when the development is balanced between ecological viability, economical feasibility and social desirability (Campbell and Walter 1997). The ecological objectives of any sustainable development should include restoring the natural ecosystem and maximizing the diversity of natural systems. No development is possible unless it can be constructed within the means of its developers. The social objectives of a sustainable development require the design to be a response to the needs of those intended to live within its boundaries. This involves local participation in the design process, maintaining a cultural identity, and allowing for social mobility. Although the emphasis given to each of these objectives is subject to interpretation, all of them should be included in a truly sustainable development. The sustainability of human environment aims to achieve stable and comfortable indoor and outdoor environment by providing adequate functional spaces and noticeable ecosystem services. There is therefore a dire need for the built environment to be re-organised in such a way that it could be adequately sustainable.

3.0 ANTHROPOGENIC FACTORS AGAINST ENVIRONMENTAL SUSTAINABILITY

3.1 Urbanisation

Urban growth causes various environmental problems. Presently, urbanization is rapid worldwide and is expected to continue in the coming decades, especially in the developing world where the United Nations Population Fund (UNPF-2007) anticipates 80% of the world's urban communities will be found by 2030 (Beardsley et al., 2009). Thus, in order to respond to the idea of sustainability, urban areas have to maintain an internal equilibrium balance between socioeconomic and environmental conditions in such a way that the urban system and its dynamics evolve in harmony, internally limiting, and as much as possible low impacts on the natural environment (Barredo and Demicheli, 2003).

3.2 Deforestation

Another human activity identified as major way by which humans have and are continuing to change the amount of GHG in the atmosphere is deforestation. Forest could be seen as plant community, predominantly of trees or other woody vegetation, occupying an extensive area of land. In its natural state, a forest remains in a relatively fixed, self-regulated condition over a long period of time (Aiyeloja and Ajewole, 2006). Deforestation on the other hand, is the deliberate removal of forest and other forms of vegetative covers from a site without replacement. It is the alteration of natural arrangement of trees, a process of depleting without reforestating the flora and fauna within the forest. It is a process whereby trees are felled for several purposes, but without replanting to replace the ones felled (Omofonmwan and Osa-Edoh, 2008; Nzeneri, 2010).

Agbogidi (2010) asserted that the contributions of forests to human well-being can only be sustained if the forests are themselves sustained. But Nigeria has lost most of her natural forest cover and the rate of forest depletion is put at about 3.5% per annum, which translates to a loss of 350,000 – 400,000 hectares per year (Aruofor 2000). If the natural vegetation and urban greening is not rapidly maintained, various environmental challenges may continue unabated.

3.3 Industrialisation

Establishment of industries is also another activity that causes serious environmental threats to the built environment. Effluents, noises and various discharges from these industries constitutes pollutions at different levels to the environment. Akachukwu in Onuche (2010) asserts that petroleum exploration, exploitation, and oil spillage are together destroying large areas and causing serious environmental threats in Nigeria. Constant releases of various gases to the atmosphere by these industries are very dangerous to humans, plants and animals in the environment and thus pose great challenge to issues of sustainability to the environment.

3.4 Environmental Degradation

Agbola and Agunbiade (2007), opined that the goal of environmental sustainability is to minimize environmental degradation, i.e. the damage to the biosphere as a whole that results from human activity. Environmental degradation occurs when natural resources (such as trees, habitat, earth, water and air) are consumed faster than nature can replenish them, when pollution results in irreparable damage to the environment, or when human beings destroy or damage ecosystems in the process of development. An unsustainable situation occurs when the natural capital (the sum total of nature's resources) is used up faster than it can be replenished. Sustainability requires that human activity, at a minimum, only uses nature's resources at a rate at which they can be replenished naturally (Agbola and Agunbiade, 2007).

4.0 CLIMATE CHANGE AND CHALLENGES POSED TO ENVIRONMENTAL SUSTAINABILITY IN LAGOS STATE

United Nations Framework Convention on Climate Change (UNFCCC) cited by Omotoso (2007) defines climate change as a change of climate that is attributable directly or indirectly to human activities and which alters the composition of global atmosphere, in addition to natural climate variability observed over comparable time periods. Scientists have intensified the greenhouse effect by increasing the concentration of greenhouse gases in the atmosphere. This leads to increase in overall global temperature, which further warms the earth (global warming) and more melting ice leading to climate changes.

For example, the extreme weather conditions in Europe in July 2007 was associated with high temperature that caused deaths in Southern Europe while heavy rainfall in Northern Europe led to major floods in part of United Kingdom (Alao, 2007; Olujimi, 2007). In Nigeria, cases of flooding, rainstorm, urban degeneration, drought, erosion and many other dysfunctional environmental phenomenons has become routine occurrences in Lagos and other states of the federation.

Lagos state been a very populous urban centre in the Southwest Nigeria grew from 305,000 inhabitants in 1950 to 5.3 million in 1991 and 9.1 million in 2006 (National Population Commission, 1998). In 2010, the population was estimated to be about 15.5 million (Adelekan, 2010). Metropolitan Lagos is located in the south-

western part of Nigeria. It has an annual population growth rate of about 13.6 percent (about 5 times as fast as the national growth rate of 2.8 percent), Lagos is Africa's second fastest growing urban centre after Cairo, being a focal point for regional, national and international trade and served by significant and often overloaded road, rail, ocean and air transport facilities (Aluko, 2011). Lagos is the hub of business and economic development in Nigeria, housing around 70 percent of the country's industrial establishments and more than 65 per cent of all

Moreover, the location of the state within the coastal region is a great challenge to sustainability of the city. This is because coastal cities are by far the most developed of Africa's urban areas, and by implication have a high concentration of residential, industrial, commercial, educational and military facilities (UN, 2008). Rising sea levels consequent to climate change poses real threats to coastal populations along low-lying coastal sites because of the increased likelihood of flood events (Kabat and Van Schaik, 2003); furthermore, the frequency of storm surges may also be exacerbated by sea-level rise. For example, Aderogba (2012), cited Akani and Bilesanmi (2011) report on how a Lagos flood forced Lagosians to relocate as a result of heavy rain of 7th and 8th of July 2011 not knowing there was going to be a more devastating torrential rain that will result in "more disastrous floods in Lagos Metropolis" in the following week (Mordi, 2011).

At thesame time, diverse categories of environmental pollution abound in Lagos state. This could probably be attributable to the concentration of different categories of industries in Lagos state and environs. Series of gaseous substances been released to the atmosphere by the conglomeration of these industries ultimately warm up the atmosphere. During dry seasons, it is not uncommon to see Lagos state residents complaining of excessive heats. This could be linked to the emission of heat into the atmosphere by these industries in Lagos state and environs. It will therefore not be an over statement to assert that Lagos state been a very populated Nigerian urban centre is constantly challenged by issues of environmental sustainability.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

The 21st century has presented divers kind of environmental challenges requiring urgent human action. While researchers are working tirelessly at resolving the challenges of urbanization, challenges of global climate change and environmental sustainability has apparently caught up with these efforts. It is therefore essential that human being who is the major collaborator with global warming inducing agents should work out the solutions to these daunting challenges.

One of these actions is constant re-orientation programme for citizens against wrong environmental attitude. Environmental attitudes have been defined as "the collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues" (Schultz et al. 2004). As a crucial construct in environmental psychology, it is seen as a psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour (Milfont and Duckitt, 2010). Researchers like Steg and Vlek, (2009) emphasized that environmental quality strongly depends on human behavioural patterns. This implies that the impact of human environmental behaviour to environmental sustainability cannot be underestimated.

Thus, constant effort should made by Lagos state government to organise re-orientation programme for citizens on correct environmental attitude. If people can develop quality positive attitudes to the environment the challenges of climate change can reduce to the barest minimum. For example, attitudes like unnecessary emission of CO_2 to the atmosphere by vehicles can be checked if many Lagosians can decide to do less driving in private vehicles and take advantage of the Bus Rapid Transit (BRT) established by the state government.

Also, correct attitude towards disposal of wastes in Lagos state by residents will go a longer way to solve blockages of canals and other drainage channels which consequently causes flooding in the state. While organising re-orientation programmes towards proenvironmnetal attitudes, mass campaign on awareness of climate change should go simultaneously in order to cope with these challenges. More awareness campaign should be intensified by the government and other stakeholders for people to be more knowledgeable on the existence of climate change as this will determine the extent of support the concept will receive from the society.

To achieve all that is stated above, there is the need to widen professional orientation and training of relevant stakeholders who will consequently be saddled with the responsibility of carrying out awareness on climate change and citizens re-orientation on environmental attitudes. If all the above stated recommendations are well articulated and carried out appropriately by all stakeholders then, climate change and environmental sustainability challenges in Lagos state, Nigeria, and other nations of the world will be appropriately tackled.

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