

CLIMATE CHANGE, IMPACTS AND CONSEQUENCES ON NIGERIAN COASTAL AREA

BY

**J. E. Ukeje, L. E. Edafeenene, G. A Oyegbule, J.O Olayanju, A.O Ediang, M.O Sholademi and
J. k Dogbey**

ABSTRACT

The impacts and consequences of climate change is a major concern to many countries in the world. The WMO Secretary General in 1977 noted that climate shapes our cultures, many of our settlements and all our landscape. Sea level rise would increase erosion and flooding along coastlines, threatening many cities. In Africa more than one quarter of the population live within 100km of the sea coast rendering a great number of people vulnerable to rise in sea level as a result of climate change. Nigeria has been identified by UNEP as one of the Countries most vulnerable to the impacts of climate change. Rise in sea level would cause inundation along more than 70% of the Nigerian coastline placing land at risk many kilometer inland (Awosika et al.1992)

This paper examines climate change, its impacts and consequences in Nigeria generally and the coastal Area as a case study. Statistical analyses of temperature and rainfall in five major coastal cities for 25 and 50 years respectively, were made. Sea surface temperature for 20 years (1989 to 2008) for Victoria Island Lagos was also looked into. The study reveals increase in temperature confirming global warming in coastal area of Nigeria. Variation in rainfall in most parts of the coastal area were revealed. Nigerian Coastal Area with its high population density and heavy economic activities faces the challenges and consequences of climate change ranging from storm surges, flooding, soil erosion, salination of surface and sub surface waters, toxic gas release, drought, health problem, etc.

INTRODUCTION

The WMO Secretary General in 1977 noted that climate shapes our cultures, many of our settlements and all our landscape. It largely determines food production and its variability, also cause famine. There is no doubt that even in the tropics, where climate is most equitable, good information on weather is an invaluable resource for planning.

Climate change challenges and consequences is one the world wide topical issues today. The impacts of climate change and global warming and their consequences on the socio economic and socio cultural resources in many parts of world have been of major concern to many countries. With floods and droughts, desertification, soil erosion, sea level rise storm surges and other consequences of climate variation and climate change, there has been considerable and disturbing concern among the Government and people of West and Central Africa, Nigeria inclusive. This has led to issues of sustainable development.

This paper examines the evidence of climate change, its impacts consequences and challenges in the coastal area of Nigeria.

SOME FACTS ABOUT CLIMATE CHANGE

Global warming, and climate change have become a reality and the focus of international community. 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

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 effects in the past and is likely to remain so in the future. Other greenhouse gases include nitrous oxides, methane (CH₄), chlorofluorocarbons (cfc's), ozone and aerosols

Evidences no doubt show that there is an urgent need to be concerned with the implications of climate change and sea level rise for effective socio-economic planning and management, for sustainable development, and for developing

Policies which will reduce, and if possible, eliminate the adverse impacts of global warming and climate change, including the impacts of sea level rise. (O. Ojo, 2008)

It is now well recognized that the human factor has become very significant in the balance of forces that determine the earth's climate.

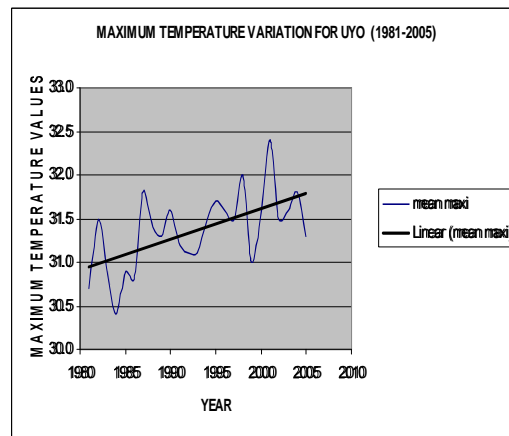
Nigeria has been identified by UNEP as one of the countries most vulnerable to the impacts of climate change through sea level rise along our coast line, intensified desertification, erosion and flooding disasters and general land degradation

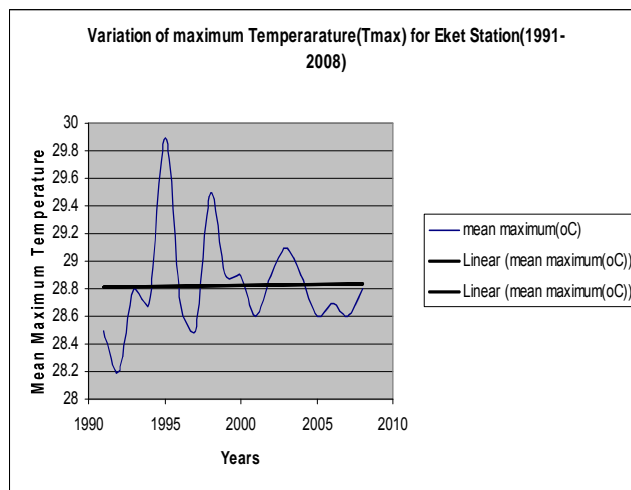
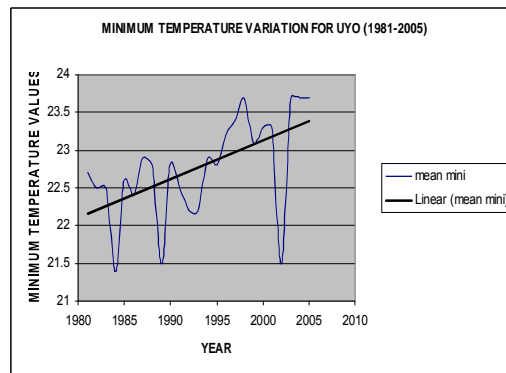
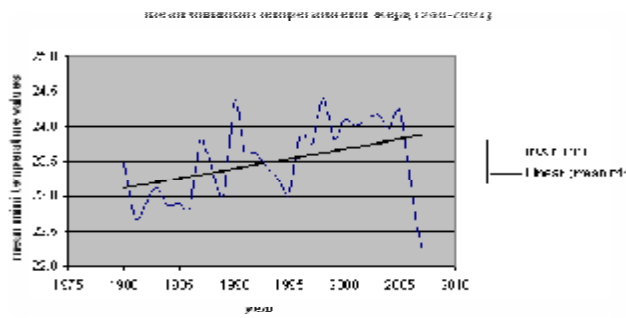
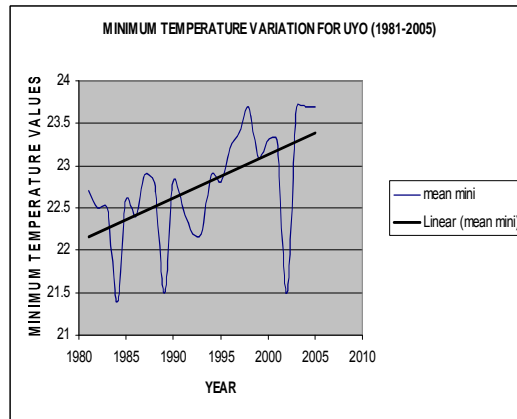
Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* [90%] due to the observed increase in anthropogenic greenhouse gas concentrations. (IPCC WGI Fourth Assessment Report)

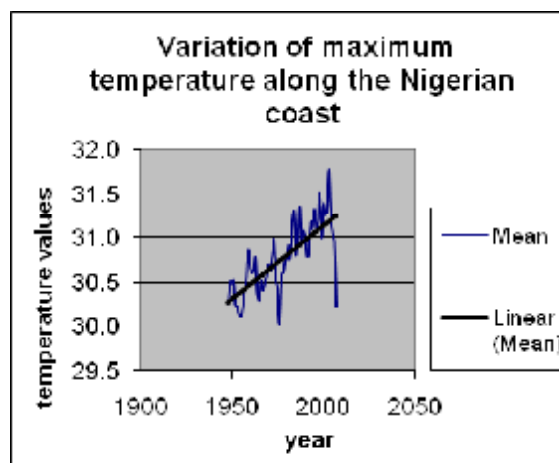
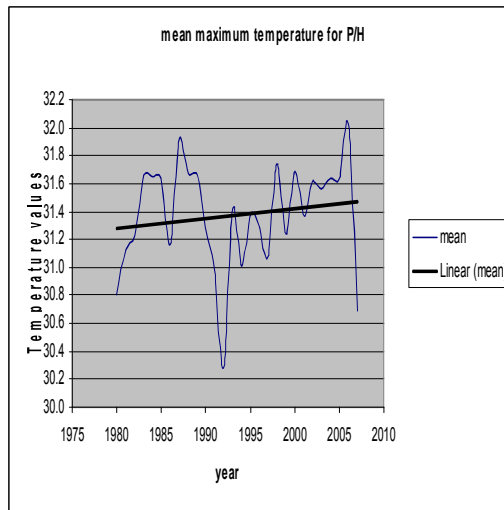
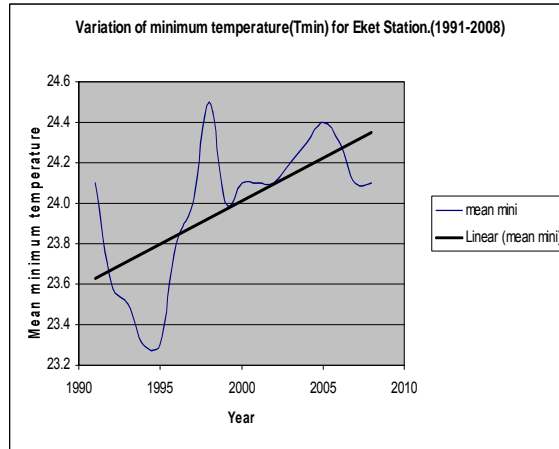
Global warming impacts everyone regardless of national borders. We need a joint effort and have to agree on a common road map to tackle the issue. It calls for proactive and immediate action because climate change has no respect for borders and affects all. (J. N. Okpara, 2009)

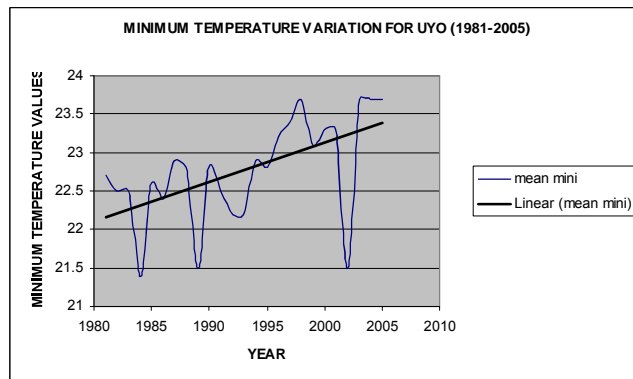
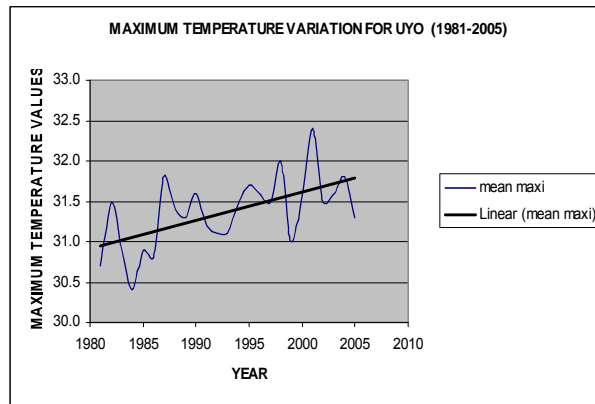
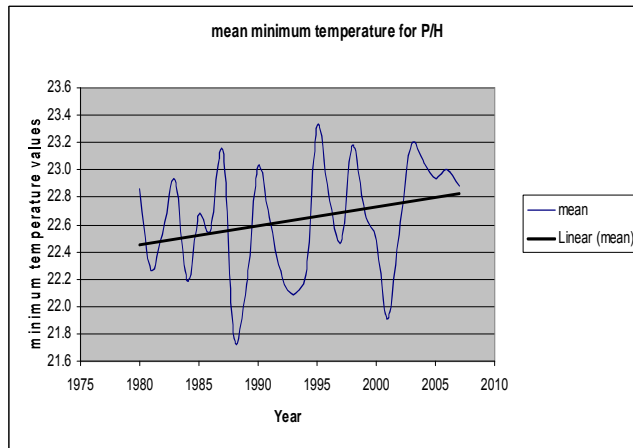
EVIDENCE OF CLIMATE CHANGE AND GLOBAL WARMING IN NIGERIA COASTAL AREA.

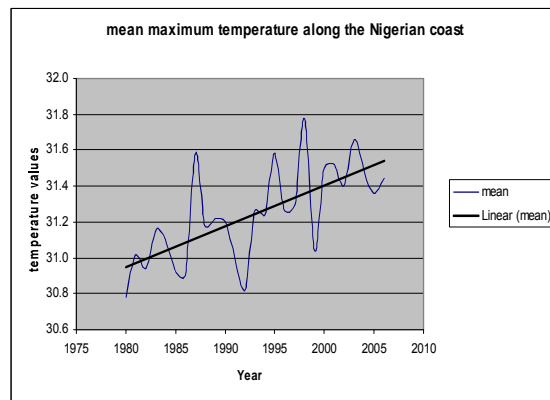
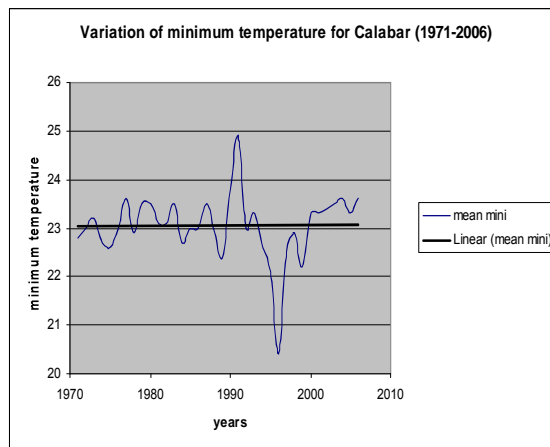
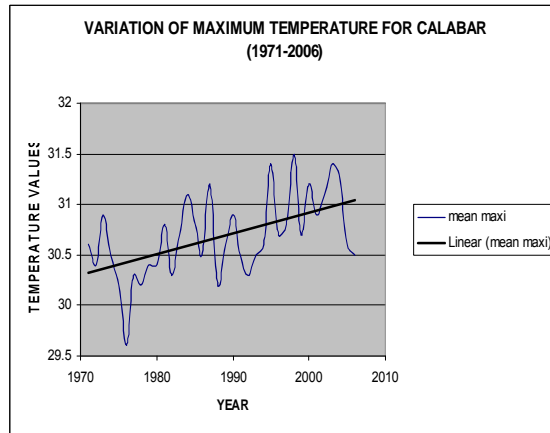
Temperature Rise Rainfall Variation Changes in Onset and Cessation of Rainfall

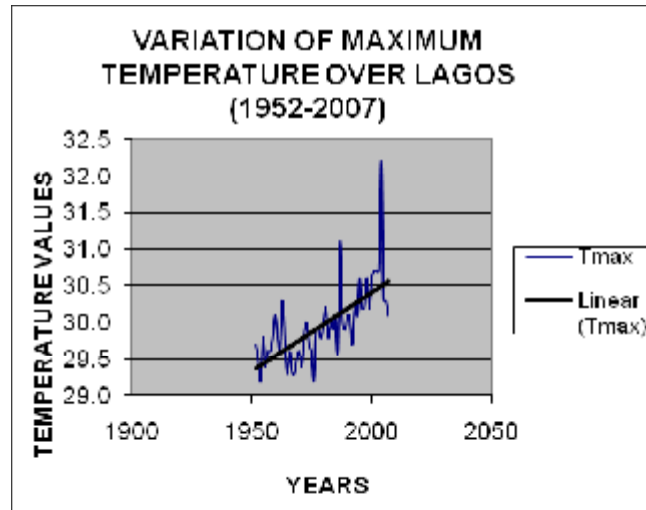
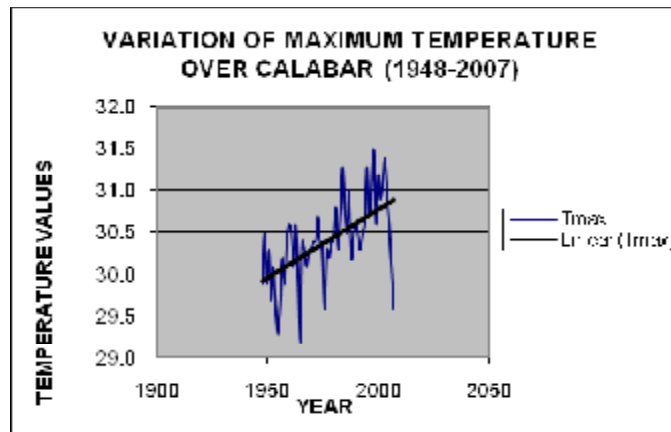
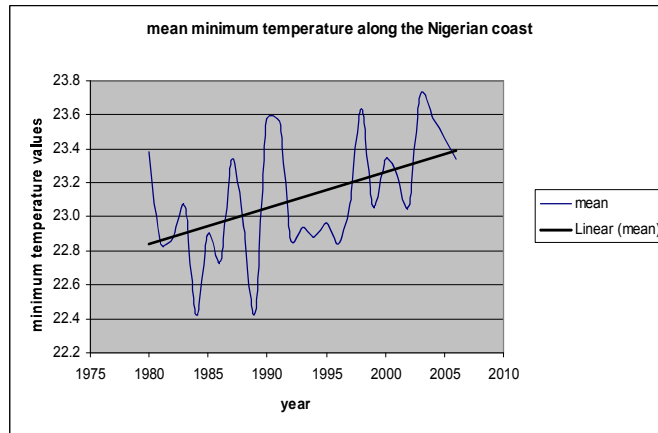


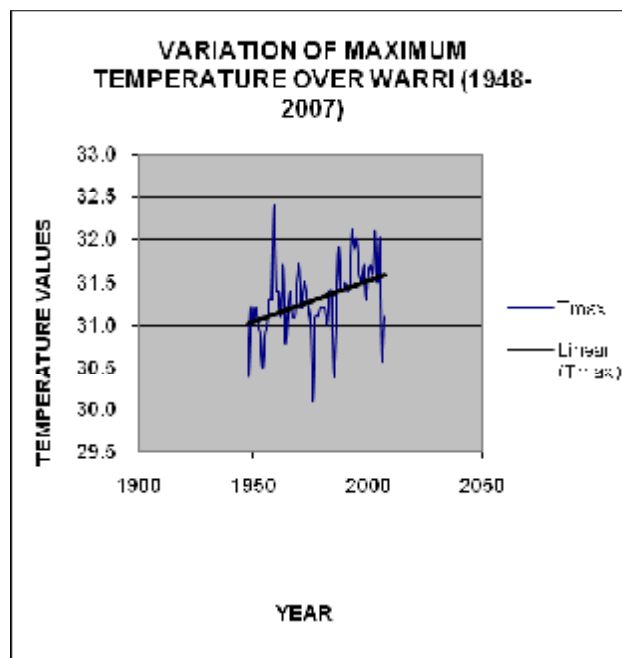
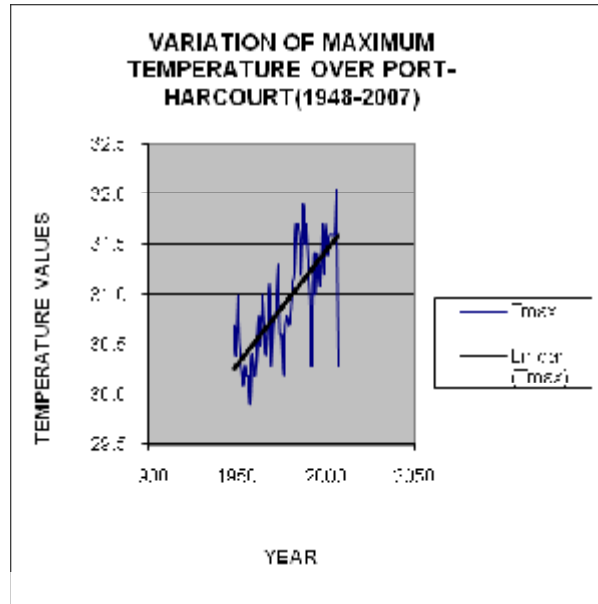












IMPACTS AND CONSEQUENCES

1. Changes in air temp and precipitation affects fisheries by altering habitat availability or quality carpenter et al 1992
- ❖ Drought

- ❖ Forest fire damaging the ecosystem and releasing more green house gases
- ❖ Agriculture

- ❖ By 2020, in some countries in Africa, yield from rain fed agriculture could be reduced by up to 50% (IPCC 2006).

Table Summary of anticipated direct and ecosystem mediated health effects of global climate change in Nigeria

Environmental alteration	Direct effects
Higher temperatures and Precipitation Patterns	1. Increased heat-related. 2. Mortality and Morbidity 3. Increase in photochemical and 4. Possibly other forms of 5. Pollution, with resulting 6. Increased in respiratory illness 7. Increased frequency of floods, 8. Storms and natural disasters.
Sea level rise	Loss of habitable land contaminated freshwater supplies, damage to public health infrastructure.
Ecosystem – mediated health	
1. Changes in distribution and 2. Seasonal transmission of vector. 3. Borne diseases 4. Increase in toxic 5. Algal blooms and possibly in 6. Transmission of water borne diseases.	
Decreased agricultural production and food shortages.	
Decreased fish stocks due to loss of coastal wetlands.	

O. OJO, 2008

**POSSIBLE IMPACTS OF SEA LEVEL RISE (SLR)
PHYSICAL EFFECTS**

The impact of SLR depends on the type of area lost its associated land uses and the speed at which it occurs

- ❖ Coastal lowlands, Wetlands and Estuaries.

The sea level rise would lead to submergence of the lowlands along the coast and much of the land currently used for agriculture and livestock production or other human activities would be lost leading to socio-economic and socio-cultural problems

❖ Erosion

Approximately 70% of the world's sandy shoreline are presently eroding and it is generally expected that the process will be aggravated by an increase in sea level rise (wind and Peerbolte, 1993). Nigeria is not exempted

❖ With a 1-m rise up to 600km² of land would be at risk in Lagos, and other smaller towns along the coast.

❖ For the mud coast of Ondo State, a 1-m rise will place more than 2000km² of land at risk.

❖ By 2100, even with no acceleration in sea level rise, current rate of land loss through erosion is more than 250km² (K. Ogunjobi, 2009)

❖ Shores and Beaches

An increase in mean water depth leads to an increase in mean wave height and wave related effects, for hard coastal defence structures, this implies an increased risk of overtopping.

❖ Rivers Inlets and Outlets

The mean water level of a river may increase as result of SLR due to the back water effect. Such an increase may extend some kilometres inland depending on local conditions, river gradients, etc

ENVIRONMENTAL AND SOCIO ECONOMIC IMPACTS

❖ Loss of lives

Of all the environmental and socio – economic and also physical impact, the most important one is human casualties.

❖ Salt Intrusion

❖ Land loss

There is loss of productivity capacity of land due to submergence and erosion in the following areas:

Agriculture, residential, tourism, recreation and industrial.

Capital losses

Heavy capital losses such as Infrastructure, Factories, Roads etc. face danger of being lost.

❖ Water supply

Salinity, pollution and salt intrusion would threaten drinking water

❖ Ecological

With respect to ecological systems, a rise in sea level is most likely to cause a shoreward shift in a situation of gently slope. Wetland which are important to commercial fisheries in many areas especially in major river deltas are in danger.

❖ In some cases, farmers may be forced to change their practices

❖ Because most of the coastal environment would be characterized by water surfaces and their associated ecological systems, converting to aquaculture could be a viable response in many of the coastal areas.

All these imply that Nigeria is highly vulnerable and that there is need for adaptation measures for agriculture in the country

THE COASTAL IMPACTS

(a) The Nigerian coastal areas are endowed with extensive and productive mangrove ecosystems

(b) Vast and fertile coastal plains have made the food basket of southern Nigeria.

(c) In addition, many of the barrier islands depend on the rich low-lying coastal lands against storms; they enclose and protect the rich low-lying resources of estuaries, marshes, mangroves, all of which are highly vulnerable to flooding resulting from sea level rise.

- (d) Also, many of the barrier islands (e.g. Victoria Island and Ikoyi Island) are heavily developed and urbanized, with most coastal state capitals and settlements (e.g Port Harcourt and Calabar) situated near the coast.
- (e) Many industries and oil and gas installation handling facilities built near the coastline, particularly in the Niger Delta will also be affected by flooding.
- (f) With rising level, the potential for flooding and erosion of certain key transportation arteries on the barrier islands and other coastal units will increase. This will lead to a degeneration and interruption of social services.
- (g) Existing fishing facilities such as jetties and storage centers, built on the coastal fringes only a couple of feet above the mean high tide line, will be subjected to more frequent tidal and storm inundation.
- (h) The growing coast based-tourism will also be heavily affected as a result of both increased rates of erosion and persistent flooding.
- (i) A rise in sea level will damage or destroy the delicate coastal ecosystems, which depends on wetlands, beaches, mangroves, the Niger Delta and estuaries.
- (j) The lumber industries along the coastal areas, for example, in Sapele, are expected to suffer from deforestation resulting from increased salinity.
- (k) Some 85% of the country's more than 2000 industrial establishments are located in the coastal zone and the majority of the country's oil exploration/exploitation facilities is located in the low-lying Mud, Delta and Strand coastal regions. (O. Ojo 2008)
- Thus, there is urgent need for adaptation policies along the coastal areas of Nigeria.

Capital Value at risk in Lagos State with SLR of 0.5 and 1.0m

LOCAL GOVT AREA	VALUE AT RISK WITH SLR (in U.S. billion Dollars)	
	0.5m	1.0m
Etì Osa	15.0	25.0
Lagos Island	8.1	14.0
Lagos Mainland	6.5	12.0
Shomolu	4.2	6.0
Surulere	3.1	5.0
Ikeja	2.8	4.0
Oshodi – Isolo	2.6	4.0
Mushin	2.4	4.0
Ibeju – Lekki	1.8	3.0
Ojo	1.8	3.0
Agege	1.6	3.0
Badagry	1.4	2.0
Alimosho	1.1	2.0
Ikorodu	0.3	0.5
Epe	0.3	0.5
TOTAL	53.0	88.0

Capital values at risk in Eti-Osa Local Government area with SLR of 1.0m

<i>SOCIO – ECONOMIC PROPERTY TYPE</i>	VALUE IN BILLION U. S. Dollars
Residential Buildings	12.0
Land	6.8
Embassies	2.4
Oil Companies	1.5
Commercial Activities (Including Apapa Port Complex)	0.8
Industries	0.2
Social Services and values (Roads, Schools, Hospitals, Communication systems, Etc.)	0.8
Banks	0.2
TOTAL	24.7

Relevance of Meteorological and oceanographic information / services in mitigating climate change challenges.

- ❖ Better understanding of the science of climate change
- ❖ Improved monitoring and modeling of climate change
- ❖ Availability of Improved data base (including local (field) data, national data archives and international and satellite data)

MITIGATING THE IMPACTS OF CLIMATE CHANGE AND GLOBAL WARMING .

Adjustment strategies

Strategies / measures from governmental / environmental stand point:

Identifying nations most vulnerable to sea level rise.

Making rough estimate of the potential implication.

Evaluation of adjustment strategies Improving environmental data basisCoastal reclamation and development Building of walls and pumping system:

Thick wall are build round areas that are densely developed to keep the sea out. This could be supplemented by pumping systems to remove excess water.

- ❖ Conversion to other uses:

The encroachment of the sea is preferably allowed, without abandoning the areas but rather convert it for other uses.

- ❖ Evacuation:

Evacuation of people, animals and other valuable movable assets takes place in face of submergence or serious erosion.

Elements for planning.

Information for planning directed toward establishment of regulations to include: environmental atlases, assessment of SLR impact, inventories of shoreline erosion , zoning of coastal areas etc.

Impounding water: The most ambitious set of impoundment would only lower sea level rise by about 7cm.

6.0 COMMENDATION AND ONCLUSION

- ❖ Needs for more effective coordinated national programme and management policies:
This is to access the potential impact of climate change, global warming and sea level rise and analysed possible cost effective response measure.
- ❖ Creating awareness on the impacts and consequences of climate change and global warming.
- ❖ Prevent if possible or reduce the causes of climate change and global warming.

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