FOREWORDEXECUTIVE SUMMARY

There is evidence that Climate Change has accelerated in this 21st Century. Its effects which include sea level rise, higher temperature, increase in rainfall, severe weather conditions and flooding have serious impacts on health and human settlement, energy, agriculture and food security, biodiversity and ecosystem services, Land use, Transport, Infrastructure, Industry, water resources and human coastal settlements which spans over a large part of Nigeria especially in Delta State, inducing the spread of diseases such as malaria, water borne diseases etc.

Delta state which is situated in the Niger Delta flood plain on the coast of Nigeria is particularly vulnerable to these impacts and is already experiencing the detrimental effects of climate change. A large number of the coastal towns in the State have already been displaced by flooding induced by sea level rise.

The economy of Delta State is dominated by the Oil and Gas sector because of its abundant reserves of Oil and Gas. This sector contributes as much as 40% of the Country's GDP and 83% of total government revenue. Other major activities of the State which include agriculture, fishing and trading are on the decline since the discovery of Oil. Despite the success of the Oil industry, the level of poverty, unemployment, intercommunity conflict, conflict over land and housing pressure are high.

Also the deleterious environmental effects of fossil fuel exploration and climate change have reduced the adaptive capacity of the environment. The State is rich in biodiversity and the mangrove swamps are the largest in Africa, however, climate change impacts have led to loss of wetlands through deforestation, oil spills and saline intrusion from sea level rise and flooding having devastating effect on the State's biodiversity resource and livelihood options.

About three-quarters of greenhouse gas emissions are from the unsustainable exploration of Oil and gas by multi-national corporations operating in the State. In addition, decades of Oil spills have seriously damaged aquatic and terrestrial ecosystems. All these hinder development and delay progress in eradicating poverty especially in the most vulnerable groups made up of farmers, fisher folks, the elderly, women, children and physically challenged.

The rapidly increasing population, expansive coast line which covers about 17698km, the numerous tributaries and mangrove swamps have further increased the vulnerability of the State to climate change impacts.

Because of its impact on society as a whole and a wide range of economic sectors, climate change is no longer viewed as just an environmental matter but also as a developmental matter.

However, there are intrinsic opportunities from climate change that developing countries like Nigeria and states like Delta State can take advantage and benefit from. These include the Clean Development Mechanism (CDM) which is legislated under Article 12 of the Kyoto Protocol,

National Appropriate Mitigation Actions (NAMAs) and Reduced Emissions from Deforestation and Forest Degradation plus (REDD+). Carbon accounting and REDD+ projects are of particular relevance in Delta State considering the current levels of ecosystem degradation.

Effective Climate Change Greenhouse gas mitigation and adaptation will require long-term planning and explicit consideration of the risks across sectors. Given the complex, cross-cutting nature of climate change and the scale of challenge, a comprehensive strategy for implementing a dynamic long-term and coherent approach to Greenhouse gas mitigation and adaptation needs to be adopted. Such a strategy requires committed leadership, strong institutions and a comprehensive and multi-disciplinary approach.

Though Policies, programmes and measures presently exist, they are insufficient to address the level of risk posed by climate change. Inadequate enforcement by the relevant agencies has also rendered them non-effective. Institutional and individual capacity to adapt to climate change and initialize Greenhouse gas mitigation opportunities in the key sectors within the State is currently under-developed. This is particularly evident in the limited capacity to identify appropriate adaptation and mitigation measures.

Lack of appropriate Institutional framework and governance instruments particularly at the national level are additional challenges exacerbating the effect of climate change impacts.

Despite all these challenges, the Delta State Government is responding promptly to tackle the menace of Climate Change. In January 2009, the Governor, Dr. Emmanuel Uduaghan commenced a series of consultations with international development partners, the State of California in the United States of America and the United Nations Development Programme UNDP as part of a systematic but structured process towards a green economy in Delta State using Climate Change and sustainable development strategies.

The Delta State Government strongly recognizes the need for the creation of an enabling Policy environment for the implementation of priority interventions towards reversing the considerable environmental degradation within the State. This prompted the development of the Delta State Climate Change Policy. This Policy is in line with the Federal Government Policy on Climate Change but taking into consideration the needs of Delta State.

The Policy will assist decision makers and other Stakeholders within the State to identify priority Greenhouse gas mitigation and adaptation interventions and implement collective measures to address them while ensuring an environmentally sound and sustainable socio-economic development through harmonized and coordinated strategies, programmes and actions.

The Policy provides an integrated and harmonized territorial approach to climate change which is a coordinated and collaborative approach within sub nations and regions that is intended to increase effectiveness in combating and adapting to climate change through adaptation and mitigation. Given the scale of the challenge, the Policy also provides a comprehensive strategy for implementing a dynamic, long-term and coherent approach to Greenhouse gas and adaptation needs with special attention on the cross cutting measures which include education and training, research and development, technology development and transfer, finance, mainstreaming and governance.

The Policy considers the differentiated impacts of climate change on different segments of the society, the roles of women, men, youth, physically challenged, gender and other social perspectives.

The Policy recommends the implementation of measures that meet the sustainable development needs of the State. This is in line with the United Nation Development Program's (UNDP) climate change strategy to support the design of integrated climate change (adaptation and mitigation) policies, strategies and action plans that promote long-term sustainability and poverty reduction. This integrated approach is grounded in the fact that the Greenhouse gas mitigation is essential to avoid the unmanageable, while adaptation is crucial to manage the unavoidable.

The Policy recognizes the critical need for the development and implementation of integrated adaptation and mitigation projects to secure sustainable development for the State.

The Policy conforms to the followings:

a) The Fundamental and Operational Principles of Delta State set out in chapter II (Fundamental Objectives and Directive Principles of State Policy) of the Constitution of Federal Republic of Nigeria (1999).

b) Article 20 of the 1999 Constitution which empowers the State to protect and improve the environment and safeguard the water, air, land, forests and wildlife in Nigeria.

c) The Principles of Environmental Law as envisaged in Environmental governance instruments including Edict No 25 of 1999 that established the Delta State Environmental Protection Agency.

d) Articles 3.3 and 3.4 of the UNFCCC.

e) Established UNDP and EEG procedures and World Bank practices.

The Policy complements these various International conventions, treaties and protocols on environment and natural resources in which Nigeria is a party to and therefore affects Delta State:

a) UNFCCC, Kyoto Protocol and Conference of Parties (COP) decisions.

The objective of the UNFCCC is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner (United Nations, 1992).

The Kyoto Protocol's Clean Development Mechanism (CDM) allows industrialized countries with greenhouse gas emission reduction obligations under Kyoto to meet some of their obligations by investing in greenhouse gas reduction activities in developing countries like Nigeria.

b) The United Nation's Convention to Combat Desertification (UNCCD).

c) The Convention on Biological Diversity (CBD).

d) The Stockholding Convention on Persistent Organic Pollutants (POPs).

e) The Vienna Convention for the Protection of the Ozone Layer.

f) The Montreal Protocol on Substances that deplete the Ozone Layer.

The implementation of the Policy will be the responsibility of the Ministry of Environment of Delta State working in close collaboration with other key Ministries. The Policy recommends that various implementation instruments be developed for its operationalization. These include the Delta State Integrated Territorial Climate Plan (ITCP).

The Climate Change Unit of the Delta State Ministry of Environment will monitor and evaluate the implementation of the Policy. It shall work jointly with other relevant State and National government agencies, departments and institutions.

The aims of the Policy are as follows:

Ensure the establishment of a State Climate Change governance framework for the development and implementation of climate change sectorial strategies, measures and initiatives, and involving Lawmakers, experts and other stakeholders to coordinate and harmonize the implementation of climate change activities and initiatives in Delta State.

Facilitate the incorporation of climate change considerations into economic and development planning, policy and interventions in the State.

Identify priority adaptation and mitigation areas and roles of the State and other stakeholders to address climate change and promote investment in mitigation and adaptation intervention projects.

Promote capacity building efforts through education and training, public awareness, research and development, technology development, transfer, information and knowledge managements.

Promote climate change research programs and raise climate change-related science and technology to a level that will enable the State to better participate in international scientific and technological cooperation on climate change.

Strengthen the State capacity to utilize opportunities offered by climate protection worldwide for economic development and job creation.

Effectively complement the measures undertaken by the Federal Government and the African Union in combating climate change and maintain the lead in the development of a low-carbon economy.

A Monitoring and Evaluation (M & E) framework shall be put in place by the Delta State Ministry of Environment in accordance with established UNDP and EEG procedures and World Bank best practices to ensure that Policy goals and objectives are achieved.

The Policy will be reviewed every three years to take into account emerging issues, challenges and trends on climate change at the local, national, sub-regional, regional and global levels including the ongoing International Climate Change Policy debate.

The Delta State Climate Change Policy has been driven through a bottom – up approach by a comprehensive stakeholders' consultative process, supported by Consultants, Academia, and Professional Organizations. The following groups, amongst others, were consulted for input, Climate Change Experts drawn from the various sector in the State economy viz: Energy, Forestry and Environment, Transport, Agriculture, Lands, Health, Water Resources, Oil and Gasetc. both in the public and organized private sectors across Delta State Nigeria,Civil Society Institutions, International Development Partners and Relevant Ministries, Departments and Agencies MDAs

The Delta State Climate Change Policy shall be submitted to the Delta State House of Assembly for to be passed into enabling law as the Delta State Climate Change Law (DESCCLA)

Contents

Acronyms and Abbreviations

AR4	Fourth Assessment Report
BAP	Bali Action Plan
BAT	Best Available Technologies
BET	Best Environmental Practices
BNRCC	Building Nigeria's Response to Climate Change
CA	Conservation Agriculture
CBD	Conversion on Biological Diversity
CCA	Climate Change Adaptation
CCM	Climate Change Mitigation
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CIDA	Canadian International Development Agency
COP	Conference of the Parties (to the Kyoto Protocol)
CSOs	Civil Society Organisations
DPR	Department of Petroleum Resources
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EWS	Early Warning System
FME	Federal Ministry of the Environment
GDP	Gross Domestic Project
GHGs	Greenhouse Gases
GIS	Geographic Information System
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel on Climate Change

IPR	Intellectual Property Rights
ITCP	Integrated Territorial Climate Plan
KP	Kyoto Protocol
MAP	Mangrove Action Projects
MDG	Millennium Development Goals
MEA	Multilateral Environmental Agreement
M&E	Monitoring and Evaluation
MoE	Ministry of Environment
NAMA	Nationally Appropriate Mitigation Action
NASPA	National Adaptation Strategy and Action Plan
NESREA	National Environmental Standards and Regulations Enforcement Agency
NC	National Communication
NEST	Nigerian Environmental Study Action Team
NOSDRA	National Oil Spill Detection and Response Agency
NRDARP	Niger Delta Natural Resource Damage Assessment and Restoration Project
POPs	Persistent Organic Pollutants
PPPs	Public Private Partnerships
R&D	Research and Development
REDD+	Reduced Emissions from Deforestation and forest Degradation plus
SEEFOR	State Employment and Expenditure for Results
SLR	Sea Level Rise
SME	Small and Medium Enterprise
SNC	Second National Communication
SON	Standards Organisation of Nigeria
TACC	Territorial Approach to Climate Change
UN	United Nation
UNCCD	United Nation Convention to Combat Desertification

UNFCCC United Nation Framework Convention on Climate Change

UNDP United Nation Development Programme

Terminologies and Concepts

Adaptative capacity: ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantages of opportunities, or to cope with the consequences.

Climate: situation of a climate system, including the statistical description, taking into account averages and variations in temperature, rainfall, wind and other relevant meteorological factores in a given period.

Climate Change: change of climate attributed directly or indirectly to human activity that alters the composition of global atmosphere which in addition to natural climate variability observed over comparable period.

Climate variability: seasonal shifts in mean climatic conditions such as temperature and precipitation.

Climate change adaptation: adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Such adjustment maybe preventive or reactive, private or public, autonomous or planned.

Climate change mitigation: human interventions to reduce the sources or enhance sinks of greenhouse gases.

Carbon sink: any process, activity or mechanism that removes greenhouse gases, aerosis or precursors of greenhouse gases from the atmosphere.

Coping capacity: means by which people or organizations use available resources and abilities to deal with adverse consequences of disaster. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and human – induced hazards.

Disaster risk management: the systematic process of using administrative decisions, organizations, operational skills and capacities to implement policies, strategies and coping capacities of communities to lessen the impacts of natural hazards.

Disaster risk reduction: is the conceptual framework of actions considered and taken with the possibilities of minimizing social and economic vulnerabilities of hazards (mitigation), within the broad context of sustainable development.

Disaster mitigation: structural and non – structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Early warning system: is a functional system for generation and provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response.

Climate Impact Assessment: the practice of identifying and evaluating the detrimental and beneficial consequences of climate change on natural and human systems.

Greenhouse gases: gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re – emit infrared radiation.

Global warming: intensifying greenhouse effect resulting from anthropogenic actions, where the consequence is an increase in the concentration of greenhouse gases, aerosols or their predecessors in the atmosphere, which absorb part of the infrared radiation emitted by the Earth's surface, thus increasing the average temperature on the planet and causing adverse climatic phenomena.

Resilience: the ability of a system to adapt to climate change, whether by taking advantage of the opportunities or by dealing with their consequences, the analysis of adaptation identifies and evaluates the different options, benefits and costs of the measures.

Sustainable Development: development which meets the needs of the present without compromising the ability of future generations to meet their own needs.

Vulnerability: The degree to which a system is susceptible to, and unable to cope with,, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity.

1 CHAPTER ONE

INTRODUCTION

The World is passing through a regime of changes in usual climate pattern causing widespread concerns on its implications to life. Climatological records of daily weather events of temperature, rainfall and other parameters have shown considerable variation in global climate. These changes are as a result of a global warming of the atmosphere brought about by an alarming increase over the years in the concentration of greenhouses gases in the atmosphere leading to an abnormal effect which most scientists believe will continue to cause increased warming of the earth's climatic conditions.

The fluctuations have important socio-economic consequences on the ever increasing world population.

The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) revealed that climate change is real and much more advanced than previously presumed. It also affirmed that anthropogenic climate change is the world's greatest developmental challenge and responsible for most of the increase in the global average temperature. Its effects which include increase in global average air and ocean temperature, rise in sea levels, severe weather conditions, heavy rainfall, heat waves, widespread melting of snow and ice etc. are aggravating environmental issues of deforestation and land degradation, fresh water storage, threatened food security, air and water pollution etc.

Through the effect of human factors, greenhouse gases in the atmosphere have reached concentrations beyond the acceptable limit for the past decades. Carbon dioxide levels in particular have risen from 280ppm before industrialization (1750) to almost 380ppm today and must be drastically reduced in the next few decades.

From the above perspective of the IPCC, this is only feasible by radically embarking on a new green industrial revolution.

The magnitude and urgency of the challenges in stabilizing and reducing atmospheric concentrations of greenhouse gases and adapting to climate change will require an unprecedented level of cooperation and collaboration among all levels of government around the world and thus strengthen global, national and sub-national economies.

There must be concerted efforts throughout the world towards the enaction of national and sub-national legislation that address climate change and strong steps taken to reduce the emission of greenhouse gases in order to put the world on a path to greenhouse stabilization.

Responding to climate change falls into two broad categories namely Mitigation and Adaptation.

Mitigation of Climate change refers to measures that may either reduce greenhouse gas emissions (abatement) or increase terrestrial storage of carbon (sequestration). In this field of greenhouse gas mitigation, sub-national authorities have at their disposal a wide array of actions they can undertake. These range from influencing transport use and emissions to the promotion

of decentralized cleaner energy production particularly through renewable resources, composting and recycling of waste amongst others.

On the other hand, adaptation is an adjustment in natural or human systems to actual or expected climatic stimuli (IPCC 2007).Adaptation is a context-based activity, with planning and implementation of adaptation measures occurring in response to unique circumstances and capacity at different scales. The sub-regional or local levels are the most appropriate for the implementation of adaptation measures in a number of areas such as water resource management, biodiversity, conservation and infrastructure planning.

1.0 CLIMATE CHANGE – GLOBAL CONTEXT

In our quest for development, we have engaged in certain actions that are potentially damaging to our very existence. These actions have resulted in a global climate change, the precise magnitude of which is unknown, but has led to very serious degradation of the environment. Nature also contributes to environmental degradation due mainly to the natural processes of plant and animal decay and natural background radioactivity. The present state of the global environment will worsen due to increase in human activities, expected as a result of envisaged rapid industrialization, growing demand for transportation services, staggering population growth and desire for improved standard of living.

Climate is the one factor of man's environment over which he has very little direct control. Climate affects the soil, vegetation and water resources which are man's most basic resources for his drive towards modernization and economic advancement. Increase in human population and the resultant increase in man's needs for food, fibre, shelter, energy and other necessities of life have left the environment dangerously depleted of its natural resources, filled with toxic wastes and pollutants and characterized by massive erosion and floods. Human activities primarily the burning of fossil fuels and clearing of forests have greatly intensified the natural greenhouse gas effect.

The major environmental impacts of human activities include:

Deforestation and Desertification which arise from the conversion of forests to other uses such as agriculture, commercial logging and excess fuel wood utilization.

Pollution which occurs when contaminants are introduced into the environment through various human and natural activities. The different sources of contaminants are the burning of fossil fuels such as the exhaust emission from vehicles, emission and waste from power plants, flaring of natural gas, burning of fuel woods, refinery emission, oil spillages during crude oil production and pollutants from mining operations.

Of all the damaging effects of these pollutants, GLOBAL WARMING is the most imposing. These pollutants which are a buildup of the gases emitted into the environment particularly Greenhouse gases alter the global climate and impact negatively on those sectors necessary for man's existence, sustenance and development. Based on recent IPCC publications, the average surface temperature of the earth has increased over the past century by about 0.6^0C.

Environmental degradation and problems respect no boundaries. A deteriorated environment will exacerbate poverty just as poverty leads to environmental degradation. The implication of global climate change has strong social, political and economic linkage that requires adequate considerations in the overall decision making process. There is therefore need for compromise between developmental needs and environmental protection.

In search for a sustainable future, the pace of integration must be accelerated and strategies formulated for addressing the global warming issue in all its ramifications.

The United Nations Framework Convention on Climate Change (UNPCCC) and its Kyoto Protocol constitute the basic framework and legal basis for an international cooperation on climate change.

For the African continent, characterized by widespread poverty and inadequate developmental infrastructure, and which depends mainly on climate sensitive sectors such as rain-fed agriculture for its livelihood and economic growth, the picture appears bleak. By 2020, yields could be reduced by up to 50% and access to food severely compromised. This would adversely affect food security and exacerbate malnutrition.

At one of the International Conferences on "Global warming and Climate Change: African Perspectives", scientists declared that climate change would occur and would be unpredictable with devastating effects on developing regions and would have severe effect on the ecosystem unless anticipatory measures are taken. This prompted an urgent call for immediate action on policies to support research, review of planned development and strengthening of environmental conservation measures.

Therefore progressive policy regimes and adaptation/mitigation interventions need to be established. This will require a strategic approach to address the dual challenges of poverty reduction and climate change at all levels (global, continental, national, regional, provincial and community level). Responding effectively to climate change not only involves managing risks through greenhouse gas mitigation measures but also building resilient ecosystems and fostering communities that can rapidly advance sustainable development.

1.1 NATIONAL CONTEXT

Nigeria is especially vulnerable to climate change. It has a large population estimated at 140-150 million people with an annual growth of 2% making it the most populous country in Africa, an extensive coastline of about 853km long. It has high levels of greenhouse gas emissions, one of the highest in Africa due to its intense industrial activity. Its major sources of sustenance i.e. Oil, Energy and Agriculture are the largest contributors to greenhouse gas emissions. All these expose the country to serious environmental problems.

According to UNDP (2010), climate change poses a serious threat to equitable and sustainable development in Nigeria where about 55% of the population is living below the poverty level.

Given the potential implications of this development the UNDP considers climate change a top priority issue and is engaging closely with the Government on various fronts. The strategy is to pursue climate change mitigation and adaptation in the context of an environmentally sound and sustainable socio-economic development framework. The UNDP aims to support the country's efforts to scale up climate change mitigation and adaptation activities to enable the country embark upon a low emission, high growth, climate resilient, socially equitable, gender sensitive and sustainable path.

Nigeria recognizes the urgent need to respond to climate change and has taken the challenge very seriously as it portends a serious threat to its poverty eradication, sustainable development, achievement of its Millennium Development Goals (MDGs) and vision 2020.

Nigeria signed the United Nations Framework Convention on Climate Change (UNFCCC) and is a Non-Annex 1 party to the convention. The First National Communication (NC) was developed in 2003 while the Second National Communication (SNC) which took place in December 2009 is being finalized.

According to Nigeria's Initial Communication to the United Nations Framework Convention on Climate Change (UNFCCC) Nigeria will experience over the next century a change of $7^{o}C$ or more in maximum and minimum temperatures in certain parts of the country as well as increase in rainfall in other areas (although this increase is likely to be offset by increased evaporation rates due to rising temperatures). The impacts of these changes which include flooding, water shortages, food insecurity and increased disease incidences together with associated social disruption will be felt across different sectors including health, water, biodiversity, agriculture, forestry and human settlements.

Nigeria also ratified the Kyoto Protocol in December 2004 and under the framework established the Presidential Implementation Committee on Clean Development Mechanisms (PIC – CDM). This committee raises awareness among project developers and other stakeholders on the impacts of Climate Change and the benefits of adopting clean technologies in their projects and processes.

The National Adaptation Strategy and Action Plan (NASPA) have been concluded.

Also, the country now has a Climate Change Department (CCD) in the Federal Ministry of Environment in Abuja, Nigeria, created to implement the climate convention and protocol activities as well as several policies and strategic initiatives to combat climate change. It also coordinates the activities of the Inter-Ministerial Committee on climate change.

The Building Nigeria's Response to Climate Change (BNRCC) which was officially launched in May 2008 to run for a period of five years is funded by the Canadian International Development Agency (CIDA) and coordinated by the Nigerian Environmental Study Action Team (NEST). The project aims to help build informed responses to climate change in Nigeria by enhancing capacity at the community, state and national levels to implement effective adaptation strategies, policies and actions. One of the BNRCC projects is underway in Delta State at involving a research project, youth education programme and waste management with twenty five local government schools participating.

Nigeria had four CDM schemes endorsed in 2009 by the UNFCCC, two of which are operational within Delta State, namely: i) the Oil gas processing plant project which involves the recovery of associated gas that would otherwise be flared at Kwale and ii) the OvadeOgharefe Gas Capture and Processing project which is an oil field flaring reduction project.

Other relevant national initiatives and reports aimed at reducing the country's vulnerability to climate change include: The Nigerian National Climate Change Commission, National Climate Change Policy for Nigeria, Nigeria Poverty Reduction Strategy Paper (PRSP), Nigeria's Climate Change Policy and Response Strategy, UNDP Niger Delta Project, Government's Transformation Agenda (TA:2011 – 2015) and ECOWAS sub – regional Action Plan.

While all sectors of the national economy will be affected by climate change, UNDP Nigeria focuses specifically on sectors that would have some comparative advantage in supporting national aims, namely i) capacity development and advocacy for mitigation and adaptation, and ii) supporting development of new climate related policy. These two overarching interventions will support broad mitigation and adaptation actions, which include: i) promoting energy efficiency in the economy, ii) promoting renewable energy, iii) improving public energy access, iv) reducing carbon and GHG emissions as well as wastes, and v) promoting sustainable use and conservation of ecosystems and biodiversity.

As Nigeria works towards becoming one of the top twenty economies in the world by the year 2020 (vision 20:2020) the country envisions a large, strong, diversified, sustainable and competitive economy.

One of the key pillars of the vision 20:2020 is investment in low carbon fuels and renewable energy.

1.2 DELTA STATE

Delta State is a coastal state located within the flood plain of the Niger Delta Region of Nigeria. It has an estimated population of about 4 million people (2006 national population census) and a total land mass area of about 18050km^2 out of which 160km^2 is on the coastline along the Atlantic Ocean. The State has five ecological zones – coastal, barrier forest, mangrove forest, freshwater forest and inland humid forest, and long wet season and rainfall as high as 4000mm in the coastal area. Temperatures range from 21^{0}C to 33^{0}C.

The economy is dominated by the Oil and Gas sector as the State is rich in oil and gas reserves. It hosts most of the Federal Government's oil and gas facilities. The energy sector is powered mainly by fossil fuels. Other major economic activities which include agriculture, fishing and trading are on the decline since the discovery of oil.

Despite the success of the Oil sector, Delta State has a high level of poverty, unemployment, ethnic conflicts, housing pressure, land conflicts, uncontrolled population growth, restlessness among the youths and high crime rate.

The State is currently experiencing Climate Change – related impacts which include an increase in temperature and frequency in heat waves, an increase in frequency and intensity in storms, more extreme rains leading to flooding and increased erosion, landslides, sea level rise and coastal inundation.

The risks are particularly high as a result of the following:

a) The State is a coastal region with low – lying terrain, criss – crossed by a number of waterways and facing significant threat from sea level rise and flooding.

b) The menace of oil spillage and gas flaring in the state is damaging aquatic and terrestrial ecosystems and emitting exceptionally high quantities of greenhouse gases into the atmosphere.

c) The Agricultural sector which is rain fed is highly sensitive to changes in rainfall patterns. The increased variability in rainfall is a threat to food security and local economy.

d) Competing Land Use needs by the increasing population for settlements and farming has led to exploitation and depletion of forest reserves.

e) Heavy concentration of gross domestic products (GDP) generating industries and infrastructure near the coast exposing them to the hazards of climate change.

f) The five ecological zones of the state make the Niger Delta the richest wetland in terms of biodiversity and the mangrove swamps the largest in Africa. Wetlands provide environmental and economic benefits to mankind through fishery production, timber production, waste water purification and recreational opportunities. Wetlands are also important habitats for a wide variety of plants, fish, marine animals, shrimps etc. Because they both have land and aquatic characteristics, wetlands are some of the most diverse ecosystems on earth. It follows therefore that loss of wetlands and pollution of water resources from sea level rise and flooding will have devastating effect on the state's biodiversity resource and livelihood options.

1.2.1 CLIMATE CHANGE RESPONSE ACTIONS BY DELTA STATE

In May 2009, His Excellency Dr. Emmanuel Uduaghan initiated a three point agenda (1) Peace and Security (2) Human Capital Development (3) Infrastructural Development. The Ministry of Environment was directed to develop and implement policies that will promote the agenda through environmental protection, sustainable development and Land Use.

In Jan 2009, the Governor commenced a series of consultations with International development partners, the State of California in the United States of America, Algeria and the United Nations Development Programme (UNDP) as part of a systematic but structured process towards a green economy in Delta State, using Climate Change and sustainable development strategies. In 2010, the Delta State Government evolved a Climate Change programme to proactively

complement and boost the efforts being undertaken on international and national level for the implementation of the agenda, laws, policies and executive orders on the environment (including national climate protection programme) with a view to ameliorating the negative effects of climate change.

UNDP Territorial Approach to Climate Change (TACC) Programme

The Delta State Government initiated the TACC Programme in collaboration with the UNDP in 2010 and theprogramme has produced a biophysical and socio economic assessment of the nexus of environmental degradation and climate change in Delta State.

The TACC Programme is aimed at reducing the vulnerability of Local Communities within Delta State to the anticipated climate change impacts and develop a low carbon and climate resilient economy for Delta State.The TACC programme is developing an integrated territorial climate plan for Delta State

The project's executing partners include the Federal Ministry of Environment (MOE) in collaboration with the Niger Delta Development Commission (NDDC), and the Federal Ministry of Niger Delta Affairs (MNDA).

Delta State is an active member of the R20 group of Regions founded during the COP15 in Copenhagen by Arnold Schwarzenegger when he was Governor of California USA. The group consists of 36 regions and 27 International organisations from all over the world. This group aims to develop and implement low- carbon and climate resilient projects through cooperation between sub national government of developed and developing regions and for Delta State in particular, promote a more sustainable future.

Climate change is being tackled by the Delta State Government on a holistic basis i.e. from all sectors and disciplines.

- Climate Change is now a major consideration in all aspects of Environmental Impact Assessment (EIA) on every project to be embarked upon in the state.
- In 2011 the state Government officially inaugurated a multi – sectoral and multi-disciplinary team on Climate Change to coordinate Climate Change activities in the State.
- The Delta State Emergency Management Agency (SEMA) is on ground and the Agency coordinated the evacuation and rehabilitation of the victims of the flood of 2012.
- A Technical Committee on Flood Impact Assessment has been established to assess the extent of damage of the flood that devastated the State in 2012and make recommendations for the reconstruction of infrastructure and the resettlement of the victim of the flood.

- The State has appealed to the Federal Government, Corporate organizations and individuals for assistance towards alleviating the flood problems.

- The UNDP Niger Delta Project has been developed in order to mainstream biodiversity conservation issues into the oil and gas sector within the Niger Delta, particularly into their development policies and operations. The Niger Delta is a biodiversity hotspot under significant environmental threat from population growth, the oil and gas industry and overharvesting.

According to a study by the United Nations Development Programme (UNDP), the implementation of Climate Strategies relies heavily on local behaviors and investment choices. Success can only be achieved when activities at sub – national level are carried out simultaneously with national initiatives.

The study also states that 75% of the solutions for mitigating and adapting to climate change can be found at the local level (city, state, and region).

The study established a prima facie case that warming has taken place within the territory of Delta state and the warming has led to climate change that has had cross – sectional negative impacts on the socio – economic, biophysical and environmental sustainability of the state.

The climate change impact and environmental problems exert a strong influence on the day to day economic development of Delta state particularly in the following sectors:-

Health implications of Climate change include increase incidences of water borne diseases e.g. diarrhea, cholera, typhoid fever due to water quality impairment as a result of flooding or salt water intrusion, vector borne diseases e.g. malaria and yellow fever due to variation in temperature and other climatic elements and respiratory diseases.

The greenhouse gases and other gases from gas flaring combine with atmospheric moisture to form acid rain with resultant health implications such as heart and lung disorders. These health hazards are expected to worsen due to increased rainfall and will be exacerbated by the damage of healthcare infrastructure due to flood and storms.

With increase in rainfall there will be flooding causing potential destructive consequences on communities, infrastructure and natural ecosystems and also salt water intrusion causing pollution of water sources. The energy sector has been affected through flooding of oil wells due to sea level rise as far back as 1983 when eight oil wells were flooded in Ogulagha, Delta State and some oil wells submerged. Increased intensity of storms has destroyed electricity poles resulting in blackouts.

Agriculture is predominantly rain – fed and therefore vulnerable to the impacts of climate change. Flooding has damaged farming activities with reduction in crop yields, decrease in food security and destruction of access roads. Flooding has resulted in damage to infrastructure, affecting access routes to coastal communities, limiting availability of public transport and destroying properties. The corrugated roofs of buildings are being damaged as a result of corrosion due to the acid rain.

The Coastal fisheries sector is already severely undermined due to the degradation of mangrove forests resulting from human pressure (collection of firewood) and coastal erosion due to sea level rise. The rivers, streams and estuaries are polluted through oil spills and from inland industrial waste washed downstream by increased river flow from excessive rainfall resulting in decreased oxygen content of the polluted water bodies and impacting negatively on fish survival.

The different ecosystems of the five ecological zones contribute significantly to biodiversity and human well-being. However sea level rise has impacted negatively on aquatic biodiversity particularly the mangrove forests by altering the salinity content of the estuarine waters.

The climate change related impacts to all of the above sectors affect the income and livelihood choices of those living in Delta State. Economic activities are limited and the natural resources upon which local communities are reliant are depleted. People now have to travel long distances in search of fuel wood and forest products. Women and children, who are predominantly responsible for fetching fuel wood for their household, are the most affected.

Climate Change projections for Nigeria which are likely to affect Delta State include the following:

- An increase in mean annual temperature of 3.2^0C by 2050 under the high climate change estimate (based on the IPCC climate change assumptions, latest research findings and results of a consultation exercise in Nigeria), and of 0.4-1.0^0C under the low climate change estimate.

- A rise in sea level of 0.3m by 2020 and 1m by 2050 under the high climate change estimate (from 1990 sea level, based on the same findings as above), and of 0.1m and 0.2m over the same time periods under the low estimate. A 1m rise in sea level will result in the loss of 75% of the Niger Delta and the inundation of approximately 660 communities with a population of 1.2 million, as well as the displacement of a further 2-3 million people from flood erosion due to the intruding salt water.

- An increase in the frequency and intensity of extreme weather events such as floods, droughts and heat waves, and

- Changes in rainfall pattern (timing and intensity), with an increase in mean annual rainfall of 8-20 mm per year by 2050.

The impact of climate change has become quite profound and with the projected changes highlighted above, Delta state will experience far reaching consequences on all its socio-economic sectors.

However, there are opportunities from climate change that developing countries like Nigeria and States like Delta State can take advantage and benefit from. These include the Clean Development Mechanism (CDM) which is legislated under Article 12 of the Kyoto Protocol, National Appropriate Mitigation Actions (NAMAs) and Reduced Emissions from Deforestation and Forest Degradation plus (REDD+). Carbon accounting and REDD+ projects are of particular relevance in Delta State considering the current levels of ecosystem degradation.

It is against this backdrop that the Delta State Climate Change Policy has been developed to assist the state to build informed responses to climate change by enhancing capacity at the community and state level using as much local content as are available and encouraging coordinated efforts by all stakeholders towards adaptation and mitigation of climate change. The Policy will assist the State to engage a multi sectoral and multi-disciplinary approach to responding to the impacts of climate change from all sectors and disciplines. It will also assist the state in developing a comprehensive blueprint for implementing a dynamic, long term approach to mitigation and adaptation that cut across sectors and links the Federal, State, Local and Community while maximizing any potential benefits of climate change from instruments such as the CDM, NAMA, REDD+ and others.

The Policy represents the commitment of the State to addressing and ameliorating the negative effects of climate change and developing a low- carbon economy for the benefits of the people.

The Policy is guided by the precepts of International Environmental Law including the Principle of sustainable development as reflected in the objective of the UNFCCC and its Kyoto Protocol, the Cancun Agreement and other International Environmental governance instruments.

CHAPTER TWO

DELTA STATE CLIMATE CHANGE POLICY

GOALS AND OBJECTIVES

2.0 GOALS

The overall goal of the Policy is to secure a future of a low carbon economy in order to promote a more sustainable development for Delta State through harmonized and coordinated strategies, programmes and actions to combat climate change.

2.1 OBJECTIVES

The purpose of the Policy is to guide the state and other stakeholders in identifying the causes and impacts of climate change and building capacity to address the menace by identifying and implementing the required interventions through adaptation, mitigation and other measures while assuring a sustainable socio-economic development.

The objectives of the Policy are anchored on pillars such as adaptation, mitigation, disaster risk management, finance, technology, capacity building, research and development, mainstreaming and governance, disaster management.

They are to:

1) Ensure the establishments of a State Climate Change governance framework for the development and implementation of climate change sectorial strategies, measures and initiatives.

2) Ensure the establishments of a State Climate Change governance framework involving Lawmakers, experts and other stakeholders to coordinate and harmonize the implementation of climate change activities and initiatives in Delta State.

3) Facilitate the incorporation of climate change considerations into economic and development planning, policy and interventions in the state.

4) Identify priority adaptation and mitigation areas and roles of the state and other stakeholders to address climate change and promote investment in mitigation and adaptation intervention projects.

5) Promote capacity building efforts through education and training, public awareness, research and development, technology development and transfer and information and knowledge managements.

6) Promote climate change research programmes and raise climate change-related science and technology to a level that will enable the state to better participate in international scientific and technological cooperation on climate change.

7) Strengthen the State capacity to utilize opportunities offered by climate protection worldwide for economic development and job creation.

8) Effectively compliment the measures undertaken by the Federal Government and the African Union in combating climate change and maintain the lead in the development of a low-carbon economy.

2.2 SCOPE OF THE POLICY

The Policy provides an integrated and harmonized territorial climate plan to address the challenges of climate change through adaptation, mitigation and other measures collectively referred to as 'cross-cutting measures. The cross cutting measures include education and training, research and development, technology development and transfer among others.

2.3 GUIDING PRINCIPLES

The Policy conforms to the following:

i. The Fundamental and Operational Principles of Delta State set out in Chapter II (Fundamental Objectives and Directive Principles of State Policy) of the Constitution of Federal Republic of Nigeria (1999)
ii. Article 20 of the 1999 Constitution which empowers the State to protect and improve the environment and safeguard the water, air, land, forests and wildlife in Nigeria.
iii. The Principles of Environmental Law as envisaged in Environmental Governance Instruments including Edict No 25 of 1999 that established the Delta State Environmental Protection Agency.
iv. Articles 3.3 and 3,4 of the UNFCCC
v. Established UNDP and EEG procedures and World Bank practices.

The Policy is also guided by the following principles and concepts:

i. Consistency with national and state development priorities including poverty alleviation, gender considerations, access to basic amenities including energy, job creation, rural development, human resource development and improved health leading to sustainable economic growth.

ii. Addressing Climate change within the context of a sustainable socio-economic development framework.

iii. Importance of integrating Climate Change Policy with other interrelated Policies towards promoting economic and environmental efficiency.

iv. Active participation of various stakeholders from government (Federal, State and Local) inter-governmental, non-governmental, development partners, private sector, civil society, vulnerable communities and groups including women, youths and the physically challenged in the formulation and implementation of the Policy actions.

v. Importance of mainstreaming climate change issues especially its impact on the Oil and gas sector into State planning and development processes.

vi. Importance of establishing cooperation and collaboration with other levels of government around the world in order to stimulate a new variety of economic activities that could be the panacea to real economic development

vii. Importance of implementing prioritized climate change adaptation and mitigation actions in accordance with environmental impact assessment, and ecosystem based adaptation approach.

viii. Importance of integrating Best Available Technologies (BAT) and Best Environmental Practices (BEP) into climate change response measures.

ix. The IDEEL principles of sustainable development; Integrity, Diversity, Efficiency, Equality and Longevity in order to achieve Economic prosperity, Improvement in the quality of life and Environmental sustainability.

x. The importance of Preparing, Preventing, Responding and Recovering.

xi. 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;

3 CHAPTER THREE

3.0 CLIMATE CHANGE ADAPTATION AND MITIGATION

Responding to climate change falls into two broad categories namely Mitigation and Adaptation.

Mitigation of Climate change refers to measures that may either reduce greenhouse gas emissions (abatement) or increase terrestrial storage of carbon (sequestration). In this field of greenhouse gas mitigation, sub-national authorities have at their disposal a wide array of actions they can undertake. These range from influencing transport and emissions to the promotion of decentralized cleaner energy production particularly through renewable resources, composing and recycling of waste amongst others.

On the other hand, **Adaptation** is an adjustment in natural or human systems to actual or expected climatic stimuli (IPCC 2007).Adaptation is a context-based activity, with planning and implementation of adaptation measures occurring in response to unique circumstances and capacity at different scales. The sub-regional or local levels are the most appropriate for the implementation of adaptation measures in number of areas such as water resources management, biodiversity conservation and infrastructure planning.

Greenhouse gas mitigation and adaptation are both equally important in the management of climate related risks. Greenhouse gas mitigation and adaptation responses complement each other to significantly reduce the risk of climate change, and together they can also bring opportunities in terms of local development.

The Policy therefore emphasizes on the importance of mainstreaming them into the State's development plan, taking a sectoral approach with focus on key socio- economic sectors more likely to be adversely affected by climate change.

They are supported by the following critical capacity building areas and pillars which cut across different sectors: Finance, technology development and transfer, education, training and public awareness, information and knowledge management systems.

Specific sectors for climate change adaptation include Agriculture and Food Security, Health and Human Settlement, Water, Land Use, Forestry, Ecosystem and Biodiversity, Coastal Zones and Marine Ecosystem, Economic Infrastructure, Disaster Risk Management.

Specific sectors for climate change Mitigation include Energy, Agriculture, Transport, Forestry, Small and Medium Enterprises, Industries, Waste Management.

The Policy recognises the critical need for the development and implementation of integrated adaptation and mitigation projects to secure sustainable development of the state.

3.1 CLIMATE CHANGE ADAPTATION

The global world is already subjected to a certain degree of future warming because of past emissions of greenhouse gases. If these emissions continue unabated, future climate change impacts may be more severe than what current science projects.

The State must therefore prepare for and adapt to the effects of global warming through adaptation actions and policies that are designed to tackle both current and future climate change threats. The State's precarious situation as a coastal State with low-lying terrain, criss-crossed by a number of water ways and facing significant threat from sea level rise and the menace of oil spillage and gas flaring further underscores the need for a holistic approach to adaptation measures.

3.1.1 CHALLENGES TO ADAPTATION

i. Adaptation activities are limited in scope and scale and their impacts are neither cohesive nor sustainable due to budgetary and funding issues.

ii. Institutional capacities, relationships, legal and regulatory frameworks, policies and practices to assess and manage climate change risks are not developed sufficiently to create an enabling environment.

iii. Limited knowledge of the most appropriate adaptation policies and measures hinders the state's future and long term preparation to support climate risk management.

iv. Limited financial options to sustain scaled-up adaptation remain a constraint.

v. Difficulty for the state to enforce environmental compliance because current oil and gas laws and the constitution of Nigeria are obsolete with excessive exclusive powers to the Federal tier and not in consonance with the current best practices.

vi. Low levels of awareness of climate change impacts and human vulnerability to it especially at community level.

vii. High levels of poverty which reduce adaptive capacity and contribute to poor coping strategies.

viii. Lack of capacity and innovative friendly technology in the oil and gas industry.

3.1.2 ADAPTATION OBJECTIVE

The objective is to develop and implement robust measures that will increase the resilience of the state to withstand anticipated climate change impacts and improves the adaptive capacity of its citizens.

3.1.3 ADAPTATION POLICY STATEMENTS

The State shall aim to adapt all climate sensitive and vulnerable areas in Delta state in the best possible manner to the impacts of climate change by mainstreaming climate change adaptation into its development planning processes and assisting to ameliorate the consequences of climate change.

Adaptation Policies shall aim at the followings

The state shall:

i. Promote rural urban interaction to cope with climate change and reduce the vulnerability of rural-urban systems.

ii. Improve and strengthen the capacity of decision makers and support the development and implementation of sound adaptation strategies and action plans.

iii. Strengthen the capacity of the vulnerable groups to adapt to climate change and promote alternative livelihood systems amongst most vulnerable communities.

iv. Promote governance framework to reduce threats and risks to priority ecosystems and mainstream biodiversity conservation in the oil and gas industry into policy making, budgeting implementation and monitoring processes.

v. Promote engagement between the oil and gas industries and communities on topics related to managing biodiversity areas in the state.

vi. Develop financial mechanism for the oil and gas industry to support biodiversity conservation and community based management activities.

vii. Develop a resource mobilization plan for financing quick win priority interventions.

viii. Promote diversification of economies to reduce over dependence on climate sensitive sectors and occupations.

ix. Undertake periodic vulnerability assessments, impact monitoring and status assessments of key socio-economic sectors to inform adaptation decision making.

x. Collaborate with the Federal Government in the implementation of adaptation strategies identified in the National Communication to the UNFCCC.

xi. Ensure that current development planning follows the principles of sustainability and that there is adequate information and capacity to integrate adaptation related considerations into decision making.

3.2 CLIMATE CHANGE MITIGATION

Forecasts on the implications of climate change action as contained in the Fourth Assessment report of IPCC 2007 states that climate change is already much more advanced than previously presumed and greenhouse gas concentration in the atmosphere have reached concentrations beyond the acceptable limit.

Carbon dioxide emissions must therefore be reduced.

Although Nigeria, as a developing country under the UNFCCC is not obligated to reduce national greenhouse gas emissions under the UNFCCC's Kyoto Protocol, it is now globally recognized that a low carbon development strategy is indispensable to sustainable development, therefore this Policy emphasizes on the need for Delta State to undertake mitigation.

Also an Oil based state like Delta is well placed for using the opportunities offered by climate protection worldwide to the benefit of economic development, job creation and securing a future of low carbon economy.

3.2.1 Challenges to Mitigation:

i. Lack of understanding of the current biophysical environment which influences how the State responds to climate change e.g. the impact that decades of oil spills have had on the environment within Delta State which have reduced the resilience of the natural environment to withstand anticipated climate change impacts and also reduced the greenhouse gas mitigation capacity of mangrove forests.

ii. Lack of information and capacity to integrate mitigation related climate change considerations into decision making.

iii. Policies, norms, regulations and laws regarding urban planning and infrastructural development are inadequately enforced by agencies in charge of the environment and there is little adherence to industrial standards.

iv. The installation of facilities and utilities in ecological sensitive zones is undertaken without appropriate planning and without adherence to existing regulations.

v. Institutional and individual capacity to utilize greenhouse gas mitigation opportunities in the key sectors is currently under developed.

vi. Lack of maintenance of infrastructure particularly in the water and oil sectors.

vii. Inadequate financial resources to implement mitigation activities as may be identified in low carbon development strategies.

viii. Inadequate technical capacity to design and develop low emission development strategies.

3.2.2 Mitigation Objectives

To identify and fund projects that will enhance the building of a low carbon climate resilient green economy and support global efforts towards climate change mitigation.

3.3.3 Mitigation Policy Statements

The state shall:

i. Develop capacity and acquire technology for the production, conversion and use of fossil fuel based energy in order to reduce gas flares and reduce dependency on fuel imports.

ii. Develop Government and private sector capacity to implement appropriate mitigation interventions.

iii. Effectively complement the measures undertaken by the Federal Government and the African Union for pursuing a Climate Protection Policy in the development of low carbon economy.

iv. Identify bankable mitigation intervention projects and leverage funds to implement the projects.

v. Develop programmes for technology acquisition and capacity development to support climate change mitigation actions.

vi. Support mainstreaming of climate change especially its impact on the oil and gas sector into state planning and development process in order to secure a future of low carbon economy.

vii. Utilize opportunities offered by climate protection worldwide for the benefit of economic development and job creation. e.g.CDM, REDD+ .

viii. Establish cooperation and collaboration with other levels of Government around the world to stimulate a new variety of economic activities that could be the panacea to real economic development.

3.3 SECTORAL APPROACH TO CLIMATE CHANGE RESPONSE

Adaptations and Mitigation Interventions

Introduction:

The current wave of disasters occasioned by the impact of Climate Change requires well-coordinated proactive measures in preventing and responding to its impact on lives and properties.

Presented below are the Climate Change impacts on key sectors of the economy in Delta State together with their challenges and Policy recommendations for mainstreaming into State development planning.

A) AGRICULTURE AND FOOD SECURITY

Over 80% of land in Delta State is devoted to Agriculture and Forestry so these sectors are among those most affected by Climate Change. The major food crops are cassava (of which the state is a leading producer), yam, plantain, maize and vegetables. Indigenous food crops not produced in very large quantities but available throughout the state are rice, cowpea, groundnut, okro, melon, sweet potato, millet, cocoyam, pineapple, tomato, pepper, bananas etc.

Small Scale farmers/fishermen account for up to 90% of total agricultural output and they dwell in the rural areas of the state. These farmers practice subsistence farming which is mainly rain – fed and therefore vulnerable to the impacts of climate change related hazards. Crop yields have been reduced through crop damage from flooding. Changes in rainfall patterns have made it difficult for farmers to determine optimal time to plant crops, increased frequency and intensity of extreme weather conditions such as storms have caused damage to market access roads infrastructure resulting in increased cost of transportation. All these factors have led to decrease in food security and farmers income.

Furthermore soil fertility has been reduced by salt water intrusions from sea level rise into agricultural fields. Other impacts include incidences of crops and animal diseases, pests and parasites, limited fishing activities as a result of terrestrial land and excessive heat resulting in the scorching of crops.

Sectoral Challenges

i. The environmental effects of fossil fuel exploitation, oil spills and gas flares have reduced the resilience of the natural environment and degraded aquatic ecosystems.

ii. Inadequate and inappropriate research into planting regimes and management of appropriate high yielding and climate friendly variety food crops to cope with current and future climatic scenarios in Delta state.

iii. Lack of appropriate agricultural research into potential impacts of Climate Change that may reduce productivity and undermine food security

iv. Ineffective agricultural and related Policies as well as technical manpower to address the impacts of Climate Change.

v. Lack of training of agricultural extension officers to provide education and enhance the skill of local communities for the application of modern agricultural technologies.

vi. High rates of population growth threatening food security.

vii. Inadequate database of baseline information for monitoring food security situation.

viii. Inadequate financial resources for adaptation to climate change and improved agricultural management resources.

Sector Specific Objectives

Attainment of food security through improved protection and optimum utilization of agricultural land, water and human resources and improved agricultural productivity, food storage and distribution

Sectoral Policy Statements

i. Protect agricultural land from the impacts of Climate Change by employing regulatory measures and review existing agricultural policies to provide for abatement measures and use such as construction of ridges, culverts and other drainage infrastructure for flood risk reduction.

ii. Promote research and development into management of appropriate high yielding and climate friendly flood tolerant and saline resistant variety of food crops and livestock to cope with current and future climate scenarios.

iii. Promote policies and measures that will discourage agricultural development in areas at risk to sea level rise and flooding and encourage expansion of agricultural land in other beneficial areas under new agricultural methods in order to maintain food security.

iv. Strengthen the Agro – Meteorological Information Centres with modern technologies and improved Early Warning Systems (EWS) to enhance the capacity of the State to predict and cope with poor growing conditions.

v. Enhance the subsistence farming communities with appropriate post-harvest storage and processing technologies in order to reduce post-harvest food loss exacerbated by climatic conditions such as floods, heavy rains, droughts, pests and diseases.

vi. Develop and promote new and appropriate storage and processing technologies that can render root and tuber crops (these are important household food security and income generating crops like cassava, sweet potato, yam and cocoyam) less perishable and increase their nutritional and economic value.

vii. Develop climate sensitive agricultural value chain systems for these key agricultural crops identified, which enhancee proper farm management practices e.g. discouraging bush burning, encouraging crop and pasture rotation, adoption of fallow farming system, encourage climate smart use of fertilizers (manure), adjusting planting and harvesting seasons to new Climate regimes etc, which holistically can be further integrated with the goals of the Federal Government on establishment of Staple Crop Processing Zones (SCPZ) in the different geo-political zones of Nigeria.

viii. Promote diversification of livelihood among the farming population.

ix. Support integrated farming, particularly the use of cover crops such as potatoes, groundnuts, melon and cowpeas to protect top soil against erosion and promote the use of integrated crop and livestock pest and disease control and management.

x. Enhance farmers with the techniques of conservation farming that can improve agricultural productivity and reduce the need for slash and burn methodologies which is very high in carbon emission.

xi. Promote the use of agricultural risk insurance to cushion farmers against unexpected loss resulting from climate change.

xii. Enhance agricultural yield distribution systems especially rural roads and communication gadgets to enable access of agricultural produce to markets.

xiii. Ensure availability and improve the management of natural resources (land, water, fisheries, forest) in order to ensure sustainable agriculture.

xiv. Develop measures aimed at controlling population since pressures on agriculture and industrialization are fuelled by unguarded population growth.

B) HEALTH AND HUMAN SETTLEMENT

The increase in the frequency and intensity of extreme weather events such as floods and heat waves will increase the prevalence of water borne, vector borne and respiratory diseases to vulnerable communities.

Also gas flaring emits greenhouse gases and other gases in the state that result in acid rain with resultant health implications such as heart and lung disorders. These health hazards are expected to worsen due to increased rainfall as a result of climate change and will be exacerbated by the damage of healthcare infrastructures due to flood and storms.

Human settlements are at greater risks especially those in the coastal areas, estuaries and river banks who could be displaced by sea level rise and storm surges.

Sector Challenges

1) Poor water quality, sanitation and health facilities.

2) Poor community education programmes highlighting the importance of proper sanitation, water quality and long term health.

3) Heavy burden of vector diseases affecting significantly more people under changing climate conditions.

4) Increase in the spread of diseases due to adverse living conditions as a result of increased floods from intense rainfall events and sea level rise.

5) Climate change impacts have resulted in the displacement of communities, pollution of domestic water sources and malnourishment due to failed crops, community migrations leading to proliferation of infectious diseases.

More heat waves can be expected in the dry season leading to an increase in death rate.

Increase in exposure of the population to ultra violet rays A&B because of the State's peculiar geographical location

Rising air temperatures will encourage the spread of infectious diseases not previously encountered.

Specific Sector Objective

Strengthen health care and build human health resilience in order to reduce vulnerability of the people to climate sensitive diseases.

Sectoral Policy Statements

i. Promote state wide education campaign highlighting the importance of sanitation and training people in the construction of Ventilated Improved Pit Latrines (VIPs).

ii. Improve basic health care system and provide access to health care services to vulnerable groups especially pregnant women, babies, children, and the elderly.

iii. Develop specific emergency response plans that will address the climate threats identified in health care delivery systems at primary, secondary and tertiary levels.

iv. Build capacity of medical personnel to effectively manage climate induced diseases.

v. Educate the community and promote awareness on climate change related diseases and ways to prevent them.

vi. Ensure the availability of health facilities and provide funding for modern medical equipments and drugs to assist in early diagnosis and treatments in climate change related diseases.

vii. Endeavor to undertake periodic health impact assessments for industrial activities in rural communities to ensure all potential negative impacts are identified and mitigated.

B) WATER

The most serious direct and indirect implications of climate change for society are expected in the water sector. This sector will be impacted by both changes in rainfall pattern and an increase in salt water intrusion in coastal areas leading to a decrease in supply of portable water. The population growth of Delta State and with this decrease in portable water is expected to create significant problems to development in the state and will have significant adverse effect on the other sectors e.g. human health and settlements, infrastructure etc.

Furthermore acid rain has acidified lakes and streams in the State with detrimental effects on aquatic life. This has also indirectly impacted on the quality of drinking water as the lowered pH of the water sources can alter the chemistry of the water.

Sectoral Challenges

i. Threat of salt water intrusion affecting water sources in the state.

ii. Inadequate public water storage and distribution infrastructure causing problem of stability of water supply.

iii. Poor water source management especially at the household, farms and industries.

iv. Limited education of local communities in the benefits of rainfall harvesting and training in the construction of low cost storage facilities.

v. Lack of research on alternative schemes for long term water availability to communities.

vi. High investment cost in the water sector development.

Sector Specific Objective

Ensure the provision of adequate and regular portable water at an affordable cost and on a sustainable basis in view of the changing climate.

Sector Policy Statements:

i. Carry out the comprehensive inventorization of water resources in the State upon which information, the plans to improve the quality and integrity of water distribution infrastructure aimed at enhancing resilience can be implemented.

ii. Promote the implementation of large scale water harvesting programmes for effective means of increasing stability of water.

iii. Promote the investment in water storage infrastructure including dams, reservoirs and man-made lakes to hold sufficient reserve for use during dry seasons for long term water availability to communities.

iv. Support research and development into water conservation and management using hydro climatic information and technology eg. Rain Water harvesting measures can reduce the quantity of water reaching rivers, minimizing the potential for flood damage.

v. Ensure the education of local communities in the benefits of rain water harvesting and training in the construction of low cost dams.

vi. Undertake a survey of vulnerable areas within Delta State where no alternative water source can be located with a view to investing in atmospheric harvesting of water.

vii. Support the piloting of solar water pump projects in vulnerable communication.

viii. Improve water supply infrastructure to ensure adequate and reliable supply of water.

ix. Ensure the enactment of relevant legal and institutional instruments to protect water resources from pollution and contamination.

x. Review existing institutional, legal and regulatory frameworks for water supply and waste discharge within river basins.

xi. Support all efforts at promoting the adaptation of water conservation and harvesting practices in every sector and at all levels.

xii. Promote the education of communities in the values of retaining ground cover vegetation and the degrees of stream back cultivation in order to undertake watershed protection projects for improved water security.

xiii. Promote linkages with the academic and international forms for dissemination of technology on recycling of waste water and treatment of brackish/saline water through desalination, inter and intra basin water transfer.

xiv. Promote gas flare out policy to reduce pollution of surface water from flare particles.

C) ENERGY

Nigeria is the largest Oil producer in Africa with oil reserves mostly located in the Niger Delta region. Production has been hampered by security issues in this region and oil production has been well below production capacity. The economy is heavily dependent on the Oil sector. The country is also rich in energy resources having the seventh largest natural gas reserve in the world and the biggest in Africa, again mostly located within the Niger Delta region and affected by similar security problems. Many of Nigeria's oil fields lack the infrastructure to produce and market the associated natural gas and this often vented or flared.

Energy supply is inadequate. Only 40% of the population has access to electricity and yet available energy is wasted in efficient appliances and wasteful energy use habits hence the need to adapt energy efficiency and conservation through best practices in all sectors.

The current emphasis on the ambitions plans for expanding access to electricity via the Road Map for Power Sector Reform launched by President Goodluck Jonathan in 2010 will provide an opportunity to put in place many of the elements needed for renewable energy production. Also the Nigerian Government is working to end gas flaring and make the gas available for the domestic market and for use by the new gas fired generation plant.

The Delta State Government is keen to promote sustainable development, tackle the problems associated with global warming and diversify the economy by her active membership of the R20 initiative.

Although the state is responsible for about 35% of Nigeria's oil production and much of the country's gas, there is at present no electricity production within the state and electricity is imported via the national grid. However the state is at present promoting the establishment of an Independent Power Plant Project (IPP). Currently biomass is the mainstay of rural energy provision in Delta State (providing over 80% of total primary energy requirements).

Sectoral Challenges

i. There is no production within the state as electricity is imported via the national grid. Over reliance on the national grid from all the states of the federation gave led to minimal and poor electricity transmission and distribution across the entire country.

ii. Climate change impacts from increase in temperature, increase in rainfall and sea-level rise which have led to fluctuations in water level are disrupting electricity generation from the hydro power station.

iii. Inundation of coastal areas has affected the growth of coastal trees used as firewood.

iv. Majority of energy production facilities (e.g. Power, oil wells and gas plants) located along the coastal areas have been damaged by severe weather conditions.

v. Gas flaring creates large amount of pollution from emission of benzene and other toxic substances which are associated with leukemia and other respiratory diseases.

vi. About 75% of gases produced are flared as a by-product of petroleum resulting in a considerable loss of energy and sufficient carbon-dioxide emissions.

vii. Underdeveloped domestic market for low carbon energy options.

viii. Lack of adequate gas infrastructure such as distribution pipelines and station for gas.

ix. Unconducive climate for investors and states to invest into the power grid since this is a preserve of the Federal Government.

x. The low gas and gas products prices do not encourage or attract investors to invest in the subsector.

Sector Specific Objective

To complement the Federal Government's efforts in its commitments to increase power generation capacity and availability by facilitating the establishment of an Independent Power Plant project in Delta State and investing in other renewable energy projects.

Sector Policy Statements:

i. Promote State Government partnership with the Federal Government to develop alternative hydro power energy sources.

ii. Determine the environmental footprint of the State by carrying out an inventorisation of Green House Gas (GHG) emissions, both direct and indirect and establish GHG Institution in a University in Delta State.

iii. Develop an approach to identify the GHG reduction potentials, explore low Carbon development opportunities in the State and actively participate in Clean Development Mechanism programmes through the establishment of Carbon Asset Management Unit in MOE.

iv. Promote State Government partnership with private investors for investment into renewable energy options.

v. Promote investment research and development into other renewable sources of energy e.g. biomass, solar, nuclear, wind, methane, tidal.

vi. Partner with the Federal Government and the multinational corporations to harvest and utilize the gas flared into the atmosphere for sustainable transformational economic benefits of the state.

vii. Mandate the use of renewable energy and energy efficiency technologies in all government institutions and owned buildings e.g the use of energy efficient bulbs in government offices and local Government council buildings and solar and wind powered street lighting and encourage private ownership of Solar Housing Programmes for the Urban, semi-urban & rural communities.

viii. Promote regulations fund programmes and develop the capacities of private property developers to incorporate climate smart and resilient designs into new buildings and encourage energetic refurbishment of existing buildings.

ix. Ensure that climate change impacts are proactively taken into consideration in the citing of new energy infrastructures(climate proofing strategy).

WETLANDS AND FRESHWATER ECOSYSTEM

About 10% of the Niger Delta is covered with mangroves, with much in Delta State. Mangroves are resilient ecosystems which are a vital source of resources for rural coastal communities. Over 60% of the fish caught in the seas of West Africa breed in the mangroves of the Niger Delta making this an essential resource for the region. Oil spills and clearance for charcoal manufacture account for large losses in mangrove. The National Oil Spill Detection and Response Agency (NOSDRA) identified about 2000 sites requiring remediation by 2008 and the Niger Delta Natural Resource Damage Assessment and Restoration Project (NRDARP) identified many ecosystems in need of restoration as a result of Oil Spills.

Restoration of mangroves is essential because it represents an important biodiversity pool and economic resource and it also plays a vital role in protecting coastal regions from increasing impacts from sea level rise. This means that planting efforts will have to focus not only on maintaining the current extent of the mangroves but also identifying areas suitable to facilitate their migration.

Some restoration projects piloted by oil companies are currently underway although the efficacy of these restoration efforts has not been established.

Global best practice methods have been developed for the restoration of mangroves such as the Mangrove Action Project (MAP)'s Ecological Mangrove Restoration Method. This method has been successfully applied in Indonesia to restore tsunami- damaged mangroves and it involves direct community participation and education.

The NRDARP has identified potential restoration models to be followed and a series of socio-economic, environmental and public awareness recommendations. Notable among these recommendations is holding oil companies responsible for restoration of areas damaged by their activities and making sure they provide some of the funding for restoration of affected areas.

Also Nigeria could secure carbon offset finance from the REDD+ methodologies under the CDM for damage prevention and restoration schemes in mangrove areas.

Carbon accounting and REDD+ projects are of particular relevance in Delta State considering the current levels of ecosystem degradation.

Mangrove ecosystems are highly productive and play an essential role in the survival of numerous species and other marine organisms. Mangrove forests also aid in protecting surges and tidal activities thereby reducing coastal erosion and also serve as effective buffer systems against climate change related sea level rise, storm surges and cyclonic activities.

Mangrove decline and deforestation is of significant environmental concern as mangroves are commonly felled for home use and for commercial purposes leaving the area exposed to Nypa Palm invasion which prevents the re-establishment of mangroves.

Sectoral Challenges

i. Loss of wetlands due to oil spills, clearance for charcoal manufacture and uncontrolled agricultural land expansion.

ii. Inundation of wetlands due to sea level rise

iii. Lack of education of local communities about the value of mangroves and wetlands and their non-engagement in restoration operations.

iv. Weak legal framework and limited political goodwill and commitment to conserve and manage wetlands.

v. Limited participation by stakeholders such as women, youths, private sectors, civil societies and community based organizations in wetland management practices.

vi. Engagement in development that are not ecologically sound

vii. Uncontrolled anthropogenic actions have reduced the efficiency of the delta to serve as a natural buffer system to anticipated climate change impacts

viii. Mangroves are threatened by deforestation for firewood, mining, industrial activities

ix. Invasion of mangroves by Nypa Palm which prevents the re-establishment of mangroves,

Sector Specific Objective

To promote the conservation of the ecosystem through global best practice methods that involves direct community participation and education.

Sector Policy Statements

i. Work in elaboration with the Federal Ministry of Environment and other relevant agencies for the implementation of the strategy to prevent biological diversity in Delta State (Delta State Biodiversity Strategy) with the participation of the organizations concerned

ii. Carry out a survey of all wetlands in Delta State and their assessment of their conservation and management needs.

iii. Ensure the involvement of Oil companies responsible for the oil spills in the restoration plan of the mangroves especially in the part of funding.

iv. Support and raise awareness on nature conservation measures where communities must cooperate and ensure the availability of large habitats for the protection of endemic species that can help to maintain ecosystem balance. Vital ecosystem functions like the protective function of forests or the marshland acting as water retention basins and carbon sinks will also be maintained.

v. Ensure the enforcement of laws on the protection of wetlands and prohibit uncontrolled development of wetlands and over harvesting of the ecosystems (lowland and mangrove forests) by communities and industries.

vi. Ensure urgent attention and up scaling of mangrove development through developed best practices in restoration, rehabilitation and small-scale trials of restoration techniques.

vii. Enhance research and studies on the impact of Climate Change on Wetlands and the appropriate best measures that will enhance the resilience of wetlands.

viii. Ensure the enforcement of environmental impact assessment on any proposed project to avert any adverse impact on wetlands.

COASTAL ZONES AND MARINE ECOSYSTEMS

Coastal wetlands cover about 3% of Nigeria's land surface. The coastline spans a distance of about 800km out of which the delta coastline within the Niger Delta region stretches to about 450km. Delta State constitutes one of the nine states in the Delta region. The coast line is characterized by a rich diversity of fish populations, coral reefs and mangrove forests. It also provides nursery ground for many marine and freshwater organisms. Estuarine and coastal fisheries provide livelihood for many coastal communities. The coral reefs buffer the coast line against the impacts of waves, storms and cyclones. The mangroves provide physical protection against erosion and are also used for firewood, boat building, fish smoking and in making domestic appliances. All these are significant contributions to bio-diversity and human wellbeing.

This ecosystem is however being impacted by climate change principally through habitat loss. Also continued global temperature increase melts the glaciers and polar ice, causing thermal expansion of sea water which leads to coastal inundation, salt water intrusions into aquifers and farmland acidity. Developments in the low-lying areas such as farmlands and infrastructures (roads, pipelines, residential houses, ports) are the worst hit.

The impacts of acid rain have detrimentally affected surface water bodies resulting in a decrease of ecosystem health.

Sectoral Challenges:

i. Loss of wetlands due to oil spills and uncontrolled agricultural land expansion.

ii. Increased shore line erosion due to sea level rise.

iii. Over harvesting of mangroves by coastal communities and industrial action (i.e. logging).

iv. Increase in rainfall has led to an increase in flood events claiming many lives, destroying infrastructure, causing extensive soil erosion and polluting fresh water sources.

v. Salt water intrusion, contamination of fresh water sources and inflow of sediment-laden waters into the coastal areas as a result of flooding affects coastal fisheries.

vi. High cost of the construction of shore line protection infrastructure.

Sector Policy Objective

To promote adaptation initiatives for the coastal and marine ecosystems and enhance the adaptive capacity of coastal communities against the impacts of climate change.

Sector Policy Statements:

i. Create awareness on the risk of residing in low-lying areas that are threatened by sea level rise and storm surges and offer incentives for relocation to safer areas.

ii. Ensure the enforcement of laws on the protection of wetlands and prohibit uncontrolled development of low-lying areas by creating buffer zones or setbacks from the shorelines within which no development project should be implemented.

iii. Enhance research and study to identify the vulnerable coastal areas and develop effective shoreline protection technologies.

iv. Ensure the involvement of oil companies and other relevant stakeholders in the coastal areas to address coastal zones problems especially the mobility of funds.

v. Protect coastal and marine biodiversity and the livelihood of the people dependent on this biodiversity by investing in marine aquaculture and introduce salt tolerant aquatic species.

vi. Develop a flood and storm warning system for effective monitoring of any impending disaster and prompt warning to all the potentially affected population as part of disaster risk management.

vii. Support and aid the replanting of mangroves in degraded zones to protect biodiversity and reduce erosion and storm surges.

viii. Ensure the enactment and enforcement of laws for the prohibition of gas flares and prosecution of oil pipeline vandals and oil companies responsible for oil spills.

ix. Strengthen the capacity of the local communities to protect themselves against storm surges and sea level rise through training in making sand bags and other low cost protection technologies.

x. Build capacity to facilitate the design of bankable project documents and leverage funds from the carbon market for the implementation of REDD+ projects in Delta State considering the current levels of ecosystem degradation in the state.

REDUCING EMMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION (REDD+), FORESTRY AND LAND USE

Rainforest is one of the three main vegetation types in Nigeria and is largely located in the southern part of the country. This rainforest constitutes the country's main source of wood.

Delta State consists of the following ecological zones: coastal forest, barrier forest, mangrove forest, freshwater forest and inland humid forest. Forest resources play a fundamental role in the socio-economic wellbeing of the people. Rural population depends on natural resource exploitation for their livelihood.

Tropical forests are of great economic significance to both the rural and urban poor. They serve for food, shelter, industrial wood products and fuel wood. Firewood is the most important source of energy for developing countries and the only source of energy for most rural areas in Nigeria.

Forest and forest trees are sources of variety of food that supplement and complement what is obtained from agriculture. Many forests in Delta State are either privately or communally owned. Ughelli south LGA has a large expanse of forest areas. There are only a few functional and efficient community based forest resource management institutions and no specialized forest resource management institutions. Management is by the local communities who restrict themselves to the regulation of timber harvesting while exploitation of NTFPs continue unregulated.

Anthropogenic actions have adversely impacted the environmental integrity of the Niger Delta and reduced the efficiency of the delta to serve as a national buffer system to anticipated climate change impacts. By 1980, the urban population of Delta State increased. This led to sharp increase in the demand for fuel wood and the elimination of trees. Farmlands have been stripped of trees due to the unrestricted large scale cutting of firewood, demand of poles for the construction of houses and fences and the consumption of other forest products for food, medicine, cosmetics and timber. All these have led to severe deforestation and massive environmental degradation leading to the collapse of a sustainable agricultural system.

Also due to competing land use needs especially for human settlement and farming, there has been a rapid decline in forest cover in Delta State.

Forestry and Land Use therefore have major roles to play in mitigation and adaptation in terms of reducing atmospheric concentration of greenhouse gases in the atmosphere. Unfortunately land is being lost to population pressure and careless use and the nation's forests have almost disappeared completely.

Climate change has greatly impacted on this sector, sea level rise has led to salt water intrusion in the mangrove forest having negative impact on the aquatic biodiversity due to the limited salinity tolerance range of plants.

Sea level rise results in coastal inundation reducing the availability of land for planting.

Due to the impacts of climate change on the agriculture sector and decreased food security, over harvesting of the forest by communities and industrial actions (i.e. logging) has occurred. Also the impacts of acid rain have detrimentally affected forests and surface water bodies resulting in a decrease in ecosystem health.

By the year 2050 sea level rise will have severe consequences for Delta State with up to 75% loss of land and a 1m rise in sea level if drastic measures are not taken. Communities will be displaced due to loss of land. Other impacts will include: loss of mangroves, loss of barrier inland forests, loss of coastal plantation of crops, likelihood of forest fires and extension of ecosystems, range of pests and pathogens due to rising temperature.

Deforestation accounts for 20% of global greenhouse gas emissions. Actions to protect and restore forests must be a key component of climate protection.

The Delta State Government has embarked on serious forest regeneration through tree planting campaigns, raising of seedlings, afforestation in forest reserves, greenbelt planting schemes and wildlife conservation programmes. Afforestation remains one of the most potent response measures to check the impacts of climate change. Hence, the Government has included REDD+ mechanisms in its framework for combating climate change. It directed that all major ecological stabilization projects currently being undertaken by the Ministry of Environment shall be reviewed to accommodate climate change imperatives.

Sectoral Challenges

i. Decline in mangrove forests due to threat from sea level rise and coastal erosion.

ii. Population increase and pressure leading to massive demand for wood and thereby depleting forests reserves.

iii. Lack of appropriate alternative primary sources of energy leading to over – exploitation of forest products.

iv. Non – involvement of the stakeholders (i.e. Women, youth organizations, civil societies, private sector and community based organizations) in forest management practices.

v. Loss of forest biodiversity and degradation of forest and wetland areas.

vi. Lack of effective land use planning and zoning.

Sector Specific Objective

To ensure the conservation of forests and other natural resources while assuring the improvement of the livelihoods of forest – dependent communities.

Sectoral Policy Statements:

i. Address poverty issues of the people and seek alternative ways to improve on their livelihood in order to reduce their overdependence on wood.

ii. Promote afforestation programmes such as free planting of fast – maturing tree species and ensure the involvement of stakeholders in the programme as well as in other forest management practices.

iii. Promote the production of sustainable forest products like timber.

iv. Support the use of sound techniques such as agroforestry and conservation farming that can improve agricultural productivity and reduce the need for slash and burn technologies and also rehabilitate degraded areas.

v. Ensure the education of local communities on improved agricultural management practices and raise their awareness on the importance of forests.

vi. Promote the use of appropriate carbon offset methodologies to provide finance for afforestation projects.

vii. Promote alternative energy sources in order to reduce the dependency on biomass for energy needs.

viii. Implement and enforce laws on forest management, techniques and control measures to limit access to protected forests and endangered species.

ix. Strengthen and implement forest fire and pest control measures.

x. Develop a comprehensive REDD road map for the State that will have an over-arching approach to ensuring the establishment of protected area functions, control conversion of forests, restore forests where necessary, increase agricultural and plantation productivity where applicable, manage forests sustainably through the control of conversion of productive land, prevent bush burning in forests, promote value added downstream industries, expansion of sustainable alternative livelihoods and the management of multi-function landscapes.

xi. Strengthening of forests and land use governance, while developing necessary environmental and social safeguards that will be encourage stakeholder involvement.

xii. Engage experts to champion forest restoration projects with REDD+ methodologies under the CDM and ensure that significant portion of carbon earnings devolve to affected communities and for forest restoration and protection.

xiii. Identify and establish a Steering Committee on REDD + to provide guidance and recommendation on the REDD + implementation in the State.

xiv. Identify and establish a technical Committee on REDD + that will provide guidance on methodology and technical issues.

xv. Formalize establishment of a stakeholder consultative platform to be involved in discussions on REDD+ implementation in the State.

xvi. Adopt regulatory measures to reduction in wood utilization particularly in construction and charcoal production.

TRANSPORT

The Delta State Government is committed to pursuing a climate friendly development in transport system with focus on energy efficiency and economical public transport that will ensure that mobility in passenger and goods traffic is maintained throughout the State.

Road transport plays a key role because it is responsible for most of the carbon emissions from the transport sector. With regard to climate protection, the Government recognizes the need to maintain pollution from transport at a low level. This means that all malfunctions and hindrances in the flow of traffic must be reduced to a minimum through optimized road network and traffic management measures.

Sector Challenges:

i. No State Motor Agency to monitor vehicular movements and spearhead the sector's developments.

ii. No clear law on emission limit for the transport sector.

iii. Government participation in mass transportation of people and goods is still very low.

iv. No good and organized road network and traffic management measures.

v. No efficient Inland water transport system to take care of those in the riverine and coastal areas.

Specific Sector Objective

To pursue a climate friendly reliable transport system with increased energy efficiency that will ensure a reduction in greenhouse gas emission from the transport sector.

Sectoral Policy statements:

i. Ensure the establishment of a State Traffic Management Authority to champion the transport sector development especially Land and Water means of transportation.

ii. Invest in Mass Transit Scheme in order to reduce the number of private owned vehicles on the road and ensure an increased shift from individual transport to mass transportation.

iii. Explore the potential of an organized and coordinated private investor initiative in this sector that will address the critical need for sustained and uninterrupted services during the transition to a low carbon economy.

iv. Support the introduction of ambitious and realistic average emission limits in compliance with the concepts of REDD+ using such parameters as vehicle weigh by the automobile industries.

v. Engage in intensified dialogue with the global automotive manufacturers for the tropicalization of imported vehicles in line with the demands of greenhouse gas emission reductions.

vi. Ensure that all malfunctions and hindrances in the flow of traffic are reduced through optimized road network and traffic management measures.

vii. Promote rapid expansion development of the transport sector especially land and water and ensure good network and easy access to those in the riverine and coastal areas.

viii. Encourage the importation of fuel efficient vehicles and attract international firms that manufacture fuel efficient vehicles such as plug – in hybrids.

ix. Encourage non – motorized modes of transport such as use of bikes and trekking in urban centres as in the rural areas.

INDUSTRY

The Government and Man are partners in progress especially in the area of industrialization, thus in our pursuit of industrialization, care must be taken to avoid polluting the environment. The environment as a valuable asset has to be effectively controlled and managed.

The Federal Government has undertaken a number of fiscal and monetary policies as well as institutional reforms aimed at reforming Nigeria and making it an industrialized nation and an economic power.

The Government of Delta State subscribes to and are bound by these policies and reforms as well as the entire Industrial policy document of the Federal Government of Nigeria.

Delta State is the leading producer of Oil and Gas in Nigeria and the State has some of the country's major oil – based industries and facilities. These include a refinery, a petrochemical complex, a gas plant, steel complex, two gas fired electricity stations and two oil export terminals, the Warri refining and petrochemical company, the Nigerian Gas Company at Ekpan (Effurun), Utorogu Gas plant , the Delta Steel company, Ovwian – Aladja, and the gas fired

electricity turbines in Ughelli and Sapele among others. Asaba, the State capital also boasts of standard hotels and commercial activities.

The State is endowed with vast human and natural resources and has abundance of raw materials to support the establishment of any scale of industries e.g. natural rubber and rubber products, palm oil and palm products, a rich variety of tropical woods, cassava, yam, plantain, fish, vegetables, maize, silica, clay, lignite and kaolin. Its industrial policy and programmes are designed to attract both foreign and local investors into the state.

Sectoral Challenges:

i. The operations of these industries contribute to the large emissions of greenhouse gases and this sector is the largest contributor to carbon dioxide emissions in the state and the country at large.

ii. Lack of political will and poor enforcement of environmental regulations especially on gas flaring and oil spillage.

iii. Very minimal electricity transmission across the entire country.

iv. Use of outdated and inefficient machines and processes.

v. Lack of market induced forces that would compel the sector to adopt green technologies and processes.

vi. Lack of investment and incentives to adopt efficient modern and greener technologies.

Sector Special Objective

To boost industrial production and improve the economic climate for private investment through measures that would reduce the impact of climate change on the resources of the state.

Sectoral Policy Statements:

i. The State shall utilize gas emitted from the oil industry as a significant source of energy for the Nigerian economy.

ii. Increase the fines and legislative restrictions on all gas flaring activities by the oil industries in the State.

iii. Support Landfill – gas – to – energy projects which capture methane from landfill to generate electricity besides offering opportunities for CDM and other carbon credit market mechanisms.

iv. Ensure that the private sector and the oil industries continue to cooperate with the relevant Government Agencies to ensure better management of industrial wastes and pollution.

v. Create an enabling environment for both foreign and local investors and facilitate the establishment of industries that will be private sector driven to ensure its sustainability.

vi. Encourage industries that utilize associated natural gas for their operations and promote gas conversion thereby reducing the gas flared into the atmosphere with incentives of tax reductions and reduced state levies.

vii. Support the sector to adopt green production processes and products.

viii. Encourage the adoption of appropriate technologies for more efficient utilization of farm resources and planting of climate resilient crops to boost industrial production of crops for local industries and for export.

ix. Intensify the climate and energy – efficiency information service for industries and companies at the information centres for better management of the environment through best practices.

FISHERIES

The Coastal fisheries sector in Delta State is severely undermined due to the degradation of the mangrove forests resulting from human pressure (e.g. collection of fuel wood) and coastal erosion due to sea level rise. The situation is exacerbated by the pollution of rivers, streams, and estuaries through oil spills and from inland industrial waste washed downstream by increased river flow from excessive rainfall. This has resulted in decreased oxygen content of the polluted water bodies and impacted negatively on fish populations and fish catch e.g. the abundance of fish species such as gynnarchusniloticus have reduced in Uzere, Delta State and may become extinct in the near future. Increase in marine and fresh water temperature also cause stress on fish populations, leading to migration and a shift in traditional fishing grounds, impacting negatively on food security and income.

Sectoral Challenges

1) Pollution of rivers, streams and estuaries through oil spills endanger the lives of fishes.

2) Inland industrial waste washed downstream from excessive rainfall render fisheries unproductive.

3) Degradation of mangrove forests through felling of trees for fuel wood severelly undermine the coastal fisheries sector since over 60% of fish caught in the seas of West Africa breed in the mangroves of the Niger Delta.

4) Increase in temperature causes stress on fish population and disrupt the supply of nutrients to fishes.

5) Intrusion of salt water into rivers, lakes and mangrove forests due to sea level rise and inflow of sediment- laden waters into the coasts as a result of flooding have adverse effect on the coastal fisheries.

Sector Special Objective

To boost Fish production by promoting measures that would reduce climate- related risks in this sector and enhance the capacity of fish farmers to anticipate and cope with climate related changes.

Sector Policy Statements:

The State shall:-

1) Review and reinvigorate existing fisheries policy taking into account the implications of climate change and ways to address them.

2) Raise awareness on the impacts of climate change on this sector and establish institutional mechanisms to enhance the capacity of fishing interests and ensure that the special risks to the fishery sector are understood and used to plan state climate change responses, including setting of mitigation targets.

3) Encourage integration of cultural practices used locally in the communities to regulate fisheries activities.

4) Enhance the people directly involved in fisheries activities through provision of credit facilities to ensure that appropriate energy efficiency gears that emit less carbon are produced for their fishing activities and provide training on modern fishing techniques.

5) Support risk reduction initiatives such as exposure of fishing people to climate related risks and enhance their capacity to anticipate and cope with climate related changes.

6) Establish use of fiscal mechanisms in post disaster situations aimed at supporting recovery by fish farmers in order to improve returns on investment.

7) Encourage integrated fish farming e.g rice- fish culture to increase rice yields and reduce the need for artificial fertilizers and pesticides (fish excreta fertilizes the field and fish consume pests like the rice stem borer)

8) Encourage brackish water aquaculture (mariculture) to mitigate the impact of increasing saline intrusion on fresh water hydrology and develop new aquaculture species and disease resistant species that are tolerant and can resist the intrusion.

9) Promote appropriate regulatory measures to safeguard the aquatic environment and its resources against adverse impacts of mitigation strategies and measures such as restoring mangrove to protect the coast lines, fisheries and livelihood of the fishers.

10) Encourage cooperation and flexibility among fishing communities over fishing agreements in order to reduce conflicts that arise from resource use and ensure coherence of adaptation activities and flexibility in implementation of policies.

11) Provide modern and reliable early warning systems to monitor the environment and alert the fishing communities of any threat from climate change impacts.

12) Promote the integration of local community methods of early warning to improve mechanisms of information dissemination as a tool of early warning to fish farmers.

13) Encourage aquaculture participants of the need for insurance covers against damage to stock and property from extreme climatic events.

14) Enact legislations to control the management of underground petroleum products, the disposal of oily and industrial wastes, pipeline vandalisation and ensure cleanup of oil spills by oil companies.

WASTE MANAGEMENT

One of the biggest challenges to environmental management in Delta State is in the area of waste management and this sector contributes significantly to climate change through emission of greenhouse gases into the atmosphere. Increase in population accompanied by increase in industrial activities to support the increase in consumption has also contributed to the increase in greenhouse gas emission. Concentration of oil based industries and other major industries in the State have led to large quantities of industrial wastes which are not properly disposed of. Poor management of industrial wastes and uncontrolled discharge of oily wastes also result in emission of methane and carbon dioxide. The State Government has established an integrated waste management faculty in Asaba and another planned for Warri.

It has also initiated some sustainable waste management practices for the State in conjunction with the private sector. This includes the State Employment and Expenditure for Results (SEEFOR).

Waste and sewage management have enormous climate protection potential which needs to be exploited in the fields of energy (with highly efficient refuse incineration plants) and raw materials. Improved use of materials, material recycling and efficient input of resources all contribute to reducing carbon dioxide levels.

Sector Challenges:

i. Lack of official landfills with modern technologies where different wastes can be sorted and separated in order to create landfill – gas – energy projects which captures methane to generate electricity and also attract CDM.

ii. Poor enforcement of existing regulations and standards of waste management in homes and industrial level.

iii. Inadequate urban waste management gives rise to environmental problems such as air, water and soil pollution.

iv. Lack of adequate private sector participation in this sector.

v. Lack of available market for recycled products thereby discouraging potential entrepreneurs form the venture.

vi. Indiscriminate dumping of waste and derelict materials in drainage channels due to lack of proper waste collection facilities.

Sector Specific Objective

To develop an efficient waste management system for mitigation of climate change.

Sector Policy Statements:

i. Promote cleaner production mechanisms to reduce waste from production processes.

ii. Undertake qualitative and quantitative baseline studies on waste generation aimed at ensuring evidence based decisions on waste in the State.

iii. Provide adequate funds for solid waste management facilities such as landfills for improved disposal of waste and incinerations for separation and segregation at source of waste and recycling for re – use.

iv. Equip landfill with facilities for the generation of bio – energy, organic fertilizers and other by – products of organic wastes.

v. Build capacity and support technology for land – fill methane capture to use and attract CDM and other carbon market mechanisms finance.

vi. Enforce existing standards and regulation to ensure compliance with waste management guidelines.

vii. Ensure free flow of waste water into designated channels to avert population and associated health impacts.

viii. Develop tools and methods for air quality control at waste dumps and landfills to avert environmental pollution associated health impacts.

DISASTER RISK MANAGEMENT

Delta State being a coastal region is highly susceptible to a number of climate change impacts. The State is experiencing increase in temperature, increase in frequency of heat waves, intensity in storms, increase in flooding and sea level changes. Storms and floods are the primary weather and climate related disasters in the State.

Climate change has had a pervasive impact on all communities in all the ecological zones in the State with effects ranging from submerged coastal communities in the fresh water zones to the salient leaching of soil nutrients and water logged farm lands. Livelihoods, properties and human lives have been lost; food, water and environmental security gave been compromised; infrastructure has been destroyed and the environment further degraded by climate change

impacts, all resulting in loss of Gross Domestic Product (GDP) and other socio – economic setbacks.

The State is also faced with other environmental problems resulting from oil exploration and exploitation activities. Gas flaring in the state emits greenhouse gases and other gases that result in acid rain with resultant health implications.

All the above listed climate change impacts and environmental problems pose a big challenge disaster risk management. Projected impacts of future climate change are likely to be more devastating hence the need to put in place sound policies and programmes to combat it.

Sectoral Challenges

i. Greater frequency of floods and sever climate change related disasters on the local communities.

ii. Poverty, local economic development and limited adaptive capacity of the local population have reduced the ability of the people to manage risks.

iii. Limited data generation for timely early warning information systems for extreme weather and climate disasters.

iv. No legal and regulatory framework and disaster risk reduction and management responses.

v. Insufficient knowledge of drainage lines, flood lines and water logged areas.

Sector Specific Objective

To improve resilience to anticipated climate change impacts thereby reducing the vulnerability of socio – economic systems of the state to climate related disasters.

Sector Policy Statements:

i. Ensure the enforcement of policies, planning and regulations within the state.

ii. Ensure the maintenance of infrastructure particularly in the water and oil sectors which is often the cause behind oil spills.

iii. Ensure that the installation of facilities and utilities in ecological sensitive zones is undertaken with appropriate planning and with adherence to existing regulations. This will reduce the disaster risk associated with climate change impacts.

iv. Support the implementation of climate related disaster risk reduction and management as a tool for adaptation.

v. Promote community based approach to disaster risk reduction (DRR) and community based adaptation.

vi. Support the production and dissemination of weather and climate information service for improved early warning system (EWS) emerging response and post disaster recovery to minimize or avert the impact of climate related disasters.

vii. Promote the implementation of the African Regional DRR and Programme of Action.

viii. Increase capacity to identify priority interventions to respond to disaster.

ix. Identify the needs to vulnerable groups such as women, children, youth, elderly and other specific groups.

x. Develop a flood and storm warning system for effective monitoring for any impending disaster and prompt warning for all the potentially affected population as part of disaster risk management.

OIL & GAS

The main economic sector of both Delta State and the whole of Nigeria is the oil sector as a result of its abundance oil and gas reserves. This sector contributes as much as 40% of the country's GDP and 83% to total government revenue, and comprises 95% of the country's major oil based industries and facilities exposing it to environmental hazards due to oil spills and gas flares. Oil spills due mainly to lack of maintenance of the infrastructure in the oil sector and pipeline vandalization account for large loses of mangrove. The National Oil Spill Detection and Response Agency (NOSDRA) identified about 2000 sites that require remediation by 2008 and the Niger Delta National Resource damage Assessment and Restoration Project (NRDARP) identified many ecosystems in need of restoration as a result of oil spills.

Sector Challenges:

i. Limited guidelines and plans exist regarding oil spill cleanups and appropriate ecosystem restoration protocol to be followed.

ii. Oil spill damage both aquatic and terrestrial systems resulting in a) severe bush burning, b) pollution and death of aquatic life in affected rivers, c) contamination of water used by communities for drinking and domestic use d) contamination of soil and farmland sediment. Mangroves are also threatened by pollution from oil spills.

iii. Gas flaring releases methane and other greenhouse gases into the atmosphere thereby contributing to global warming and negatively impacting on human health in surrounding areas and reduces crop yield. Energy consumption processes from gas flaring is one of the highest emitters of greenhouses gases.

iv. 80% of all natural gas produced is flared and the greenhouse gas emitted into the atmosphere result in localized acid rain which has adverse effect on water resources, agriculture, health, property and natural ecosystems.

v. Excessive human pressure especially activities of oil exploration and exploitation on the natural resource base has led to the depletion of biodiversity in the region.

vi. Lack of maintenance of infrastructure is often the cause behind oil spills.

vii. Coastal erosion cause damage to the infrastructure (e.g. oil wells) of the oil industry.

viii. Lack of enforcement of policies, planning and regulations as regards reducing of gas flaring by the industrial petroleum private sector.

Sector Specific Objective

To mainstream biodiversity conservation issues into the oil and gas sector particularly their development policies and operations taking into consideration the impacts of climatic change

Sector Policy Statements

The State shall:-

i. Recover the dry associated gas that is being flared and deliver some to the Nigerian domestic gas market for production use as an energy product.

ii. Refurbish all damaged infrastructure and replace old ones to avert oil spills and protect oil pipelines from vandalisation.

iii. Intensify on diversifying the economy of the state from oil agriculture and gas industry.

iv. Facilitate engagement between the oil and gas industries and communities in the state in managing biodiversity areas in the state.

v. Enforce environmental compliance with current best practices.

vi. Build capacity and innovative environment friendly technology in the oil and gas industry.

vii. Develop financial mechanisms for the oil and gas industry to support biodiversity conservation and community based management activities.

viii. Implement a government framework to reduce threats and risks to priority ecosystems and mainstream biodiversity conservation in the oil and gas industry.

ix. Ensure periodic inspection of industrial facilities to ensure adequate capacity for pollution control in terms of pollution abatement technology and human resources.

x. Develop capacity to facilitate the design of bankable project documents and leverage funds from the carbon market for CDM projects.

xi. Ensure the enactment and enforcement of laws for the prohibition of gas flares and prosecution of oil pipeline vandals and oil companies responsible for oil spills.

INFRASTRUCTURE

The Delta State Government is committed in the provision of necessary infrastructure in all the sectors in order to alienate the impacts of climate change on these sectors. The State is vigorously pursuing the National Policy on Privatization and Commercialization of government enterprises by creating an enabling environment for investors and providing the necessary infrastructure e.g. roads, water and energy.

However, the efforts of the State Government are being threatened by the impacts of the climate change. Its location in the flood plain of the Niger Delta Region has made it very vulnerable to the effects of the climate change. The state is experiencing storm surges, sea level rise, increased flooding and inclination of its low – lying areas and assets of strategic national and state economic value such as ports, roads, oil wells etc. are under threat from climate change.

The concentration of the country's major oil based industries and facilities near the coast further add to the states vulnerability.

Flooding has resulted in damage to infrastructure affecting access routes to coastal areas e.g. the communities of Oko – Amakom, Oko – Anala, Oko – Gbele and Oko – Odifuluare are regularly cut off due to flooding.

The increase in rainfall and in frequency and intensity of severe rain and flooding events has damaged infrastructure resulting in the limited availability of public transport, increase in the cost of transportation and damage due to properties. There has also been damage to corrugated roofs as a result of corrosion due to acid rain.

Sector Challenges:

i. Use of poor quality materials in the provision of infrastructure.

ii. Destruction of existing infrastructure especially those located in the low lying coastal areas by flood and storms.

iii. Failure to integrate climate change in infrastructural designs.

iv. Poor planning of road networks.

Sector Specific Objective

To ensure the provision of sustainable infrastructure for the key sectors in the state through mainstreaming of climate change into the design and development process of infrastructure.

Sector Policy Statements

The State shall:-

i. Ensure that infrastructure development follow the necessary climate change proof standards and codes.

ii. Ensure energy efficient infrastructure for sustainable urban development.

iii. Ensure the proper planning of road networks to remove malfunctions and hindrances on flow of traffic to minimize pollution from the transport sector.

iv. Participate in any Federal – State – LG investment plan for energy efficient refurbishment of social infrastructure.

v. Carry out site selection for development of infrastructure projects should give due consideration for the maintenance of existing drainage patterns, especially in swamp areas and water channel crosses.

vi. Ensure compliance with Best Environmental Management Practices (EIA's, EMP's, Environmental Audits etc).

vii. Road construction should give due consideration for the maintenance of existing drainage patterns, especially in swamp areas and water channel crosses.

viii. Develop construction codes and guidelines that will take into consideration key environmental peculiarities and address specific climate vulnerabilities.

ix. Support research into the use of local construction materials, types of buildings and building technologies that can contribute to enhancing resilience for climate threats that are specific to the State.

CHAPTER FOUR

CROSSCUTTING SECTORS

There are critical pillars that cut across adaptation, mitigation and all sectors for effective implementation of adaptation and mitigation policy recommendations.

These include:

i. Capacity building/training, education and awareness.

ii. Technology, Research and Development

iii. Information Management

iv. Gender

These pillars will be mainstreamed into the policy recommendations to ensure achievement of the policy goals and objectives according to the needs of the state.

4.0 Capacity building/Training, Education and Awareness

Although, Nigeria has a comparatively highly educated population, individuals and institutions are limited in terms of greenhouse mitigation and adaptation capacity. The general awareness within local and communities is low in delta state. Capacity needs to be developed especially with the decision makers in order to mainstream climate change into decision making processes.

Local knowledge regarding climate change will be increased through the introduction of modules for school curricula highlighting the greenhouse gas mitigation and adaptation actions within Delta State and their relevance.

Already, climate change clubs have been initiated in schools through the climate change units of the State Ministry of Environment with the aim to educate and build capacities of the children and youths to the adverse effects of climate change and the necessary response measures.

Challenges

i. Lack of capacity building of individuals and institutions to adapt to climate change and utilize institutions to adapt to climate change and utilize greenhouse gas mitigation opportunities in the key sectors within the state.

ii. Low levels of climate change awareness among the general population and poor understanding of the linkages between every day actions and the environment.

iii. Lack of technical capacity to facilitate the design of bankable project documents in order to leverage for funds.

iv. Lack of financial resources for training and education needs.

Objective

To increase the level of awareness among the general populace of the impacts of climate change and build capacity for response strategies.

Policy Statements

The State shall:

i. Raise awareness of local authorities and communities of suitable greenhouse gas and adaptation technologies in order to increase adaptative capacity, reduce vulnerability to anticipated climate change impacts and curtail environmental degradation.

ii. Develop technical capacity for assessing climate change risks across the key socio economic sectors such as health transport and energy.

iii. Promote and develop capacity through training of major stakeholders e.g. politicians, planners, decision makers, individuals, women, youths and representatives from the key sectors on the utilization of greenhouse gas mitigation opportunities.

iv. Create awareness on the important ecosystems such as forests, wetlands and marine ecosystems and the adaptation and mitigation measures put in place to tackle the impacts of climate change on these ecosystems.

v. Provide funds and support the training and education on Disaster Risk Reduction (DRR) programmes and development of relevant training modules in educational institutions.

vi. Develop capacity to enable local decision makers and planners design policies and strategies that take climate change risks into account and promote investments in appropriate mitigation and adaptation interventions, particularly ecosystem – based approaches.

4.1 Technology, Research and Development

The government of Delta State is committed to partner with universities and relevant research institutes to carry out appropriate research into the menace of climate change impacts and develop technologies to reduce these impacts. The technology will be transferred to the different stakeholders such as governments, private sector entities, financial institutions, non – governmental organizations and educational institutions. Technology is integral to both adaptation (e.g. early warning systems, climate resilient crop varieties etc.) and in mitigation (e.g. low carbon and transportation systems)

Challenges

i. Lack of funds for technological research and development.

ii. No linkage for cross learning with other states on climate change issues.

iii. Lack of coordination and understanding between the key Ministries in Delta State to provide human resources for the purpose of research and development on climate change issues.

iv. Weak intellectual property rights (IPR) laws that impede access to internationally best available technologies (BATs)

Objectives

To promote sound technology for sustainable development of the state.

Policy Statements

The State shall:-

i. Enhance technology development and transfer.

ii. Address in collaboration with the national government, technology transfer barriers, including trade tariffs, intellectual property rights (IPR) and technical trade barriers.

iii. Support research and development on new opportunities that climate change offers particularly innovation approaches to the diversification of the state's energy mix, development of alternative energy sources etc.

iv. Strengthen its research capacity to gather, analyse and disseminate climate related data such as land use data, meteorological data etc. to facilitate the determination of climate change risks, impacts and adaptation planning.

4.2 Information Management System

Information on climate is critical and it is important to disseminate any information gathered especially from research fundings to all stakeholders across Delta State. Such information will also help in the design of appropriate adaptation and mitigation actions, planning and choice of strategies including assessment of risks and early warning systems. This is vital because of the high vulnerability of the State to anticipated climate change impacts.

The establishment of a climate change unit at the Ministry of Environment (MOE) with the responsibility of coordinating activities and disseminating information on climate change is a step in the right direction towards addressing Information Management Systems.

Challenges:

i. Lack of adequate information on Climate Change in order to climate change considerations into decision making.

ii. Limited understanding of current biophysical environment which influences how the State responds to climate change.

iii. Insufficient knowledge on the dynamics of the Niger Delta. There is a high risk that current development is not in line with the principles of sustainability as climate change threats are not taken into considerations.

iv. Lack of comprehensive report on institutions and organizations involved in generation of climate change data, information and knowledge systems requisite for policy making and planning.

Objective

To create an enabling environment for the climate change information management systems to generate improved responses to climate change by the populace.

Policy Statements

The State shall:-

i. Disseminate information to the public and private sector on the current state of the biophysical environment as well as the nexus between environment degradation and climate change impacts.

ii. Develop a database for sectorial information sharing including knowledge management.

iii. Support the preparation of a roaster of experts working on climate change and their respective thematic areas and capacities.

iv. Develop a climate change education, information and awareness plan.

4.3 Gender

Women and men react and participate in social, economic and environmental realities differently depending on the age, socio – economic status and cultures (UNDP 2008).

Women lack adequate representation in decision making including climate change related matters. They significant proportions of people living below the poverty line and they lack access to critical resources for their survival. Climate change has adversely impacted all the sectors in Delta State affecting the livelihood choice of those living in the State, the most vulnerable being women, children, youths and the physically handicapped.

Economic activities are limited and the national resources upon which local communities are reliant are depleted due to the impacts of climate change, women and children who are traditionally responsible for fetching fuel wood for the household are the most affected as they are here to travel long distances in search for fuel wood. The gender inequality often determines the extent of vulnerability of men and women in the State to climate changes.

However, women have proven that they are more effective in mobilizing their communities to prepare for disasters and respond to the consequences of climate change. Women bring unique capabilities to the adaptation efforts. Gender must therefore be mainstreamed into the adaptation process of climate change to ensure the success and sustainability of climate projects and policies.

Adaptation responses including for disaster risk reduction can be more effective if both women and men's capabilities and strengths are incorporated.

Challenges:

i. High levels of illiteracy and inadequate access to information and technology especially among the women.

ii. Youth restiveness in the Niger Delta and rising unemployment particularly among the youths exacerbate their vulnerability to climate change.

iii. Non – involvement of women in decision making processes.

Policy Objectives:

To mainstream gender into the adaptation process of Climate Change in order to ensure the success and sustainability of climate projects and policies.

Policy Statements

The State shall:-

i. Take gender – conscious steps to reduce the negative impacts of natural disasters on women, particularly in relation to their critical roles in the rural areas in the provision of water, food and energy.

ii. Ensure the involvement and increase of women representations at all levels of the decision making process on all matters relating to climate change.

iii. Build the capacity of the local women groups especially in the analysis and evaluation of the characteristics of key disaster risks and enhance their access to technology and finances in times of disaster through women farmers cooperatives and other sources.

iv. Ensure the education of women on the new technologies of tackling climate change impacts.

v. Integrate gender dimensions in assessing vulnerability impacts and risks of climate change.

vi. Promote social protection programmes for vulnerable communities, households and individuals including women, men, children, youth and physically challenged.

vii. Reduce dependence of the people's livelihood on climate sensitive resources.

CHAPTER FIVE

STRATEGIC ACTION PLAN

5.1 **Background**

With recent scientific evidence gathered from various Climate related studies, it is clear that Climate change is occurring and shall continue to be experienced notwithstanding the emission reduction efforts undertaken by the different States in Nigeria. Consequently, it is evident that Delta State will need to adapt to these changes, especially the climate threats of variability in rainfall pattern and deepening extreme weather occurrences.

In the Niger Delta, the risks associated with these climate threats will be further exacerbated by the lack of necessary resources required to adapt to these changes. In order words, if action is not taken to confront these threats, the risks will continue to deepen and adversely affect the sustainable development efforts of this State.

Hence, this has revealed a vital need for Delta State to develop a set of activities, as actions, and define a clear strategy aimed at deploying these actions, with a goal of addressing specific climate risks along the lines of the policy thrust that have been identified in the different key sectors of the State.

5.2. **The Approach**

Delta State is rich in biodiversity and natural resources. Climate Change will therefore continue to drive rising temperature thereby impacting the water cycle and deepen extreme rainfall pattern changes, while the upstream activities in the oil and gas sector will in turn continue to influence

the carbon cycle through increasing GHG emissions from pollution and other activities associated with the oil extractive industry.

Clearly, this and other climate driven issues will continue to exacerbate the specific sectoral challenges and changes identified earlier in this policy document. So, this approach defines a strategy aimed at Climate Proofing the State. The tactical mechanisms in this strategy will be pursued through delivering performance in the following key result areas (KRA's):

- Integrate adaptation and climate risk management into Delta State Development Agenda
- Develop a mechanism for Protecting and investing in Ecosystems
- Exploit existing mitigation opportunities
- Develop an effective Mechanism to Manage water
- Promote Sustainable agriculture and provide support to expand sustainable agriculture methods
- Increase Target Investment in climate smart infrastructures
- Scaling up investment in Provision of Climate information services

Strategy 1:

Integrate adaptation and climate risk management into Delta State Development Agenda

Developing adaption options to climate change and climate variability in line with the adaptation policy statement contained in this policy may further drive an increase in overall short term developmental expenditure in Delta State. Therefore, this strategic objective is aimed at developing and integrating sound adaption strategies that offer sound, resilient development and ensuring economic gains over the long term. Integration of climate change adaptation, mitigation and disaster risk into planning and decision-making processes at all levels of government is crucial.

Consequently, bearing in mind that paying attention to the details of evolving small-scale solutions could unleash the adaptation potential that can be quickly implemented at the local level, are flexible and have the potential to initiate change on a larger scale with high multiplier and spill-over effects capable of stimulating further large-scale policy process even at the national level, the emphasis by the State will be in Key Result Areas (KRA's) that includes; sustainable land, water, and forest management; coastal and urban development; floodplain management; increased agricultural productivity; health; and social issues.

Strategy 2:

Develop a mechanism for Protecting and investing in Ecosystems

The ecosystem based adaptation options that will be considered in the State shall also be guided by the Climate Change policy direction in this document and also by other cross-cutting policy

issues, and the nature of the regulatory environment, which may facilitate or constrain specific approaches to adaptation.

Consequently, sectoral considerations for Climate proofing shall be be hinged on a mechanism flexible enough for assessing the potential impacts of climate change and the vulnerability of the sector to those impacts, evaluating the relative merits of technically feasible adaptation options, and effectively implementing selected option(s).

Strategy 3

Exploit existing mitigation opportunities

The large role played by the oil and gas industry in the energy sector of Delta State requires that we give prominence to the opportunities in mitigating the influence of this GHG emission releasing activities that have an ultimate impact on the Climate. This would underpin the fact that most mitigation opportunities that will be considered are invariably linked to options such as more sustainable land and forest management, clean energy use and development (such as geothermal or hydropower), and the creation of sustainable urban transport systems. As such, these existing opportunities will be properly exploited to evolve best-practice measures for management.

Also, due to the vast forest resource in the State, some opportunities exist to take advantage of and access carbon finance by reducing emissions from deforestation and forest degradation under the REDD mechanism, while further taking advantage of options in renewable energy and energy efficiency.

Strategy 4

Develop an effective Mechanism to Manage water

An effective mechanism to manage water resource in the State will be developed. This mechanism shall leverage strongly on strengthening the interface between the relevant State institutions and the existing mechanism at national level, which would enable better management of water among small farmers, through a combination of new and existing technologies, good information and stronger policies.

These measures shall give due and necessary consideration to options that underpin the expansion of existing infrastructure and systems, and give priority to planning for storage and power transmission in the context of the changing climate.

Strategy 5

Promote Sustainable agriculture and provide support to expand sustainable agriculture methods

As stated earlier, over 80% of land in Delta State is devoted to Agriculture and Forestry so these sectors are among those most affected by Climate Change.

Thus, an effective climate proofing approach of the agricultural sector for this State shall be defined to adopt climate-resilient technologies and practices to increase its crop yields and protect its livestock. To accomplish this purpose, Delta will need to accelerate research, extension services and market infrastructure, while helping farmers benefit from integrating biodiversity into the landscape, and reduce carbon emissions from soil and deforestation.

Furthermore, to protect the State from Climate shocks, the economy shall be focused on diversifying income sources and genetic material in crops.

Strategy 6

Increase Target Investment in climate smart infrastructures

As climate variability increases in the Sub-Saharan Africa region, so also the threats associated with these climatic events such as floods. Considering the littoral nature of Delta State, sea level rise is also a clear and present challenge. Thus, to mitigate these climate risks, hazard risk management shall be mainstreamed into land use planning. Initiatives shall also be established with the aim of supporting and investing in networks of business incubators that have a knock-on effect on stimulating entrepreneurship and innovation that is based on market demand and addressing climate change challenges.

Strategy 7

Knowledge and capacity development

As discussed earlier in the policy document, undoubtedly, even though there is unequivocal evidence that the climate is changing, much uncertainty still covers the level and degree of change. Certainty regarding the pace and extent of Climate Change, as well as the impacts on different sectors is relatively low. This uncertainty makes policy decisions more complex, and magnifies the need to build up the knowledge and analytical base, as well as strengthen the capacity of State and Local Government institutions for weather forecasting, water resources monitoring, land use information, disaster preparedness, risk management, and planning and coordination.

Consequently, the State will initiate studies aimed at gathering and strengthening already acquired information on reliable Climate related baseline data and statistics. This shall facilitate the development and implementation of evidence based capacity development plans that will have far-reaching impact in Delta.

Strategy 8

Scaling up Investment in Communication and Information Services

Nigeria as a country, through the activities of NIMET, is gradually scaling up performance relating to systems for better monitoring and forecasting Climate variability. This is crucial as reliable information is fundamental for good natural resource management.

Thus, at State level, this strategy will focus on enhancing target investment aimed at improving weather forecasting, water resources monitoring, land use information, disaster preparedness and investing in appropriate technology development, strengthening capacity for planning and coordination, participation and consultation; and, bring all sectors together to collaborate and engage on a common vision for addressing climate change in Delta State.

Strategy 9

Climate Proofing For Development

As Delta State gears up to champion a less carbon intensive sub-national initiative growth and development in Africa, climate proofing for development, as a strategic methodological tool, shall be incorporating all issues of climate change into development planning. The rationale is to enable development and investment measures in Delta State to be proactively analyzed with regard to the current and future challenges and opportunities presented by climate change. Thus making development, measures, beyond oil & gas, more efficient and resilient. Climate proofing for development offers a means of identifying and prioritizing options for action when adapting planning to climate change and when reviewing priorities. The approach shall be applied in the planning phase or when revising all development and investment plans in Delta State through the Ministry of Environment.

CHAPTER SIX

IMPLEMENTATION AND RESOURCE MOBILIZATION PLAN

6.0 IMPLEMENTATION PLAN

The implementation of the policy will be the responsibility of the Ministry of Environment (MOE) of the Delta State Government working in close collaboration with other key line ministries.

Various implementation instruments will be developed for the policy.

The Delta State of Nigeria initiated the Territorial Approach to Climate Change (TACC) Programme in collaboration with UNDP under the Delta State Ministry of Environment Climate Change Unit and through which various implementation instruments for the implementation of the policy have been developed as follows:

i. The Integrated Territorial Climate Plan (ITCP) which includes a Climate Change Strategy and Action Plan. The ITCP represents a road map guiding future climate change related activities including both greenhouse gas mitigation and adaptation interventions within Delta State.

ii. Multi stakeholders technical working groups comprising stakeholders from key sector ministries in Delta State, local authorities, academic institutions, NGO's and the private sector will be established to develop sector specific strategies and plans of action to address climate change in line with the Delta State Climate Change Policy. The Ministry of Environment shall work closely with relevant Ministries and Institutions in the execution of programmes, projects and activities emanating from the policy.

iii. The TACCprogramme has built capacity within public and private sectors for undertaking quantitative environmental and climate change impact assessment and meeting pressing climate change challenges.

6.0.1 INSTITUTIONAL ARRANGEMENT

The environmental degrading experiences of climate hazards, compounded by the menace of oil spillings and gas flaring in Delta State and the uncoordinated manner in which climate change response initiatives were being undertaken by various departments, institutions and organizations in the state prompted the mapping out of a climate change unit within the Ministry of Environment to oversee climate change activities.

Given the policy's enormous mandate, it is imperative that the Climate Change Unit (CCU) be upgraded to the status of a full department under the Ministry of Environment as it is in the Federal Ministry of Environment, fully equipped to coordinate and manage the implementation of the policy.

It shall work jointly with existing relevant state and national government agencies, departments, institutions and others that may be established in the implementation of the policy.

As a coordinating institution the climate change unit shall oversee the TACC programme which has been vested with the mandate to develop implementation instruments for the implementation of the policy, design climate change strategies and plans, design climate change capacity building projects.

6.0.2 PARTNERSHIPS AND COLLABORATION

The Delta State Government initiated the TACC programme in collaboration with the UNDP in 2010 and they have produced a biophysical and socio – economic assessment of the nexus of environmental degradation and climate change in Delta State.

The State is an active member of the R20 group of Regions made up of 36 regions and 27 international organizations from all over the world. The State has partnered with this group to produce a strategy and action plan that will define the activities and projects to be implemented in Delta State for a more sustainable future of their citizens. The group plans to make Delta State the R20 hub for Anglophone West Africa and Central Africa.

Other partnerships with various stakeholders including intergovernmental bodies, development partners, non – governmental organizations (NGOs), private sector and Civil Society Organizations (CSOs) shall be established.

6.0.3 POLICY STATEMENTS

The State shall:-

i. Develop instruments to implement the policy including the Delta State Climate Change Strategy and Action Plan.

ii. Establish and strengthen institutional framework, guided by both state and national laws and regulations, for the coordination and implementation of the Delta State Climate Change Policy, Delta State Climate Change Strategy and Action Plan.

iii. Establish partnerships with national, regional and international for sharing of information and knowledge on climate change including best practices.

6.1 RESOURCE MOBILIZATION PLAN

6.1.1 FINANCE

The State needs to establish for the implementation of the Policy appropriate financial mechanisms and ensure availability of sustainable financial resources to support mitigation adaptation initiatives and programmes as well as other initiatives such as capacity building, training, education, awareness, research and development etc. These funds shall be mobilized from development partners, intergovernmental agencies and the private sector.

The State shall identify innovative funding mechanisms e.g. CDM, voluntary carbon markets, Ecological fund of Nigeria and the Adaptation Fund put in place necessary measures and procedures to benefit from them.

6.1.2 Policy Statements:

The State shall:-

i. Mobilize resources from various sources including the public and private sectors, international community and state resources to implement climate change activities.

ii. Identify innovative funding mechanisms including domestic funds and carbon finance and develop modalities for accessing them.

6.2 MONITORING, EVALUATION AND REVIEW

The Climate Change Unit of the Ministry of Environment will develop rules and guidelines for monitoring and evaluating the implantation of the policy in accordance with established UNDP and EEG procedures and World Bank practices.

A monitoring and evaluation (M&E) framework shall be developed as an integral component of the Policy implementation to ensure Policy goals and objectives are achieved and priority actions are implemented in a cost-effective, coordinated and harmonized approach.

The Policy will be reviewed every three years to take into account emerging issues, challenges and trends on climate change.