

The Dilemma of Climate Change and the Socio-Economic Development in South -West Nigeria

ABSTRACT

Scientists and Geographers (especially climatologists) have provided scientific and meteorological evidence of the patterns of change in the climatic conditions of the world with the resultant conclusion that global warming is rapidly occurring and the on-going global warming is anthropogenic in nature because people continue to excessively burn fossil fuel as Oil and Gas; Coal and fuel wood. Man has also engaged in excessive felling of trees for commercial lumbering and there is also the double-edged ozone connection which poses grave danger due to its fragile Geo-Chemistry.

Nigeria contributes significantly to the greenhouse emissions for example, land use change and forestry (LULUCF) sector generated about 40% of gross national emissions into the atmosphere. Also significant as sources of CO₂ emission are gas flaring and transportation, which account for 30% and 20% respectively. All these have significant advert effect on the social, economic, cultural and political development of the country.

This paper seeks to identify how we got to this point of imminent catastrophe, how vulnerable Nigerians are, especially those that lives in an environmentally disadvantaged areas. The effects of this change on the socio-economic development of the people will also be explored while adaptation developmental practices that can be adopted in order to mitigate against impending disaster will be proffered.

The study make use of both primary and secondary data on the impact of climate change phenomena as well as relevant already published data on the nature and effect of climate change in Nigeria. The result reveal that climate change is real and has adverse effects on the Social, Economic and even Political Development of the Country and that women and the children as well as people living in the Coastal and Arid regions are more vulnerable to the change.

KEY WORDS : Climate change; Socio-economic Development.; Adaptation Strategy; Environment

Introduction:

Several scholars have attempted to define the concept of climate, Ojo (1987) referred to it as an average of weather conditions. He also noted that this widely and wrongly used concept of climate implies that climate can be taken for granted and this has been the case until recent times. Indeed, up to 1950, and particularly between 1900 and 1950, not much was thought of climatic events and their consequences, mainly because there were relatively not much adverse consequences of these events on agriculture, particularly on a global scale. At least, the population was well fed and the stomach well catered for. Incidentally, in Europe and America, historical records of climatic data gave scientific support to the concept of constancy in climate (Lamb, 1982).

However, recent events all over the world have indicated that the climate cannot and should not be regarded as constant and that for all practical purposes, the statistics required to specify climate comprise not only averages but also extremes and frequencies of occurrence of the various characteristics that are of interest to man (Ojo, 1987). It is thus clear that in defining climate, the total experience of weather at any place over some specific period of time must be considered. Thus, it is out of place to continue to have an idea that if a long enough series of observations could be amassed at a location, it would produce a “climatic normal” and an average value of each climatic element which could be of use for any practical considerations (Ojo, 1987).

In essence, far from being average of weather, the climate is always changing on a variety of time scales. The underlying mechanisms for the various changes which occur in the climate are related to the restless nature of the atmosphere, the range of whose activity spans from very local to the very global scales. While the local scales focus upon the short-lived activities near the ground at different places, the global scales include the long-lived general atmospheric circulations. Between these local and global scales lie the meso-scale transitional activities which influence zones and regions at continental or oceanic scale. Indeed, it is the various micro-meso and macro-scale atmospheric processes which produce the various changes and variations in weather and climate.

It is pertinent to note that the global climate system also involves in addition to the atmosphere, the oceans and other surface waters, the world of ice masses, the surface soil and vegetation and geophysical features of the earth.

Another noticeable feature of the climatic system is the temporal dimension of events in the climatic complex which involves climatic revolutions or climatic changes at different time scales. In this respect four categories of scales may be distinguished. The first refers to climatic revolutions or climatic changes at time scales greater than 1,000 years. The second results in climatic fluctuations at time scales of 10 – 1,000 years, while the third category results in erratic pulsations, usually of less than ten years duration. The fourth and final category results in man-induced climatic fluctuations whose time scales may be ten years or less (Lansberg, 1976). The first two categories are of significance for practical applications of climate to human society.

This paper seeks to identify how we got to this point of imminent catastrophe, how vulnerable Nigerians are, especially those that lives in an environmentally disadvantaged areas. The effects of this change on the socio-economic development of the people will also be explored while adaptation developmental practices that can be adopted in order to mitigate against impending disaster will be proffered. The study make use of both primary and secondary data which will include a questionnaire survey of their perception of the impact of climate change phenomena as well as relevant already published data on the nature and effect of climate change in Nigeria. The result reveal that climate change is real and has adverse effects on the Social, Economic and even Political Development of the Country and that women and the children as well as people living in the Coastal and Arid regions are more vulnerable to the change.

CLIMATE CHANGE CONCEPT

It is now established that humanity is altering the concentration of greenhouse gases and aerosols, both of which influence, and are influenced by climate. Recently, and especially over the past three or four decades, the issue of global climate change due to the greenhouse effects, including global warming and sea level rise have been a subject of scientific discussions and public debate. Indeed, it is bow well recognized that the human

factor has become very significant in the balance of forces that determine the earth's climate. In particular, it is the consensus of opinion that the atmospheric concentration of a number of gases are known to be increasing and that some of these gases have important effects in causing the greenhouse warming and keeping the earth warmer than it would otherwise be. Among the greenhouse gases, carbon dioxide has potentially been the most effective in changing the earth's climate, and has been responsible for over 50% of the enhanced greenhouse effect in the past and is likely to remain so in the future. Other greenhouse gases include nitrous oxide (N₂O), methane (CH₄), chlorofluorocarbons (cfc's), ozone and aerosols. The atmospheric concentration of the greenhouse gases have grown significantly since pre-industrial times (about 1750 A.D.) For example, CO₂, increased from about 280 to almost 360 ppmv³, CH₄ from 700 to 1720 ppbv and N₂O from about 275 to about 310 ppbv.

HOW IT ALL BEGAN

About 80 years ago, a seemingly harmless chemical was invented called CHLORO-FLUORO-CARBONS (CFC's); which are used in Air conditioners, Refrigerators, and aerosol cans. However, 50 years after this invention, scientists discovered that the huge amounts of CFC molecules were being released into the air during the course of usage and that CFC's were floating past the Troposphere to the Stratosphere where the ultra violet rays had been breaking them down into the constituent CHLORINE & FLUORINE.

They also discovered that these liberated chemicals float around in the stratosphere and "BREAK-UP" the "OZONE" molecules in the massive Ozone Layer that nature has positioned to protect Planet Earth from harmful UV rays from the sun. (After the breaking-up of ozone molecules, space is created within the ozone layer where UV rays from the sun penetrate to planet Earth. - This space is generally referred to as "THE OZONE HOLE". The initial facts on Global Warming points to the fact that excessive heat from the sun due to this Ozone hole is a major contributor to the high temperature regimes on planet earth. Upon full realization of the relationship between CFC's and other greenhouse gasses in the Ozone depletion cycle and the Global Warming phenomenon, there was a global consensus to ban the continued use of CFC's.

Also numerous concerns were raised by authorities around the world which resulted in meetings, evaluations by technical groups and mini conferences on the matter.

RIO – SUMMIT : In further response, the 1st United Nations Conference on Environment and Development “Earth Summit “ tagged **RIO – SUMMIT** was convened in Rio De Janeiro – Brazil during the month of June 1992. The mandate of the RIO summit was to among others create the forum for collectively deriving global response plans on pressing global environmental problems. The summit also entered into major treaties on Forest management, Biodiversity and Climate change.

The five separate agreements that were reached at the Rio Earth Summit include:

- The Convention on Biological Diversity;
- The Framework Convention on Climate Change;
- Principles of Forest Management;
- The Rio Declaration on Environment and Development; and
- **Agenda 21** (a “blueprint” for sustainable development).

The United Nation’s Agenda 21 is a UN convention on Biological Diversity which sought to encourage governments to be proactive in development planning and rethink their policies so that all economic decisions will take into account any potential environmental consequences. There is also an overall objective of stabilizing greenhouse gas levels whereby industrialized nations were urged to reduce carbon emissions to 1990 levels by the year 2000.

Five years after RIO, the Kyoto Earth Summit was convened with an expanded mandate which sought to set **Mandatory Targets** to countries aimed at tackling climate change head-on. The Kyoto protocol binds industrialized nations to reduce worldwide emissions of greenhouse gases by an average of 5.2% below their 1990 levels. Whereas under the Kyoto Treaty, the US agreed to cut its carbon emissions by 7%. As of 2001, it further deteriorated to a point which is 13% above the 1990 emissions level.

Similarly, Japan agreed to cut its carbon emissions by 8%; but in 2001 it was around 2.7% above its 1990 emissions level. (The Globalist 2001). Only the European Union (EU) made good effort because they also agreed on 8% and by 2001, they had improved

to 0.5% of 1990 emissions. Developing countries were left exempt from the targets due mainly to the fact that their carbon footprints were still low and especially because they have inadequate resources which cannot even cope with their chronic pressing problems such as: Hunger, Illiteracy, Disease, Energy & Infrastructure deficits.

THE SAD TURNING POINT

Regrettably, the United States pulled out of this commitment in March of 2001, with President Bush stating that the US will never sign the treaty. (US Government cited issues of extremely negative economic impact if Kyoto were to be implemented. They also claimed that typical job losses in USA would be in excess of 4 million jobs, while estimated financial loss to US Economy was put at an approximate \$400 Billion; (whereas in order to become international law, the Kyoto Treaty needs to be ratified by a minimum of 55 countries. This ratification must be by the nations that accounted for 55% of the industrialized world's CO2 emissions in 1990.

In what seemed like an “Inconvenient Truth, the Intergovernmental Panel on Climate Change (IPCC) has asserted that without active efforts to reduce emissions, the planet is expected to warm by an unprecedented 2.5-10 degrees F during the 21st century . Therefore, danger still looms since the story with China, India and Russia are no less different from the US scenario; The danger seems more imminent because according to Earth Observatory- NASA, *“The last time global temperatures were “one degree” or warmer than today, sea levels were 6 meters (20 feet) higher, with the water mainly from the melting of the Greenland and West Antarctic ice sheets (we know that many coastal cities around the world already lie below sea level and would be submerged if the oceans of the world rise to levels far beyond the extra 1⁰ degree mark to about 2.5-10⁰ F).*

Evidence obtained from meteorological records points to the fact that there have been slight upward variations in ‘in – coming solar radiation, since early 20th century .However, recent changes in regional and global temperatures of this era have already exceeded expected limits of Natural Solar Variability. Apart from meteorological records,

several other confirmations were made from indirect indications such as “Sea Ice” (Bjorgo et al, 1997; and Smith 1998 and “Ice – Core data (Thompson et al 1993) .

Ground temperature profiles from deep Boreholes were also analysed for further confirmations by Duchkov and Devyatkin, 1992; Gosnold et al 1997 and Lachenbruch and Marshall 1986. Results from all these studies have made scientists and Climatologists to attribute the current global warming to anthropogenic factors rather than stochastic factors.

WHERE ARE WE HEADED

Experts have used comparative analysis of both empirical data and simulated equilibrium for future predictions and have asserted the impending doom if no urgent action is taken. For now, air temperature records are being used to monitor changes in Regional details of Climate Change. The global efforts in this regard involves the measurement of “Mean Monthly Air Temperatures” from data available in about 7,000 weather stations (Global Historical Climatology Network Temperature Database (Peterson and Vose 1997).

Here are few analytical graphs for further clarifications on some of these findings.

Oxide (NOx) and elevated concentration of more carbon in combination with water vapour and sunlight results in the formation of the Ground level Ozone which causes more heat and aggravates Global Warming.

For now the observable effects of global warming can be itemised as follows:

- Steady rise in global surface temperatures including extreme temperature regimes in some cases.
- Increase in Drought situations and its consequent Hunger and Starvation in some regions of the world.
- Increased Desertification
- High frequency of incidences of coastal erosion
- Gradual Ice melts in the Arctic region.
- Lengthening of growing season in Agriculture due to erratic precipitation.

- Increased incidence of flooding and physical habitat destruction due to irregular and storm laden rainfall around the world.
- Increase in Hurricanes due to warmer ocean surface temperature.
- Slow but systematic impact on eco-system and Biodiversity.
- All of the forgoing effects of Global Warming have also impacted on the global socio-economic and political environment including explosive urbanization, community vulnerability, human individual behaviour, individual vulnerability and associated Emotional complexities.
- Health effects of Global Warming on Human Health is unquantifiable because all of the climate change events enumerated above have consequences on the health and livelihood of people around the world.

CLIMATE CHANGE SCENERIO IN NIGERIA

Nigeria contributes significantly to the greenhouse emissions for example, land use change and forestry (LULUCF) sector generated about 40% of gross national emissions into the atmosphere. Also significant as sources of CO₂ emission are gas flaring and transportation, which account for 30% and 20% respectively.

Summary of Emissions from the Nigerian Energy Sector 1994 emissions

Sector	Total Energy Consumption (p)	CO ₂	CH ₄	N ₂ O	CO	No _x	NM VOC
Public Electricity	100.9	5686.3	0.01	0.20	1.30	5.82	0.00
	9.5	70.67	0.02	0.02	3.34	9.54	0.12
Petroleum Refinery	765.9	6098.9	0.61	2.91	28.34	4.14	12.10

Industry	18.3	1435.9	0.05	0.12	0.30	3.06	0.04
Transport	545.1	38473.4	12.07	0.86	4728.99	322.47	896.19
Small Combustion	738.5	4700.9	445.21	3.36	4139.25	127.87	4.71
Fugitives	5.2	58080.0	1018.23	0.00	4224.00	28.99	951.10
Total	2183.4	115182.1	1476.21	7.47	13125.53	501.89	1864.26

Source: FGN (2003) Nigeria's First National Communication.

Per Capita Sectoral and Gross Emissions in Nigeria for 1994

Sector	1994 Specific Emissions					
	C0 ₂ kg C/cap	CH ₄ kg C/cap	N ₂ O kg C/cap	C0 kg C/Cap	NO _x Kg C/cap	NMVOC (kg NMVOC/Cap
Energy	324.65	11.44	0.05	54.26	1.58	19.27
Industry	4.96	0.00	0.00	0.00	0.00	3.79
Solv. Use	0.00	0.00	0.00	0.00	0.00	0.00
Agric	0.00	18.17	0.03	14.83	0.47	0.00
Luc	212.92	0.14	0.00	0.67	0.01	0.00
Wastes	0.00	16.21	0.00	0.71	0.01	0.00
Total	542.54	45.97	0.08	70.46	2.07	23.06

Source: FGN (2003) Nigeria's First National Communication.

No matter the level of the uncertainties in the knowledge of the characteristics and future trends of the climate, climate change and sea level rise have significant impacts globally, regionally and locally, creating problems for sustainable development and resources management. Indeed climate change and sea level rise would compound the serious problems of sustainability of the environment and management of resources, as well as the currently serious problems in population consumption patterns and characteristics in

many parts of Africa. In particular, climate change and sea level rise will threaten the coastal zones and low lying islands, which are already constantly plagued by floods and erosion, while in many cases, the impacts would also be most severely felt in regions such as the Sudan and Sahel areas, which are already under serious water stress. There would no doubt be serious management, water resources management, forests and forestry, fisheries and other economic activities.

Perhaps it is important to mention a few things about the Niger Delta area, the main source of petroleum resources on which the economy of the nation substantially depends. As noted by Ojo et al (2001), with sea level rise of one meter, for example, inundation in the Niger Delta alone may render more than 15,000km² of land at risk, while soil erosion may claim more than 300km² (Awosika et al, 1994). With sea level rise of 0.3, the land loss due to inundation may exceed 7,000km², while that due to erosion may be up to 120km². with ASLR of 1.0m, about 2-3 million people could be displaced in the Niger Delta (Awosika et al, 1994).

It has also been estimated that along the coastline of the Niger Delta alone, about 110 villages with values of 35 million US dollars and about 550 villages with values of 175 million US dollars would be impacted with a sea level rise of about 0.2m and 1.0m respectively. Indeed, the entire municipality of Port Harcourt (about 70km²) may be inundated. Other significant localities that may be inundated in the Niger Delta area include warri, Abua, Okrika, Nichia, Ahoada, Bori, Bonny, Brass, Degema and Yenagoa, all of which are local government headquarters.

In a study carried out by this inaugural lecturer on the Lagos Metropolitan area (Ojo, 1998), I emphasized that, the implications of climate change and sea level rise for water resources and water supply-demand management systems in the Lagos Metropolitan area would be significant for a number of reasons. For example, there would be changes in the magnitude and timing of water resources and these would necessitate changes in water management strategies and greater conservation efforts would be required in order to balance water supplies and demands. Also, in the event of a sea level rise of between 0.3m and 1.0m in the Lagos area, most of the water resources in and around the

Metropolis would be polluted by the intrusion of salt water and water resources management would place greater emphasis on desalination.

Another likely consequence of the impact of climate change and sea level rise on water resource systems in the Lagos area is the possible alteration of the characteristics of the hydrological systems with serious consequences on the availability of water resources in the area. This is particularly important for water resources planning in the area because already more than half of the population in the metropolis could be subjected to further stress as a result of the likely adverse effects of climate change and salt level rise on ground water resources in the area.

Apart from the direct impacts of climate change and sea level rise on the water supply-demand systems in the Lagos Metropolitan area, there are a lot of implications on socio-economic and socio-cultural sectors which are indirectly linked to water resources. For example, the impacts of climate change and sea level rise would include damages and losses due to flood, erosion, inundations and loss of vegetation and possible displacement of people from flooded areas (Awosika et al, 1994).

In another study carried out for Lagos State by the Climatological Research Group, Laboratory of Climatology, University of Lagos, of which this speaker is a member. Ojo et al (2000), it was emphasized that Lagos State, which consists of large areas of lowlands is very vulnerable to the impacts of climate change and sea level rise. This is particularly so because the State is generally characterized by low lying areas, most of which are below 5m. The summary of the results of the studies shows that considerable physical, ecological and socio-economic losses would be incurred with the expected rise in sea level of between 0.5m and 1.0m, if adequate response measures are not taken.

For example, almost all parts of the Eti-Osa, Ibeju, Lekki, Lagos Island, Ojo, Shomolu and Badagry Local Government areas will be inundated, resulting in considerable physical ecological and socio-economic consequences. In particular, all the 189km² land of the Eti-Osa Local Government Area, about 230km² of land in Lagos Mainland LGA and about 445km² of land in Shomolu LGA will be inundated with an expected SLR of about 1.0m. In the Eti-Osa Local Government areas of the metropolis (this includes the

Victoria Island and Ikoyi, which form the most expensive areas in Nigeria), for example, more than 200 industrial establishments worth more than US\$45 billion will be lost.

Global Warming Implications for the Socio-Economic Development of Nigeria:

Although there are no globally compulsory development models for mitigating global warming, it is imperative for “**DUTY-OF-CARE**” that governments all over the world including Nigeria engage in governance practices that guarantee sustainable development.

In developed countries for example, economic and social planning is characterized by efficient allocation and use of resources to achieve sustainable and buoyant economic and social life for their citizens. However, economic and social planning in underdeveloped and developing countries such as Nigeria is characterized by Policy inconsistency and implementation irregularities. These countries (especially in Africa) are inefficient in the deployment of natural and other development resources; a situation which results in extreme disparities in the distribution of incomes and political power. This phenomenon frequently generates poverty, illiteracy, disease, political agitation and conflict.

Since Nigeria does not exist in global isolation, there are some negative recent impacts of global warming around the country which include:

1. High surface temperatures regimes has resulted in climate-driven **HEAT STRESS** to huge populations around the country.
2. Increase in Drought situations especially in Northern parts of Nigeria has created negative impact on food and agricultural production with resultant “Reduction of Farm-Incomes” which in turn results in increased Poverty, Hunger and Starvation.
3. There is high frequency of incidences of coastal erosion which destroys Housing Assets and Farmslands in littoral communities of Southern Nigeria. Gully erosion in Eastern Nigeria has also impacted negatively on habitat assets and general economic life of the communities in that region.

4. Desertification has moved inland progressively and several kilometres of desert encroachment has been witnessed in Northern parts of Nigeria in the last 3 decades.
5. Increased incidence of flooding further complicates the poor sanitation infrastructure thereby resulting in high incidence of water related diseases like cholera / vector-borne diseases like malaria around the country.
6. The reduction in the perimeter size and depth level of important lakes like LAKE CHAD and the reduction in river water through-put in some of our important rivers shows that inland water bodies in Nigeria are drying up gradually which has high negative impact on artisanal fishing business in Nigeria.

Also the River Niger which used to be a reliable source of Kanji Dam feedstock for the production of electricity has witnessed a great level of dryness in the past 20 years; (although the incidence of excessive damming of the river by members countries of the MANO - RIVER - UNION has contributed to this phenomenon
7. There is also a systematic negative impact on eco-system and Biodiversity.

All of the forgoing effects of Global Warming has serious negative impact on the socio-economic and political environment in Nigeria including explosive urbanization due to shortages of Arable land, community vulnerability, human individual behaviour, individual vulnerability and associated Emotional complexities.

Also, the health effects of Global Warming on the health of Nigerian is unquantifiable because all of the climate change events enumerated above have consequences on the health and livelihood of the citizens of Nigeria.

This situation is further compounded by the absence of a well articulated response plan in the country and the behaviour of Corporate Organizations in Nigeria have proved to be negatively impactful on both Natural and Human Resources around the country. The ordinary case of Gas Flares in the Niger Delta is a case in point. For instance Nigeria has been setting targets for “Zero Gas Flare” over the past 20 years, but unfortunately the oil companies operating in Nigeria have refused to comply despite knowing the importance of Targets and Compliance on Global Warming issues. Ordinarily, compliance to such laws in their own HOME COUNTRIES is non-negotiable.

Each time they default on the matter, they cite financial difficulty and huge capital outlay for the appropriate E&P technology in that respect. (Whereas they cart away profits of hundreds of billions of dollars every year since Oloibiri Oil well in 1957 up to Bonga and Errha super fields of the new millennium). Gas Flares and spills have caused great economic downturn for the ordinary citizen of the Niger Delta. In some cases Air Pollution has been responsible for associated health problems; The effect of acid rain is escalating. Some of these problems have been partly responsible for youth restiveness and community agitation which in-turn disrupts the economic expectation of both federal Government and ordinary citizens of Nigeria.

Similarly, Manufacturing Industries and the Transport sector in Nigeria excessively consume diesel oil (AGO) and other high carbon emitting “Heavy Oils); and have encountered a lot of challenges in utilizing cleaner and greener fuels for some decades now. (for instance in the mid 1980s, the NNPC tried to encourage Nigerians to utilize gas for running their vehicles and actually installed gas conversion facilities in Warri and some other parts of Nigeria but this initiative has since been discontinued.

Also the erratic nature of electricity supply in Nigeria have compelled a lot of domestic use of high carbon emitting generating sets in homes and offices; - *which frequently results in high cost of living and high cost of doing business for many organizations.*

Despite the foregoing problems Nigeria still has the opportunity of keeping HOPE Alive; by formulating a well articulated socio-economic response plan to mitigate effects of Global Warming. However, this requires a well defined concerted effort from all stakeholders including the Academia, Politicians and Administrators, Teachers, Professional Bodies and Youths including the rural dwellers.

For a start, the 7 point Agenda of the present administration in Nigeria; (and its ambition of becoming one of the world's largest 20 economies by the year 2020), is a welcome development and a step in the right direction especially if built on the gains of the Neo-Liberal economic reforms of the immediate past administration.

A revolutionary agro – energy program can be a starting point of this new direction and Nigeria has all the prerequisites for successful implementation of a sustainable development agenda.

WHAT ECONOMIC PLANNERS SHOULD DO:

As mentioned in the earlier part of this presentation, there is need for stakeholders to formulate a formidable Global Warming response plan that is multi-disciplinary such as the simple solution package that is recommended in this paper which hinges primarily on Energy efficiency, Water development, Agricultural expansion, Transportation, Environment and Rural Poverty Eradication.

1. Energy

- ✓ In the area of Energy efficiency, the Ministry of Energy should design and implement a strategic energy plan which seeks to reduce portfolio burden on one single hydrocarbon resource; (which promotes pollution in the CO₂, NO_x and VOC's category). This new energy plan should adopt an Energy Mix in which Renewable Energy sources such as Solar, Wind and Biofuels are adequately harnessed and used to control Global Warming. Renewable Energy Fuels are classified as “Clean Fuels” apart from originating from Renewable Resources.

- ✓ Drastic measures such as “PACK and GO” sanctions need to be taken against oil companies that do not comply with a final “Zero-Flare Order”.
- ✓ Also the process of improving electricity supply through the use of **Gas** should be accelerated in order to minimize the use of power generators whose exhaust emissions also contribute to CO₂ pollution.

Agriculture and Water Resources

Agriculture is the centrepiece of this agro - energy solution plan because both the Biofuels initiative and the Poverty Eradication plan revolve around it. The Ministry of Agriculture should undertake a massive agricultural expansion program through **ACREAGE EXPANSION of up to 50%** of current cultivation portfolio and this expansion should be used for the cultivation of all categories of mandate crops in order to produce both the required feedstock for the **BIOFUELS** program and also increase **FOOD** production for human consumption / food security. This scheme can be used to provide jobs and economic empowerment to the multitude of SME farmers who will grow the cassava / sugarcane for the Biofuels program and Rice/other staples for the accelerated food expansion program. As in many other parts of the world, agriculture in Nigeria not only supplies food, but also provides a lot of opportunities for employment. It is also significant as a source of raw materials for industry and as a major source of income for farmers and others who depend on agricultural products for commercial purposes.

Although crude oil is now by far the most important source of government revenue in Nigeria, about 70% of the labour force is still employed in agriculture. Indeed, the low per capita income reflects both the continuing reliance of most Nigerians on traditional agriculture. Most Nigerians are still peasant farmers producing their own food crops and deriving income from one or more cash crops as well as from the sale of surplus food crops. Mixed cropping on fields which rarely exceed 2 ha. is characteristic of agriculture in Nigeria. The seasonal nature of much of the farming work shows the significance of the climatic factor with the farmer and his assistant's ability to cope with the busiest agricultural season or otherwise often setting a limit on the area which they can cultivate

effectively. In general, the work of the farmer is strongly related to the seasons and productivity is affected by the rains; in this regard, the issue of the climatic dilemma comes into play. No doubt, weather and climate to a large extent, control agricultural characteristics including plant growth, length of the growing season and the productivity of plants and animals. Thus, the successes of agricultural operations depend very much on man's understanding of the weather.

The most critical factor in the trend of agricultural production is rainfall and particularly, the variability and unreliability characteristics. With the Sahelian droughts of the 1970s, for instance, food production dropped by over 60% in the northern parts of Nigeria. Similar characteristics were found in other parts of the country, although the growth in total food production has been slightly better than in the northern parts of the country (Ojo, 1991). The water resources ministry should revisit the concept of Inter – Basin – Water – Transfer - Schemes in order to efficiently manage water resources for Agriculture, Human consumption and Drought control.

Transportation:

Transportation sector has been one of the major contributors to the Greenhouse gas problem around the world and more so in Nigeria because the level of poverty has frequently compelled Nigerians to purchase and use automobiles that produce great amount of tail-pipe emissions. The Mass Transit System is also a major contributor to high level of tail pipe emissions in Nigeria.

Therefore, Government should design efficient mass transportation systems to curtail excessive use of personal automobiles in order to reduce Tail Pipe emissions. This Mass Transit System can be designed to run on gas or bio diesel. Efforts at rehabilitating rail transport should be intensified.

4. Environment

Given the fact that Environment is Everything and everything happens in an environment, the Ministry of Environment in Nigeria needs to be more proactive in its operations by designing policy upgrades which promotes holistic environmental sustainability with sector by sector mandates to be handed down to every sector of the economy and adequately enforced for total success.

In the short term, home grown plans to reduce greenhouse gases and preserve Biodiversity should be made. Intensive Afforestation and Reforestation should be pursued while efficient enforcement mechanisms should be put in place to ensure compliance with set global environmental standards.

In the long terms, a comprehensive environmental Data acquisition exercise should be embarked upon and the result should be used to formulate concrete environmental Reparation programs which can be tabled before Global Funding Agencies like the GLOBAL ENVIRONMENTAL FACILITY (GEF fund) in order to secure matching Fund for practical implementation.

5. National Planning

The Ministry of National Planning should take the lead in providing direction for all planners in the country to upscale design parameters so as to cater for possible flash points in environmental events; especially for Housing and settlement development (such as New Towns), Road infrastructure, Water and Sanitation delivery etc.

CONCLUSION

Environmental Impact Assessment regulation should be strengthened while enforcement should be ensured on all categories of development.

More importantly, since mankind has discovered that all the substances that were mis-used by Man to cause and sustain Global Warming on Earth are “Chemicals”, it will therefore be beneficial if mankind focuses more attention on development of energy sources whose chemicals are environmentally friendly, Global Warming problem will be solved. This is the basis of “Responsible Geo-Chemistry”

The Academia should occupy its traditional driver’s seat and provide direction for Political legislation so that Governments would be compelled by law to undertake man’s singular most important assignment – **SUSTAINABLE DEVELOPMENT**; which is the only way to guarantee a “**Sustainable Environment**” for the “**Future of Planet Earth**”

& Mankind. The Academia should also engage in studies relating to Surface Temperature Reconstruction for some specific mandate period in Nigeria.

They should also engage in studies to estimate “Climate Sensitivity” around the country.

REFERENCES

Adalemo, LA (1983) Design for Development Inaugural lecture Delivered at the University of Lagos, Wednesday Dec. 21, 1983.

Ariehayo, V.R (1990); On Effective Climatologies! Information for Architects and Settlement Planners in Africa. African Urban Quarterly 5 (1&2): 3-8.

Adebayo, Y.R (1990): Periscopmg the Problem of Documenling the City Artifacts for Studies of Urban Microclimatology in the Less Developed World: The Ibadan Experience. African Urban Quarterly 5 (1&2):14-24.

Adebayo, Y.R (1990): setting African Settlement and Climates to same Rhythm: An Editorial comment African Urban Quarterly 5 (172): 1-2

Andrew G. (2000): The Human Impact on the Natural Environment, Blackwell Publishers

Arbitrage Consulting Group (1997): Optimal Strategy for Waste Management in Lagos State.

Ayoade, J.O (1995): Climatic and Human Welfare. Inaugural lecture Delivered at the University of Ibadan. Dept of Geography.

Faniran A. and O, Ojo (1980) Man's Physical Environment; An Intermediate Physical Geography, Heinemann, London, Tbadan. Pp 403.

FEPA (1999): Nigeria's National Agenda 21

FGN (2003): Nigeria's First National Communication under the United Nations Framework Convention on Climate Change (UNFCCC)

FMNR (2006): National Guidelines and Standards for water quality in Nigeria

FMWR (2006): Water for People, water for Life

FMWR (2006): Nigeria: Water Resources Information Profile

Gbadegesin, A.S (2005): Minimizing Risk and Sustaining the Environment: The Role of Sustainability Science. Paper presented at Faculty Lecture Series at the Tai Solarin University, Ogun State. Dec. 2005. pp 22.

John Asiyani Associate (2005): Lagos State Government Ministry of Physical Planning and Urban Development. Report on the Review of the Lagos State Regional Plan (1980-2000) Executive Summary. April 2003

John Asiyani Associate (2005): Report on the Review of the Lagos State Regional Plan (1980-2005) vol. II Revised edition.

Oguntoyinbo, J.S (1990): Climatology and Building Design in West Africa. African Urban Quarterly 5 (1&2):104-117.

Ojo, A (1990): Aspects of the Urban Climate of Lagos, Nigeria. African Urban Quarterly 5 (1&2):76-90.

Ojo, A.O (1988a): Urbanization and Thermal Problems in Tropical Cities: The Lagos Experience, in Sada P.O and Odemerho, F.O (Eds). *Environmental Issues and Management in Nigeria Development Evans (Nigeria) Limited, Ibadan. Chap. 27, pp. 291-308.*

Ojo, A.O (1992a): "Rainfall Distribution and Flood Hazards in Lagos Metropolitan Area" in Oguntoyinbo, J.S et al (Eds) *Meteorological Hazards and Development*. Kola Okanlawon Publishers, Lagos. Pp 182-189.

Ojo, A.O (1992b): "Climate Variation and Food Production in Tropical Africa: Issues and Challenges before the O.A.U." in Charles Alade and Tayo Odumosu (Eds):

The O.A.U at 25, Past Perspectives, Current Problems and Future Prospects.
Chap. 3, pp.8.

Ojo, A.O (1994); Urbanization and Physioclimatic Responses to thermal conditions in Lagos. In Kunle Lawal (ed) *Urban Transition in Africa: Aspects of Urbanization and Change in Lagos*. Pumark (Nig) Ltd. Pp. 140-150.

Ojo, A.O (1994a): "Urbanization and Physioclimatic Responses to Thermal Conditions in Lagos" in Kunle Lawal (Ed) *Urban Transition in Africa: Aspects of Urbanization and Change in Lagos in Lagos*, Pumark Publications Nigeria Limited Ikeja, chap. 11, pp. 140-150.

Ojo, A.O (1996): "Rainfall Variations and the Water Balance Characteristics of Lagos Metropolitan Area". African Climatological Research Series Vol.1 Department of Geography, University of Lagos, SEDEC Publications.

Ojo, A.O (1997a): Water, Environment and Sustainable Development Ti Tola Adejuwon and A.G.K. Moaii (Lu₃>; Perspective on Education, Women Environment in Nigeria, Central Educational Services, Lagos. Chap. 42, pp 279-286.

Ojo, A.O (1997b): "Implications of Climate Change for water Supply - Demand Systems in Lagos Metropolitan Area". In Ojo, O. and Ukeje, J (Eds); *Sustain Africa'95 Implication of Climate Change, Global Warning and Environmental Degradation in Africa*. The Nigerian Meteorological Society, Lagos. Voi 5, pp. 11-17.

Ojo, A.O. (1995a): "Towards the Optimization of Public Water Supply Systems in Lagos State: Problems and Prospects:, LASU Journal of Social Sciences vol.3, pp.84-89.

Ojo, A.O. (1996b): "Recent Climatic Variations and the Structural Adjustment Programme in Africa: Challenges and Opportunities. LASU Journal of Social Sciences Vol. 4.

- Ojo, A.O. (1996c): "Women and the Water Question: Abuja", A Journal of Nigerian Studies Vols. 1 & 2 pp. 74-79.
- Ojo, K. (2000): "Social Issues of Sustainable Water Supply Management in Nigeria". In Odumosu, T, et al.
- Ojo, K. (2000): Social Issues of Sustainable Water Supply Management. In Tayo Odumosu et al (Eds.) Social Problems and Social Work in Nigeria, Centre for Planning Studies, LASU.
- Ojo, O (1977): The Climates of West Africa. Heinemann. London. Pp218.
- Ojo, K (1995b): "Natural Disasters" in A.O.K Noah (Ed) Fundamentals of General Studies. Rex Charles Publications Ibadan. Chap. 40, pp.530-538.
- Ojo, K (1997): "Impact of Climatic Variations on Surface and Ground Water Resources Systems in the Lagos Area: A Preliminary Assessment". African Climatological Research in series vol.5, No. 1, September, 1997, pp. 1-33. Laboratory of Climatology, Department of Geography, University of Lagos. SEDEC Publications.
- Ojo, K, (1998): 'The Development of Urban and Regional Planning Laws in Lagos State: A Planner's Perspective'.
 _____ March Sries, Vol.Z, TTu.1, june 1990 pp. 1-15. Laboratory of Climatology, Department of Geography, university of Lagos. SEDEC Publications.
- Ojo K and Omotayo A. (1988b): The Physical Environment of Lagos State in O.O Arowolo (Ed). *Living Conditions of the people of Lagos State. A Research Publication of the Faculty of Social Sciences, Lagos State University.* Chap. 2 pp. 7-26.

