

Population, Technology and Social Inequality: The Impact of the Dynamic Trio on Climate Change and Sustainable Development in Nigeria

John Lekan Oyefara

ABSTRACT

The issues around climate change have remained at the centre of developmental discourse most especially in the past two decades for obvious reasons. Human activities such as burning of fossil fuels, coal and various energy-related emissions from bush burning, cooking and usage of various machines that produce smoke result in the building up of greenhouse gases (GHGs), such as carbon dioxide, nitrous oxide, chlorofluorocarbon and methane in the atmosphere, lead to global warming of the earth surface and rising sea levels with devastating consequences that threaten the existence of humanity and earth. The paper examines the nexus between population, technology, social inequality and climate change in Nigeria. To achieve these objectives, eclectic research methodology was adopted using documentary secondary data. The theoretical underpinning of the paper was derived from the integration of biological, economic and social models as explanatory tools. The paper observed and posited that the interactions between population growth rate and size with evolution and diffusion of technology across cultures and entrenched social inequalities are major factors responsible for rapid climate change and its associated consequences. In Nigeria, the effects of climate change are already being felt with unprecedented floods, rendering many people homeless, devastating massive farmlands and population dislocation. Using the UNFPA's framework of agenda, the paper suggests that the current Nigerian national population growth rate should be contained, the lifestyles most especially the adoption and utilization of technology should be modified, social inequality should be reduced, while various laws on environmental sustainability should be strictly enforced.

JEL. Classification: K32, N5, P28, Q56.

Key words: Population, Technology, Social Inequality, Climate Change, Nigeria.

1. INTRODUCTION

The concept of climate change denotes long-term alteration in global weather patterns. It is the departure from normal climate patterns and conditions expressed in terms of increases in temperature and changes in the activities of other constituent components of weather such as rainfall, sunshine, mist, wind and haze among others, regarded as the consequences of greenhouse effect. Scientist believe that the Earth is currently facing a period of rapid warming brought on by rising levels of heat-trapping gases known as greenhouse gasses in the atmosphere (Princiotta 2011; Ekweozoh 2010).

Cosmologically, greenhouse gases (GHGs) occur naturally and retain the radiant energy or heat provided to Earth by the Sun in a process called the greenhouse effect. Without them, the planet would be too cold to sustain life as we know it. Only greenhouse gases, which make up less than one percent of the atmosphere, offer the Earth any insulation; every life on Earth relies on the greenhouse effect. Without it, the average surface temperature of the planet would be about 18 degrees centigrade, and ice would cover the Earth from pole to pole. However, it is now being feared that the warming effects are being undesirably increased, since the beginning of the Industrial Revolution in the mid-1700s, leading to global warming. For instance, levels

of carbon dioxide (CO₂), a powerful greenhouse gas, have risen by 35 percent since 1750, largely from the burning of fossil fuels such as coal, oil and natural gas (Princiotta 2011; Bolarinwa 2010). According to a more recent report from the Intergovernmental Panel on Climate Change (IPCC), greenhouse gas emissions increased by 70 percent between 1970 and 2004, and anthropogenic warming and sea-level rise will continue for decades to come, in line with anticipated demand for energy by current and future populations (Bolarinwa 2010). In other words, even with the increasing levels of greenhouse effect, a development which in itself is potentially catastrophic, prospects for decrease is not within the horizon because current and future population will in the cause of their everyday life, continue to commit greenhouse emissions.

Unless climate change is reversed, scholars fear that the public health and security implications decade, hence will be particularly severe, with millions of people facing increased risks of hunger, malaria, flooding, diseases, and water shortages (Princiotta, 2011; Bolarinwa 2010). In Africa, these problems, as Bolarinwa (2010) observes, are likely to be more severe. Recently in Nigeria, there were unprecedented pestilential environmental challenges such as violent floods that destroyed human habitation and defied governments' ability to protect the citizens from sudden disaster. Millions are displaced by flood, while many lose their lives; and croplands are devastated leaving communities without means of livelihood. Economic activities are disrupted for months, worsening the nations' feeble economic strength.

On a general note, the cause of climate change has always been attributed to the activities of man (i.e. anthropogenic), both at the industrial and subsistence levels such as cutting trees for firewood. This is a generalized conclusion that does not reveal how these activities are influenced by other background factors and their dynamics.

The present paper is an attempt to look at the impact of population, technology and social inequality on climate change. Apart from this introduction, the paper is divided into other subsections. These sections involve examination of Nigerian National Policy on Environment, Consequences of climate changes from empirical evidence; followed by efforts to control global warming in Nigeria. Then next sections are on the nexus between population, technology and social inequality and climate change respectively. The final section involves critical examination of appropriateness of some of UNFPA's plan of action in Nigeria situation.

2. THE NIGERIAN 1998 NATIONAL POLICY ON ENVIRONMENT AND RELATED ISSUES

Nigeria as a country has good policy. The challenge of implementation is what has made the country to remain at this point of development. What is policy? Policy is mostly defined as scientific instrument for solving social problems. National Policy on the environment in this manner is the Nigerian instrument which aims at solving environmental problems facing Nigeria as a country. This aspect of this paper shall look at some extracts from the Nigerian National Policy on Environment 1998 (FEOA 1998) and make suggestions to the government officers on what they can adopt from the policy in order to have better environment for Nigerians.

The following extracts from the introduction of the Policy is relevant to our analysis in this write-up:

Nigeria is committed to a national environmental policy that will ensure sustainable development based on proper management of the environment. This demands positive and realistic planning that balances human needs against the carrying capacity of the environment. This requires that a number of complementary policies, strategies and management approaches are put in place which should ensure, among others, that:

- Environmental concerns are integrated into major economic decision- making process;
- Environmental remediation costs are built into major development projects;
- Economic instruments are employed in the management of natural resources; environmental friendly technologies are applied;
- Environmental Impact Assessment is mandatorily carried out before any major development project is embarked on.

This policy, in order to succeed must be built on the following sustainable development principles:

- The precautionary principle which holds that where there are threats of serious or irreversible damage, the lack of full scientific knowledge shall not be used as a reason for postponing cost-effective means to prevent environmental degradation;
- Pollution Prevention Pays Principle (3p+) which encourages Industry to invest positively to prevent pollution;
- The polluter pays principle (PPP) which suggests that the polluter should bear the cost of preventing and controlling pollution;
- The user pays principle (UPP), in which the cost of a resource to a user must include all the environmental costs associated with its extraction, transformation and use (including the costs of alternative or future uses forgone);
- The principle of intergenerational equity which requires that the needs of the present generation are met without compromising the ability of future generations to meet their own needs;
- The principle of intra-generational equity which requires that different groups of people within the country and within the present generation have the right to benefit equally from the exploitation of resources and that they have an equal right to a clean and healthy environment; and
- The subsidiary principle which requires that decisions should as much as possible be made by communities affected or on their behalf by the authorities closest to them.

This policy thrust is based on fundamental re-thinking and a clearer appreciation of the interdependent linkages among development processes, environmental factors as well as human and natural resources. Since development remains a national priority, it is recognized that the actions designed to increase the productivity of the society and meet the essential needs of the populace must be reconciled with environmental issues that had hitherto been neglected or not given sufficient attention.

In enunciating a national policy on the environment, cognizance must be taken of the various institutional settings and professional groupings, as well as the complex historical, social, cultural and legal considerations which have been and continue to be involved, in the identification and implementation of measures designed to solve national environmental problems. The provisions of the Policy have thus been informed by recent national policy initiatives in Science and Technology, Agriculture, Health, Industry, Oil and Gas, Population, Culture, etc., as well as major international efforts in the field of environment. The Policy aims

to provide a rational, practicable, coherent and comprehensive approach to the pursuit of economic and social development in a way that minimizes contradictions and duplications, while enhancing inter and intra-sectorial co-operation and effectiveness at all levels (FEPA 1998:1-2).

Since the health and welfare of all Nigerians depend on making the transition to sustainable development as rapid as possible, this National Policy on the Environment provides the concepts and strategies which will lead to the procedures and other concrete actions required for launching Nigeria into an era of social justice, self-reliance and sustainable development as we enter the 21st Century'' (FEOA 1998).

The promulgation of the Federal Environmental Protection Agency Decree No.58 of 30th December, 1988, Signal attempts at contending with the ugly incidents of environmental problems for Nigeria. The responsibility for the protection and development of the environment in general and environmental technology including initiation of policy in relation to environmental research and technology (Obabori, Ekpu and Ojealaro 2009).

As stated by (Obabori, Ekpu and Ojealaro 2009) there are reported cases of violence emanating from adjudication for better deal by inhabitants that suffer losses as a result of cost due to contamination and farmland, landslide pollution of water bodies and degradation of the environment. Since the beginning of time human activities have continuously revolved around environment whether considered scientifically or technologically, the experiences and endeavors of man dwell with his inseparable and unceasing interaction with the environment. In Gabeikoro Nagymaros Project Hungary vs. Slovakia where it was observed by International Court of Justice that "Throughout the ages mankind has for economic and other reasons, constantly interfered with nature. Badly-managed economic growth can and does damage the environment both locally and globally through air and water pollution, soil contamination and destruction of resources.

Economic development is a necessity but it is equally important that control systems for environment quality be improved. For a country of Nigeria's size and geopolitical importance, non-strategic, arbitrary and inadequate efforts on environmental stewardship have both present and future negative impacts on economic development quality of life and peace. In addition to its effect on public health, poor environmental conditions drive away foreign investment and tourism that are needed to promote Nigeria's economic growth. On the part of oil and gas sectors in both private and public organizations, it should be noted that oil exploration and production waste were necessarily generated, adding that shell was fully aware that the way and manner such waste was managed had tremendous impacts (Obioha and Olokesusi 2003). The impact include the following: Gully erosion, flooding, environmental pollution, loss of biodiversity, urban environment decay and slum, deforestation and degradation. Relatively, one of the consequences of population growth is the environmental degradation. This degradation becomes manifest as human activities increase in consonance with population growth. The population growth exerted pressure on available infrastructure that is not functioning at their best. With the environmental degradation, majority of the people in the state are negatively affected. The permanent secretary, Federal Ministry of the Environment noted that "the issue of the environment is not extensively reflected in the nation's planning instrument owing to poor advocacy and limited technical capacity (Obabori, Ekpu and Ojealaro 2009).

Relatively, there has been agreement between African countries, donor governments, civil society and multilateral organization to cooperate in the comprehensive effort to eliminate the accumulation of obsolete pesticides. This partnership addresses a serious and growing public health and environmental danger, which confronts almost every country in Africa. It has been observed that solid waste management has not succeeded in some cases because of attitude of the residents, the cultural factors, government factors and seemingly the ad hoc measures being adopted. Lagos state officials have traditionally blamed the lack of equipment, shortage of operational funds, indiscriminate dumping of waste and the unsanitary attitude of residents as being the bane of refuse management in the metropolis. Added to these factors is unabated increase in population, insufficient number of dumpsites, lack of adequate personnel and evacuation equipment still remain the obstacle to refuse management.

It is important to rekindle ourselves of the Federal Environmental Protection Agency (FEPA) principles at dealing with solid waste management. The highlights are as follows: the full application of “polluter pays principle” in which waste disposal would be fully commercialized and not treated as a social service by local government councils; the commercialization of waste disposal which must be devoid of monopoly, official or non-official, but would be operated under free market leases for which government owned waste disposal boards/corporation will compete in order to ensure visibility and profitability; the construction of sanitary landfills and identification of suitable sites for such landfills as an indispensable requirement in the waste disposal system/chain.

3. SPECIFIC CONSEQUENCES OF CLIMATE CHANGE

At the introductory section, the paper made a passing note on some of the problems caused by climate change such as violent floods that destroyed homes and devastated farmlands; widespread hunger and diseases and so on. Beyond that, scientists are equally projecting that the polar regions of the Northern Hemisphere will heat up more than other areas of the planet, and glaciers and sea ice will shrink as a result. Regions that now experience light winter snow may receive no snow at all. In temperate mountains, snowline will be higher and snowpack will melt earlier. Winter and night time temperatures will tend to increase, more than day time temperature.

In a warmer world, scientists predict that more people will get sick and die from heat stress due not only to hotter day, but more importantly to warmer nights. Diseases such as malaria, now found in the tropics and transmitted by mosquitoes and other animal hosts, are projected to widen their range as these animal hosts move into regions formerly too cold for them (Backlund, Janetos and Schimel 2009). The impact of changes on ocean temperatures, sea levels and coastal storm patterns are broad and include displacement and loss of wetlands, inundation of low-lying property, increased erosion of the shoreline, expansion of the flood zones, and salinization of surface water and groundwater. Since many cities and their built infrastructure are located on the coast, impacts from sea level rise on urban areas and the hinterlands will be significant (Matthias et al. 2006).

Furthermore, mid-latitude climates exhibit strong cyclical temperature and mortality patterns (Matthias et al 2006). Exposures to extreme temperatures are commonly associated with higher mortality rates; and the seasonal nature of mortality rates has been observed, for example, in heart failure-related morbidity and mortality, coronary heart disease and incidence of stroke. In 1995, it was recorded that more than 700 deaths in Chicago, USA, were attributed to that year’s heat wave (Matthias et al, 2006). Extreme heat events increase requirements on

the cardiovascular system to produce physiological cooling which in turn, may lead to excess deaths, in particular among infants, the elderly, individuals with pre-existing illnesses, the poor and the overweight. Individuals living in urban areas are also said to be vulnerable to heat-related morbidity and mortality (Backlund et al 2009; Matthias et al 2006).

Similarly, storms are expected to be more frequent and severe in a warmer global climate. Water is likely to evaporate more rapidly from soil, causing the soil to dry out faster between rainfalls. Some regions will actually become drier than before, e.g., drier conditions are likely to prevail in the Sahel region of western Africa, southern Africa, the Mediterranean, and parts of southern Asia. Heat wave will continue to become more frequent and intense. Hurricanes, violent storms that derive their forces from warm ocean water, are likely to become more severe. Droughts are projected to become longer and more intense, and in fact this has already been observed since the 1970s, particularly in the tropics and subtropics (Princiotta 2011; Bolarinwa 2010). A case in point was that of Ethiopia which brought about severe famine in which tens of thousands died of starvation (Findlay and Findlay 1991).

Although Africa contribute only about 3.8 percent of greenhouse gas emissions, but several factors make the continent more vulnerable to climate change. Among these factors are poor governance, widespread poverty, recurrent droughts, and high dependency on rain-fed agriculture and overpopulation. Meanwhile, because of its position on the globe, the continent already has a warm climate and is exposed to inconsistency in rainfall, prevalence of poor soils and flood plains (Bolarinwa 2010).

In Nigeria, Ekweozoh (2010) has documented some visible evidence of climate change based on long term meteorological data. They are:

- **Shift in Rainfall Pattern:** Rainfall patterns show a considerable shift in the onset and cessation dates of the rainy season across Nigeria. The length of the rainy season has become shorter, and *August break*, a brief dry period in the rainy season now occurs in July in the Southwest, and no longer reckoned with in the Southeast. In many parts of the country, the rains start late and cease early.
- **Flood and Erosion:** Wetter than normal conditions have been observed over the extreme north, the Central States, and some Southern States. Coastal erosion is sand deficit caused by both natural and human activities. Coastal erosion rates are said to be high at Ugborodo /Forcados in Delta State and Brass in Bayelsa State.
- **Sea Level Rises (SLR):** SLR is caused by global warming resulting from the thermal expansion of oceanic waters and the melting of glaciers. Sea level rises occur along the entire stretch of Nigerian coastline.
- **Hail Disappearance:** Hail is an aspect of precipitation. Previously seen in Jos up till the mid-20th Century, but has disappeared at the turn of the century.

4. EFFORTS TO CURB CLIMATE CHANGE GLOBALLY

Efforts are being made to see to the successful reduction of greenhouse gases. Such efforts have culminated into international conferences and agreements, although some authors have criticized the efforts as “soft” (Uchegbu 2010). The first international conference addressing the issue was held in 1992 in Rio De Janeiro, Brazil. At the United Nations Conference on Environment and Development, informally known as the Earth Summit, 150 countries agreed to take actions to control the problem by signing the United Nations Framework Convention on Climate Change (UNFCCC). Currently, about 180 countries have ratified the UNFCCC,

which commits nations to stabilize greenhouse gas concentrations in the atmosphere at the level that would avoid dangerous human interference with the climate. This is to be done so that ecosystems can adapt naturally to global warming, food production is not threatened, and economic development can proceed in a sustainable manner (Princiotta 2011).

The Nations at the Earth Summit agreed to meet again to translate their plans into a binding treaty for emission reduction. In 1997, 160 countries drafted an agreement known as the Kyoto Protocol, an amendment to the UNFCCC. This treaty sets mandatory targets for the reduction of greenhouse gas emissions. The agreement requires industrialized nations that ratified the treaty to cut their emissions by an average of 5 percent below 1990 levels. The reduction is supposed to be achieved before 2012. Developing nations were not required to commit to mandatory reductions in emissions. Under the Kyoto rule, industrialized nations are expected to take the first steps because they are responsible for most emissions and have more resources to devote to emission reduction-efforts. Having considered this, the next segment will focus on the impact of the trio of population, technology and social inequality on climate change.

5. POPULATION AND CLIMATE CHANGE

No social phenomenon has attracted more attention of development scholars and researchers in the past half century than the size of human population in today's world. The surge of human population in the world from about 2.5 billion people in 1950 to 7 billion in 2012; making this period one of unprecedented population growth and a source of tremendous international concern (World Bank 2000; United Nations 2009; PRB 2011). The situation becomes more alarming when attempt is made to trace the share of the total population by region, because the poor impoverished nations have the larger part of the world population.

How is population, a concept that is almost exclusively discussed in the domain of demography related to climate change? We pointed out earlier the inclinations of some authors to brandish the banner of emissions as the primary cause of climate change, without waiting to explain that emissions became a problem because of the number of people involved. Population growth has contributed, and is contributing to a variety of environmental changes (Preston 1998). Some of these changes would be classified as ailments or degradations, which undoubtedly include the destruction of forests, especially tropical forests; soil erosion and degradation in certain major regions, especially within sub-Saharan Africa, and the loss of species of plants and animals.

Today, Africa is home to the most rapid levels of population growth and of urbanization in the world. Already, it is inhabited by 14 percent of the world's human population. The continent will inevitably face greater challenges owing to climate change than any region. The potential linkages between climate change and population pressure is already well documented (Bolarinwa 2010; Backlund et al 2009; Matthias et al. 2006; Preston 1998). Africa is characterized by widespread poverty, slow economic growth and persistent drought; with close dependency of people on natural resources. It is this dependency on natural resources that will present Africa with potentially severe adaptive problems in dealing with the twin effects of climate change and population growth. There are concerns about the depletion of forest in Africa. I Mali for instance, wood and charcoal represent 80 percent of the country's energy consumption (Bolarinwa 2010). Bolarinwa (2010) reports that carbon absorption capacity will play a critical role in our common global future. According to the author, what is left of Africa's tropical rainforests is in Central Africa, what we used to have in West Africa has gone through population pressure in a place such as Nigeria; and in Cote d' Ivoire, through

commercial logging and agriculture. In other words, the band of West African tropical forest that once extended from Guinea to Cameroon has been savagely depleted as a result of population pressure. As one author reported, “the effects from forest loss are yet to be fully understood, though erosion has greatly increased, as has the incidence of drought in the interior countries of Mali and Niger.” The message here is that, the level of erosion and drought currently being expressed is a child’s play when the full effect of forest depletion in Africa would be witnessed.

One way to keep carbon dioxide emission from reaching the atmosphere is to preserve and plant more trees. Trees, especially young and fast growing trees soak up a great deal of carbon dioxide from the atmosphere and store carbon atoms in new wood. In Nigeria, most forests are being cleared in alarming rate; and there is little re-growth as land loses its fertility or changed to other uses such as housing development. Nigeria is the most populous country in Africa, with a larger part of her population in the rural areas and in the informal sector; this situation puts pressure on the natural environment and affect the climate system. Already, Nigeria is beginning to experience the consequences of climate change with the unprecedented levels of floods that the country has witnessed within the last four years. Most environmental problems, including those arising from climate change tend to be aggravated by population growth and large population size.

6. TECHNOLOGY AND CLIMATE CHANGE

The full impact of technology on climate change is appreciated when we consider types of greenhouse gases. They include carbon dioxide (CO₂), ozone (O₂), methane (CH₄), synthetic chemicals and nitrous oxide (N₂O). We shall consider these in sequence. To begin, carbon dioxide (CO₂) is the second most abundant greenhouse gas, after water vapor. It constantly circulates in environment through a variety of processes known as carbon cycle. It is released into the atmosphere through natural processes such as eruption of volcanoes; the respiration animals, and burning or decay of plants and other organic matter. Carbon dioxide leaves the atmosphere when absorbed into water, especially the oceans, and by plants and trees. Through photosynthesis, plants use the energy of light to convert carbon dioxide and water into simple sugars, which they use as food.

However, human are significantly increasing the amount of carbon dioxide released into the atmosphere through burning of fossil fuels (such as coal, oil and natural gas), solid waste and wood products to heat building, drive vehicles and generate electricity. Therefore, human activities, through technology, are causing carbon dioxide to be released into the atmosphere much faster than the Earth’s natural processes can remove it. Before the Industrial revolution, there were about 280 molecules of carbon dioxide per million molecule of air (sometime referred to as parts per million or PPM). Concentrations of carbon dioxide have risen since then. In 2007, the Intergovernmental Panel on Climate Change (IPCC), a major scientific organization reported that the levels of carbon dioxide had reach 379 ppm, and increasing at an average rate of 1.9 ppm per year. Similarly, methane (CH₄) is emitted into the atmosphere during the mining of coal and the production and transport of natural oil and gas.

On the other hand, ozone is both a natural and man-made greenhouse gas. Ozone (O₂) in the upper atmosphere is known as ozone layer and shields life on Earth from the Sun’s harmful ultraviolet radiation. However, ozone in the lower atmosphere is a component of smog, severe air pollution. Nitrogen oxide and volatile organic gases emitted by automobile and industrial sources combine to the ozone in smog. This ozone is poison that damages vegetation, kills

trees and irritates lung tissues. It is a greenhouse gas that contributes about a fourth as much as carbon dioxide to global warming. Synthetic chemicals, on the other hand, are powerful greenhouse gases generated through manufacturing processes.

All of the above forms of greenhouse gases, as we have demonstrated, emanate from technological processes and industrial production. With particular reference to carbon dioxide, it is now being canvassed that to stabilize atmospheric concentrations of carbon dioxide, global emission would need to be cut significantly with about 70 to 80 percent (Princiotta 2011).

7. SOCIAL INEQUALITY AND CLIMATE CHANGE

The impact of inequality on climate change can be looked from the point of view of the level of development available to people, which influence how they contribute to environmental degradation. Both the rich and poor countries actions negatively affect climate change (Crook 1997). Rich countries and rich people can damage the Earth out of all proportion to their number. For instance, in industrialized nations, the major source of greenhouse gases is, as we have shown earlier, through automobile and industrial emissions. The number of automobile and manufacturing concerns in many industrialized countries constitute significant source of serious and large greenhouse gas emission. In fact, growth in wealth is a key driver of global emissions (Bolarinwa 2010). On the other hand, the major source of greenhouse gases among poor people includes the depletion of forestlands for wood and agricultural purposes, as well as degradation of the environment as a result of population pressure and poor sanitation, such as experiences in Nigeria.

Furthermore, social inequality also meant that the rich and the poor do not contribute equally to climate change. For instance, in 2004, Africa then with almost 920 million people contributed 7.8 percent of GHG emissions, while Canada and the USA with just about 326 million people contributed 19.4 percent of emissions. Africans contribute less than one ton of CO₂ per person per year, compared with the 19.9 tons CO₂ per person, per year contributed by Americans (with literally one vehicle for one of its citizens, and then 8.2 tons by Europeans (Bolarinwa 2010).

8. APPLICATION OF UNFPA'S PLAN OF ACTION AND RECOMMENDATIONS

This paper concerned itself with population, technology and social inequality, and the impact of their dynamics on climate change in Nigeria. The paper observed that the issues around climate change have remained at the centre of development discourse. Climate change refers to long term alteration in global weather patterns, particularly increases in temperature and storm activity regarded as the consequences of greenhouse effect. Scientist believe that the Earth is currently facing a period of rapid warming brought on by rising levels of heat-trapping gases known as greenhouse gasses in the atmosphere (Princiotta 2011). This development has been observed to have grave and reverberating consequences on human life if nothing is being done to stem the tide of climate change. The paper focused attention essentially on the impact of the trio of population, technology and social inequality on climate change. The paper contends that population is a major factor to the problem of climate. Population exerts pressure on the physical environment, and is responsible for the fast depletion of forestlands in many non-industrialized parts of the world, especially Africa. Nigeria, with a population of over 160 million with the current low level of development is poses a particular problem if nothing is done to accelerate the pace of development. Technology and social inequality are also significant sources of greenhouse gases emissions. Evidence indicates that the more

technologically advanced a society is, the more they contribute to atmospheric pollutions. As way forward, the following recommendations are suggested for consideration:

- Support advocacy for mitigation of climate change. Strong evidence-based arguments are critical in helping the growing global environmental concern with climate change reach its own tipping point in terms of mobilizing world opinion, national governments and international agencies towards urgent and effective action.
- Improving knowledge of the interactions between other population/environment changes. Much attention has been focused on the impact of population size and growth on environmental change. However, on a world scale, current population dynamics involve other significant changes that have probable implications for environmental change. Chief among these are the changes in the age composition that have resulted from fertility decline and increased longevity.
- Promoting reproductive health. Although reducing population growth rate may not be the final solution to reduce resource degradation, however, most environmental problems would benefit from slower growth rates and smaller population size. Efforts to promote the empowerment of women, promote better social conditions and to make it possible for people to exercise their reproductive health rights would all help to reduce fertility rates and hasten population stabilization, and in the long run, help to curb overall pressure on environmental resources. Support in this domain is most critical from the standpoint of human rights in the poorest countries.
- Support the preparation of sustainable cities. The world's urban population will show an increase of 1.7 billion people between now and 2033, most of this in Asia and Africa. The scale of growth that will be faced by the developing countries in coming decades has no parallel in history: its urban population is projected to double in a generation's time. At the global level, practically all population growth in the foreseeable future will occur in towns and cities. Urban centers, especially those in the developing countries are the primary source of greenhouse gas emissions and thus are implicated in global climate change. Unmanaged urban very often tends to outpace the development of infrastructure and environmental safeguards, leading to high pollution and carbon dioxide emissions which impact on climate change. Therefore, there is need for a radical change in the anti-urbanization attitudes on many developing country policymakers. Evidence-based advocacy to change mindsets and to prepare for this massive urban growth is thus urgently needed.
- Reduce Urban Vulnerability. Cities are highly vulnerable to natural crises and disasters: Sudden supply shortages, heavy environmental burdens or major catastrophes can quickly lead to serious emergencies. Some of the alarming prospects of climate change are its impact on sea level rise and its potential consequences for coastal urban areas. These concentrate people and economic activities, many of the world's largest and fastest-growing cities are on seacoasts and at the mouth of the great rivers. The impact of global environmental change, particularly climate-related hazards, disproportionately affect poor and vulnerable people; those who live in slum and squatter settlements on steep hillsides, in poorly drained areas, or in low-lying coastal zones. Programmatic activities will have to contemplate both research and action to reduce these vulnerabilities.
- Improve response to emergency situations: The impacts of severe weather events and other natural disasters are consistently more damaging among the poorest segment of the population. Within the scope of responses to emergency situations and natural disasters, more effective policies and programs in support of more vulnerable populations need to be designed, tested and implemented with increasing levels of resources.

- Culture and Climate Change: Climate change is an environmental problem with strong cultural, political and developmental components. Considerable attention has already been given to the risks that climate change presents for some traditional cultures and their rich legacy of knowledge. However, another aspect of cultures' link to the environment has come to the forefront and will directly determine man kinds' ability to mitigate climate change. Ultimately, this will require drastic changes in mankind values with respect to their life goals and aspirations. For instance, when people define happiness in terms of consumption goals, it is heading rapidly towards extinction. So, there is need for drastic change in terms of our value, with a critical review of our current environmental dilemma in another light, and to address the critical issues that market cannot be expected to resolve.
- Given the impact of population size on climate change, efforts should be made to contain the population growth rate of Nigeria. Evidence has shown negative correlations between population and degrading environment. By a similar token, the adoption and utilization should be modification to reduce the level of industrial emissions; while social inequality should be reduced to mitigate the increase in deforestation engendered by the need for subsistence.
- Finally, existing laws on environmental sustainability should be strictly enforced, while new ones should be introduced to tackle new and emerging environmental challenges.
- It is our hope that if these recommendations are consciously implemented, there would be prospect for cleaner, safer and more secure environment in Nigeria. In addition, the current developments in the country will be sustainable.

REFERENCES

- Bolarinwa, J. O. 2010 Climate Change, Population and Conflict in Africa. in Eze, O.C. and O. Oche (eds.) *Climate Change and Human Security in Nigeria*. Lagos: The Nigerian Institute of International Affairs.
- Backlund, P., Janetos, A. abd D. Schimel. 2009. The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States. *Synthesis and Assessment Product: Report*. New York: US Climate Change Science Programme and the Subcommittee on Global Change Research.
- Crook, N. 1997. *Principles of Population and Development with Illustrations from Asia and Africa*. Oxford: Oxford University Press.
- Ekweozoh, C. P. 2010. Technology Transfer Issues in Climate Change: Nigeria's Perspective. in Eze, O. C. and O. Oche (eds.) *Climate Change and Human Security in Nigeria*. Lagos: The Nigerian Institute of International Affairs. Pp. 199-234
- FEOA. 1998. *National Policy on Environment*. Abuja: Federal Environmental Protection Agency (FEPA).
- Findlay, A. and A. Findlay. 1991. Population and Development in the Third Word. in Bale, J. and D. Drakakis-Smith (eds.) *Routledge Introduction to Development*. London: Methuen & Co. Ltd. Pp. 1-13.
- Matthias, R., K. Donaghy and P. Kirshen. 2006. *Regional Climate Change and Variability: Impact and Responses*. Massachusetts: Edward Elgar Publishing Ltd.

- Obabori, A.O., A.O.O. Ekpu and B.P. Ojealero. 2009. An Appraisal of the Concept of Sustainable Environment Under Nigerian Law. *Journal of Human Ecology* 28(2):135-142.
- Obioha, E. and F. Olokesusi. 2003. Population Growth and Environmental Degradation: Implication for Good Governance in Imo State. *International Journal of Governance and Development* 1(1):1-17.
- PRB. 2011. *World Population Data Sheet*. Washington: Population Reference Bureau (PRB).
- Preston, S. 1998. Population and the Environment: The Scientific Evidence. in Demeny, P. and G. McNicoll (eds.) *Population and Development*. United Kingdom: Earthscan Publications Ltd.
- Princiotta, F. 2011. Global Climate Change and Mitigation Challenge. in Princiotta, F. (ed.) *Global Climate Change: The Technological Challenge*. New York: Springer. Pp. 1-50.
- Uchegbu, A. 2010. The Kyoto Protocol and its Implementation: Words Without Sword. in Eze, O. C. & O. Oche (eds.) *Climate Change and Human Security in Nigeria*. Lagos: Nigerian Institute of International Affairs.
- United Nations. 2009. Prospect for Fertility Decline in High Fertility Countries. *Population Bulletin of the UN*. Department of Economic and Social Affairs.
- World Bank. 2000. World Development Indicators. Washington: Development Data Centre of the World Bank. .

ACKNOWLEDGEMENT

Paper was presented in “1st International Conference on Global Sustainable development (1st ICGSD-2013), held on 27-28, February 2013”.

Author(s) would like to thank the editors and anonymous referees for their comments and insight in improving the draft copy of this article. Author(s) further would like to declare that this manuscript is original and has not previously been published, and that it is not currently on offer to another publisher; and also transfer copyrights to the publisher of this journal.

DECLARATION

The material presented by the author(s) do(es) not necessarily represent the viewpoint of editors and the management of Khadim Ali Shah Bukhari Institute of Technology (KASBIT) as well as the author’s institute.

ABOUT AUTHOR(S)

Dr. John Lekan Oyefara has a B.Sc in Demography and Social Statistics from Obafemi Awolowo University, Ile-Ife, Nigeria. In addition, he obtained a M.Sc and PhD in Sociology from the University of Ibadan, Nigeria. He specializes in Demography and Population Studies. His areas of research include fertility, mortality, migration, nuptiality, family planning, gender studies, public and reproductive health including HIV/AIDS. He has worked for over fifteen years in the development sector with local and international organizations in Nigeria. He is currently a senior lecturer in the Department of Sociology, Faculty of Social Sciences, University of Lagos, Nigeria. E-mail: oyefara@yahoo.com, loyefara@unilag.edu.ng, 3002603841

Received: 08-02-2013; Revised: 20-02-2013; Accepted: 30-12-2013; Published: 31-12-2013