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REPORT

**LOW EMISSIONS CLIMATE RESILIENT
DEVELOPMENT STRATEGY OF THE GAMBIA
(LECRDS)
2018 – 2030**

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Abbreviations and Acronyms

AACC	Adapting Agriculture to Climate Change
ACPC	African Climate Policy Centre
AfDB-	African Development Bank
ANR	Agriculture and Natural Resources
CFL	Compact Fluorescent Lamps
CRR	Central River Region
DCCFW	Domestic Climate Change Finance Window
EbA	Ecosystem-based Adaptation
EU	European Union
FAO	Food and Agriculture Organisation
GBA	Greater Banjul Area
GBOS	Gambia Bureau of Statistics
GCCA	Gambia Civil Aviation Authority
GCCF	Gambia Climate Change Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
Gg	Gigagrams
GHG	Greenhouse Gas
GOTG	Government of The Gambia
GWh	Giga Watt Hour
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
IMCCC	Inter-Ministerial Council on Climate Change
LDC	Least Developed Countries
LDCF	Least Developed Countries Fund
LECRDS	Low Emission Climate Resilient Development Strategy

LRMS	LECRDS Resource Mobilisation Strategy
LRR	Lower River Region
MECCNAR	Ministry of Environment, Climate Change & Natural Resources
MEP	Ministry of Energy and Petroleum
MoFEA	Ministry of Finance and Economic Affairs
NEMA	National Agricultural Water Management Development Project
NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programme of Action
NARI	National Agricultural Research Institute
NAWEC	National Water and Electricity Company
NCCC	National Climate Change Committee
NCCP	National Climate Change Policy
NDMA	National Disaster Management Agency
NDP	National Development Plan
NEA	National Environment Agency
NERICA	New Rice for Africa
NGO	Non- Government Organisation
NIR	National Inventory Report
NRA	National Roads Authority
PAGE	Programme for Accelerated Growth and Employment
PMCCFW	Private and Market Climate Change Finance Window
PPA	Power Purchase Agreement
PURA	Public Utilities Regulatory Agency
SPCR	Strategic Programme for Climate Resilience
TAC	Technical Advisory Committee
TNA	Technology Needs Assessment
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change

UNIDO	United Nations Industrial Development Organisation
URR	Upper River Region
WCR	West Coast Region
WMO	World Meteorological Organisation

Executive summary

Although not a significant contributor to global warming and climate change, The Gambia is among the countries most at risk from the projected adverse impacts of climate change. The country has made significant efforts to implement the United Nations Framework Convention on Climate Change (UNFCCC) and these include the formulation of the National Climate Change Policy (NCCP) in 2016, the Intended Nationally Determined Contribution (INDC) in 2015 and the Strategic Programme for Climate Resilience (SPCR) in 2017. The Low Emission Climate Resilient Development Strategy (LECRDS) comes as a complement to these policy instruments with the objective of moving The Gambia from its brown development pathway to a green development pathway. The study has identified the sectors that are most vulnerable to climate change impacts and proposed interventions to reduce or mitigate these impacts, while promoting a low-carbon economy and climate change-resilient production systems. The report is structured in to ten chapters as presented below.

Chapter 1 discusses the national circumstances including the major development policies, plans and programmes and also highlights the challenges of poverty, access to basic services as well as youth unemployment in the context of challenges posed by climate variability and change. The National Development Plan 2018-22 recognises these challenges and it proposes to continue and expand the process of integration and mainstreaming of climate change in all national development frameworks.

Chapter 2 provides an overview of the the GHG emissions highlighting the contributions of the various sectors notably energy, transport, agriculture, waste, industry and fisheries with projections to 2020 - 2050. General summary of results from all the various climate change strategic reports suggest that under the projected climate change, The Gambia will be warmer (current mean annual temperature increases 0.3°C in 2010 to about 3.9°C in 2100), and drier (mean annual rainfall decreases from about 1% in 2010 to about 54% in 2100; potential evapotranspiration increases by about 10% (Adaptation TNA, 2015).

Climate change profile and vulnerability scenarios for the sectors are also presented as well as the main drivers of vulnerability which include societal factors, climate stressors and societal factors.

Chapter 3 examines the priority mitigation and adaptation options and strategies in each of the sectors identified, and the potential savings in GHG emissions that can be realized the proposed options. The Chapter also includes a summary of assessment of some of the mitigation and adaptation projects already implemented with the view to determine their potential for upscaling in the context of a green development pathway.

Chapter 4 presents the Low Emissions and Climate Resilient Development Strategy of The Gambia with a clear vision, mission and goal. The strategic objectives are underpinned by the guiding principles of inclusiveness and country-driven, sustainability, equity-based development etc. Twelve strategies have been presented for The Gambia and they include:

- Strategy 1:** Institutionalization of coordination, monitoring, reporting and verification of climate change issues by strengthening the Climate Change Secretariat of the Ministry of Environment, Climate Change and Natural Resources for effective and efficient provision of technical policy advice to the Government and people of The Gambia for relevant decision making in transitioning to green economic growth.
- Strategy 2:** Continuation of the transformation of the National Meteorological Services of The Gambia into an Agency and strengthening of Climate Change Early Warning System of The Gambia
- Strategy 3:** Estimation, in a sustainable manner, of The Gambia's contribution to global warming and climate change; assessment of the impacts of climate change on The Gambia's economy and people; and analysis and contextualization of the possibility of national and sectoral climate change integrated plans providing guidance for the development and investment pathways of the country and choice of investments.
- Strategy 4:** Promotion of energy efficiency, enhanced management (improved transmission and distribution) and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of The Gambia.
- Strategy 5:** Enhancement of waste management systems in the Administrative Regions (NBR, LRR, CRR, URR and the peri-urban areas of WCR) to reduce pollution and greenhouse gas emissions under the waste category so as to improve health of both humans and animals and reduce global warming.
- Strategy 6:** Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy.
- Strategy 7:** Adoption and application of climate-smart and conservation agriculture that allow minimum disturbance and year-round maintenance of soil and soil cover, including the use of leguminous crops to boost soil nitrogen; adoption of new crops, crop rotation and/or crop varieties and adjusting the time of planting/harvesting; introduction of integrated soil-fertility management systems that cater to the nutritional needs of the crop without polluting the environment; and integrated water management practices.
- Strategy 8:** Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.

- Strategy 9:** Integrated management of crops and Livestock management including the modification of herd composition: variation of species/breeds; and adaptation of grazing management practices to increase soil carbon. Reduction of greenhouse gas emissions from livestock by improving animal nutrition, breed selection and manure management.
- Strategy 10:** Restoration of degraded lands with high production potential; application of erosion control, soil and water conservation, organic amendments, perennial or deep root crop systems; and improvement of land and soil, including drainage, desalinization, addition of gypsum to renovate sodic soils.
- Strategy 11:** Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems; and aquaculture in areas inundated by rising sea levels.
- Strategy 12:** Promotion and facilitation of disaster management through strengthening and improvement of climate early warning systems, drought contingency plans, response to drought and flooding, sensitisation and awareness-raising, and promotion of weather-indexed risk insurance.

Chapter 5 presents the LECRD Action Plan which is developed to take the activities (adaptation and mitigation) needed to respond to climate change in The Gambia to another stage beyond identification to planning. Under the LECRD Action Plan, the strategies identified in Chapter 4 have been translated into mitigation and adaptation actions to enable The Gambia to take decisive and sustainable actions in addressing the root causes and the adverse impacts of climate change on the national economy and move the country into a green and resilient economy.

The LECRD Action Plan includes (a) prioritised activities that will support The Gambia to transition to a low-carbon and climate-resilient economy; (b) information on financing the LECRDS and its Action Plan; (c) mobilisation of resources and (d) monitoring, reporting and verification of impacts on the citizens and economy of The Gambia due to the implementation of the strategy and action plan.

The strategies and activities proposed are intended to transition the economy of the Gambia to low emissions and enhance resilience of the economy and citizens to climate change. Together, the LECRDS and its Action Plan set the framework for future strategies and actions to alleviate the adverse effects of climate change, to raise awareness within the local population about the challenges ahead and to establish Government's commitment to work in partnership with the wider community to achieve a more sustainable and low-carbon green economy future for the country and her citizens.

Chapter 6 discusses the implementation arrangements. The institutional arrangements for the implementation of the LECRDS will be those already defined in the NCCP. Project-level oversight of the LECRDS investment programmes would be developed as the NCCP puts in place the key institutions.

Given the cross-cutting and overarching role that policy, legislative and institutional reform play in enabling The Gambia's climate change response, the following priority actions are envisaged for the implementation of the LECRDS and the LECRD Action Plan:

- i. Strengthen the National Climate Change Secretariat as the primary national government agency for climate change response, located within the Ministry of Environment, Climate Change and Natural Resources which is responsible for climate change political affairs;
- ii. Establish the enabling legislative framework to implement the LECRDS and its Action Plan by enacting a stand-alone and overarching Climate Change Law. Amendment of key sectoral laws will be required to make them to be consistent with the climate change law and to ensure that all actions under the LECRD Action Plan have the legislative basis to be implemented and translated from concept to practice;
- iii. Strengthen the high-level National Climate Change Council (NCCC) with the role of primary coordination, policy direction, oversight and guidance across all levels of government.

Chapter 7 reviews the funding and resource mobilization for LECRDS and the Action Plan. The estimated funding requirement for the LECRDS Action Plan is **D170.5 Million US Dollars**. Raising the necessary capital will present a major challenge to The Gambia for reasons which include policy and regulatory weaknesses, difficulties in accessing commercial finance and technical capacity shortcomings. For sustainability, it is recommended to create a stand-alone Gambia Climate Change Fund (GCCF), which would focus both on mitigation and adaptation activities; its governance structure would allow broad and equal representation from the government, civil society and the private sector leading to improved capacity of the Government to absorb international public climate finance. In the proposed Resource Mobilization Strategy to implement the Strategy and Action Plan, it is recommended that resources should be mobilized both domestically and internationally. For this reason, the GCCF should be designed to have three (3) windows: (1) Domestic Climate Finance; (2) International (Bilateral and Multilateral) Climate Finance; and (3) Private and Market Climate Finance. Detailed information on the structure and management of these Funds are contained in the underlying text in this document. International cooperation is an important and necessary source for leveraging of inputs for the implementation of the LECRDS and the Action Plan. The document emphasizes the importance of international cooperation with bilateral governments and multilateral organizations and institutions in order to mobilize resources such as knowledge, experiences and funds for implementation of the LECRDS and the ACTION Plan and facilitate the effective transfer of climate friendly technologies. Capacity building needs for the implementation of the LECRDS and the Action Plan have also been discussed.

Chapter 8 reviews some of the outstanding legislative, policy and regulatory issues that could further enhance the implementation of the LECRDS and the Action Plan. These include the establishment of the Climate Change Secretariat and the other organs as well as the Fund as

provided for in the Policy. For the sectors, the regulatory and policy issues include the promotion of a greater use of renewables in the energy mix with the aim of having a renewable electricity target of 5% by 2025 and 10% by 2030. In the transport sector it is recommended to put in place a policy that reduces GHG emissions through enforced vehicle inspection for emissions, road worthiness and fuel efficiency; and improvement of public transport system in Greater Banjul Area (GBA). Regulations will also be required in the energy sector in setting standards such as energy efficiency standards, regulatory and licensing framework for LPG market, and establishing regulatory mechanisms to ensure compliance. For the improved cook stoves it will be necessary to develop a regulatory framework for development of standards and testing in line with regional and ISO international process to ensure performance and quality improvement.

Chapter 9 deals with monitoring, evaluation, reporting and verification of the implementation of The Gambia LECRDS and its Action Plan. These activities are expected to ensure that implementation actions of the strategies and projects identified in this document are effective and help track the transition of The Gambia to a low carbon and climate resilient economy.

The proposed monitoring, reporting and verification (MRV) proposes an integrated framework for measuring, monitoring, evaluating, verifying and reporting results of response (mitigation and adaptation) actions and the synergies between them. Effective implementation of the LECRD Action Plan is highly dependent on the internal “feedback” generated through the MRV processes. The framework must be able to assess the effectiveness of investment in mitigation and adaptation actions. Securing further financial support for the implementation of the LECARDS and its Action Plan will be dependent on the successful establishment and implementation of a MRV framework.

The monitoring and evaluation framework in this LECRDS (Table 7) determines actions, responsibilities, indicative timeframe, baselines and year by which the Priority Action Plans under this LECRDS can be achieved in The Gambia, including the involvement of stakeholders. The indicative timeframe, baselines and year and percentages are based on those contained in Nationally Determined Contribution (NDC/iNDC) of the country. This framework will facilitate the Measuring, Reporting and Verification of the LECRDS and also contribute to the tracking of the implementation of the NDC.

Chapter 10 constitutes the conclusion. The strategies and activities proposed in this LECRDS and the Action Plan are intended to transition the economy of the Gambia to low emissions and enhance resilience of the economy and citizens to climate change. Together, they set the framework for future strategies and actions to alleviate the adverse effects of climate change, to raise awareness within the local population about the challenges ahead and to establish Government’s commitment to work in partnership with the wider community to achieve a more sustainable and low-carbon green economy future for the country and her citizens.

CHAPTER 1: INTRODUCTION

1.1 Background

The Gambia is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol as a Non-Annex I Party member. Although not a significant contributor to global warming and climate change, it is among the countries most at risk from the projected adverse impacts of climate change. Since ratification The Gambia has made significant efforts to implement the Convention and these include the formulation of the National Climate Change Policy (NCCP) in 2016 which seeks to provide “.....the framework for managing climate risks, building institutions and capacities, and identifying new opportunities for climate-resilient sustainable development in The Gambia”. In 2017 the country developed the Strategic Programme for Climate Resilience (SPCR), an overarching strategy to support the implementation of the NCCP. The Programme is “an adaptation and mitigation investment plan, designed to reduce and manage the country’s high vulnerability to climate variability and change.” The present study, Low Emission Climate Resilient Development Strategy (LECRDS) is expected to form an integral part of this strategic framework.

The LECRDS seeks to move The Gambia from its brown development pathway, particularly the planned urban and rural electrification and transport sector modernization, to a green growth path. More specifically it would, for maximum efficiency and synergy, spell out a detailed strategy to achieve the transition from those specific brown development aspects that will not be covered in the SPCR investment programmes, into a green development pathway.

1.2 Methodology

1.1.1 Participation Process

The formulation of the LECRDS was done in two phases each of which involved a wide consultative and participative process with the stakeholders. The first one consisted of the preparation of a background paper on the LECRDS of the Gambia in 2013⁽¹⁾. This was to be followed by a more detail study in a second phase. The present study comprises this phase which has also benefitted from extensive consultative and planning process with all relevant national and local stakeholders undertaken during the preparation of the SPCR. The issues raised and the recommendations reached during these stakeholder consultations were taken into account in preparing this report. The stakeholders included representatives of

¹Dr.-Ing. Yves J.M. Lamour and Bubu Pateh Jallow, 2013: Background Paper on LECRDS of The Gambia

government institutions/agencies, local communities (farmers, fishermen, pastoralists etc.) including women, youths, NGOs and the private sector.

In addition to this background consultative process the consultant reviewed all available literature (both print and electronic) made available, followed by interviews with representatives of different categories of stakeholders. There was also a two-day (5th-6th July) meeting of the National Climate Committee (NCC) that discussed, among other topics, the proposed LECRDS study and points raised during this meeting were also taken into account in preparing the study.

The draft report was submitted to a national validation workshop on 7/12/2017 and the comments /observations of the meeting were used to further improve the report.

1.3 National Circumstances

1.3.1 Geography

The Gambia lies between latitudes 13 and 14 degrees North and longitudes 17 and 12 degrees West with a total area of about 11,300 sq. km of which 10,000 sq. km is land and 1,300 sq. km is water. The country is widest at its westerly end towards the ocean, narrowing to about half this width at its eastern tip, 480 km inland. The country is bisected by the River Gambia that originates from the Fouta Djallon highlands, forming the North and South banks. The Gambia sits on the flood plain of the Gambia River flanked by savannah and low hills. Except to the west it is surrounded on all sides by the Republic of Senegal. The Gambia has a total land boundary of 740km, all of which is shared with the Republic of Senegal (Figure 1 below). On its marine seaboard, the country has an 80 km open coastline of which 11 km represents the mouth of the River Gambia.

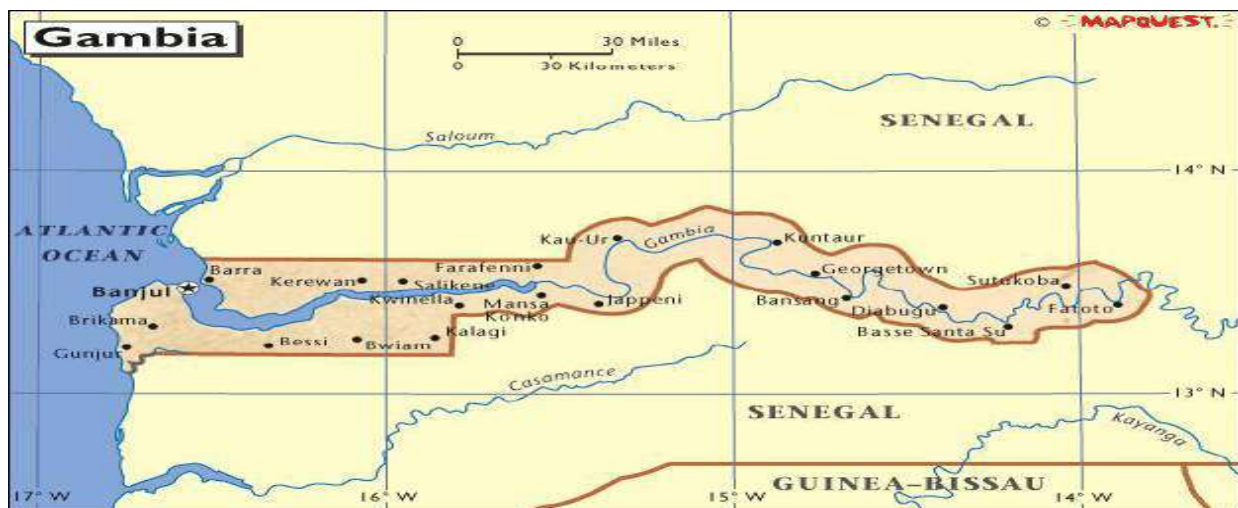


Figure 1: Location Map of The Gambia

1.3.2 Demography

According to the Population Census 2013⁽²⁾, the population of The Gambia is 1,856,417 and 57.8 per cent of the population live in urban areas. On average, the population of The Gambia has been growing at the rate of 3.3 per cent per annum during the inter-census period 2003-2013. With this rate of population growth, the population of The Gambia is expected to double in 21 years. The population density of 173.7 persons/km² makes The Gambia one of most densely populated countries in Africa. The total number of households is 217,610 households with about 21 per cent headed by females. All these developments have contributed to increase pressure on the natural resources such as land and on the social services such as health, education and housing.

1.3.3 Economy

The Gambia's gross domestic product has been estimated at USD 0.9646 billion for 2016 (World Bank).⁽³⁾ The economy had been generally strong in the past decade, with an average annual real GDP growth rate of about 6% during 2003-2006, and a slight reduction to 5.3% during 2006-2010. In 2011 the country experienced a major drought with serious consequences for agricultural production which resulted in a negative growth rate of -4.4%. Similar impacts were registered in 2014 as a result of the late start of the rains and the adverse effects of the Ebola epidemic in the sub-region even though the Gambia even though The Gambia was not directly affected by the disease which is estimated to have cut tourism receipts for the 2014/15 season by more than half (World Bank).⁽⁴⁾

The recent political impasse following the Presidential elections of December 2016 had also negatively impacted on the overall economy with the result that the GDP growth rate has been revised to 2% as opposed to the projected 4%. Head on Inflation has also been revised upwards from 5 % to 8% (MOFEA 2017).

The main sectors driving economic growth are services, agriculture and tourism. Agriculture accounted for around 25% of GDP over the period 1994 to 2013 and provides work for 70% of the labour force. Services account for 60 percent of GDP, with trade, transport and communications being its two largest components.

The agricultural sector is largely dependent on rainfall which makes the economy vulnerable to the vagaries of the climate. Over the past 25 years, rainfall volumes have been erratic (from a low of 55mm in 1984 to a high of 102mm in 1999), as well as the shortening of the rainy season over time from 5 months a year in 1985 to less than 4 months in 2014 (Department of Water Resources, 2014).

Tourism is The Gambia's primary foreign-exchange earner. The sector contributed about 12 per cent of The Gambia's real GDP in 2010. The tourist industry is one of the fastest growing sectors of the economy. However most of the tourism infrastructure is located along the coast with high

2. The Gambia 2013 Population and Housing Census Preliminary Results: The Gambia Bureau of Statistics 2013

3. <https://www.google.gm>

4. The Economic Impact of Ebola on Sub-Saharan Africa: Updated Estimates for 2015-January 20, 2015-World Bank Group -93721

risks of destruction in the event of sea level rise. In the predicted sea level rise these and other investments will be destroyed with huge material and financial losses.

The industrial sector (about 15 percent of GDP over the same period), consists mostly of construction and agro-processing activities. Trade has also traditionally played an important role in the economy especially the re-exports. However, recent developments including political disruption in key destination countries (Guinea and Mali) and deterioration in the country's export competitiveness have adversely affected performance in this sector.

1.3.4 The National Development Plan 2018- 2022

To address some of the socioeconomic challenges highlighted above, The Gambia has recently developed the National Development Plan, (NDP), 2018-2022 as a successor to the Programme for Accelerated Growth and Employment (PAGE) 2012-2016. The primary objective of the NDP is to achieve sustainable inclusive growth and prosperity by making the poverty reduction efforts more effective by explicitly creating productive economic opportunities for the poor and vulnerable sections of society. In this process a key thrust of the NDP is the "identification and prioritization of the growth levers of the economy and prospect for diversification based on their contribution to GDP, employment creation and potential impact on poverty reduction." (NDP 2018-2022).

The Plan recognizes the susceptibility of The Gambia to climate variability and climate change, which places a major burden on inclusive growth and ultimate national development because it affects the productive base of the economy which are climate-sensitive. This is notably the case in agriculture where performance is very much influenced by national rainfall patterns which in turn are principally under the influence of climate change. The focus is to strengthen the country's productive and trade capacities within a green economy.

With the development of the National Climate Change Policy; and the formulation of the Low Emissions Climate Resilient Development Strategy (LECRDS) of The Gambia, The Plan proposes to continue and expand the process of integration and mainstreaming of climate change in all national development frameworks- a process which has already started in the ANR sector.

1.4 Key development issues and priorities

1.4.1 Poverty

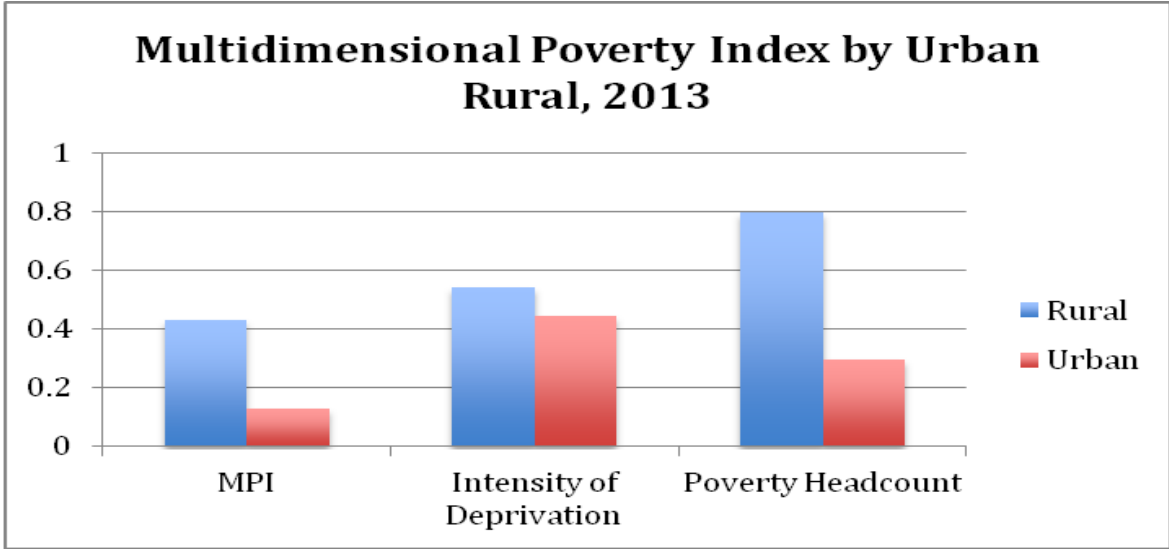
The Gambia Human Development Index (HDI) has been increasing steadily over the years from 0.441 in 2011 to 0.452 in 2015; but it still remains in the Low Development ranking (175 out of 188 countries) in the United Nations Development Programme's Human Development Report for the year 2015. Poverty continues to be a major challenge for the country although poverty assessments have indicated decline in poverty⁽⁵⁾. The overall national poverty rate at \$1.25 per person per day is 48.4% (2010) compared to 55.5% in 2008. The incidence of poverty was

higher in the rural than in urban areas. Poverty is highest among household heads working in the agriculture and fishing industry, sectors which are very much climate sensitive.

Aside from income poverty, poverty in The Gambia manifests itself in multiple deprivations such as widespread food insecurity resulting from weather-induced crop failures, shortage of cash and lack of alternative income-generating opportunities. Poor people are deprived of their economic right to food, education, health, adequate shelter and decent living standards.

Recent studies, including the Integrated Household Survey (IHS)⁽⁶⁾ of 2010 and Drivers of Growth studies (2014)⁽⁷⁾ have shown that growth has been inclusive in The Gambia, with both rural and urban populations seeing a fall in the poverty headcount over this period. Unfortunately, the benefits of growth have been skewed towards the urban areas with 30% of urban households in the 2013 multi-dimensionally poor (poverty headcount) as opposed to 80% in the rural areas⁽⁸⁾. Poverty levels remain extremely high in rural areas even though there have been efforts by the government to provide basic social services such as schools, health care services and electricity to rural settlements.

Figure 2: Multidimensional Poverty, Intensity of Deprivation and Poverty Headcount by Urban/Rural



Source: Study on Multidimensional Poverty and Inclusive Growth in The Gambia, UNDP, 2015

5. Poverty Assessment 2008 Government of The Gambia and the World Bank
 6. Integrated Household Survey, GBOS, 2010
 7. Growth Drivers, Poverty and Inequality in the Gambia, GBOS, 2014
 8. Study on Multidimensional Poverty and Inclusive Growth in The Gambia, UNDP, 2015

1.4.2 Food Insecurity

The food insecurity situation in The Gambia is influenced by various underlying factors that are chronic in nature and particularly affect the rural poor (crop producers). Increasingly, there has been deterioration in the ability of both rural and urban communities to cope due to recurrent shocks predominantly the Sahel drought crisis of 2011/2012; whose impact continues to aggravate the food and nutrition security of the most vulnerable populations in the country. The agricultural seasons (2014/2015) have also suffered shocks that had some impact on the household food security and in turn, affecting children's nutrition as well as access to basic social services. For instance, the late and erratic rains during the planting season in 2014 led to a significant drop in crop production. Children are particularly vulnerable to food insecurity because reduced nutritious food intake and associated problems lead to stunting, wasting and micronutrient deficiencies all of which have adverse effects on child health and development.

1.4.3 Access to Basic Services

Poor access to basic services such as health is augmented by factors such as high unemployment rates, lack of women's empowerment, and social exclusion of vulnerable groups such as people living with disabilities. The Gambia is prone to malaria and meningitis outbreaks due to its global positioning and climate change. The results of the 2013 Demographic and Health Survey ⁽⁹⁾ show that less than 40% of the population has access to improved sanitation.

1.4.4 Youth Unemployment

According to The Gambia Labour Force Survey of 2012⁽¹⁰⁾, unemployment rate stood at 29.8% with the youth (defined as between the ages of 13 and 30) unemployment rate, estimated at 38%. It further shows that female youth are less likely to be employed or in education, and more likely to be inactive (31 percent against 27 percent for male youth). The increasing unemployment among the youth is increasingly seen as the cause for migration, particularly illegal "back-way" migration to Europe – an estimated 11,300 people migrated illegally from the country in 2014. This poses a particularly challenging situation for the Government.

1.5 Climate Change Projections for The Gambia

The best available climate projections for The Gambia are currently those presented in the Third National Communications (to be published in 2018), which are mainly based on the downscaling of the outputs of four Global Circulation Models (GCMs).

The Gambia has witnessed irregular precipitation patterns over the past 30 years. Previous studies concluded that there was decreasing seasonal precipitation during the rainy season of June to October over 1951 to 2000. Yet, the proportion of precipitation collected from intense

⁹ The Gambia: Demographic and Health Survey 2013- Gambia Bureau of Statistics and ICF International -2014

¹⁰The Gambia Labour Force Survey, April 2012-Gambia Bureau of Statistics 2013

events over the last decade in the wettest months of August and September have contributed toward observed annual rainfall increases from 2000 to 2010.

Flooding events which include flash floods immediately following an abnormally heavy rainfall event are also expected to increase. These are compounded by inadequate planning and storm water management infrastructure in urban areas. Catastrophic seasonal floods may also occur along the River Gambia after an above average rainy season.

With respect to wind and dust storms their frequency of occurrence increased in The Gambia over the last twenty-five years (Jaiteh and Sarr, 2011). Contributing factors to the increase in dust storms include human impacts such as overgrazing and deforestation, which create a new source of dust. Wind storms during the rainy season are also expected to increase in strength and severity as the atmosphere becomes warmer.

1.6 Past and on-going climate change and related risk management actions

In an effort to address climate change and related risks, the Government of the Gambia instituted a number of policy measures as well as programmes and projects. At the policy and institutional level the Government prepared a Nationally Appropriate Mitigation Actions (NAMA) document in 2011, and Agricultural NAMA in 2013 and an Energy NAMA in 2014. Also in 2014 the Government established a climate change portfolio within the Ministry of Environment, Climate Change and Natural Resources (MECCNAR) to facilitate policy coordination and implementation of climate change activities at the national and regional levels. In 2016 the National Climate Change Policy was developed and important policy recommendation relating to the establishment of a Climate Change Secretariat has already been implemented.

The past and current climate change and related risk management programmes/projects of the Government include the following categories:

1.6.1 Improving Resilience and Adaptation in the coastal zones

i. The GOTG/AfDB Coastal Protection The Gambia Project 2002-2004

Between 2002 and 2004 the Government of The Gambia with funding from the ADB implemented a programme to minimize/halt alarming erosion rates at strategic locations of the Gambian coastline using both hard and soft engineering techniques. Before then erosion was addressed on a piecemeal basis and mostly through community initiatives.

Through this project implemented by Royal Haskoning of Netherlands, a more holistic approach was taken which consisted of beach nourishment along some hotspots of the coastline with some hard engineering techniques that included the construction of

groynes, gabion baskets and revetments. The Haskoning works have not fully taken into consideration outcomes of and recommendations from previous studies on the coastal zone. This has resulted to faster than expected loss of nourished beach after the end of the project in 2004.

ii. The GOTG/EU Climate Change and Coastal Area Project for an Integrated Coastal Zone Management and the Mainstreaming of Climate Change Policy

In 2014 with the support of the European Union the Gambia Government implemented the above project adopting a holistic and integrated approach in addressing climate change in the coastal zone. The project has taken an integrated coastal zone management approach and the activities undertaken include development of climate risk management capacity for coastal zones, development of a coastal zone monitoring programme and the formulation of a national Climate Change Policy which provides a framework and direction for addressing the adverse impacts of climate change.

iii. The GOTG/GEF/UNDP: Enhancing Resilience of Vulnerable Coastal Areas and Communities to Climate Change in The Gambia

This project is complementary to the EU Project with funding from the Least Developed Countries Fund (LDCF), UNDP and Gambia Government. In addition to the coastal zone the project has also covered some inland areas within the Gambia River estuary. The project activities comprise the construction of hard structures to minimize coastal erosion arising from climate change induced sea level rise as well as developing alternative livelihood systems to build resilience in the communities identified. The climate risk management measures undertaken by the LDCF project fit well into the ICZM process, enhancing resilience to climate change in coastal areas of The Gambia and supporting climate change development plans in vulnerable coastal areas.

The activities undertaken hard coastal protection infrastructure designed and constructed with additional redundancy against sea level rise and climate induced erosion; Low cost infrastructure built to protect up to 1,500 ha of vulnerable rice growing areas; Strengthened livelihood of coastal communities at risk of climate change through agricultural development supported in vulnerable saline areas

1.6.2 Strengthening National capacity in generating, processing, storing and disseminating Climate data and information

i. The GOTG/UNEP/LDCF project “Strengthening of the Gambia’s Climate Change Early Warning System”

This project focused on enhancing the capacity of the networks of synoptic meteorological and hydrological stations within the country to identify climate-related natural hazards (mainly drought, flooding, wind storms leading to wind erosion) and forecast their potential impacts on vulnerable communities as well as delivering climate

information including early warning to enhance adaptive capacity and reduce vulnerability of The Gambia's population to climate change. The activities undertaken include: i) rehabilitation of existing hydro-meteorological stations and equipping them with a critical minimal set of equipment and instruments; ii) enhancement of human resources capacity in the Gambian National Meteorological and Hydrological Services (NMHS) to enable accurate and timely collection, processing and interpretation of weather and climate data; and iii) improving the capacity of the NMHS to effectively package and share weather forecasts and early warning messages. The strengthening of the early warning and information sharing system in the Gambia is translating into a better-informed decision making on climate change issues by government officials and the general public. The Project is now in its second phase.

ii. The GOTG/UNECA/ACPC Climate and Climate Change Data Management Project, Under this project, the Government of The Gambia and the African Climate Policy Centre (ACPC) under the United Nations Economic Commission for Africa (UNECA) are collaborating to strengthen the climate data, information, science, knowledge and capacity base in the Gambia, and improving coordination and synergy building among partners and institutions engaged in implementation of climate change and development activities in The Gambia. The support is being provided on (i) Meteorological and Hydrological data and information upgrading and management, (ii) climate change resilience, adaptation, mitigation and low carbon/green economy in The Gambia and (iii) capacity building and technical support (mainly to be implemented under (i) and (ii).

iii. The African Climate Policy Centre (ACPC) Technical Support Programme to The Gambia on Climate and Development-

The main objective of the project is to improve the meteorological and hydrological observation networks in the country and rescuing existing data. This will involve Upgrade the Observation Network System (Purchase and install new equipment for the hydro-meteorological network stations); Data rescue, data management (Existing data are rescued and available in a usable format); Capacity building (To strengthen the capacity in Hydro-meteorological instruments operation, maintenance and data manipulation). The project was launched in 2013 and so far the process for rescuing the existing meteorological data has been completed and two instrument technicians have been trained on the operation, maintenance and calibration of AWS.

1.6.3 Managing climate change and related risks in Agriculture

i. A Nationally Appropriate Mitigation Action (NAMA) for the Agriculture Sector has been developed with the main objective of reducing greenhouse gas emissions through the promotion of an integrated crop-livestock system and promotion of sustainable

development, poverty reduction and other co-benefits. Specifically this NAMA strategy will promote green growth path through:

- a. Promotion of the restoration of degraded grazing lands and promotion and application of appropriate harvesting, storage, and preservation techniques for livestock feed;
 - b. Facilitation of further crop diversification and cultivation for the main purpose of reducing the clearing of virgin lands for cultivation which will help maintain forest carbon sinks; and
 - c. Facilitation of the displacement of fossil fuel (diesel/gasoline) powered pump irrigation by solar and wind powered irrigation systems, and expansion of tidal irrigation.
- ii. A GOTG/GEF/FAO/LDCF Project to support climate change adaptation in the agriculture sector.** The Project will strengthen diversified and sustainable livelihood strategies for reducing the impacts of climate variability and change in agriculture and livestock sector through (i) strengthening of institutional and technical capacity for adaptation to climate change in agriculture sector, (ii) assessment of vulnerabilities, risks and dissemination of timely risk information to users at all levels, (iii) promoting diversification of livelihood strategies and intensification of agriculture production, processing and marketing, and (iv) improving livestock production and land management for sustaining livelihoods of local communities.

Some of the prioritized technical measures proposed for implementation include (i) selection of drought-, pest- disease-, and salinity-resistant, high-yield crop varieties for local conditions; (ii) change in planting dates and replacement of long-duration upland and lowland rice varieties with short-duration varieties; and (iii) demonstration, promotion and diffusion of improved postharvest technologies that will have the long-term effect of reducing extensive cultivation of marginal lands. Promising regulatory measures consist of discouraging cultivation on marginal areas; cooked food waste reduction; and diversification of eating habit (change from rice to other cereals). From animal husbandry perspectives, measures complementary to those geared towards rangeland regeneration/restoration would most likely be needed to buttress traditional livestock production systems and minimize farmer-herder conflicts. It would be appropriate to increase fodder production from intensive feed gardens; promote crop/livestock integration; improve feed conservation techniques and access to supplements; and further explore opportunities for selective/cross-breeding of Ndama cows with higher milk-producing breeds.

iii. A GOTG/FAO/World Bank/IFAD Project-Adapting Agriculture to Climate Change (AACC) in The Gambia

The project has the overall objective “to promote sustainable and diversified livelihood strategies for reducing the impacts of climate variability and change in agriculture and livestock sector”. Since existing planning frameworks and programmes in the

agricultural sector have little or no explicit consideration to increasing climate variability and climate change the project will strengthen the on-going and planned programmes by taking care of additional elements related to increased climate variability and climate change which would have the potential to enhance food security and fight against poverty. The Geographic Coverage of the project is North Bank Region, Central River Region (North) and Upper River Region (North). The Project document was only signed in February 2017 and the process of setting up the implementation structures is in progress. The planned activities will include Strengthening of institutional and technical capacity for adaptation to climate change in the agriculture sector; Assessment of vulnerabilities, risks and dissemination of timely climate risk information to users at all levels; Promoting integrated livelihood and income generation, sustainable production and management practices in agriculture and linking to value addition and marketing; Enhancing resilience of rangelands by implementing improved management practices and Monitoring, Evaluation and Knowledge Management.

iv. Strengthening Climate Resilience of the National Agricultural Land and Water Management Development Project (ASAP) – Chosso; under the IFAD-initiated National Agricultural Land and Water Management Development Project (NEMA). NEMA seeks to reduce the poverty of women and young people in rural areas by increasing their incomes from improved productivity based on sustainable land and water management practices. ASAP's objective is to improve the climate resilience of large-scale rural development programmes, and improve the capacity of at least almost 155,700 rural households across the country to expand their options in a rapidly changing environment. According to him, the objective is to optimise the NEMA's effectiveness in addressing climate-related threats to smallholder agriculture, and to ensure the systematic mainstreaming of climate risk management in decision-making and planning processes at all levels.

v. GOTG/GREEN FUND/UNEP Large-scale Ecosystem-based Adaptation in The Gambia: developing a climate-resilient, natural resource-based economy.

The Project seeks to build the climate-resilience of rural Gambian communities and facilitate the development of a sustainable natural resource-based (green) economy by implementing large-scale EbA within and adjacent to agricultural areas, community-managed forest reserves and wildlife conservation areas of The Gambia. Currently the necessary administrative measures are underway for the start of the project. The actions to be undertaken include restoring and building The Gambian natural resource base in transformed agricultural landscapes and degraded ecosystems (including deciduous and semi-deciduous forests, savanna woodlands and mangroves) using climate-resilient tree and shrub species across an area of at least 10,000 hectares. Interventions will take place within and adjacent to at least 125 newly established Community Forestry Reserves (CFs) and Community Protected Areas (CPAs), across four regions of The Gambia (Lower River, Central River and Upper River Regions

1.6.4 The GOTG/UNDP supported National Disaster Management Programme

This project has made significant strides in disaster management in The Gambia. In the face of challenges posed by the paradigm shift from rescue and relief operations to disaster prevention and preparedness, the National Disaster Management Agency was established, a Disaster Management Policy was developed and a long term Disaster Risk Reduction and Climate Change Adaptation Strategy (CCA 2009-2013) has been implemented. The CCA highlights the need to focus on climate change adaptation and to mainstream disaster deduction and climate change in the development agenda.

1.6.5 A GOTG/GEF/UNIDO STAR: “Greening of the domestic and services sector in the Gambia: Improving energy use efficiency and promoting renewable energy in the domestic and services sectors.”

The project seeks to promote energy use efficiency and integration of renewable energy systems in the domestic and services sectors in the Gambia in an integrated manner. The project scope and approach is premised on the need to systematically promote a business case for promoting both renewable energy and energy efficiency on the part of end users. To date, most projects that seek to promote renewable energy have focused on the generation of renewable energy on a large scale. Given the nature of these large-scale projects in terms of size and technical complexity, the lessons and benefits of the success stories in this sector have not been transferred to the domestic and services sector in an integrated and systematic manner.

The Project components are (a) demonstration of viable technologies and development of business models for renewable energy and energy efficiency technologies deployment, (b) capacity building and (c) establishment of innovative financial mechanisms enabling access to modern energy services.

1.7 Brown development challenges/gaps as identified in the recent policy/programmes documents and not covered in the SPRC.

Earlier policy and programme documents have identified a number of brown development challenges which need to be addressed to move the country along a green development pathway. These challenges exist mainly at the levels of policy, capacity, technology and finance. The SPRC has covered some of these challenges but focused primarily on adaptation, “...given the overriding needs in The Gambia;” although it has, where possible, and in line with the policy directions set out in the NCCP, also considered some mitigation priorities within the framework of an integrated approach to adaptation and mitigation.(SPCR page).The challenges outlined below cover mainly mitigation as contained in various policy documents (NDC, NAMA, NCCP, etc.) and they include the following:

i. Absence of a national strategy to guide the process of transiting to a green development pathway

Although the NCCP has defined the main policy direction and the SPCR has provided an overarching strategic framework the primary focus of the strategy, as indicated above, is on adaptation. From the mitigation perspective the current enabling environment is still heavily weighted towards the prevailing brown economy, which depends excessively on fossil fuels, resource depletion and environmental degradation. In view of the transformation processes that will be required, a strategic framework is necessary to guide the transition from a brown economy to a green economy that is socially, economically and environmentally acceptable and sustainable whilst capable of building the resilient capacity of the population and reducing GHG emissions. The current regulatory and institutional gaps will need to be reviewed changed to a more positive enabling environment. The object of the present study is to provide such a strategic framework. The Government will have to adopt a more positive environment for the growth of a green economy that looks at prevailing policies, regulations, subsidies and incentives, as well as trade and technical cooperation.

ii. Low technical skills and capacity

The main challenge under capacity building relate to technical and professional knowledge in developing different aspects of climate change including the preparation of GHG inventories, developing GHG mitigation projects to attract international financing, developing and implementing MRV for mitigation projects. Such skills will help improve climate risk management at national, regional and sectoral levels. The other challenge is the low institutional capacity in terms of the limited availability of material resources to carry out work. Such resources include logistics to collect the data necessary to carry out the studies such as inventory studies, availability of electricity, access to computers and internet facilities etc. These and similar challenges will need to be addressed to move the transition process forward.

iii. Technology Development and Transfer

The core of the LECRD strategy should be a strong technology policy with a focus on mitigation of greenhouse gas emissions through acquisition and utilizations of green technologies and building and enhancing resilience through appropriate adaptation measures and strategies. Currently there are no such technology policies and programmes in place to facilitate access to mitigation technologies. A technology needs assessment study is in progress which should form the basis of a policy that would define the country's urgent technology needs particularly in the energy sector, waste management, transport and agricultural sectors which continue to be the major contributors to GHG. The present study will help identify some appropriate technologies to reduce GHG emissions.

iv. Information challenges

Generally there is a low public and institutional awareness on mitigation and this can reduce the level of participation of the various stakeholders in the transition process which will require technological and attitudinal changes as well as trade-offs that will impact on people's lives. Whilst some public awareness campaigns have been carried out in the past in the overall framework of climate change information, there is, however, a limited outreach on the mitigation challenges. There will be a need to develop an education and communication strategy that focuses on mitigation and resilience once the LECRDS is developed in order to increase the level of awareness among the general public and increase a greater stakeholder buy-in. The general public must be helped to understand that some of the initial high cost of mitigation technologies, such as solar photovoltaic technologies, have a social, environmental and economic benefits for the individual and the community in the long term which may not be readily apparent in the initial stages.

v. Financial Challenges

One of the major financial challenges facing The Gambia is the level of poverty with an economy very much dependent on a limited tax base and therefore a high dependence on donors to finance its development. Already the national budget is struggling under a heavy debt burden whilst performance of key sectors such as tourism and agriculture has remained very much unpredictable. The Gambia's climate change priority action plan for 2012–2015 and the National Climate Change Policy 2016, require in excess of an estimated US\$1.35 billion in climate financing by 2030. It is therefore clear that The Gambia as a Least Developed Country (LDC) will continue to depend on donors to implement its transition programme to a green economy. At the moment, available climate financing targets mainly adaptation and resilience, while mitigation will need more financial resources in both the medium and the long run. Attracting international public financing has not been easy in the past, mainly because of the issues of governance of the past regime. However, the recent political changes in the country ushering in new democratic dispensation may facilitate this process through an active engagement with donors.

At the individual level the high initial capital cost of some of the technologies required such as the adoption of solar systems in the homes is very much beyond the means of an average Gambian. Policy incentives and other measures will therefore have to be in place to facilitate access to such new technologies. Another financial challenge is accessing international market-mechanisms. The ability to apply, at national level, some of these complex procedures and guidelines for accessing some of these funds has yet to be developed nationally.

CHAPTER 2:

CLIMATE CHANGE IMPACTS ON SELECTED SECTORS

2.1 Assessment of existing GHG emissions of selected sectors (energy, transport, fisheries, industry, agriculture and forestry)

The previous National Greenhouse Gas Inventory of 2000 shows total emissions of greenhouse gases of about 3,623 Gg or 20.02 million tons CO₂equivalent (tCO₂e), giving per capita emissions of 13.5 tCO₂e. It further showed about 84% of the emissions were sulphur dioxide primarily from energy sector activities, about 9% was carbon-dioxide, 5% carbon-monoxide and methane was approximately 1%. All the other greenhouse gas emissions contributed less than 2% of the total national emissions. In 2010 the Third National Greenhouse Gas Inventory was conducted, thus providing updates on the Second National GHG Inventory. The assessment of the emissions of the selected sectors is given below based mainly on the 2010 National Inventory Report.

2.1.1 Energy

According to the Third National Greenhouse Gas Inventory Report of 2010 (NIR, 2010), the Energy sector emitted a total of 437.6 Gg of Carbon Dioxide (Gg CO₂), 6.2 Gg of Methane (Gg CH₄), 0.09Gg of Nitrous Oxides (Gg N₂O), 3.3Gg of Oxides of Nitrogen (Gg NO_x), 108.21Gg of Carbon Monoxide (Gg CO), 18.8 Gg of Non-methane Volatile Organic Compounds (Gg NMVOCs), and 1.7 Gg of Sulphurdioxide(Gg SO₂). It further indicated that 76% of the greenhouse gases emitted in 2010 were carbon dioxide (CO₂), about 19% was carbon monoxide (CO), about 3% was non-methane volatile organic compounds (NMVOCs), 1% was methane (CH₄) and the remaining 1% was NO_x, N₂O and SO₂. Energy Industries (ENI) contributed 33%, Residential sub-sector emitted about 26%, Commercial and Institutions sub-sector contributed about 4% and the remaining sub-sectors (WATRAN, AGFOFI and MACO) contribute about 2% on the total energy emissions.

Figure 3 below shows the trends in the total greenhouse gas emissions (GgCO₂e) from the Energy Sector from 2001 to 2010. Emissions in Gg were converted to GgCO₂ equivalent using GWP in AR5 (IPCC, 2013). The trend shows year-to-year variations but there is a general increase in total emissions during the ten-year period.

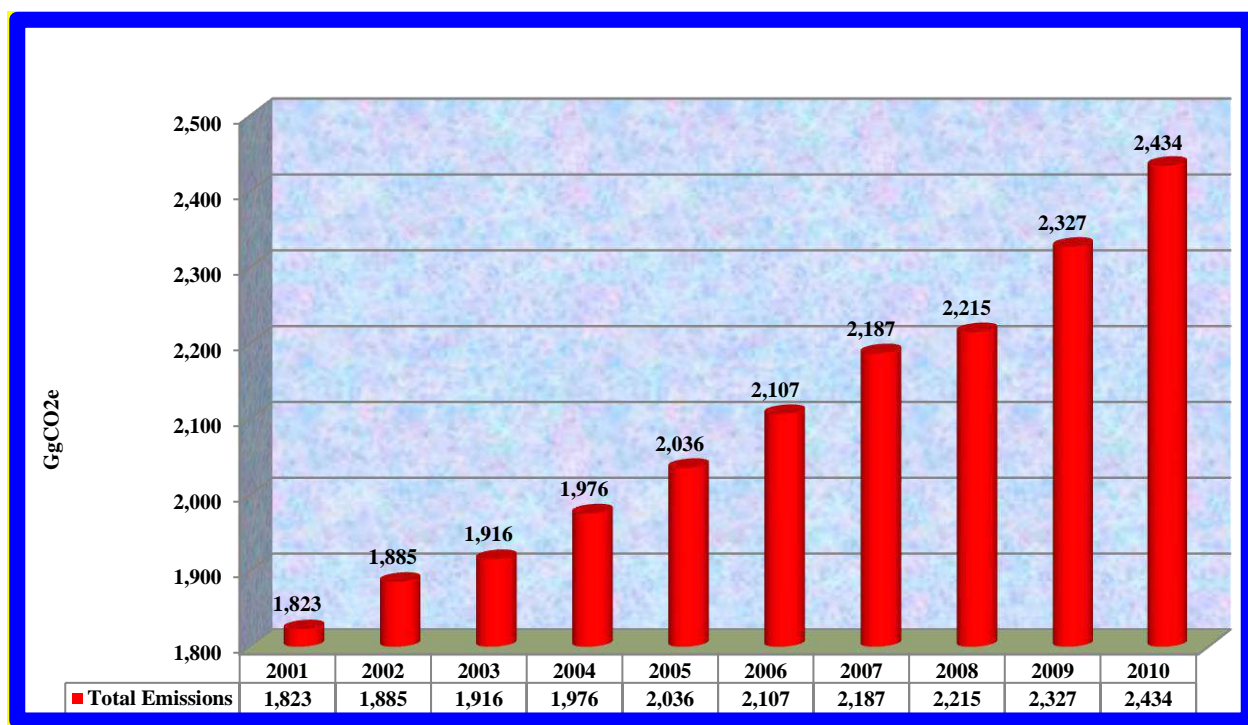


Figure 3: Trend in GHG emissions (GgCO₂e) of the energy sector in the Gambia from 2001 – 2010 (NIR, 2010)

2.1.2 Transport

In the transport sector the main GHG emissions consist of CO₂ and Nitrogen Oxide (NO_x). In 2000, of the total national CO₂ emission of 218 Gg, 43% came from the transport sector, whilst 50 % of the total NO_x emission of 3.31Gg also came from the transport sector (SNC). In 2010, Road Transport (RTRAN) contributed about 35% (NIR, 2010) of the total emissions from the energy sector. It is fair to assume that with the increase number of road vehicles the emissions from the transport sector has increased since the first GHG Inventory was prepared. A historic reconstruction of GHG emissions in the transport sector has shown emissions grew by 111% between 2000 and 2012 (TNA-mitigation report 2016).

2.1.3 Fisheries

Emissions from the Fishery sector were not assessed in the First and Second National Communications, hence direct GHG emissions from the Fishery sector are not known. However, it is agreed that emissions of the sector come from fish smoking, canoe making, fish storage and processing and out boat engines. Emissions from fish smoking and canoe making are categorized under the forestry emissions as fuel wood consumptions and deforestation, whilst fish storage and processing are categorized under industrial emissions and emissions from out boat engines are categorized under energy emissions. Therefore, emissions from the fishery sector are taken care of in the forestry, Energy and industry sector emissions.

2.1.4 Industry

Results of estimation of greenhouse gas emission from The Gambia in 2010 (NIR, 2010) show total emission from the Industrial Processes and Product Use category is 21.2Gg, using GWP, the total emissions from the category is 793.8Gg CO₂e, with HFCs being the biggest contributors (89%) to the emissions from IPPU category followed by Methane and Carbon dioxide

The trend (Figure 4) shows greenhouse gas emissions (GgCO₂e) from the Industrial Processes and Product Use emissions have been increasing from about 373 in 2001 to about 794 GgCO₂e in 2010. In every year, HFCs have been the highest emitted gas contributing to more than 85% of the emissions.

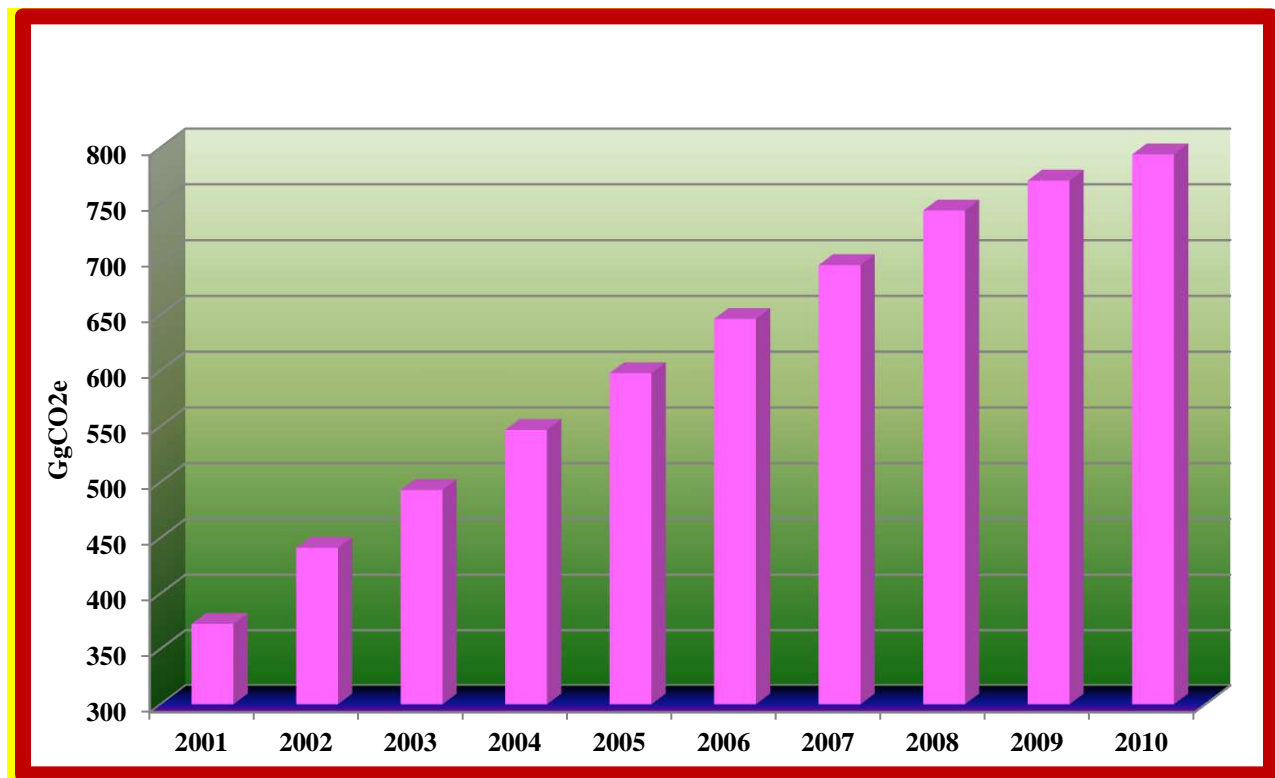


Figure 4: Greenhouse Gas Emissions (CO₂e) Trend 2001 – 2010 of the IPPU category in the Gambia (sourceNIR, 2010)

2.1.5 Emissions from Agriculture, Forestry, Other Land Use (AFOLU)Category

Total emission of about 2514GgCO₂e was emitted from the AFOLU category (NIR,2010) in The Gambia in 2010 (Figure 5 below). About 53% of the emissions came from Agriculture (Cropland and Livestock) sector, while 47% were recorded from Forest and Land Use Change (NIR,2010).

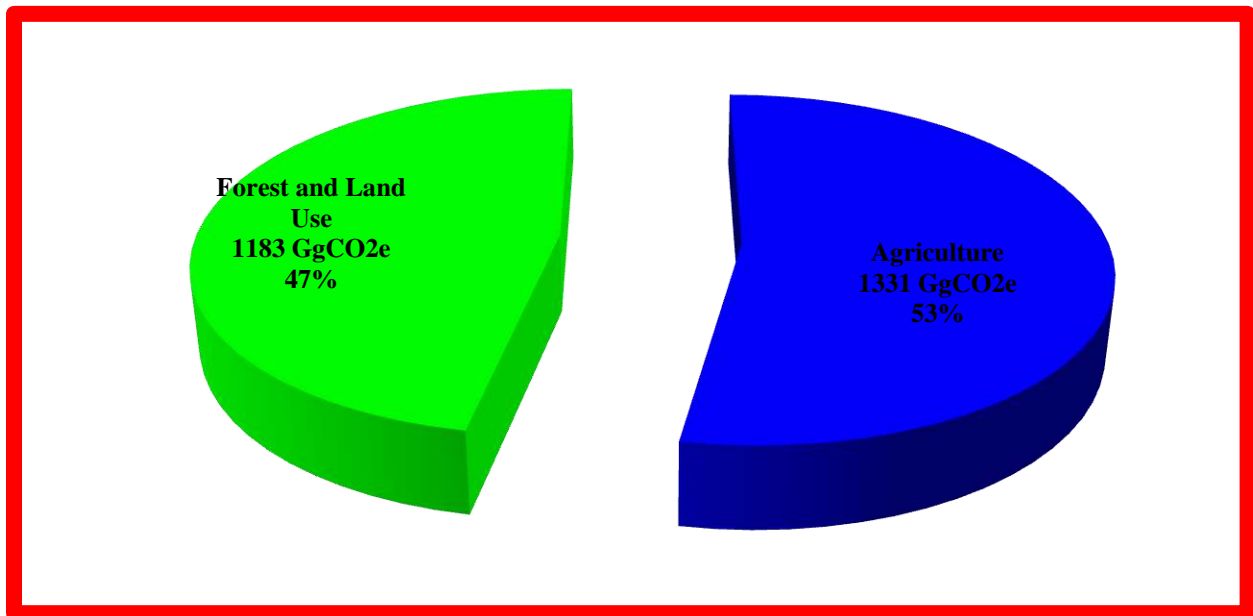


Figure 5: Emissions (GgCO₂e) from the Agriculture and Forests in the Gambia by 2010(sources:NIR, 2010)

Figure 6 below shows the trend of emissions from AFOLU from 2001 to 2010. The results indicate a decreasing trend in emissions from Forest and Land Use Change, while whole emissions from Agriculture are on the increase (NIR, 2010).

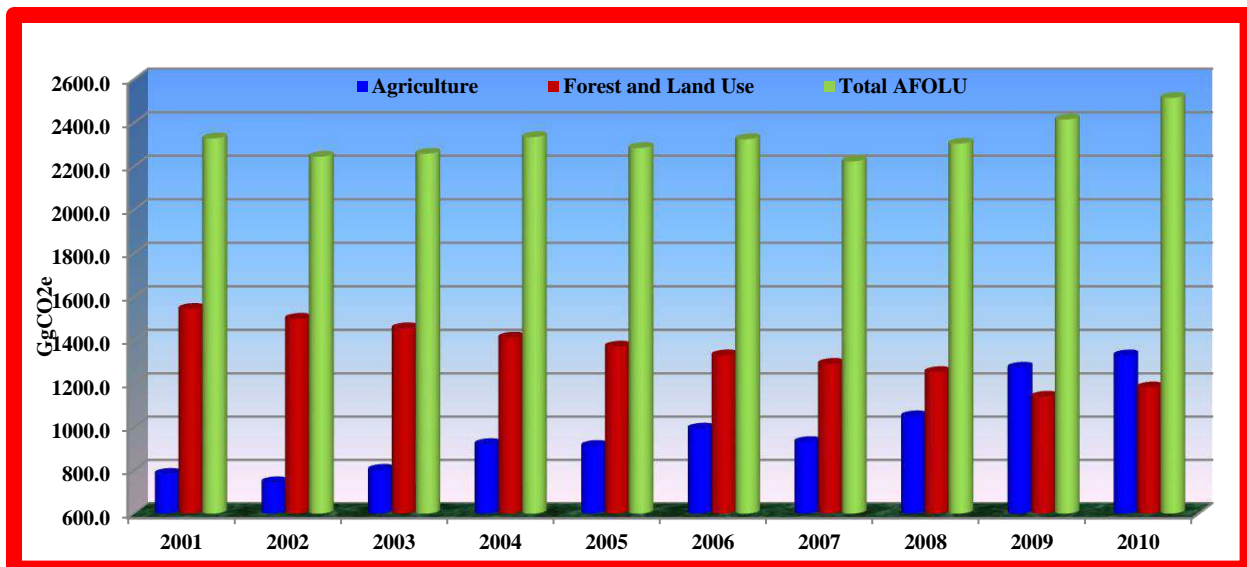


Figure 6: Emissions trends (GgCO₂e) from the AFOLU Category in the Gambia by 2010(sources:NIR, 2010)

Emissions from Agriculture

Figure 7 below shows the emissions of greenhouse gases from sub-categories⁽¹¹⁾ of the Agriculture category in 2010. Rice cultivation (RC, 34%), Enteric Fermentation (EF, 29%) and Agricultural Soils (AS, 25%), are respectively, the biggest emitters of GHG (NIR, 2010).

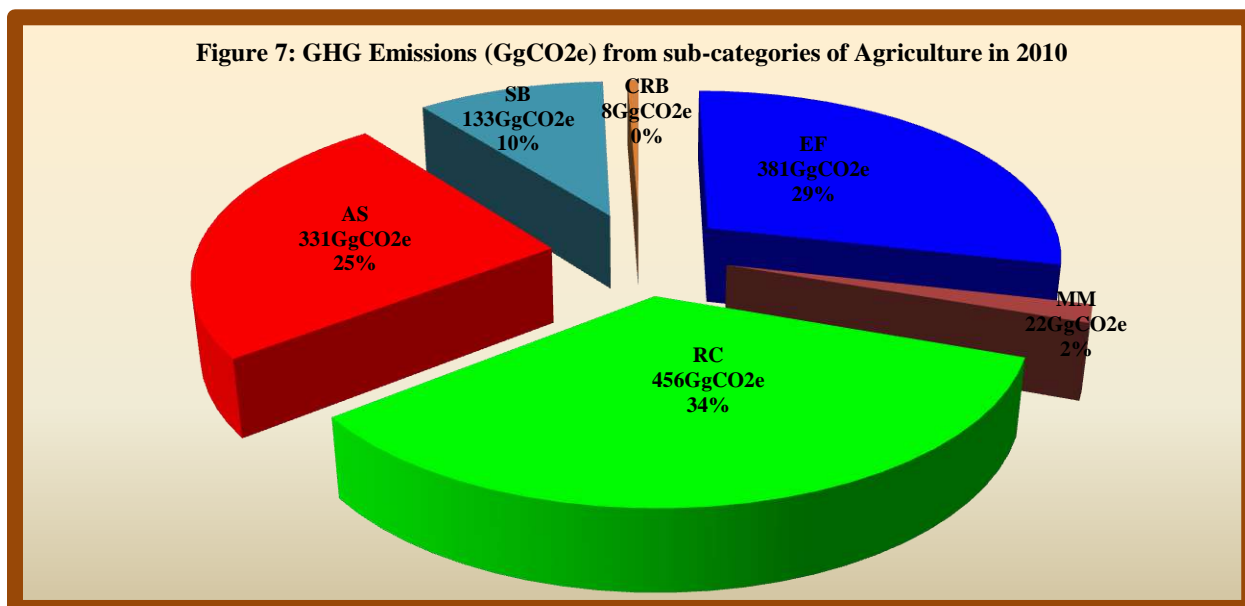


Figure 7: Emissions (GgCO₂e) from the sub-categories of Agriculture in the Gambia by 2010(sources:NIR, 2010)

¹¹EF=Enteric Fermentation, MM=Manure Management, RC=Rice Cultivation, AS=Agricultural Soils, SB=Burning Savanna and CRB=Burning of Crop Residues

Figure 8 below shows the trend in annual emissions from Agriculture category for the period 2001 to 2010. It is evident that emissions from the category show a generally increasing trend (NIR, 2010).

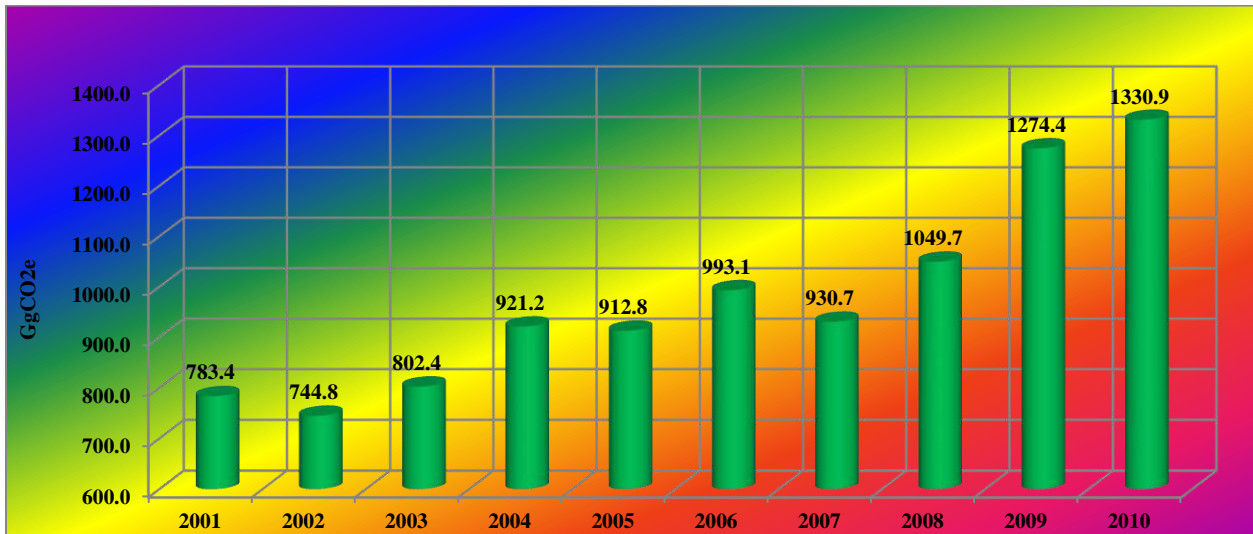


Figure 8: Trends in annual emissions (GgCO₂e) from Agriculture in the Gambia from 2001 to 2010(sources:NIR, 2010)

Emissions from Forestry and Land Use Change

In 2010, total net emissions of 1,183GgCO₂e were registered under Forestry and Land Use Change sub-category. Of these emissions 2,301GgCO₂e came from Forests (1,334GgCO₂e) and Forest Soils (967GgCO₂e) while 1,118GgCO₂e were absorbed from the atmosphere by Other Wooded Lands (-657GgCO₂e) and Soils in these OWL (-462GgCO₂e)(NIR, 2010).

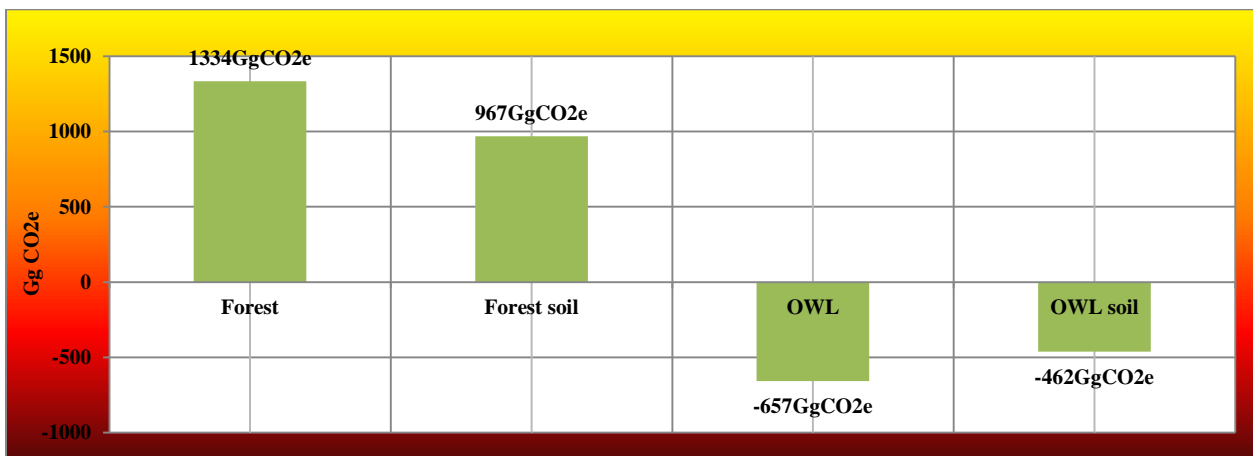


Figure 9: Greenhouse Gas Emissions and Uptake (GgCO₂) by the Forestry sector in 2010(Sources:NIR, 2010)

With regard to the trend, Figure 10 shows a generally decreasing trend in emissions from Forests and Land Use Change of about 23% from 2001 to 2010.

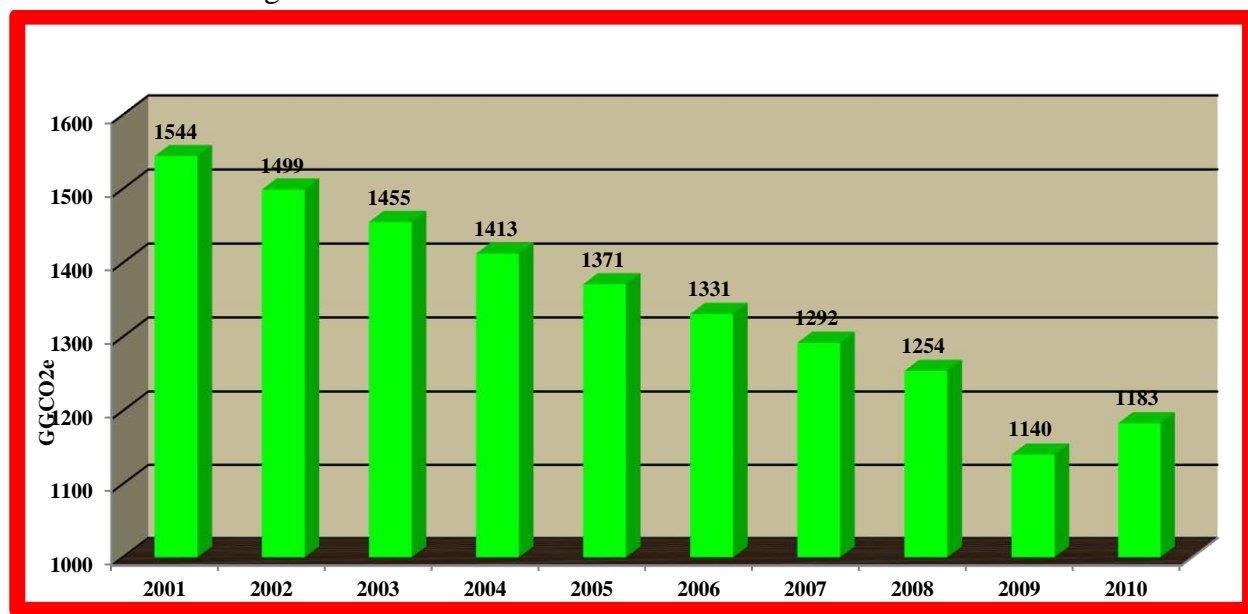


Figure 10: Annual Emissions (GgCO₂e) from Forests for the period 2001 to 2010(sources:NIR, 2010)

2.2 Projected GHG emissions to 2020-2050 under a business-as-usual (BaU) and alternative development scenarios

2.2.1 Expected SectoralGHG emissions by 2020-2050under a business-as-usual

The general expected emission trends by 2020 and 2030 of the 4 sectors is a gradual increment except for Forestry which shows a sharp emission decrease by 2030. Figure 11 below shows the projected emissions from the Agriculture, Energy, Transport and the Forestry sectors covering from the periods of 20 , 2025 and 2030. By 2020 to 2030 through 2025 emissions from the Agriculture are expected to gradually increase to 1700 GgCO₂e by 2030. The energy sector emissions will increase from 500GgCO₂e in 2020 to 700 GgCO₂e by 2030 and emissions from the transport sector will also see a steady rise to 500GgCO₂e by 2030. On the other hand, emissions from the forestry sector will to increase up to 1300GgCO₂e by 2025 and will then drop sharply 700GgCO₂e by 2030.

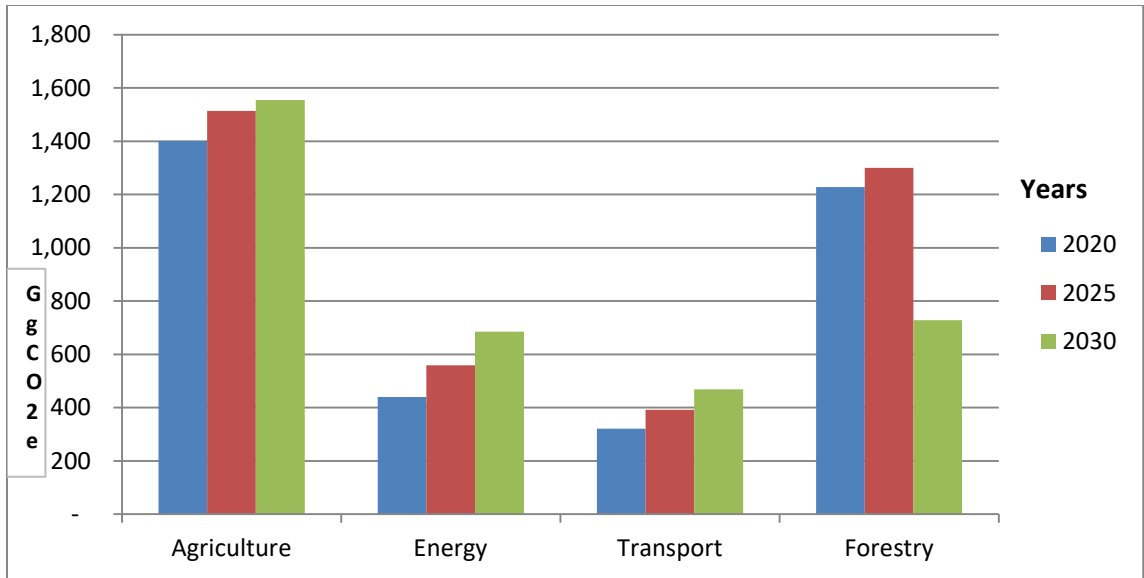


Figure 11: Projected GHG emissions from the Agriculture, Energy, Transport and the Forestry sectors by 2020, 2025 and 2030 (Source Gambia INDC 2015)

Industry, industrial processes and product (IPPU) is not included in this graph as projected national emission data is not available; the only available data is from 2001 to 2010, which is on HFC emissions from aerosols (INDC technical report May 2015).

In 2000, about 43% (1.39Gg) of greenhouse gas emissions from industrial processes comprised of HFCs, 34% (1.07Gg) represented carbon dioxide, 22% (0.71 Gg) NMVOCs and 1% (0.04Gg) SF6 emissions.

HFC emissions were generated from consumption in refrigeration and air-conditioning equipment (9%), closed-cell foam blowing (41%), fire extinguishers (26%), aerosols (0.04%) and solvents (24%). The trend in the emissions of greenhouse gases from industrial processes from 1994 to 2000 shows a general increase.

2.2.2 Alternative emission development scenarios

The selected mitigation options of the different sectors identified here as alternative emission scenarios are those used in the Gambia INDC 2015, which were based on existing research and available documents and strategies for The Gambia. The options came from the analysis, quantification and qualification of the effects of all the sectors except IPPU based on the available documents (INDC Technical report May, 2015). The NAMA submitted to the UNFCCC formed the starting point for the analysis, but also other mitigation options from other national or sectoral documents were included (INDC Technical report May, 2015).

Table 1 presents an overview of the summary of the mitigation options for alternative emission scenarios that were considered for quantification. These are mostly based on existing documents and ongoing or planned activities. The table provides a short description and sources of

information. Based on the information, further analysis in terms of Mitigation potential, Economic cost, Co-benefits and Type of co-benefits was conducted of the different mitigation options. Results of analysis are summarized in **Error! Reference source not found.** below.

Table 1: Overview of mitigation options as alternative emission scenarios

(Source: INDC technical report May2015)

Sector	Mitigation option	Description	Source of information
Energy	Increasing renewable energy sources	Increase by 20% the share of renewable sources in the electricity mix (20%*525MW); 30MW Wind & 75MW solar.	The Gambia NAMA (2010)
Forestry	Improved cooking stoves	Two hundred thousand (200,000) of improved cooking stoves (100,000 of charcoal and firewood stoves) are targeted to be distributed by 2030.	The Gambia NAMA (2010)
Energy	Reduced transmission losses	Minimize losses through the refurbishment, upgrading (from 33Kv to 132Kv) and expanding (link GBA to provinces networks).	The Gambia NAMA (2010)
Agriculture	Postharvest and food processing technology	This project aims to promote and facilitate the procurement of and utilization of post-harvest and food processing, reducing the waste of food.	The Gambia NAMA (2010)
Agriculture	Improved animal genetics	Promote an integrated crop-livestock system and improvement of animal genetics expected to lead to lower numbers of animals and a higher level of productivity.	The Gambia NAMA (2010)
Agriculture	Restoration of degraded grazing lands	Restore Degraded Grazing Land through Multiplication and Popularization of Forage Seed Planting of Multiple Purpose Plants in Grazing Areas.	The Gambia NAMA (2010)
Agriculture	Rice projects (NERICA)	Promote the cultivation of Upland High-yielding Rice varieties.	The Gambia NAMA (2010)
Agriculture	Rice projects (SRI)	Increase the efficiency of rice production through mechanization, the optimal use of fertilizer, and a system of rice intensification (SRI).	Ceesay (2011)
Forestry	Enhanced forest management	Improve harvesting and wildlife management to remove related causes of forest fires.	The Gambia NAMA (2010)
Forestry	Enhanced forest management	Reduce harvesting to maximum sustainable yield, remove all man-made causes of forest fires, and improve forest law enforcement through community forest management.	The Gambia National Forest Policy (2010), Sillah (2009)
Forestry	Afforestation	Afforestation of 1 million trees per year in urban and rural areas as well as mangrove forests.	The Gambia NAMA (2010), Sillah (2009)
Energy	Energy efficiency: lighting	Current programs: National Energy Efficiency Program (with ECOWAS) to substitute incandescent bulbs with CFLs. Plan to replace 305 000 bulbs in the residential sector.	SE4ALL Action Agenda (2014)

Sector	Mitigation option	Description	Source of information
		Sensitization on Energy Efficiency & Conservation (UNDP): Campaign, TV shows, leaflets.	
Energy	Energy efficiency: appliances	No activities currently on-going or planned. Proposed activities should follow the guidelines developed by ECOWAS for the NEEAP.	National Energy Efficiency Action Plan (NEEAP) (2014)
Energy	Domestic energy use: solar water heating	No projects on-going or planned, only some private activities. Proposed activities should follow the NREAP suggestions for measures. Targets for the implementation are set under the NREAP for health centres, maternities, school kitchens, boarding schools, agro-food industries and hotels for 2020 and 2030.	National Renewable Energy Action Plan (NREAP) (2014)
Energy	Energy efficiency: industrial applications and co-generation	No activities currently on-going or planned. Proposed activities should follow the guidelines developed by ECOWAS for the NEEAP.	National Energy Efficiency Action Plan (NEEAP) (2014)
Transport	Improving vehicle fuel efficiency	No activities currently on-going or planned. Proposed activities should follow the guidelines developed by ECOWAS for the NEEAP. For the longer term this also includes investment in improved road infrastructure to allow the use of smaller, non 4WD cars with lower fuel use, at least within urban areas.	National Energy Efficiency Action Plan (NEEAP) (2014)
Transport	Substitution of fuel with CNG/LPG	CNG and LPG have lower GHG emissions per distance travelled compared to gasoline. Compared to diesel, only CNG produces net emission reductions. The technology can be installed in existing vehicles.	(Atlantic Consulting, 2009)
Transport	Substitution of fuel with biofuels	Biofuels can substitute fossil fuels used for transportation. This can be done by mixing in a share of biofuels into the regular fuel dispensed at petrol stations or by providing pure biofuel.	n.a.
Transport	Promote public transport	No activities currently on-going or planned. Proposed activities should follow the guidelines developed by ECOWAS for the NEEAP.	National Energy Efficiency Action Plan (NEEAP) (2014)

Table 2: Qualitative evaluations of the different mitigation options as alternative emission scenarios (source: INDC technical report May 2015)

Mitigation option	Mitigation potential	Investment cost*	Economic cost	Co-benefits	Type of co-benefits	Comments

Mitigation option	Mitigation potential	Investment cost*	Economic cost	Co-benefits	Type of co-benefits	Comments
Increasing renewable energy sources	Medium	Low	Negative	Very high	Reduced pollution from fossil power plants. Reduced fuel consumption/import cost. Enhanced access to energy.	
Improved cooking stoves	High	High	Negative	High	Improved health, reduced time for firewood collection reduced cost of firewood.	
Reduced transmission losses	Medium	High	None	Low	Reduced pollution from fossil power plants. Reduced fuel consumption/import cost. Enhanced access to energy.	
Postharvest and food processing technology	Medium	High	Negative	High	Improved food security, reduced waste and emissions from waste.	Insufficient data
Improved animal genetics	Low	High	Negative	Low	Improved food security.	Cultural acceptance problematic
Restoration of degraded grazing lands	Medium	Medium	Medium	Low	Improved food security, protection from soil degradation and erosion.	Insufficient data
Rice projects (NERICA)	Very high	High	Low	Medium	Improved balance of payments and food security, poverty alleviation for small scale farmers.	
Rice projects (SRI)	Very high	Very high	Negative	Medium	Improved balance of payments and food security, poverty alleviation for small scale farmers.	
Enhanced forest management	Medium	Low	Negative	Medium	Enhanced biodiversity, long-term increased wood production, watershed management.	Partial quantification
Enhanced forest management	High	Very high	High	High	Positive impacts on microclimate and rainfall, enhanced biodiversity, long-term increased wood production, watershed management, eco-tourism.	Partial quantification
Afforestation	High	High	High	Low	Improved water management, reduced soil erosion, increased wood production.	

Mitigation option	Mitigation potential	Investment cost*	Economic cost	Co-benefits	Type of co-benefits	Comments
Energy efficiency: lighting	Low	Low	Negative	Low	Saved energy cost adds to disposable household income; release of grid potential.	
Energy efficiency: appliances	Low	Medium	Negative	Low	Saved energy cost adds to disposable household income; release of grid potential.	Insufficient data
Domestic energy use: solar water heating	Medium	Medium	Negative	Low	Saved energy cost adds to disposable household income; release of grid potential.	Insufficient data, rough estimation
Energy efficiency: industrial applications and co-generation	Low	Medium	Negative	Medium	Saved energy cost can be used for further investment leading to enhanced economic growth.	Insufficient data
Improving vehicle fuel efficiency	Medium	Medium	Negative	High	Investment cost is redeemed through reduced fuel cost over time. Positive effects on balance of payments for fuel imports. Positive health effects from reduced pollution.	
Substitution of fuel with CNG/LPG	Low	Very high	High	Low	Positive health effects from reduced pollutants, but slightly different for LPG and CNG. CNG technology potentially as bridge to biogas/landfill gas use.	
Substitution of fuel with biofuels	None	N.A.	N.A.	None	Positive health effects from reduced pollution, but negative effects on food security due to low availability of waste biomass, unless biofuels are imported.	
Promote public transport	Low	Very high	Medium	High	Enhanced mobility especially for the poor parts of the population; positive health effects; reduced traffic leading to reduced travel time.	

2.3 Projection of Climate Change profiles & vulnerability scenarios of the sectors identified

Overall, the Vulnerability assessments of major sectors of the country including the identified sectors have been conducted during the development of the two National Communications, the National Adaptation Program of Actions (NAPA), and the Nationally Appropriate Mitigation Actions (NAMA). These documents have been developed with a wider stakeholder involvement including the National Climate Committee (NCC) and were in line with the national policies and programmes including VISION 2020, the PAGE and relevant sectoral strategies and policies.

General summary of results from all these climate change strategic reports suggest that under the projected climate change, The Gambia will be warmer (current mean annual temperature increases 0.3°C in 2010 to about 3.9°C in 2100), and drier (mean annual rainfall decreases from about 1% in 2010 to about 54% in 2100; potential evapotranspiration increases by about 10% (Adaptation TNA, 2015).

Ground water recharge is projected to decrease by 3% and the saline front of the River Gambia is projected to reach 250 km upstream from the mouth. These translate to water stress, reduction in arable land, decrease in crop production by about 21 to 44% and a decrease in fish biomass productivity of about 4% by 2100(TNA-adaptation, 2015).

Projected sea level rise will inundate about 92 km² of the coastal zone, including the mangrove systems on St. Mary's Island and Kombo St. Mary and the strand plains from Barra to Buniadu Point (GOTG/TNA-adaptation, 2016).

The suitability of the habitats for some faunal species is projected to be highly reduced; biomass production in Forests will be lower under the warmer temperatures ; some of the grasses in the rangelands will not survive the climate after 40 years; nitrogen uptake by grasses will be reduced, the vegetation will not be palatable and so milk production in livestock will reduce. Overall, food security is threatened and ecosystem productivity and services in The Gambia will be poor under climate change (GOTG/TNA-adaptation, 2016). Sector specific vulnerability and impacts are described below

i. Agriculture

More than 98% of agricultural lands in The Gambia are rain-fed, making the sector highly vulnerable to rainfall variability. The yield of some major crops fluctuates as much as 100% from year to year. Since the 1960s, yields of these crops have decreased by as much as 30% (NCCP, 2016). Further decline in the amount and distribution of rainfall, together with increased temperatures, is expected to constrain productivity of crops such as maize,

groundnut and millet (NAPA, 2012, NCCP, 2016). Between 2002 and 2007, total rice production dropped by about 68%, from 35,900 tonnes to 11,395 tonnes. Similarly, coarse grains production (e.g. maize, sorghum, millet) fell about 27%, from 248,400 tonnes in 2003 to 181,400 tonnes in 2007, mainly due to drought (NCCP, 2016). Rice production and the lives of women farmers in the areas of production will be impacted negatively with the disappearance of freshwater swamps and soil salinisation in lowland areas as a result of sea level rise (NAPA, 2012).

Water and heat stress in particular are expected to take a heavy toll on perennials and shallow-rooted forage species. In a cattle-raising system largely based on extensive common land grazing, a decline in fodder availability and quality is expected to translate into loss of animal production. A 29 per cent to 40 per cent drop in live biomass, depending on species considered, is expected to accompany projected climate changes (NAPA, 2012).

Equally, higher temperatures and humidity will adversely impact on small ruminants (i.e., goats and sheep), which make important contributions to household economies. The result of intense climatic stress on free grazing small ruminants include: significant reduction in milk yields; slow growth rates; decreased reproductive rates and increased mortality rates (NAPA, 2012).

ii. Fisheries vulnerability and impacts

Climate change impacts on fisheries are expected to mainly derive their essence from changes to the Eastern Atlantic marine ecosystem, which incorporates the coastal and estuarine areas of the River Gambia (NAPA, 2012). The vulnerability of the fisheries sector is in two folds; the declining Atlantic fish resources due to increasing fishing intensity and irresponsible fishing practices on one hand and the impacts of climate change on the other (NCCP, 2016). Meanwhile, some single species models show increased productivity of the River Gambia under climate change (NCCP, 2016).

However, loss of mangroves and salt marsh vegetation due to sea level rise could offset these positive impacts; while a drop in mean annual run-off due to climate change could result in a complete change in the hydrological and salinity balance of the River Gambia's estuary, in turn affecting fish species abundance, composition and distribution (NCCP, 2016).

Higher salinity at the mouth of the estuary, caused by reduced freshwater sources and enhanced by less rainfall and simultaneous sea level rise linked to climate change, may impede the entry of larvae and juveniles of many marine species into the estuary, particularly the shrimp (*Penaeus notialis*), to complete their early lifecycle processes (NCCP, 2016).

Within the continental shelf area, productivity is likely to be given an initial boost by the changing heat budget of the overlying ocean, CO₂ enrichment, and seasonal upwelling. Similar to terrestrial plants however, the effects of CO₂ enrichment may peak quite early, and lose importance thereafter as respiration consumes a greater proportion of gross primary productivity (NAPA, 2012).

In the estuarine zone of the River Gambia, sea level rise may initially favour the mobilisation and export of nutrients from wetland sediments, but the same process could equally release pollutants into the aquatic ecosystem.

Additional climate forcing and loss of estuarine mangroves are therefore likely to: 1) precipitate the collapse of some pelagic fish populations, 2) threaten food security for a significant proportion of Gambians, and 3) undermine the livelihood and traditional way of life of fisher folk in the country (NAPA, 2012).

iii. Energy sector

A detail and comprehensive assessment of impacts on the energy sector is required for an adequate climate change profile of the energy sector; however, this is handicapped by a serious research deficit on the subject (NAPA, 2012). To remedy the limitations the IPCC reports (IPCC, 2001; 1996) and other national studies reports were used to provide valuable insights into potential climate change impacts (NAPA, 2012).

Rising temperatures combined with decreasing rainfall are likely to cause a decline in standing forest biomass, and hence the renewable volume of fuelwood which provides 85 per cent of national energy consumption, a biomass energy source with low solar energy conversion efficiency (NCCP, 2016, NAPA, 2012). Delivery of petroleum products, the second most important source of energy in use, and electricity supply could suffer disruptions in supply related to extreme weather events (strong winds and floods (NCCP, 2016).

The vulnerability of certain energy infrastructure, such as the growing renewable energy solutions varies according to technologies, with wind turbines likely to be least affected and solar PV efficiencies slightly reduced by dust coating of modules (NCCP, 2016). Electricity supply infrastructure will face decreased thermal efficiency of power lines, whilst Ohmic resistance of power transmission lines, known to increase with temperature, will also increase current transmission losses within power grids (NCCP, 2016, NAPA, 2012), and possibly damage to infrastructure. Higher temperatures degrade heat exchange efficiency of engines and encourage use of air-conditioning, resulting in higher fuel consumption and increased GHG emissions. Furthermore, higher temperatures are expected to increase further the energy demand across a range of end-uses (NAPA, 2012) as demand for cooling and storage of perishable goods will gradually increase.

In general, construction, protection and maintenance costs of energy delivery systems would increase in conformity with added design specifications, and facility location decisions that will incorporate climate change considerations (NAPA, 2012) to respond to policy recommendation and with further mainstreaming of climate change issues into the sector.

iv. Forest resources vulnerability and impacts

Currently, forest degradation is largely driven by consumption of woody biomass from the forests and rangelands to supply fuelwood, which constitutes 85 per cent of the energy consumed by the Gambian population. Charcoal production in The Gambia has been steadily increasing over the years, reaching over 60,000 tonnes in 2014 alone. Sea level rise of one metre will potentially inundate 6,500 ha of woodland and 40,900 ha of mangrove areas within the North Bank, West Coast, and Central River regions.

Climate change will affect forestry resources through the combined effects of rising temperature and more erratic rainfall patterns. Forest regeneration rates are expected to suffer a decline under combined effects of rising temperature and more erratic rainfall patterns similar to same trend as agricultural crops and other biomes (NAPA, 2012).

Meanwhile, the beneficial effects of CO₂ fertilisation are likely to be short-lived in mature forest stands under climate change. Additionally dry conditions and high temperatures are also noted to be of good contribution to forest fire hazards (NAPA, 2012). In freshwater parts along the estuary, lowland mangroves are likely to suffer a setback from flooding due to excessive rains and inadequate sediment supply (NAPA, 2012).

Indirect negative effects may also arise from the juxtaposition of impaired ecosystem services and over exploitation by humans and livestock (NAPA, 2012) resulting to aggravating the climate change impacts on the forestry resources.

v. Industry and Transport vulnerability and impacts

Specific vulnerability and impacts assessments of climate change on the Industry and Transport sectors are not available in the First and Second National Communication, nor were they in other subsequent climate change related documents. The vulnerability of the two sectors could be directly linked to the infrastructure sector as their performances are proportionally dependent on the viability and expansion of the existing infrastructure.

Analyses of national documents show that the infrastructure is vulnerable to the characteristic of strong winds (up to 50km/h) at the beginning and end of the rainy season (NCCP, 2016), the period squall lines (strong winds accompanied by thunderstorms). These strong winds and floods often cause serious property and structural damages, including the destruction of roads and inundation of public and business areas across the country. Over the last decade there has been an observed general increase in frequency and intensity.

In the coastal zones energy and transport networks are expected to suffer from isolation/increased damages due to extreme climatic events. Electricity transmission losses related to physical impacts (from falling trees/strong winds) on overhead lines are likely to compound power shortages and even trigger power outages (NCCP, 2016).

In rural and peri-urban areas, increased erosion by torrential rain, partly attributable to the absence of drainage infrastructure, threatens the integrity of secondary roads, bridges and water distribution networks laid beneath roads. Signal and control systems of telecommunication infrastructure may become more prone to lightning strikes (as storms

intensify) which could result in disruptions unless sufficient redundancy has been built into the system.

2.4 Summary of the main drivers of vulnerability for the identified brown development priority challenges

Climate vulnerability is defined as the extent to which a system is susceptible to, or unable to cope with, adverse effects of climate change including climate variability and extremes (AR5). Climate vulnerability does not only depend on a system's sensitivity but also on its adaptive capacity. Therefore, climate vulnerability is a function of the system's exposure (i.e. the physical environment), its sensitivity to the risk or shock and its adaptive capacity. It is determined by a comprehensive assessment of the system, which can ascertain whether the level of the system's vulnerability is low, medium or high. **Sensitivity** is the degree to which a system is affected, either adversely or beneficially, by climate variability or change, while **Risk** is a function of hazard and vulnerability.

Vulnerability and Risk both measure likelihood of experiencing negative impacts, and/or of magnitude of those impacts should they happen. Exposure and hazards depict physical manifestations of climate change and variability. Sensitivity, adaptive capacity and vulnerability are related to the underlying societal/ecological factors that determine ability to anticipate, plan for, cope with, recover from and adapt to evolving climate hazards, their impacts and other stresses. The main drivers of vulnerability can therefore be considered under the following categories:

Ecological factors

- ✓ Land degradation
- ✓ Deforestation
- ✓ Coastal erosion
- ✓ Salt intrusion
- ✓ Erosion and sedimentation
- ✓ Topography (physical environment)

Climate stressors

- ✓ Climate variability & change (Changes in “average” conditions, Changes in risk of extreme weather events)
- ✓ “Normal” uncertainties and risk of extreme weather events (floods, droughts, long dry spells storms/strong winds),
- ✓ Changing seasonal patterns (onsets and cessation of rains)

Societal factors

- ✓ Livelihood standards ,

- ✓ Settlement patterns
- ✓ Poverty levels
- ✓ Literacy levels
- ✓ Level of responses to natural hazards (Adaptation)
- ✓ Inadequate policy implementation (Environment, forestry, lands and physical planning policies),
- ✓ Weak enforcement of rules and regulation of policies (Environment, forestry, lands and physical planning policies),

2.5 Additional socio-economic information relating to specific brown development challenges

The preceding chapter has provided a general overview of the country's socio-economic situation and the section below provides further information on the specific brown development challenges with regard to specific brown developing challenges.

- **Increasing nation population:** The population is increasing on an annual basis, due mainly to two factors; a growth rate of 2.3 and migration from the neighboring countries most of which suffer from internal conflicts. These increases will put additional pressures on already stretched national resources such as energy (electricity and fuelwood) for domestic consumption; natural resources (land for farming and settlements) and social services (health, education etc.).
- **New and expanding industries (hotels and other Businesses):** With the new governance and the improving democratic environment, new investors are expected to come into the country, either to establish new businesses or expand on the existing ones. Some of the investments may be in infrastructure (hotels, restaurants etc.) which will equally increase energy (electricity) demand which is mostly coming from power plants (generators), subsequently increase emission from fossil fuel.
- **Deforestation:** Increasing deforestation is a huge challenge in maintaining current brown development. The current rate cannot be compared to the past rate, as the demand for charcoal and firewood increased tremendously in the rural and urban areas. Commercialization of forestry products (timber) has immensely increased in recent years for exports and domestic construction. Another factor contributing to deforestation is clearing of the forest for new farm lands and settlements; much of the latter is in the meantime happening in the Greater Banjul Area (GBA), where forests are being given to property developers to clear for residential purpose.
- **Rural-urban migration:** Similar to the increasing national population, the rural to urban migration is also increasing probably at a higher rate as increasingly rural dwellers move into the urban areas to seek for jobs and settlement. As the population increased in the

urban areas (GBA), so has the demand for energy (fuelwood and electricity). The further aggravate deforestation as more trees are felled to meet the increasing exorbitant demand for charcoal and firewood. Electricity supply also increased both at household level and expansion of lines to meet demands as new settlements increases, thus putting further pressure on the already struggling facilities to meet demands.

2.6 Stakeholder planning and engagement

Stakeholders comprise persons, groups or organizations that must be taken into account in implementing the LECRDS. During the preparatory process a wide range of consultations were held with the different stakeholders in order to understand key issues important to them and to determine what role and responsibilities they can play in the implementation of the LECRDS. Two broad categories of stakeholders can be identified-(i) State actors- Government ministries and agencies; and (ii) Non state actors which include local communities, civil society organizations (NGOs and CBOs) and the private sector and donors. **Table 3** below presents the key stakeholders. The categorization is sufficiently broad to include other stakeholders that may emerge during implementation. As part of the planning process it will be important to organize a stakeholder workshop to more clearly define their engagement process in conformity with the National Climate Change Policy (NCCP), the Strategic Programme for Climate Resilience (SPCR) of which the LECRDS is an integral part. To avoid duplication and fragmented coordination and strengthen collaboration, an adequate institutional arrangement is required clearly defining the role and responsibilities of each stakeholder.

Table3: Outline of stakeholders for the implementation of the LECRDS

State Actors		Non-State Actors		
Ministries	Technical dept./agencies	Community Partners & beneficiaries	Private Sector	Donor/Development Partners
Environment, Climate Change and Natural Resources;	D/ Water Resources	NGOs-both local & international	Traders & Investors	Intl. multilateral development agencies including specialized UN agencies
Energy& Petroleum	D/Forestry	CBOs and local community beneficiaries	Financial institutions	Bilateral development partners
Agriculture	D/Fisheries	Consumer Organisations	Gambia Chamber of Commerce & Industry	Multilateral financial institutions
Fisheries and Water Resources	D/Agriculture			
Fisheries and Water Resources	D/Energy			

Finance and Economic Affairs	Parastatals (NA WEC, PURA etc.)			
Works and Infrastructure	Local Government Authorities			
Justice				
Information, Comm. & ICT				
Education				

CHAPTER 3

MITIGATION AND ADAPTATION OPTIONS TOWARDS A LOW-EMISSION CLIMATE-RESILIENT DEVELOPMENT

3.1 Low Emissions and Climate Resilient Opportunities.

The goal of LECRDS remains the promotion of socioeconomic development that is low in GHG emission whilst helping The Gambia to meet its NDC targets. The key sectors considered below (energy, agriculture, transport, and waste management) have already been identified in the NAMA, INDC and other policy documents. As the SPCR has largely focused on adaptation in these sectors, the present study is centered on mitigation. Table 1 in Chapter 2 above provides a summary of the various mitigation options which will be reviewed below.

For each of the sectors, a description of the main low-emission climate-resilient mitigation opportunities which are identified based on their technical, financial and social feasibility is provided. The technical, financial and social criteria considered include no regrets/low regrets; negative/no/low costs; political and social acceptance; regulatory needs; and short/medium/long-term capacity, technological and financial requirements). The emission reduction figures are based on the analysis undertaken during the preparation of the INDC.

3.1.1 Energy sector

In the energy sector five mitigation opportunities have been identified which include the following:

i. Increase energy production from renewable sources (solar & wind) for power generation

The use of renewables such as solar and wind have already been experimented and adopted as viable alternatives to fossil fuel in the provision of electricity in The Gambia. Solar energy has had the most successful application of renewable energy in The Gambia and it has been used extensively since the early 1980s. Current solar energy applications in use in The Gambia include: PV for off-grid applications and solar water heating for homes and hotels. Wind energy is particularly efficient in the coastal zone where wind speed is sufficiently high to produce electricity.

The renewables have a great potential to reduce greenhouse gas emission if their share in the national energy mix can be increased. With a 25% increase of renewables in the energy mix it is estimated that this option will contribute to greenhouse gas emission reductions of 45.6 GgCO₂e in 2020, 78.5 GgCO₂e in 2025 and 104 GgCO₂e in 2030 (INDC)

The long history of the use of these technologies in the country has allowed the development of national capacity particularly for small scale installations at household level. About ten retail companies are active in The Gambia in PV for rural applications, and in 2004-2010 these companies installed a total cumulative capacity of 567.53 Kw (The Gambia: Renewables Readiness Assessment 2013).

With respect to investment costs, the main challenge is the initial capital which can sometimes be as much as 84% of the total installed cost for wind turbines for example⁽¹²⁾. Besides reductions in GHG emission, the use of renewables has the advantage of increasing energy access in rural and peri-urban areas and creating employment opportunities as in the case of young and vulnerable girls in the Mbolo Programme at Tujereng.

ii. Promotion of the use of energy-efficient cooking stoves

The traditional cooking stoves are inefficient in the use of fuel wood which produces a lot of GHG some of which have serious negative consequences on health of people (women and children) who are exposed to the smoke over long periods of time. (WHO 2011-Indoor air pollution). Improved cook stoves are more fuel efficient and can use other forms of fuel such as briquettes.

An assessment of the impacts of introducing 200,000 more efficient cook stoves by 2030 in replacement of traditional cooking stoves has shown reductions in emissions between 176 GgCO_{2e} and 275 GgCO_{2e} in 2030 (GOTG/INDC 2015), provided:

- The future demand for energy for cooking, mainly reflected in demand for fuel wood;
- The share of fuel wood which is harvested from forests rather than collected as deadwood; and
- The proliferation of efficient cook stoves.

There are different types of improved cook-stoves such as the '*Noflie*' cook stove which uses wood and other alternative bio-fuels in briquette format and is manufactured from metal plates or flattened empty drums; and the *Jambarr* which is the latest version of improved cook stoves and is also made of a metal casing with a ceramic lining inside to help store heat and protect the metal casing. The technology involved is relatively simple and very widely used at national level and generally acceptable socially.

The average price ranges between D450 for the *Noflie* and for the *Jambar* the price ranges from D750-D1000 depending on the size and quality. The other variant called "sinkirikuto" is built with fire bricks around an insulated, elbow-shaped combustion chamber, provides more intense heat and cleaner combustion than the traditional stove. The average price for household versions with two chambers is between D10, 000-D12, 000; and those for institutions with bigger chambers and with up to three chambers cost between D20, 000-D24, 000.00

¹²(<https://energy.gov/eere/energybasics/articles/wind-energy-technology-basics>)

The main challenge is to establish quality standards, promote outlet, and improve the value chain especially with respect to outlets and increase sensitization.

iii. Reduction of transmission and distribution system losses to 15% by 2030

The current transmission and distribution network is characterized by aging lines and transformers resulting in a high level of losses and improving and expanding it to enable production to be offloaded to reach consumers. Current transmission network is at the 33Kv level that requires upgrading to 132Kv to ensure stability to minimize losses due to outage and ensure increased system reliability and ensure network stability (GOTG/NAMA, 2016). The improvement of the transmission system is expected to generate electricity savings of 85 GWh by 2025 and 125 GWh by 2030. For 2025 this represents between 12% (high demand scenario) and 16% (low demand scenario) of total electricity production. For 2030 this represents between 13% (high demand scenario) and 19% (low demand scenario) of total electricity production. (INDC – Technical Report 2015)

Besides emission reductions through cut in the energy consumption of generating plants, this option can increase access as more electricity would be made available as well as increased system reliability and ensure network stability.

iv. Energy efficiency: lighting -Switch from incandescent light bulbs to compact fluorescent lamps (CFLs)

Another important mitigation opportunity is the promotion of energy efficiency in lighting by replacing incandescent light bulbs with LED or energy saving bulbs. More than 45% of the electricity generated is consumed by households and more than 80 percent of the household's energy consumption is on lighting. This is mainly because most households especially those in the provinces use incandescent lamps in their houses for lighting, mainly due to its low price and lack of awareness of availability of a better and more efficient lamp.

Emission savings by 2025 are estimated to reach between 18 GgCO_{2e} and 26 GgCO_{2e}. By 2030 the savings are expected to increase to between 19 GgCO_{2e} and 25 GgCO_{2e}. Changes after 2025 are due to changes in grid emission factors over the period 2025 to 2030. The price of energy saving bulbs ranges from D25 to D125 depending on the quality and brand.

v. Solar water heating

Solar water heating systems also present another option for reducing GHG emission especially in the context of the tourism sectors. Solar water heating systems have been operating in The Gambia for nearly two decades, and there is ample experience and expertise in the country for installing these systems. Currently, many of the hotels operate diesel powered and electric water heating systems. Studies in the 1980s have proven it is financially profitable and economically viable to switch from diesel powered and electric water heating systems to solar heating systems.

Solar water heaters are being used on an increasing scale in private homes. Some hotels such as Palma Rima and Kombo Beach have already invested in solar heating systems and the returns on the investment have been satisfactory. In the case of Kombo Beach Hotel the payback period for an investment of US\$60,000 solar water heating system was just 4 years⁽¹³⁾.

Emission savings from the installation of solar water heaters have been estimated between 19°GgCO₂e and 33 GgCO₂e by 2025, and 36 GgCO₂e and 60 GgCO₂e by 2030. The savings are partly attributed to fuel savings in the residential sector and partly to electricity savings (GOTG/INDC, 2015).

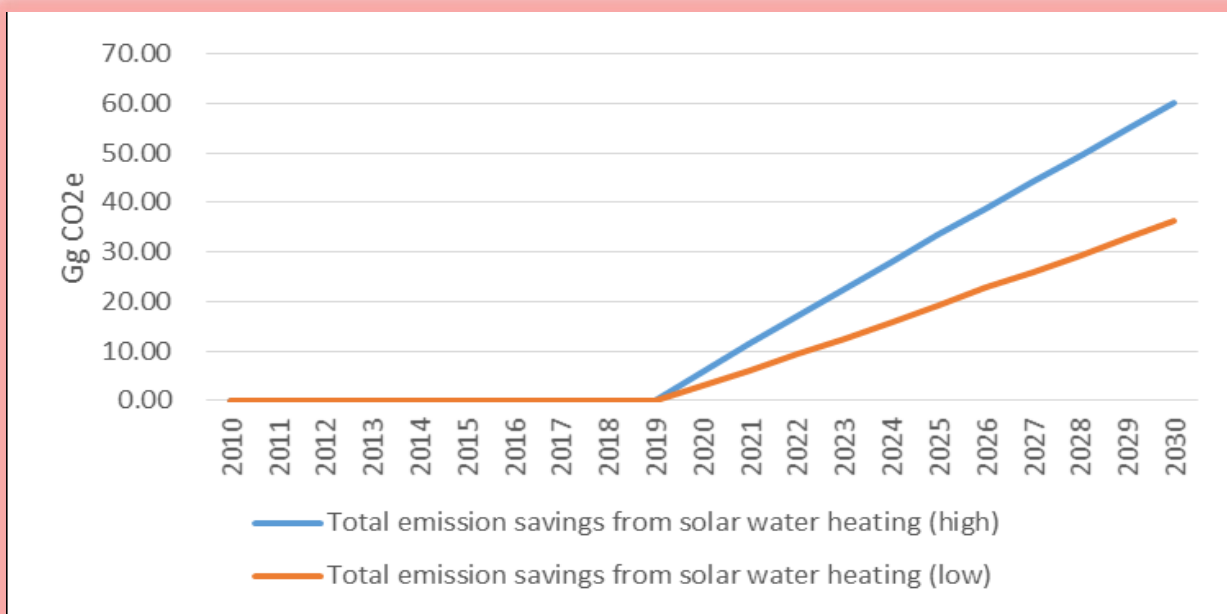


Figure12: Annual emission savings for solar water heating (INDC 2015)

3.1.2 Transport Sector

i. Improving vehicle fuel efficiency

Of the total CO₂ (437.575 Gg) emitted from the Energy Sector in 2010 the Transport sub-sector accounted for 46% (MoE/TNC, 2015). The transport sector is seeing a steady high growth with a doubling of the number of registered vehicles in only 10 years, between 2001 and 2011 and the share of transport emissions within the energy sector has increased from 29.3% in 2000 to 32.7% in 2010 (GOTG 2014).

The proposed mitigation option analyzed in this sector is the deployment of fuel efficient vehicles which depends strongly on the stringent implementation of the measures. The proposed option is expected to produce GHG emission reductions of 40.8 GgCO₂e in 2020, 114.5 GgCO₂e in 2025 and 193.3 GgCO₂e in 2030 (INDC Report 2015).

13. National Investment Program on Access to Energy Services in The Gambia 2012

The use of biofuels also present another option and estimated emission reductions, based on practice and availability of sustainable fuels, could by 2030 be between 47 GgCO₂e and 59 GgCO₂e. According to the INDC assessments the combination of efficiency measures with biofuel has the potential to halt expected growth in transport sector emissions between 13% by 2025 and 22% by 2030.

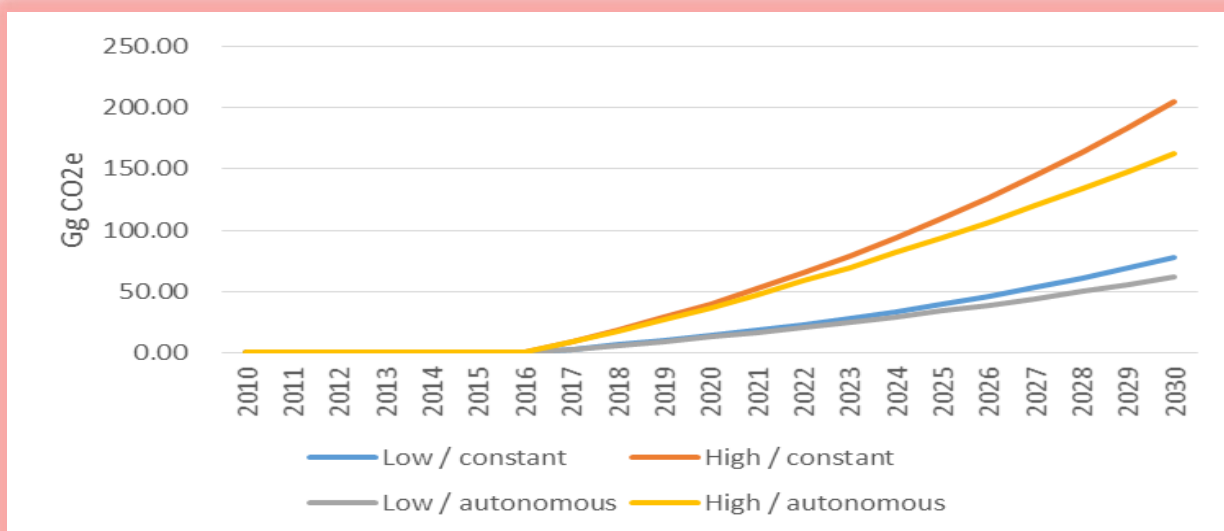


Figure 13: Emission savings range for mitigation scenarios for vehicle efficiency (Source: GOTG/INDC Technical Report 2015)

3.1.3 Agriculture sector

In the agricultural sector rice production has become the largest contributor to GHG(Methane) emissions emitting about 450 GgCo₂e in 2010. The mitigation opportunities in this sector relate to NERICA Rice production and Rice efficiency (SRI). In both cases the technologies involved are familiar and the options have the potential to increase food security and strengthen the resilience of the most vulnerable communities in the rural areas.

NERICA Rice production will consist of promoting and facilitating the expansion of the cultivation of NERICA in upland rice fields which will reduce GHG emissions from agriculture by reducing the need to expand irrigated rice cultivation. Rice efficiency, seeks to increase production and productivity on a given area. With the expansion of NERICA into around 25% of existing 30,000ha upland area it is estimated that emissions can be reduced by 124.1 GgCO₂e in 2020, 397.7 GgCO₂e in 2025 and 2030. The temporary emissions from the change of land use resulting from this expansion will be overcompensated by maximum permanent emissions reductions. For the promotion of efficiency in rice production, it is estimated that the emission reductions are 437.8 GgCO₂e in 2020, 707.0 GgCO₂e in 2025 and 2030 (GOTG/INDC, 2015).

3.1.4 Forestry sector

The forestry sector contributes to national GHG emission through forest degradation, deforestation and release of carbon stored belowground as a result of soil disturbance during and after deforestation and degradation. The proposed mitigation options are (i) Enhanced forest management and(ii) Afforestation;

i. Enhanced forest management

This option consists of combating forest fires which is considered to be the single most important threat to forests apart from land use-change. With the Forestry policy objective of protecting forests and wetlands and expanding the area under community management to 75% of total forest areas by 2030,this option is expected to reduce emissions from forest degradation by 49 GgCO₂e in 2020 and 39 GgCO₂e in 2030 amounting to 481 GgCO₂e over the period from 2020 to 2030 (Source INDC 2015).

ii. Afforestation

Assessing the mitigation potential of afforestation is difficult to predict for two main reasons: i) It is unclear how many trees survive after planting; and ii) sequestered carbon depends on tree growth and that differs widely with tree species, type of soil, available nutrients and water as well as location in general (GOTG/INDC, 2015). Bearing in mind these technicalities,emission removal from afforestation is projected between 38 GgCO₂e and 220 GgCO₂e in 2020, between 59 GgCO₂e and 275 GgCO₂e in 2025 and 78 GgCO₂e and 330 GgCO₂e in 2030, depending on the survival and growth rates of planted trees and when the project is started.

3.1.5 Waste sector

Although inadequate waste data (for both solid waste and wastewater) is a major issue, regarding both GHG emissions and waste production, a number of measures can be put in place to reduce GHG emission from this sector through conditional methane capture, waste recycling and composting.

i. Methane Capture and Composting:

Methane capture technology in landfills allows for significant GHG reduction. The basic idea with this technology is to extract landfill gas (LFG) from landfills using a series of wells and a blower/flare (or vacuum) system. This system directs the collected gas to a central point where it can be processed and treated depending upon the ultimate use of the gas such as to generate electricity and/or heat, replace fossil fuels in industrial and manufacturing operations. The gas could also be upgraded (purified) to natural gas standards.

Composting constitutes another option for reducing GHG emission from waste/landfills. The process consists of waste separation of MSW and the organic matter is composted aerobically

without methane generation. Recyclable waste goes in recycling process. Under waste management the combined greenhouse gas emission reductions of 141 GgCO₂e in 2020, 239.7 GgCO₂e in 2025, and 413.7 GgCO₂e in 2030 will be achieved through conditional methane capture, and waste recycling and composting. Figure 6 shows the emission reductions per mitigation option. However, it is important to highlight that the two mitigation options described above, methane capture in landfills and composting facilities, presuppose that solid waste is properly collected and reaches well-engineered disposal sites. Some other benefits, in addition to emission reduction, include sanitary improvements, job creations etc.

3.2 Climate Change Response initiatives (objectives, expected results) undertaken and their gaps and challenges

To address the challenges of climate change, the Government of The Gambia has undertaken a number of actions some of which have helped reduce GHG emissions. Some of these project initiatives are presented below.

3.2.1 Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in the Gambia Project

This was a Gambia Government/United Nations Industrial Development Organization (UNIDO)/Global Environment Facility (GEF) (2012–2015) initiative which had the following two significant renewable energy projects:

- i) GAMWIND Tanji wind farm which installed two turbines of 450 kVA each; and the wind farm was fully operational in 2013, but because of financing issues it ceased generating power as of March 2014
- ii) The 8.3 kW modern solar PV at a rural training centre in Tujereng operated by a local NGO, Mbolo Society provided total energy needs of the Center. The project has been operational since the beginning of 2014.

This initiative sought to support the development and implementation of a number of mini-grid and off grid renewable energy demonstration projects with high replication potential in various productive sectors in the Gambia. The project provided 30% grant funds and the investor provided the rest.

Although the Tanji wind farm has stopped operating, the 8.3 kW modern solar PV at Tujereng is still fully operational and in fact increased its production capacity with additional funding under GEF 5. The centre not only generates sufficient electricity for its own needs but it has capacity to sell excess production to NAWEC. However, the unresolved issues of Power Purchase Agreement (PPA) and the feed-in tariff for the electricity supplied have meant that the Centre cannot sell the extra power at present.

Besides the benefits of mitigation, the Center provides training for school girls who had dropped early from school and girls from disadvantaged homes with the overall objective of strengthening the productive capacity of women. They provide skills training in addition to basic numeracy and literacy training in order to provide income generating opportunities for women in the community to improve their living standards.

The Project has helped increase awareness of the potential of renewables and the construction of a solar plant at Lemon Creek hotel after a visit to Tujereng is one testimony.

The main challenges are the absence of a feed-in tariff and a PPA and limited national capacity for large scale solar and wind installations. For local entrepreneurs, there is the challenge of raising counterpart investment funds. Any future scale-up will need to address these challenges.

3.2.2 EU/Gambia Drainage, Sanitation and Waste Management Project

Following the massive flooding in September and October of 2010, the Government of The Gambia provided support for the above Project with the following objectives: i) improve the living conditions and health for households in the urban areas vulnerable to flooding by improving the drainage system and providing a basic waste management service; ii) sustain the first objective by sensitizing/training the local communities in sanitation, waste management and hygiene and by creating jobs and improving skills for the poorest in the field through labour-intensive techniques; and iii) improve the efficiency of interventions performed by the government in responding to emergency situations, particularly flooding. The Project was implemented by the National Disaster Management Agency (NDMA).

The five areas selected for project intervention were located in Barra, Brikama, Soma, Bansang and Bundung. The project consisted of civil works, sensitization and public awareness. The construction of the drainage systems is now completed which was said to have greatly improved the situation in the areas concerned and to date no reports of flooding has been received by the officials at NDMA. This intervention has helped to strengthen the resilience of the affected communities living in the flood prone areas where the Project has intervened.

The challenges experienced during implementation include: i) limited capacity of some contractors to carry out the work which resulted in delays; ii) weak supervision and monitoring of the works due to large work load of the supervising agent, NRA; iii) land disputes arising out of illegal occupation of public lands sometimes along water ways. In some cases, it was reported that, workers were physically attacked because compounds had to be demolished.

In scaling up a project of this nature it will be necessary to address these challenges by ensuring that only contractors with proven track records and in possession of required machinery are hired; ensuring a closer supervision of the works which may require alternative arrangements for

the supervision component; and finally the Government has to update land use plans especially in the peri-urban areas and ensure their strict application.

3.2.3 Replacement of incandescent light bulbs by Compact Fluorescent Lamps (CFL) or energy saving bulbs)

In 2008 the PURA launched an Energy Efficiency Project comprising of two components:

- i) Consumer Awareness Programme on energy saving tips; and
- ii) Compact Fluorescent Lamps Pilot project which seeks to demonstrate within a pilot area that consumers can make significant savings by installing energy efficient lighting. CFL technology offers a cheap alternative to inefficient lighting as CFL bulbs consume about a quarter of the energy of conventional incandescent light bulbs and last longer, typically upto 3 years (6,000hrs).

The objectives of the Pilot Project include: i) reduce the losses on the low voltage feeders; ii) advise consumers on how to save energy; iii) provide CFL lamps for consumers to realize energy savings; iv) reduce the unnecessary loads on the Pilot transformer Substation; and v) reduce the voltage drop on the feeders and improve the voltage level at the consumer premises.

The project was first implemented in Kanifing South in September 2008 with 150 households. In total 2,000 CFLs were distributed which has resulted in a dramatic decrease on the consumers consumption in many households and sometimes as much as 50% on their previous month's bill⁽¹⁴⁾. The utility company losses on the network also improved dramatically. Current reading as well as tail-end voltages on both circuits improved considerably thus improving quality of service as well. In 2011 a similar exercise was conducted in Banjul in Tobacco Road area, a poor neighborhood with a poor distribution network with high losses. A total of 100 CFLs was distributed. As in the previous case there was a reduction of network losses of up to 36%.

Although the stated objective was not the reduction of GHG emissions, the use of these lamps, as stated above, can make significant contribution in the reduction of GHG emissions in addition to the socioeconomic benefits.

The challenges continue to be public awareness of the advantages of CFL lamps; encouragement of consumers to opt for quality CFLs as opposed to the cheaper brands on the market; facilitating easy access to quality products throughout the country; and finally the provision of policy/ tax incentives that can reduce the price differential between the CFL lamps that cost around D125 and the ordinary incandescent bulb of D15.

3.2.4 NERICA Rice Dissemination Project

The overall goal of the NERICA project was to contribute to poverty reduction and food security with the specific objective of increasing rice production and import substitution. To achieve the project's goals and objectives the project had 4 strategic components, namely, Technology Transfer, Production Support, Capacity Building and Coordination. The project was launched in

2006 with 6 varieties (P163, NERICA 2, NERICA 4, NERICA 6, P106 and WAB105). The project was initially designed for only 4 villages in West Coast Region but later it was implemented introduced countrywide because of the high demand for the NERICA seed. The adoption rate of the NERICA was high because for the first time farmers could grow rice on lands initially reserved for groundnuts, maize and millet. Some communities became rice self-sufficient and some had surpluses to sell in rural and urban markets (*Interview with Dr. Ceesay Former Coordinator of the NERICA Programme in the National Agricultural Research Institute*)

Although mitigation was not identified as an objective of the Project, both the NAMA and the INDC have identified NERICA as potential source of GHG emission reduction. It will therefore be important to see how the cultivation can be expanded sustainably.

Some of the challenges identified during the implementation include (a) the risk of encroachment on forest lands by farmers trying to bring more land under NERICA cultivation and (b) coordinating a country-wide NERICA growers' network required more coordinated government intervention. Several other actors were said to jump on the NERICA bandwagon to share the glory of the NERICA success story and in the process disrupted local coordination mechanisms. To scale up NERICA cultivation will require amongst others: (i) access pure NERICA lines from the Africa Rice Center; ii) re-establish NERICA growers' associations or leverage on existing rice growers' association; iii) do a baseline inventory and needs assessment; iv) establish NERICA seed multiplication systems; v) invest in post-harvest processing and value addition equipment and infrastructure; and vi) establish and strengthen through provision of start-up capital to NERICA rice producer and marketing cooperatives.

CHAPTER 4

The Low Emissions and Climate Resilient Development Strategy (LECRDS) Framework

4.0 Approach, Vision and Mission, Goals, Objectives and Principles

4.1 Approach

The Government of The Gambia has been implementing climate change for more than 20 years but most of the activities have been based on the conduct of studies (National Communications, NCSA and NAPA, NAMAs) and small ad-hoc and unplanned adaptation, mitigation and capacity building actions. This LECRDS and its Action Plan supplements the Intended Nationally Determined Contribution (GoTG/INDC, 2015) and the Strategic Programme for Climate Resilience (GoTG/SPCR, 2017) in developing a strategic approach to addressing climate change in a holistic and inclusive manner. It will build on a foundation of experience and expertise in managing climate change. The process of development of the LECRDS has been comprehensive and inclusive and thus enhances and strengthens the understanding of climate change science, the impacts and responses (adaptation and mitigation) in The Gambia. Section 5 defines a comprehensive and detailed action plan, developed through a consultative process, that outlines the specific activities and initiatives that the government will undertake to implement the strategy.

As climate change is a rapidly evolving issue, both scientifically and politically, the Government and people of The Gambia commits to aligning this Strategy with the National Development Plan – (2018-2021). To ensure this strategy and other follow-up initiatives will be relevant, the Government of The Gambia also intends to mainstream climate change into all development efforts including integrating climate change into policies, strategies, programmes and projects of the country. The LECRDS also includes a process and framework for Monitoring, Reporting and Verification of the Work Plan.

4.1.1 Vision, Mission and Goal of the LECRDS

The VISION of the Gambian Low Emission Climate Resilient Strategy is premised on *the creation of a new era for a harmonious relationship between the economy, environment and society; promotion of long term sustainability; enable shifts from a brown, contaminative and inefficient economy to a green one; to set common technological trajectories for a decarbonized economy; unlocks new opportunities for economic growth and jobs; identification and implementation of ‘soft’ adjustments’ such as land use planning, promotion of preventive measures by ‘risk communication’ and infrastructure and ‘hard’ engineering adaptation options; facilitation and promotion of mainstreaming of climate change adaptation into other resource management, disaster preparedness and sustainable*

development programmes; is largely driven by a government policy package that promises to create new markets ranging from organic agriculture to sustainable forestry and technological advancement that takes into account environmental concerns; and one that will foster low cost and efficient and effective collaboration and equity between businesses, academia, providers of technology, financial institutions and civil society to see green growth.

The **MISSION of the Strategy** is to be all inclusive by engaging all stakeholders especially the most vulnerable communities and groups (women, children, elderly and physically challenged). By aligning it with the Gambia Medium Term Strategy – the National Development Plan (2018 – 2021), the climate change strategy will be premised on sustainable development, reduction of greenhouse gas emissions by attaching high priority to energy efficiency and increase in the share of renewables in the national energy mix; prioritizing climate change as a security issue by increasing energy security, food security, water security and human security (transport and infrastructure); and aligning the strategy with national and sectoral policies and other development frameworks. Strategic priorities will be identified and priority activities in the form of projects and programmes will be included in a LECRDS Action Plan for implementation towards achieving the Mission and Vision of this LECRDS.

The goal of the strategy and the accompanying action plan is to prepare the government and people of The Gambia to limit their carbon footprint; promote, facilitate and capitalize on strong business leadership through global partnerships to accelerate structural transformation and technological change; promote innovation and encourage ambitious action at all levels of the economy through the development and implementation of sound climate policies and effective economic mechanisms, including the encouragement and facilitation of access to domestic public and private financial resources and international carbon pricing that will accelerate the transition to the low-carbon economy; reduce or minimize risks by improving adaptive capacity, adapt by reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all citizens; and to leverage new opportunities presented by climate change through the implementation of low-emissions and climate resilient development policies and programs.

4.1.2 Strategic Objectives

The response strategy and action plan aims to support the implementation of the INDC of The Gambia for the maintenance of the emission levels of The Gambia relatively low or neutral by reducing her carbon footprint and by following green growth pathways in all economic sectors. It further aims to strengthen the country's resilience to climate change and its adaptive capacity, particularly in vulnerable economic sectors and communities. To achieve these strategic objectives, the strategy (a) recommends robust adaptation and mitigation measures to be implemented as part of the LECRD Action Plan in Chapter 5 so as to minimize risks associated with climate change while maximising opportunities. (b) recommends research and technological needs and avenues for transferring and diffusing sustainable

technologies in The Gambia; (c) develop and implement comprehensive national and sectoral education and awareness-creation programmes and forums for engagement in information dissemination to the public on current and future climate change risks; (c) works towards aligning this strategy and action plan to the proposed climate change policy and other sectoral policies, legal and institutional frameworks to address the adverse effects of climate change in The Gambia; and (d) to implement the Action Plan developed in Chapter 5, including the accompanying resource mobilization (Chapter 6) and monitoring and evaluation plans (Chapter 9).

4.1.3 Guiding Principles

The development of this Low Emission and Climate Resilient Strategy and Action Plan is based on the following guiding principles.

i. Country-driven and specific climate change interventions

Country-drivenness and ownership are demonstrated by the inclusive engagement of all relevant stakeholders in the process of development of this strategy and action plan. The strategic responses are aligned to the needs and aspirations of the local, regional and national populations and national circumstances so as to adequately, effectively and efficiently mitigate and adapt to climate change.

ii. The Gambia's response to climate change must be sustainable

By adopting mitigation and adaptation actions that are environmentally sustainable and are compatible with economic growth and social development as spelt out in the National Development Plan (2018-2021) this strategy and action plan will ensure sustainability. These measures to be pursued must also yield complementary benefits such as being less pollutant, cost effective and cost efficient.

iii. Consultative and all inclusive approach

As climate change is cross-cutting and has implications for all sectors of the economy and society, this Strategy and its Action Plan is developed through a consultative and multi-stakeholder approach. The views of relevant stakeholders were sought through extensive focused-group discussions and one-to-one consultations and interviews. These stakeholders were drawn from public and private sectors, elected representatives and local government authorities, civil society organizations, youth and women groups, and academia. The strategy recognises the need to ensure the participation of women, children and other vulnerable and marginalised groups and individuals (including the physically and visually challenged) and as well, the integration of appropriate indigenous and local knowledge in responding to climate change challenges.

iv. Cost effectiveness:

The strategy recognises that The Gambia is a poor LDC and thus takes into consideration the principle of achieving cost-effectiveness in the design and implementation of climate change activities identified in the Action Plan in Section III without compromising the desired output and outcome, and without lowering but enhancing the standards of living of the citizenry of The Gambia.

v. Equity-based development:

This strategy recognises the conclusions of all IPCC studies including the projection that the most severe effects of climate change will be felt by the rural poor in general, women, children and marginalised groups and individuals. In its design and implementation, the strategy, thus embraces the fundamental rights of all humans, including gender and indigenous peoples, where ever they may be located in the country.

vi. Mainstream climate change into development frameworks

The strategy recognises the need to mainstream climate change responses in all the development frameworks of the country. Mainstreaming is a process that is achieved through enhancing knowledge and awareness on climate change and integrating climate change in all development frameworks (Acts, policies, strategies, plans and programmes). For this reason the strategy recognises the need for continuation and intensification of raising awareness, building capacities and empowering stakeholders at local, regional and national levels and at the individual, institutional and systemic levels to ensure effective and sustained response to climate change. There is the need to appropriately integrate climate change into the education system to generate awareness and capacities from the early ages of the society in order to secure long-term capacity for climate change in The Gambia.

4.2 Priority Climate Change Response Strategies

In response to the challenges and opportunities posed by climate change, The Gambia has developed this National Climate Change Response Strategy and Action Plan. In the Agriculture, Energy and National NAMAs; the Nationally Determined Contribution of The Gambia (GoTG, 2015), and the Strategic Programme on Climate Resilience (SPCR) of the Gambia, climate change mitigation and adaptation response options were identified and the results are reported in sub-sections 4.2.1 and 4.2.2 below. Based on these response options and considering national circumstances and the policies, plans and programmes discussed in Chapter 1, response strategies have been identified under this chapter (Chapter 4) and priority actions have been identified in the LECRDS Action Plan in Chapter 5 with costs attached.

4.2.1 Mitigation of Greenhouse Gas Emissions

Though its national emissions are negligible, in a bid to significantly contribute towards the reduction of the sources and potential sources of GHG emissions or enhancing carbon sinks, The Gambiaproposed to undertake the following appropriate mitigation actions in her INDC by 2020, 2025 and 2030. Excluding LULUCF and for Low Emissions Scenario, emissions will be reduced by about 44.4% in 2025 and 45.4% in 2030 (GoTG/INDC, 2015). Specific voluntary and non-voluntary mitigation measures include:

1. The use of renewable energy sources in lighting, communication and health facilities, and for lifting water from wells and boreholes contributing to greenhouse gas emission reductions of 45.6 GgCO₂e in 2020, 78.5 GgCO₂e in 2025 and 104 GgCO₂e in 2030;
2. Continue Annual National Tree Planting as mitigation through afforestation will contribute to reductions of 220.3 GgCO₂e in 2020, 275.4 GgCO₂e in 2025 and 330.5 GgCO₂e in 2030;
3. Under the Agriculture sector, two conditional mitigation options (NERICA Rice production and Rice efficiency) have been assessed and reported on in this INDC (Figure 4). For
4. Production of NERICA Rice under upland and non-flooded conditions in place of flooded swamp rice is estimated to produce emission reductions of 124.1 GgCO₂e in 2020, 397.7 GgCO₂e in 2025 and 2030;
5. Promotion of efficiency in rice production is estimated to lead to emission reductions of 437.8 GgCO₂e in 2020, 707.0 GgCO₂e in 2025 and 2030;
6. Reducing electricity transmission losses will lead to emission reductions of 46GgCO₂e in 2020, 69.6GgCO₂e in 2025 and 98.7GgCO₂e in 2030
7. Installation and operationalization of Efficient Lighting Systems will produce emission reductions of 23.1GgCO₂e in 2020, 42.9GgCO₂E in 2025 and 41.7GgCO₂e in 2030;
8. Promotion and facilitation of the employment of Solar Water Heating will produce emission reductions of 3GgCO₂e in 2020, 19.3GgCO₂e in 2025 and 36.4GgCO₂e in 2030.
9. Employment of Renewable Energy and promotion of Energy Efficiency is expected to produce emission reductions of 56.4GgCO₂e in 2020, 121.7GgCO₂e in 2025 and 174.4GgCO₂e in 2030;
10. Employment of Efficient Cook-Stoves in the domestic sector will produce emission reductions of 297.2GgCO₂e, 287.6GgCO₂e in 2025 and 278.4GgCO₂e in 2030
11. Deployment of energy efficient vehicles will produce greenhouse gas emission reductions of 40.8 GgCO₂e in 2020, 114.5 GgCO₂e in 2025 and 193.3 GgCO₂e in 2030.
12. Under waste management, combined greenhouse gas emission reductions of 141 GgCO₂e in 2020, 239.7 GgCO₂e in 2025, and 413.7 GgCO₂e in 2030 will be achieved through conditional methane capture, and waste recycling and composting;

4.2.2 Adaptation to the Impacts of Climate Change

As the vehicle to address its adaptation needs in the post 2020 context, The Gambia is using the National Adaptation Plan (NAP) process under the UNFCCC to conduct comprehensive assessment to determine the country's adaptation needs. All necessary efforts are being made to

engage all national stakeholders and international partners in the formulation and implementation of a comprehensive transformational adaptation investment plan to protect the country's high vulnerability against climate change. The Gambia expects to harness the opportunities in the Paris Agreement that make adequate provisions to enable international climate finance support for effective adaptation in the most vulnerable countries.

In the short-term, for The Gambia to transition to a low-emissions and climate resilient development pathway, Government intends to adopt specific enabling conditions which must consist of national regulations, policies, subsidies and incentives, as well as international market and legal infrastructure, trade and technical cooperation. This will be achieved through intensive and extensive education, awareness raising and development and implementation of socio-economic research as it relates to climate change. Currently, enabling conditions are heavily weighted towards, and encourage, the prevailing brown economy, which depends excessively on fossil fuels, resource depletion and environmental degradation.

In the medium- and long-term, the Government must continue the mainstreaming of climate change into national development frameworks as achieved for the medium-term strategy – the Programme for Accelerated Growth and Employment (PAGE) and some sectorial policies and strategies (the Agriculture and Natural Resources Policy, the Forest Policy and the Fisheries Strategic Action Plan) by adjusting all national and sectorial policies to take climate change into consideration. With appropriate changes in the policies, including fiscal policy, the fostering of public investments to green key sectors (agriculture, energy, water resources, waste management, etc.); employment of new market-based instruments; greening public procurement; improving environmental rules and regulations, as well as their enforcement; improving trade and aid flows; and fostering greater international cooperation can be easily achieved.

Specific examples of short-term and medium-term activities that The Gambia plans to include in her proposed Low Emissions Climate Resilient Development Strategy (LECRDS) and its Action Plan include but not limited to:

- 1. Improve the Climate and Climate Change Resilient urban and peri-urban infrastructure of the Gambia including (a) water supply infrastructure in Greater Banjul Area; (b) addressing infrastructural deficiencies of Sanitation services in Kanifing Municipality and Brikama Area Council; (c) developing and applying infrastructure construction and management codes/guidelines under climate change; (d) strengthening climate robustness of public and commercial sector buildings in Greater Banjul Area; and (e) improved road infrastructure and drainage systems;**
- 2. Adapting the Agriculture System to Climate Change in The Gambia,** will consist of strengthening diversified and sustainable livelihood strategies for reducing the impacts of climate variability and change in agriculture and livestock sectors of The Gambia. In addition to institutional strengthening, climate change adaptation priorities will be

mainstreamed into national agriculture and livestock policies, plans and programmes; value addition of products will be promoted to complement and support crop diversification; vulnerability and risk assessment tools and agro-climatic monitoring and early warning for food security will be improved; climate information services to the agriculture sector and dissemination to wider rural communities will be promoted; livelihoods and sources of income for vulnerable communities will be diversified; sustainable crop intensification will be enabled by introducing innovative crop improvement and management practices; implementation of poultry, small-ruminants and cattle production at the local level will be improved; and sustainable livelihoods and soil and water management interventions to improve vegetative cover and to sustain livelihoods of livestock dependent communities will be expanded and intensified;

3. **The mainstreaming of climate change in all national development frameworks will be continued following the successful integration of** climate change issues and risks in the Programme for Accelerated Growth and Employment (PAGE: 2012 - 2015) and the follow-up National Development Plan (2018-2021); the Forest Policy, the Fisheries Strategic Action Plan and the Agriculture and Natural Resources Policy. Development of the follow-up medium-term strategy has started and the following activities will be carried forward.

- **Mainstreaming of Climate Change into Education Curricula:** Education, training and public awareness constitute the first pillar of mainstreaming. The Government enjoyed several achievements in education and the country is on track to achieve the education MDG target for net enrolment in primary education and literacy rate among the population aged 15-24 years. However, the issue of knowledge and education on climate change remains a challenge. Therefore, the Government will continue prioritizing basic/primary education, while expanding access to secondary, higher and tertiary education with emphasis on climate change. Integration of climate change in all education curricula will support the achievement of sustainable development in The Gambia.

- **Integration of Climate Change into Sectorial Policies:** Of particular importance is the integration of climate change into the public budgeting system under the Ministry of Finance and Economic Planning. Taking climate change fully into consideration in the national budgeting system allows climate proofing of all activities and programmes and thus determines allocation of funds to those activities and programmes that are less contaminative.

4. **The planning, development and implementation of an effective disaster preparedness and response strategy in support of climate change adaptation and loss and damage** is a critical activity to develop and implement;

5. **Build and strengthen national capacities to promote and facilitate medium and long-term climate change adaptation planning and implementation.** The proposed activity will support national systems to integrate climate and development and to plan effectively

and allocate finance, as well as identify appropriate sources of finance and policy mechanisms. The activity will build and strengthen institutional and technical capacities and knowledge brokering for climate change adaptation planning and the integration of adaptation within, or aligned with, current development planning and budgeting processes;

6. **Climate-proofing of the infrastructure in the Growth Centres** (*Kerewan, Faraffenni, Janjanbureh, Bansang, Basse, Mansa Konko, Soma, Brikama and peri-urban settlements in the West Coast Region*) **in the Administrative Regions (NBR, CRR, URR, LRR and WCR) of the country to be implemented in phases and divided into:**
 - Component 1: Water supply, Sanitation and Waste Management;
 - Component 2: Public works infrastructure (roads, bridges, communication, etc.) in Brikama and Greater Banjul Areas;
 - Component 3: Climate Resilience of Public and Commercial Buildings;
7. **Enhancing Resilience of coastal and estuarine/riverine economies and livelihoods of the districts in the coastal zone** by reducing their vulnerability to sea-level rise and associated impacts of climate change of Gambia's most important coastal economic development assets, notably the tourism infrastructures on the open and sheltered coasts and the lowland rice growing landscapes of the riverine districts in NBR, LRR, and WCR; and
8. **Climate Change Adaptation through large scale ecosystem restoration of the River Gambia Watershed;**

4.3 Priority Strategies for the LECRDS of The Gambia

This section identifies the priority strategies for low-carbon and climate-resilient development pathways for The Gambia, including general coordination and capacity building and strengthening issues. The relevant priority and fully costed actions to achieve these strategies are discussed under the LECRD Action Plan (Chapter 5).

- Strategy 1:** Institutionalization of coordination, monitoring, reporting and verification of climate change issues by strengthening the Climate Change Secretariat of the Ministry of Environment, Climate Change and Natural Resources for effective and efficient provision of technical policy advice to the Government and people of The Gambia for relevant decision making in transitioning to green economic growth.
- Strategy 2:** Continuation of the transformation of the National Meteorological Services of The Gambia into an Agency and strengthening of Climate Change Early Warning System of The Gambia
- Strategy 3:** Estimation, in a sustainable manner, of The Gambia's contribution to global warming and climate change; assessment of the impacts of climate change on The

Gambia's economy and people; and analysis and contextualization of the possibility of national and sectoral climate change integrated plans providing guidance for the development and investment pathways of the country and choice of investments.

- Strategy 4:** Promotion of energy efficiency, enhanced management (improved transmission and distribution) and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of The Gambia.
- Strategy 5:** Enhancement of waste management systems in the Administrative Regions (NBR, LRR, CRR, URR and the peri-urban areas of WCR) to reduce pollution and greenhouse gas emissions under the waste category so as to improve health of both humans and animals and reduce global warming.
- Strategy 6:** Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy.
- Strategy 7:** Adoption and application of climate-smart and conservation agriculture that allow minimum disturbance and year-round maintenance of soil and soil cover, including the use of leguminous crops to boost soil nitrogen; adoption of new crops, crop rotation and/or crop varieties and adjusting the time of planting/harvesting; introduction of integrated soil-fertility management systems that cater to the nutritional needs of the crop without polluting the environment; and integrated water management practices.
- Strategy 8:** Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.
- Strategy 9:** Integrated management of crops and Livestock management including the modification of herd composition: variation of species/breeds; and adaptation of grazing management practices to increase soil carbon. Reduction of greenhouse gas emissions from livestock by improving animal nutrition, breed selection and manure management.
- Strategy 10:** Restoration of degraded lands with high production potential; application of erosion control, soil and water conservation, organic amendments, perennial or deep root crop systems; and improvement of land and soil, including drainage, desalinization, addition of gypsum to renovate sodic soils.

Strategy 11: Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems; and aquaculture in areas inundated by rising sea levels.

Strategy 12: Promotion and facilitation of disaster management through strengthening and improvement of climate early warning systems, drought contingency plans, response to drought and flooding, sensitisation and awareness-raising, and promotion of weather-indexed risk insurance.

CHAPTER 5

THE LECRDS ACTION PLAN

5.1 Introduction

In Chapter 1, the national circumstances including the major development policies, plans and programmes have been discussed; in Chapter 2 the GHG emissions, vulnerability and impacts profiles are discussed and in Chapter 3 priority mitigation and adaptation options and strategies are presented. In Chapter 4, the Low Emissions and Climate Resilient Development Strategy (LECRDS) of The Gambia has been discussed and twelve strategies to address climate change have been recommended.

Under this Chapter (Chapter 5) the LECRD Action Plan is developed to take the efforts (adaptation and mitigation) needed to respond to climate change in The Gambia to another stage beyond identification to planning. Under the LECRD Action Plan, the strategies identified in Chapter 4 (the LECRDS) have been translated into mitigation and adaptation actions to enable The Gambia to take decisive and sustainable actions in addressing the root causes and the adverse impacts of climate change on the national economy and move the country into a green and resilient economy.

The LECRD Action Plan includes (a) prioritised activities that will support The Gambia to transition to a low-carbon and climate-resilient economy; (b) information on financing the LECRDS and its Action Plan; (c) mobilisation of resources and (d) monitoring, reporting and verification of impacts on the citizens and economy of The Gambia due to the implementation of the strategy and action plan.

5.2 Prioritization in the Action Plan

5.2.1 Priority Administrative and Cross-cutting actions to support transition to low emissions and climate resilient economy in The Gambia

These administrative and cross-cutting projects and actions 1 to 3 in Table 4 are relevant to priority strategies 1 to 2 discussed in sub-section 4.3.

5.2.2 Priority GHG Mitigation Actions and Technologies for a Low Carbon Development of The Gambia

Based on the identified strategies under the LECRDS in Chapter 4 and this LECRD Action Plan, The Gambia intends to further develop and implement the GHG mitigation projects 1 to 5 in

Table 5 to support transition to a low carbon economy. These projects are relevant to priority strategies 3 to 6 discussed in sub-section 4.3.

5.2.3 Priority Actions for Climate Resilient Development of The Gambia

Based on the identified strategies under the LECRDS in Chapter 4 and this LECRD Action Plan, The Gambia similarly intends to further develop and implement projects in Table 6. These climate change adaptation actions and projects are relevant to strategies 7 to 13 in sub-section 4.3. The projects support transition to a climate-resilient economy.

TABLE 4: Priority Administrative and Cross-cutting projects and actions to support transition to low emissions and climate resilient economy in The Gambia

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>1. Strengthening the Climate Change Secretariat of MoECCNAR for effective and efficient provision of technical and policy advice to the Government and people of The Gambia for relevant decision making in transitioning to green economic growth</p>	<p>The National Climate Change Secretariat was formed in 2016, with the mandate of working with sectors and institutions on integrating climate change into the national and sub-national plans, and coordinating the implementation of the National Climate Change Policy. The Secretariat is housed within the MoECCNAR, and work closely with various stakeholders in carrying out its functions.</p> <p>The key roles and responsibilities of this Secretariat include (a) Facilitation of climate change policy development, including the incorporation of climate change considerations into new and existing policies; (b) Establishment of procedures to integrate and mainstream climate change in all relevant national policies and programmes, for including climate considerations in government and administrative processes, procedures and systems (such as budget call circulars, public expenditure reviews, and monitoring processes); (c) Reconstitute the National Climate Committee and develop a</p>	<ol style="list-style-type: none"> 1. Build and further strengthen institutional and technical capacities of the Climate Change Secretariat to acquire and also provide appropriate and adequate knowledge and information through well established climate change data and knowledge management systems; 2. Acquire and utilize ICT to significantly contribute to easing of collection, storage, access, collation and dissemination of climate change knowledge and information; 3. Establish, develop and maintain a robust, technology-based and up-to-date climate change knowledge management system that will serve as a one-stop online space where most of the climate change data, information and knowledge in The Gambia reside, can be regularly updated and easily accessible to stakeholders; 4. Develop a network and roster of climate change actors and experts and implement a technology-based climate change knowledge management system using any of 	<p>Climate Change Secretariat, MoECCNAR, MoFEA, NEA, NDMA, MET Agency, National Climate Change Committee;</p>	<p>1,000,000</p>	<p>2018 - 2020</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>formal network of Climate Change Focal Points in each sectoral ministry; (d) Development of adaptation- and mitigation-specific policy measures that are not under the mandate of other sectoral ministries; (e) Promotion of research and technical cooperation between national, regional and international institutions; and support The University of The Gambia to develop and implement the National Research Framework on Climate Change; (f) Development and implementation of a Climate Change Technology Development and Transfer Action Plan; (g) Regularly track progress in mitigation and adaptation using participatory monitoring and evaluation methods.</p> <p>As a young and growing Secretariat, and to effectively and efficiently meet the ever growing demand for policy and technical level advisory services it is necessary to develop the institutional and human capacities of the Climate Change Secretariat of the MoECCNAR to meet the demand based on the National Climate Change Policy and PAGE II. With functions defined in the National Climate Change Policy (GoTG/NCCP, 2016), the expected</p>	<p>the internationally existing CORE METADATA standards.</p> <p>5. Regularly updated and develop cross linkages with similar information management systems outside The Gambia to capture experiences and lessons learned from other regions</p> <p>6. Acquire, install and operate Display System in key locations of major cities to enable continuous display of key environment and climate change information for public consumption, and.</p> <p>7. Acquire, install and document management, mapping and graphing software and functionalities</p>			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>implementation of this Low Emission Climate Resilient Development Strategy and Action Plan; the future development of climate change legislation and regulations; etc.; the Secretariat would be the main implementing Body of the LECRDS and Action Plan. Without the nurturing and strengthening of this young Climate Change Secretariat, its definition in law, with the requisite scientific and technical expertise, implementation of the this LECRDS and Action Plan may face challenges in terms of constitutional and legal competence, capacity, resources and political support.</p>				
<p>2. Continuation of the transformation of the National Meteorological Services of The Gambia into a National Meteorological Agency and strengthening of Climate Change Early Warning System of The Gambia.</p>	<p>The limited and timely availability of climate data and information in The Gambia is leading to increased challenges in managing, planning and coordinating the response to severe climate and weather events such as droughts and floods in The Gambia. An insufficient coverage by climate and weather observational infrastructure combined with low capacity to analyse and model the climate and environmental data, have resulted in inadequate data and information to support decision-making processes at short and long-</p>	<ol style="list-style-type: none"> 1. Establish a comprehensive business plan for deployment of effective meteorological service in collaboration with public and private partners; 2. Support the transition of the NMS into a full-fledged agency by supporting the development of a plan for its sustainable financing; 3. Build on current political processes underway to help articulate the economic possibilities and realities of the new agency; 4. Help produce a cost-recovery policy, including a list of 	<p>MoFWRNAM, MECCNAR, GCAA, NMA, Agriculture, Water Resources, Energy, etc</p>	<p>1,000,000</p>	<p>2018 - 2020</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>term ranges. Some progress has been achieved under Phases I and II of the GoTG/GEF/UNEP Climate Change Early Warning Project in the creation of an effective and comprehensive early warning system that helps protect people and productive assets. This weak observational and analytical capability compounds the difficulty to foresee and manage extreme weather events, and to mitigate long term impacts of climate change on various sectors of the economy. The Government of The Gambia is providing funds for the construction of the Head Office of a transformed National Meteorological Services (NMS). However, there much more needed to expand current services and improve on the quality of service delivery and as such contribute effectively to national food security, poverty reduction, environmental sustainability and safety of lives and properties. The transformed NMS should be vested with authority to generate revenue from its services and thereby reduce its dependence on the national budget. It is anticipated that the transformed meteorological services will provide better contributions</p>	<p>meteorological products, services, tariffs and prices for public and private clients;</p> <ol style="list-style-type: none"> 5. Support the establishment of economic structures to help the National Meteorological Service gain the ISO 9001-2008 certification as required by Annex 3 to ICAO Convention and the WMO Quality Management Systems for the provision of weather and climate information and early warning services. 6. Help provide the financial blueprint of how the new National Meteorological Agency is to be sustainable; 7. Help identify new services the NMS can provide by virtue of investments in infrastructure and human capacity; 8. Help identify and shape the economic partnerships and possibilities that can render the institution sustainable; 9. Provide a wider choice of cost-recovery services and provide tailored products that it was previously unable to due to skills and infrastructural constraints; 10. Provide better contributions towards accelerating and sustaining national development 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	towards accelerating and sustaining national development efforts, which currently depend significantly on climate sensitive sectors, ensuring that the climate resource is harnessed fully, that climate is seen as a 'development' issue and that the negative impacts of climate hazards on lives and properties are minimized.	efforts, which currently depend significantly on climate sensitive sectors.			
3. Estimation, in a sustainable manner, of The Gambia's contribution to global warming and climate change; assessment of the impacts of climate change on The Gambia's economy and people; and analysis and contextualization of the possibility of national and sectoral climate change integrated plans providing guidance for sectors for emission reduction projects.	In order to fulfill its commitment to the United Nations Framework Convention on Climate Change (UNFCCC), The Gambia being a non-Annex 1 country must periodically prepare and submit National Communication and Biennial Update Reports (BUR). These reports include a comprehensive Greenhouse Gas (GHG) inventory component. GHG inventories provide a fundamental building block to improved measurement, reporting and verification (MRV) of greenhouse gas emissions and subsequent	<ol style="list-style-type: none"> 1. Strengthen the capacity of national institutions in the collection and documentation of quality data 2. Training in the different inventory methods and planning model tools 3. Improve documentation and retrieval of data collected 4. Translation of these methods at the regional level 5. Procurement, installation and use of user-friendly computer software packages for data processing, dissemination and archiving; 6. Improved dissemination of the information contained in the GHG Inventory to policy makers and other stakeholders for planning and other purposes. 	MECCNAR, MEP GCCA, Agriculture, Water Resources. Energy, Forestry etc	500,000	2018-2020

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	mitigation actions. In addition to fulfilling a reporting obligation, a rigorous GHG inventory is an essential tool for planning mitigation activities, projecting future emissions and identifying sectors for emission reduction projects. .				

TABLE 5: Priority GHG Mitigation Actions and Technologies for a Low Carbon Development of The Gambia

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
1. Promotion of energy efficiency, enhanced management, and expansion of the energy mix through uptake of renewable energy sources (Solar and	<p>An affordable, reliable and sustainable energy supply can facilitate the provision of safe water, high agricultural productivity, the creation of local jobs and the functioning of educational and health care facilities.</p> <p>Most of the electricity which is produced in The Gambia is produced using fossil fuels (IRENA, 2013). Total installed capacity for the country is approximately 88 MW, but the available generation capacity range is</p>	<ol style="list-style-type: none"> 1. Improve energy access by combining Energy Efficiency (EE) and Renewable Energy can achieve very desirable in The Gambia; 2. Adopt, promote and expand rural electrification in The Gambia, thus addressing multiple sustainable development objectives (poverty alleviation, local green job creation, alternative income generation, provision of income equality opportunities, improved energy access 	Ministry of Energy, Ministry of Environment, Climate Change and Natural Resources; NAWEC	28,000,000	2018 - 2030

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>Wind) particularly in the rural areas of The Gambia.</p>	<p>only between 45 and 55 MW. Adding to the challenge, the existing supply suffers from planned and unplanned outages due to the inefficient distribution network (Ministry of Energy, 2014).</p> <p>The current level of electrification in The Gambia is insufficient and the Government lacks the resources to improve the situation, given the huge demand. In 2011, The Gambia had an overall electrification rate of approximately 35%, with very high regional variations (i.e., from 6 % in the North Bank region to 93 % in the Banjul region). These electrification rates indicate an average electricity access of only 12% in the rural and semi-urban regions. The government aims at increasing the rate to 95%. Results of the Renewable Energy Feasibility Study conducted in 2006 have shown great potentials in solar energy and some potential for wind energy. Through fuel switching from fossil to renewable, Solar and Wind energy will lead to reduced GHG emissions.</p> <p>Energy sector instruments geared toward promoting low carbon development and reducing carbon emissions for sustainable social and economic development, including renewable energy and energy efficiency, include (i) Renewable Energy</p>	<p>and better health, educational and environmental conditions);</p> <ol style="list-style-type: none"> 3. Replace the existing and aged generators at NAWEC; 4. Encourage and facilitate the participation of the Private and Business Sectors through adopting the feed-in- tariff in the Energy Sector; 5. Install solar and wind mini-grids (150-200KW) especially along the coastal line to complement NAWEC's generating capacity; 6. Encourage and facilitate SMEs (tailoring shops, fish markets, vegetable vendors etc.) with solar powered system to boost the sector; 7. Build the human capital and provide appropriate technologies together with a substantial investment of material resources; 8. Create, promote and facilitate markets for renewable energy technologies; 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>Initiative for Africa; (ii) Feed in Tariff; (iii) Renewable Energy Policy; (iv) Green Mini Grid; (v) ECREE Strategic Investment Plan; (vi) Rural Electrification NAMA; and (vii) PPP for Solar PV. The Renewable Energy Act of 2013 has as its principle objectives to promote and enhance the use of renewable energy resources, which, if carried out in a sustainable fashion, would be expected to promote climate resilience.</p> <p>Two small-scale wind turbine generating 100 to 150kW, at Batokunku and Brusubi, also provide surplus electricity to the power grid through commercial arrangements with NAWEC.</p>				

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>2. Promote the use of energy-efficient cooking stoves to reduce greenhouse gas emissions from fuel wood consumption</p>	<p>Fuel wood collection and burning of wood during charcoal production is reducing vegetation cover and increasing The Gambia's emissions of greenhouse gases. Major saving in both CO₂ emissions and energy consumption will be realized by simply popularizing the use of improved cooking stoves that is expected to save up to 100,000 TOE fuel wood by 2020. The cumulative saving for wood and charcoal for the urban households will be around 850,000 TOE.</p>	<ol style="list-style-type: none"> 1. Develop baseline data and information on wood (fuel wood and charcoal) consumption and related greenhouse gas emissions; 2. Identify the cook stove type and technology most appropriate for The Gambia; 3. Identify and train beneficiary communities on construction of cook stoves; 4. Construct and distribute 200,000 stoves (charcoal and firewood); 5. Monitor, collect and share feedback information on impacts, challenges and best practices 	<p>MoE, MoECCNAR, NAWEC</p>	<p>5,000,000</p>	<p>2018 - 2022</p>
<p>3. Reinforcement of transmission and distribution system to reduce losses to 15% by 2030</p>	<p>Energy infrastructure refers to NAWEC's entire electricity generation, transmission and distribution assets, comprising of power stations with an aggregate capacity of 101 MW produced by electromechanical generators. Power is distributed through an electricity grid comprising of 181 km long 33kV/11kV transmission network, step-down transformers, and finally 230V and 400V distribution lines.</p> <p>The electricity supply infrastructure faces decreased thermal efficiency of power lines, and possibly damage to infrastructure. Higher temperatures degrade heat exchange efficiency of engines and encourage use of air-conditioning, resulting in higher fuel</p>	<ol style="list-style-type: none"> 1. Rehabilitate, upgrade, refurbish and expand the country's transmission and distribution network by targeting public facilities and low-income, peri-urban and rural households for electrification; 2. Upgrade and improve electricity infrastructure which will facilitate the expansion of access to health care, education and basic infrastructure services; thus improving the quality of life; 3. Upgrade and replace transformers; 4. Refurbish, upgrade (from 33Kv to 132Kv), expand (link GBA to provinces networks at 132Kv), and build a dispatch centre and increase the sub-stations to ensure stability. 	<p>Ministry of Energy, NAWEC</p>	<p>55,000,000</p>	<p>2018 - 2025</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>consumption and increased GHG emissions. The generation and distribution network is not at all robust or reliable (Gambia Energy NAMA, 2015).¹⁶Electricity supply in The Gambia is insufficient, and is among the most expensive in Sub Saharan Africa. It is unreliable and costly due to the high cost of fossil fuel, the high cost of installing the transmission infrastructure, and 24% average electricity loss during transmission and distribution (NAWEC 2016). With increase in temperatures, sagging of overhead lines will become more serious leading to significant electricity transmission losses, resulting in subsequent power shortages and potentially triggering power outages.</p>				
<p>4. Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of</p>	<p>Despite the growing number of road vehicles and associated threats of vehicle emissions to human health, especially in areas occupied by large numbers of people, measurements of air pollutants (including GHGs such as CO, SO₂, NO_x) and GHG inventories have largely been peripheral issues in transportation planning, road traffic management, and climate protection. In a recently published national GHG inventory however, the transport sector emerged as a bigger emitter of GHGs than energy generation industries in the year 2000 (GOTG, 2012a), wherein GHG</p>	<ol style="list-style-type: none"> 1. Improve the road network, by reconstruction, rehabilitation and maintenance of existing roads, and expand the system where feasible. 2. Implement road network projects in the peri-urban and rural Gambia 3. Continue the two-way (four-lane) road network from the Airport to Kembuje in the West Coast Region; 4. Construct Foot bridges/flyovers at strategic points within the Greater Banjul Area and the western part of the West Coast Region; 5. Construct and rehabilitate civil works 	<p>Ministry of Transport and Infrastructure; National Roads Authority</p>	<p>50,000,000</p>	<p>2018 - 2030</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>greenhouses and build a stable economy.</p>	<p>emissions data from the transport sector is officially reported for the first time. According to a historic reconstruction of GHG emissions in the transport sector, total emissions grew by 111% between 2000 and 2012 (GOTG, 2015). Using data on fuel imports (WAIS, 2015) extrapolated to 2012, Njie (2017) estimated CO₂ emissions of 272.9Gg in 2012, representing a 175% growth between 2000 and 2012. According to Njie (2017), it is assumed that fuel consumed is equivalent to imports less one month reserve, that is 92% (=12/13) of total imports. Still, there is some uncertainty about how much of these emissions are attributable to portable generators, compressors, lawn mowers, and other non-transport equipment operating on diesel fuel. On the other hand, activity data and key assumptions for transport sector are not provided in worksheets supporting GOTG (2015)</p> <p>Amidst vehicle population growth patterns, NRA (2014) reports an average daily traffic of around 100 vehicles on rural feeder roads, 225 vehicles on inter-urban roads, and 2,400 vehicles along the Banjul-Brikama axis. In parallel, imports of petroleum products has steadily risen (WAIS, 2015), spurring in principle, a sharp increase in CO₂ emissions from the</p>	<p>(new and widening of existing roads and culverts) in the Greater Banjul Area and the Growth Centres in the Administrative Regions;</p> <ol style="list-style-type: none"> 6. Establish public and private partnerships (PPP) in the planning and executing investments; 7. Increase the proportion of vehicles with a lower carbon footprint in the national fleet; 8. Improve traffic management strategies to ease movement of people and goods and cut down on vehicle fuel consumption; 9. Strengthen system(s) for vehicle registration and driver licensing; 10. Regulate overloading and overcrowding of vehicles; 11. Expand road infrastructure and improve its quality; and 12. Ensure cross-sectoral policy coherence; 13. Adopt direct injection technology and Turbochargers that significantly increase fuel efficiency and power output of internal combustion engines and are expected to deliver a 10-15% reduction in GHG emissions, as oppose to conventional carbureted engines; 14. Adopt and promote battery-powered electric vehicles (BPEV) and fuel cell electric vehicles (FCEV) that eliminate vehicular noise and tailpipe emissions 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>transport sector. Thus, air pollution including greenhouse gas emissions caused by automobiles is recognized as a problem, and the project will provide measures to ease the load on the environment.</p> <p>The aim of this project is to establish new mass transport (bus, railway, river, etc) system, thereby contributing to urban economic development and environmental improvement. Operational modes of water and land transportation shall provide diverse passenger and freight services in The Gambia Due to the country's geography, economic and trade policies, part of the said passenger and freight traffic is domestic whilst a significant part is international in scope.</p>	<p>of GHGs, particulate matter and other pollutants. BPEVs have no tailpipe, but unless they use electricity generated from renewable sources, their overall impact on emissions reduction is around 40% compared to an ordinary diesel-powered car engine;</p> <p>15. Institutionalize a policy that reduces fuel or energy consumption per distance of travel which directly results in cost savings, and improved air quality.</p>			

¹⁶GOTG/MoE, 2015: NAMA Design Document for Rural Electrification with Renewable Energy in The Gambia

TABLE 6: Priority Actions for Climate Resilient Development of The Gambia

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>1. Promotion and adoption of roof-top and surface-runoff rainwater harvesting for 2000 households as climate change adaptation technologies for human consumption, animal watering and other livelihood uses.</p>	<p>Most precipitation that falls on human settlements is lost to the atmosphere through evaporation, or runs into rivers away from settlements before it can be used. However, if the rain is collected using appropriate technologies and infrastructure, it can contribute greatly to the volume of freshwater available for human consumption, animal watering and other livelihood uses (crop irrigation, fish farming, etc), and also contribute to savings for the household and the National or Regional Water Supply Authorities.</p> <p>Climate change projections for The Gambia show a decrease in rainfall by about 3-10% below the current monthly and annual values. Rainwater harvesting has the potential to alleviate water shortage or pollution in The Gambia due to climate change.</p>	<ol style="list-style-type: none"> Mobilize all relevant stakeholders particularly communities, women, youths and the private and business entities; Conduct baseline study to determine and prioritize the adaptation technologies related to rain/runoff water harvesting in The Gambia; Quantify the required resources and relevant cost and benefits of the technologies and for conducting the adaptation activities; Procure, install and operate rooftop (gutters, collection vessel, down-pipes, containers for settling particulates, storage container) and surface runoff technologies (constructed reservoir) for water harvesting; Build the institutional and human capacities to operate the facilities installed for sustainable operation; Institutionalize a robust monitoring system to ensure sustainability; 	<p>DWR, DLS, MoLGLRI, Municipalities and LGAs, and communities</p>	<p>15,000.000</p>	<p>2017 - 2022</p>
<p>2. Adoption and application of climate-smart and conservation agriculture</p>	<p>Climate-smart agriculture seeks to increase sustainable productivity, strengthen farmers' resilience, reduce agriculture's greenhouse gas emissions and increase carbon sequestration. It strengthens food security and delivers environmental benefits. Climate-</p>	<ol style="list-style-type: none"> Increase and promote knowledge, research and development into technologies, practices, and approaches for Climate-Smart and Conservation Agriculture (CSCA); practices and technology sharing and cooperation; Improve communication and information sharing, outreach, 	<p>Ministry of Agriculture, MoECCNAR, MoFWR&NAM, DoA, DoLS, UTG, etc.</p>	<p>15,000,000</p>	<p>2018 - 2030</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>smartagriculture includes proven practical techniques— such as mulching, intercropping, conservationagriculture, crop rotation, integrated crop-livestockmanagement, agroforestry, improved grazing, and Improved water management —and innovativepractices such as better weather forecasting, moreresilient food crops and risk insurance.</p> <p>Conservation agriculture system aims at soil and water conservation, nutrient improvement and enhanced production. Conservative agriculture technologies are based on the principles of (a) minimal soil disturbance (zero-tillage), (b) maintenance of good soil cover (cover crops, residues and mulches), and (c) appropriate crop rotation or crop association depending on the availability of land. Consequently soil organic matter is conserved, water retention is increased, erosion and pollution are reduced, and the productivity of agricultural systems is increased even during the prevalence of drier climate phenomena such as droughts. The Conservation Agriculture (CA) approach is recommended as a climate-smart and climate-resilient agricultural technique because conservation of soil organic matter increases the fertility and water holding capacity of soils. This simple and cost-effective</p>	<p>extension and technical assistance among stakeholders at all levels on CSCA by:</p> <ul style="list-style-type: none"> • Identifying and filling knowledge gaps that hinder adoption and implementation of CSCA; • Developing adequate metrics; • Stimulating research and investment in CSCA and food systems, drawing on indigenous knowledge and expertise where feasible; • Connecting research findings to the experiences of practitioners in a transparent and open way; • Developing knowledge platforms in order to exchange data and information; • Scaling up south-south knowledge sharing and support; • Strengthening extension and support tools for CSCA, reflecting the perspectives of producers are based on their empirical knowledge and draw on their experiences (through farmer-to-farmer engagements); and • Strengthening institutional capacity development for knowledge, practice and technology sharing relating to Climate-Smart Agriculture. <p>3. Improve the effectiveness of public and private investments that support the three pillars of CSCA including:</p> <ul style="list-style-type: none"> • Encouraging existing public and 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>approach to increasing the climate resilience of agriculture is particularly well suited to low input rain-fed agricultural systems such as those in The Gambia. Therefore, food security is assured during dry periods especially in arid and semi-arid climatic conditions familiar to The Gambia.</p>	<p>private investments to review their compatibility with CSCA;</p> <ul style="list-style-type: none"> • Leveraging new public and private investment into CSCA from domestic and external (multilateral and bilateral) sources; • Developing methodologies and metrics to guide investment strategies; • Improving climate-resilience of rural and agriculture infrastructure while reduces greenhouse gases where appropriate; • Engaging government departments, institutions, farmer organizations, the private sector and agri-businesses (large and small) and others in multi-stakeholder partnerships for climate-smart investments in agriculture and food systems, including supply chains; and • Increasing farmers' access to weather forecasting and risk management tools such as insurance. <p>4. Integrate CSCA into policy, strategies and planning at regional, national, and sub-nation levels through, for example:</p> <ul style="list-style-type: none"> • Changing public policy frameworks, for example through linking sustainable agriculture intensification with climate adaptation, resilience and disaster 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
		<p>risk reduction efforts, and aiming to reduce emissions – or the intensity of emissions -- as a result of agriculture and land use change;</p> <ul style="list-style-type: none"> • Incorporating CSCA practices into agriculture extension and outreach services; • Mainstreaming CSCA practices into local, community-driven programs, national investment and food security plans and policies for development assistance; • Establishing policies that encourage responsible practices and investment along the value chain; and • Facilitating the adoption of CSCA technology, practices and systems. <p>5. Institutionalization of a Monitoring and Evaluation system to encourage learning and adjustment through the process.</p>			
<p>3. Production of NERICA Rice under upland and non-flooded conditions in place of flooded swamp rice and Promotion of efficiency in rice production.</p>		<p>1. Introduce soil and water conserving practices in the RICE production sub-sector, such as mulching, intercropping, cover cropping, and agroforestry, and expands upon research on integrated pest management (IPM) and system of rice intensification (SRI);</p>			

CHAPTER 6

IMPLEMENTATION OF THE LECRDS AND ITS ACTION PLAN

6.1 Implementation Framework

Implementation of the LECRDS (Chapter 4) and the LECRD Action Plan (Chapter 5) of The Gambia is contingent on the existence of solid climate change legal framework backed by the existing National Climate Change Policy (GoTG/NCCP, 2016), and a well-established institutional structure with well-defined roles and responsibilities of institutions and individuals. In The Gambia both the National Climate Change Policy and the institutional structure are in their infancy stages. There is no climate change law.

The LECRDS complements the SPCR which provides the overall strategic framework for the implementation of the NCCP in the Gambia. The NCCP has defined the institutional arrangements for an enhanced coordination of climate change planning and responses and the proposed coordinating mechanisms include the National Climate Change Council (NCCC), the Inter-Ministerial Committee on Climate Change (IMCCC), and the National Climate Change Committee (NCCC) which will be expected to provide final direction on optimal oversight of the LECRDS. Project-level oversight of the LECRDS investment programmes would be developed once the NCCP is formally adopted and the key institutions are in place.

At the regional and district levels there are the Technical Advisory Committees (TACs) and the Multi-Disciplinary Facilitation Teams (MDFTs) respectively. These key institutions will be expected, as in the case of the SPCR, to play a key role in the implementation and monitoring of LECRDS, through their role as planners and facilitators of the development process at sub-national levels.

The Gambia Climate Change Fund (GCCF) will be expected to play a central role in the financing and implementation arrangements for the LECRDS under the proposed governance structure.

Given the cross-cutting and overarching role that policy, legislative and institutional reform play in enabling The Gambia's climate change response, the following priority actions are envisaged for the implementation of the LECRDS, LECRD Action Plan and other climate change issues. Jointly implemented, these actions constitute a comprehensive package that facilitates climate change mainstreaming and effective LECRDS and its Action Plan implementation. Accordingly,

the separate priority actions identified below are closely interlinked and are designed to reinforce the objectives of the other legislative, institutional and policy actions.

1. Implementation the recently adopted National Climate Change Policy to enable the country to achieve the adaptation and mitigation goals and strategies identified and discussed in Chapter 4 and priority projects/activities in Chapter 5 Sub-section 3.2.
2. Establish the enabling legislative framework to implement the LECRDS and its Action Plan by enacting a stand-alone and overarching Climate Change Law. Amendment of key sectoral laws will be required to make them to be consistent with the climate change law and to ensure that all actions under the LECRD Action Plan have the legislative basis to be implemented and translated from concept to practice.
3. Strengthen the high-level National Climate Change Council (NCCC) with the role of primary coordination, policy direction, oversight and guidance across all levels of government. The Council should ensure mainstreaming of climate change by national government agencies and departments. The Council is expected to coordinate climate change issues through an inter-ministerial and interagency committee. The NCCC will be chaired by the President or her/his representative.
4. Strengthen the National Climate Change Secretariat as the primary national government agency for climate change response, located within the Ministry of Environment, Climate Change and Natural Resources which is responsible for climate change political affairs. The Secretariat will perform defined statutory functions, key among them the proposal and continuous revision of climate policy to the NCCC, oversight of climate change strategies and action plan implementation, proposal of climate change legislation, as well as the role of monitoring of national compliance and enforcement.

6.2 Adoption of the current Draft National Climate Change Policy (NCP)

The development of the current National Climate Change Policy of The Gambia is a manifestation of government's commitment to addressing climate change through specified policies, strategies, plans and actions. The NCCP is designed to (a) ensure integration of climate change into sustainable development frameworks; (b) ensure requisite institutional capacities for climate change issues at all levels; (c) enhance the use of knowledge, education, training, innovation, and information sharing to build climate proofed societies; (d) improve the identification, assessment, and monitoring of the climate and early warning systems; (e) improve effectiveness of climate change response by fully building requisite institutions and structures; and support transitioning to green economy.

6.3 The Climate Change Legal Framework

A policy, such as the National Climate Change Policy of The Gambia, is not binding and thus there would be no legal consequence on the government or the citizens of The Gambia for failing to implement the policy. To be binding, the NCCP should be translated into law for effective implementation. This legal framework is the foundation for an effective policy and it can take the form of a stand-alone National Climate Change Act or an existing law can be amended to (a) provide legitimacy for actions (programmes and activities) to address the climate change concerns and issues, (b) set the goals that a society desires to accomplish in light of a climate change implementation, (c) to serve as the only acceptable tool in regulating human behaviour and conduct on climate change, and (d) provide official sanctions and can ensure compliance.

This study is bias towards the institutionalization of a stand-alone and comprehensive National Climate Change Act of The Gambia that addresses and provides legitimacy for all climate change issues and activities including (a) the continuous inventorying of the anthropogenic emissions sources and sinks of The Gambia; (b) institutionalization of a national framework for carbon finance; (c) development of national and regional programmes to mitigate the anthropogenic emissions by source and sinks; (d) promotion of education, training and awareness on climate change; (e) appropriate technology transfer arrangements and their authorisation, and (f) access to environmentally-sound and decarbonization technologies.

6.4 Institutional Framework

In determining an appropriate institutional framework for the implementation of climate change in general and specifically the LECRDS and the LECRD Action Plan, careful consideration should be accorded to (a) government's obligations towards meeting the implementation of the Climate Change Convention at national, regional and international levels; (b) national development frameworks (policies, strategies, action plans and programmes); (c) existing institutions that already conduct climate change activities and how they can be co-opted in the implementation of climate change at the national level; and (d) any other plausible effective options.

In the preceding sub-sections, it is revealed that The Gambia currently has a draft National Climate Change Policy but no Climate Change Law. The LECRDS therefore recommends that the current draft climate change policy be adopted and a related legislation be put in place by developing a National Climate Change Act of The Gambia. It is also recommended that during the development of the Climate Change legislation, comprehensive review of existing laws that are related to climate change (Environment, Natural Resources, Agriculture, Energy, Disaster Management, Health, etc.) should be undertaken to make these laws climate change responsive.

In addition, during the process of development of the LECRDS, it has been established that institutions currently in place to govern climate change affairs are in their infancy and are inadequate. Consequently, it is urgently recommended that the Ministry of Environment, Climate Change and Natural Resources houses a dedicated and adequately resourced Climate Change Secretariat to oversee climate change issues including the implementation of the LECRDS, its Action Plan, and other adaptation and mitigation programmes. In addition to the National Climate Change Policy, Act and Secretariat, it is recommended that relevant Divisions and Units of the Secretariat should be established and/or strengthened and some national, sub-national and thematic committees should be established to support the Secretariat in the implementation of climate change, particularly the LECRDS and its Action Plan. This institutional framework should be inscribed and anchored on the provisions of the proposed new National Climate Change Act.

The new Climate Change Secretariat shall require close cooperation and collaboration with national, regional and international organizations and bodies dealing with climate change. To be effective and efficient in discharging its functions, the Climate Change Secretariat under MECCNAR will need to work closely with some existing or proposed Thematic Committees and/or Working Groups. The recommended Committees and/or Working Groups include:

1. **The National Climate Committee(NCC)** which is responsible for (a) the technical implementation of the Climate Change Convention and all related instruments, (b) serve as an advisory body on climate change technical matters, and (c) support the Climate Change Secretariat under MECCNAR in gathering and collating input and advice from key climate change stakeholders for its use in the coordination of The Gambia's climate change activities. The Climate Change Secretariat will provide secretarial functions for the committee. The IPCC focal point based in the National Meteorological Services will augment the NCC and strengthen its scientific advisory capacity.
2. **Multi-sectoral task force on mobilization of climate finance:** The establishment of the The Gambia Climate Fund in the Ministry of Finance to facilitate the sourcing of finance from domestic budgets and international climate funding mechanisms is crucial to ensure effective implementation of the LECRDS and Its Action Plan. A multi-sectoral taskforce is recommended to support mobilisation of climate finance in close collaboration and partnership with the National Designated Authority (NDA) of the GCF, the Designated National Authority (DNA) of the Clean Development Mechanism (CDM), the National Implementing Entity (NIE) for the Adaptation Fund and the National Designated Entity (NDE) of the Technology Mechanism.

6.5 Partnerships and an Integrated Approach

Collaboration with organizations, communities, and other partners is one of the most important and sustainable means to face the challenges of global climate change and transition to low carbon green economy. The scale of climate change impacts far exceeds the ability of any one country, agency, or organization to effectively respond as a single entity. It is necessary to foster partnerships among national and sub-national governments, organizations, private, academic, and non-governmental entities at local, regional, national, and international levels. Existing sustainable partnerships, which have evolved over time, are ideal platforms to support combined efforts towards mutual goals for climate change response. Additionally, new partnerships specific to climate change should be forged to provide the enabling environments for closer working relations on a range of science and adaptation tools for decision making.

Mechanisms will be established and made functional to engage and partner with key stakeholders in order to maximise effective climate change mitigation and adaptation programmes. These partnerships will be developed in such a way that government plays a supporting role to some programmes and projects and a leading and oversight role in others. The integrated approach to addressing climate change needs to be highlighted throughout these partnerships and it is important that the activities developed as part of the LECRDS and its Action Plan are not limited to those actions that are managed by the public sector.

Examples of partnerships that The Gambia could foster during the implementation of its LECRDS and its Action Plan include:

1. Creating financial mechanisms to (a) facilitate the introduction of sub-national climate trust funds, risk transfer mechanisms and formal donor partnerships; (b) build and strengthen partnerships at the Municipalities and Administrative Regions to share costs and expertise, and pool resources at the district level with the engagement of NGOs, private sector and government special projects; and (c) facilitate decentralised responsibilities and skills, and ensure community participation e.g. through skills sharing forums/initiatives.
2. Fostering partnerships between government, private sector, academia and international partners to support to facilitate the acquisition of advanced green and decarbonization technologies such as energy efficiency, water resource management, solar technologies, etc, to The Gambia. The partnerships will develop indigenous innovation capabilities in firms, the University and research institutes to adapt, develop, deploy and operate clean technologies effectively. The Gambia technology partnerships will place the country into advantaged and strategic positions in which it can benefit from technology transfer through the UNFCCC Technology Mechanism.
3. Foster partnerships between the public, private and vulnerable sectors to raise awareness on climate change and encourage individuals and organisations to work towards transitioning The Gambia into a low carbon and climate resilient economy. These partnerships could undertake actions that help sectoral and community planning partners

to achieve significant carbon reductions across sectors of the economy and ward and district communities.

4. Although current levels of awareness of global warming issues in The Gambia are fairly high at the technical level in the public sector, misconceptions are still common outside of this level of the society. Partnerships between MECCNAR and the Ministry of Education media, civil society, academia, elected representatives, and private and business sector entities can develop and deliver a wide-ranging education campaign to exemplify best practice and enable both individuals and organisations to reduce their carbon foot-print, adapt to the impacts of climate change and build resilience to climate risks. These positive outcomes of the education and awareness partnerships will ensure that local public service organisations and their partners work towards common objectives that will tackle the climate change challenges and capitalise on funding and joint working opportunities.

CHAPTER 7

FUNDING AND RESOURCE MOBILISATION STRATEGY FOR THE LECRDS AND ACTION PLAN

7.1 Financing and Resourcing the LECRDS and its Action Plan

Climate finance refers to local, national or transnational financing, which may be drawn from public, private and alternative sources of financing. Climate finance is critical to addressing climate change because large-scale investments are required to significantly reduce emissions, notably in sectors that emit large quantities of greenhouse gases. Climate finance is equally important for adaptation, for which significant financial resources will be similarly required to allow countries to adapt to the adverse effects and reduce the impacts of climate change. In accordance with the principle of common but differentiated responsibility and respective capabilities set out in the Convention, developed country Parties (Annex II Parties) are to provide financial resources to assist developing country Parties in implementing the objectives of the UNFCCC. It is important for all governments and stakeholders to understand and assess the financial needs developing countries have so that such countries can undertake activities to address climate change. Governments and all other stakeholders also need to understand the sources of this financing, in other words, how these financial resources will be mobilized.

Equally significant is the way in which these resources are transferred to and accessed by developing countries. Developing countries need to know that financial resources are predictable, sustainable, and that the channels used allow them to utilize the resources directly without difficulty. For developed countries, it is important that developing countries are able to demonstrate their ability to effectively receive and utilize the resources. In addition, there needs to be full transparency in the way the resources are used for mitigation and adaptation activities. The effective measurement, reporting and verification of climate finance is key to building trust between Parties to the Convention, and also for external actors.

The LECRD Action Plan (NCCAP), as set out in this document, identifies the key priorities for The Gambia to successfully transition to a low-carbon, climate-resilient growth path whilst realising the ambitions of Vision 2020 of becoming a middle-income country. In terms of mitigation, the LECRDS provides mitigation strategies and its Action Plan provides mitigation activities that ensure energy efficiency, expansion of the energy mix to include renewables, and establishment of resilient transport system. Important mitigation opportunities are also available from the waste management sector and domestic energy. Adaptation priorities discussed in the LECRD Action Plan focus on building adaptive capacity including early warning for increased ability to respond to current and future climate extremes, and the provision of water harvesting technologies and infrastructure investments.

The realisation of these bold ambitions identified in the The Gambia LECRDS and its Action Plan will require substantial financial resources. To be successful, The Gambia will need to access resources from both public and private sources and from both domestic budget within The Gambia and bilateral and multilateral development partners.

The cumulative expenditure commitment estimates in the LECRDS and its Action Plan is about - **156.5 Million US Dollars**. Raising the necessary capital is currently impeded by a number of barriers some of which include policy and regulatory weaknesses, difficulties in accessing commercial finance and technical capacity shortcomings. However, the judicious use of public resources can play a key role in overcoming these barriers through improving access to finance or ameliorating some of the negative social and redistributive impacts that might otherwise be experienced from, for instance, higher fuel prices. It is also broadly recognised that the characteristics of an important component of climate change activities and programmes – such as some adaptation activity and capacity building – will require public resources in the form of concessional or grant finance.

There are three main options for the delivery of the public resources:

1. Continue with the status quo and scale-up the current project-oriented, development partner-led approach.
2. Enhance direct flows of international finance to the Government of The Gambia, i.e. budgetary support, to be disbursed using existing government structures and mechanisms; and
3. Create a dedicated National Climate Fund.

For sustainability, it is recommended to create a stand-alone dedicated Gambia Climate Change Fund (GCCF) because (a) the GCCF would have more clarity of purpose relative to greater budgetary support and it will allow the development of The Gambian expertise and transparency on climate financing; and (b) relative to maintaining or augmenting the current development partner-led approach, the GCCF would offer greater opportunities for alignment with national priorities (the ‘ownership’ principle).

A well-designed and well-managed GCCF would have a number of key features. It is proposed that the GCCF would focus both on mitigation and adaptation activities; it would evolve in a phased manner starting with providing grant financing before evolving to offer a wider palette of financing instruments; it would aim to catalyse private sector funding through interacting with other financial intermediaries (e.g. commercial banks); and its governance structure would allow broad and equal representation from the government, civil society and the private sector leading to improved capacity of the Government to absorb international public climate finance.

In this way the Fund would have the potential to evolve to become the main recipient of multilateral and bilateral climate finance flows mobilised by The Gambia. There are admittedly challenges to using the Fund to channel public resources, but with careful design and management these can be overcome. The Fund will enable The Gambia to contribute to the achievement of the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC). In the context of sustainable development, the Fund will promote the paradigm shift towards low-emission and climate-resilient development pathways by financing activities that ultimately allow The Gambia to limit or reduce greenhouse gas emissions, adapt to the impacts of climate change, access low-emissions technologies, facilitate green growth and build resilient and sustainable infrastructure.

The ability of the Government of The Gambia to absorb international public climate finance, as well as to use its own public resources expeditiously towards climate change activities could be improved. Low absorption rates arise from a range of factors, from budgeting and fund flow challenges on the part of the Treasury and line ministries, to limited alignment of government and development partner fiscal policies and procedures, capacity constraints and a limited prioritisation of climate change within the budget. These barriers can impact the speed of fund disbursement from development partners to the Treasury and implementing agencies (e.g. line ministries and NGOs), and consequently, the effectiveness of climate-relevant project implementation. The scope for improving absorptive capacity of climate change finance in The Gambia provides further justification for the creation of a Climate Fund that can manage and disburse funds more quickly and efficiently.

Future carbon market conditions are likely to be difficult, both for The Gambia and in general. The combination of an unfavourable demand/supply balance globally has already led to low carbon credit prices. The Gambia's future actions in relation to carbon market activity need to balance the fact that these conditions suggest government support is more urgent with the fact that they make it more difficult for that support to be effective. A primary trading platform is more appropriate to The Gambia's needs than a secondary platform. It is possible to distinguish 'primary' carbon trading platforms from 'secondary' carbon trading platforms. Primary platforms facilitate the origination of carbon credits from individual projects, and their initial purchase from project developers; secondary platforms allow trading on a larger scale, treating carbon credits as a uniform commodity and allowing ultimate compliance purchasers and market intermediaries to purchase credits and manage their carbon price exposure. A primary trading platform would be more appropriate for The Gambia's needs in the current market environment.

Based on the foregoing and as a matter of priority, the Government of The Gambia (GoTG) should begin the process of creating the Gambia Climate Change Fund (GCCF) by undertaking the:

1. Design of the LCF based on the detailed analysis within and accompanying the LECRD Action Plan;
2. Appoint the Governing Board and Operations Committee;
3. Establishment of a multi-departmental Task Force within government to steer the process of establishing the GCCF;
4. Convene a climate finance pledging conference;
5. Create the 3 Financing Windows of the GCCF (see Resourcing the GCFC below);
6. Communicate and consult nationwide about the GCCF, its mandate, and the target date for the launch of operations;
7. Draft terms of reference for the Fund Administrator, and recruit the GCCF Administrator;
8. Establish a joint financing agreement with development partners;
9. Develop and approve key policies, guidelines, procedures and templates; and
10. Prepare and approve the initial budget.

7.2 The Concept of the LECRD Resource Mobilization Strategy (LRMS)

This LECRD Resource Mobilization Strategy (LRMS) has been developed with cognizance of the tremendous climate change impacts, the identified strategies to respond to the impacts and address the root causes of climate change, and the priority mitigation and adaptation activities that will support The Gambia to transition to a low-emissions and climate resilient development as identified in the LECRD Action Plan (Section Chapter 5) of this document. The strategy also considers current trends in domestic and donor funding of climate change in The Gambia and then assesses internal structures and challenges on the basis of which this strategy has been developed. The strategy consists of the major approaches of (1) improve communication and information flow; (2) institute processes, systems and tools; (3) introduce incentives and empowerment; (4) enhance skills and capacity; (5) pursue donor interaction; (6) strengthen interpersonal relations and (7) produce results and monitor impacts that address a variety of challenges impacting effective resource mobilization. It is anticipated that the execution of these strategic approaches and activities will generate adequate resources for the implementation of climate change in The Gambia and facilitate resource mobilization efforts.

Considering the scale of action to address climate change challenges in The Gambia, there is no doubt that the significant funding gap threatens to jeopardize the country's response to climate change. Utilizing detailed information about current donors and funding patterns, this document aims to provide a strategy on how the Government of The Gambia can mobilize resources for activities planned to address climate change at the national and sub-national levels. The document, furthermore, seeks to improve processes for the flow of funds, provide information about distribution of funds and highlight the importance of improving capacity to deliver and absorb funding at country level, paying attention to under-funded climate change response priorities.

Due to the absence of a climate change policy, strategy and action plan, grant expenditure to address climate change in The Gambia has been ad-hoc and most of it has neither been channelled towards government priorities nor applied towards contributing to developing a holistic approach to strengthening climate change resilience. In addition, the grant aid has always been unpredictable, short-term, and volatile which restricts the ability of Government to make long-term plans. The GoTG may also not be in a position to impose harmonization, coordination and/or alignments with the multiple and fragmented sources of funding for climate change, which carries unpredictable risks and transaction costs.

It is for these foregoing reasons and to ensure that the proposed mitigation and adaptation strategies and actions are fully implemented that this resources mobilization strategy is developed. This LECRDS, its Action Plan and Resources Mobilization Strategy cover the duration of 13 years (2018-2030).

Resource mobilisation needs to be informed by the mainstreaming of climate change into the planning and decision-making of government, private sector, and civil society. This can be achieved by upscaling the current and building new initiatives of (a) creating enabling environments whereby government, private sector and civil society collectively respond to the economic, environmental and social changes necessary for climate-resilient development and green job creation, providing for the economic and social upliftment of communities, while minimising negative impacts in the future; (b) promoting the green economy as an effective means of contributing towards the climate change response, and securing resources to support climate change and green economy interventions; and (c) consolidating and extending existing initiatives towards a climate resilient economy.

7.3 Resourcing the Gambia Climate Change fund (GCCF):

The emerging climate change response finance options include grants for research and development co-operation; commercial finance through debt and equity, concessionary finance, risk insurance, specialised environmental funds, and new capital market innovations, such as green and climate bonds. These options may be extended by integrating financing for natural resources, such as payment for ecosystem goods and services. By necessity, the climate change finance framework needs to comprise a suite of measures to create and maintain a long-term funding framework for mitigation and adaptation actions and to trigger swift and urgent action towards climate resilient development. Importantly, while accessing funds is a crucial aspect of implementing the LECRDS and its Action Plan of The Gambia, removing the barriers to and creating enablers for using these funds is equally important and will need to be given focus.

It is recommended that resources should be mobilized both domestically and internationally. For this reason, the GCCF should be designed to have three (3) windows: (1) Domestic Climate Change Finance; (2) International (Bilateral and Multilateral) Climate Change Finance; and (3) Private and Market Climate Change Finance.

7.3.1 Resourcing the Domestic Climate Change Finance Window (DCCFW) of the GCCF

The Domestic Climate Change Finance Window (DCCFW) should be resourced from about 5% of the National Income Tax and 5% of current and future domestic environment levies collected annually. The The Gambia Tax System is based on a self-assessment system and comprises domestic taxes and international taxes (direct taxes and indirect taxes). These taxes are administered by the Gambia Revenue Authority (GRA).

It is proposed in this Resource Mobilization Strategy, that the funds in the DCCFW should be managed based on the decision of MECCNAR and be allocated to Local Authorities (Office of the Governors and Mayors) at the local level in The Gambia. Local government structure in The Gambia (Figure 14) essentially consists of 5 Administrative Regions and 2 Municipalities. The Regional Governors are the direct representatives of the centre and coordinate the activities of the decentralized structures of all Ministries. They also ensure that power is properly devolved to appropriate levels. The Local Government Act provides that councils shall be established for the local government areas and each council shall be a body corporate by the name 'Area Council', 'Municipal Council' or 'City Council' as may be appropriate, preceded by the name of the Local Government Area (LGA) for which the Council is established. Each Council shall be vested with the legislative power of the LGA and be answerable to the Governor. The legislative power of the council shall be exercised by by-law passed by the council in accordance with the Decentralization Act and signed by the Governor.

In 2015, GRA was given the responsibility for the collection of all revenues on behalf of councils as fiscal decentralization. Under Gambian law, fiscal decentralization involves the sharing of revenue sources between the central and local governments, the sources having been categorized into two components, i.e., central and local government revenues³. In Gambian law, besides tax revenues, the local authorities shall receive various grant subsidies from central government and they can also borrow from domestic banks. Fiscal decentralization is limited to the municipal and area councils and does not extend to the district/ward and village authorities and development committees. In the Local Government Act 2002, this is anticipated as sufficient fiscal decentralization for local governments to undertake economic and social development activities in their respective areas without having to refer back to the centre.

The Decentralization Act (2002) largely subordinated the central government authority and powers to the supremacy of Local Authorities for virtually all development activities in the

¹⁶Kemo Conteh: <http://thepoint.gm/africa/gambia/article/managing-local-tax-in-the-gambia-what-the-public-need-to-know>

relevant council localities. As a participatory constitutional democracy, a legal basis thus exists within the constitutional framework for political checks and balances on the central government, in the allocation of funds and resources in a transparent manner with a concomitant responsibility by the local administrations to be held liable by their constituents for failures to “initiate, draw up and execute development plans for the locality, as mandated for the Decentralization Act.



Figure14: Local Government Structure in The Gambia

7.3.2 Resourcing the International Climate Change Finance Window (ICCFW) of the GCCF

It is proposed that the International Climate Change Finance Window (ICCFW) of the The Gambia Climate Fund be resourced from Bilateral and Multilateral sources including the UNFCCC funds. Examples of Bilateral and multilateral funds from which the GCCF can benefit include:

1. AFD French Development Agency
2. Australia AID (AUSAID)
3. Canadian International Development Agency (CIDA)
4. CCCFL - China Climate Change Framework Loan (of EIB)
5. CCPL - Climate Change Program Loan (of AFD and JICA)
6. DFID
7. European Investment Bank (EIB)
8. European Union Emission Trading Scheme
9. European Commission Global Climate Change Alliance
10. FGEF - French Global Environment Facility (of AFD)
11. GEEREF Global Energy Efficiency and Renewable Energy Fund (advised by EIB)
12. German International Climate Initiative
13. Global Facility for Disaster Reduction and Recovery
14. International Climate Initiative (ICI)
15. Initiative for Climate and Environment Protection (IKLU of BMZ)
16. Japan Cool Earth Partnership
17. Japan Bank for International Cooperation (JBIC)
18. Japan International Cooperation Agency (JICA)
19. KfW Development Bank (Germany)
20. PCF Prototype Carbon Fund (of World Bank and JICA)
21. The European Investment Bank (EIB)
22. The German Development Bank (KfW)
23. The Japan International Cooperation Agency (JICA)
24. US Agency for International Development (USAID)
25. World Bank Climate Investment Funds
26. World Bank Pilot Program for Climate Resilience

The UNFCCC Funds that The Gambia can target in resourcing the GCCF include:

1. **Green Climate Fund (GCF)** which is intended to be the main fund for global climate change finance in the context of mobilizing USD 100 billion by 2020. The GCF was established by the COP at its sixteenth session by decision 1/CP.16, designed throughout 2011 by a Transitional Committee and launched at COP 17 through decision 3/CP.17.
2. **The UNFCCC Special Trust Funds** which include (a) the Special Trust Fund for the Core Administrative Budget of the UNFCCC (the "core budget"); (b) the Special Trust Fund for Facilitating Participation of Parties in the UNFCCC Process (the "participation fund"); (c) the Special Trust Fund for the Voluntary Supplementary Financing of the

approved activities under the UNFCCC (the "trust fund for supplementary activities"); and (d) the Special Trust Fund for the Host Country Contribution to the UNFCCC (the "Bonn Fund").

3. **The UNFCCC Special funds** which include (a) the Special Climate Change Fund, (b) the LDC Fund and (c) the Adaptation Fund.

The Gambia will need to establish a coordinated strategy and operational capacity for accessing these Funds. For accessing the GCF and its Private Sector Facility, a National Designated Authority (NDA) has been established at the Ministry of Finance and Economic Affairs (MoFEA) and the GCF Readiness Programme which is being implemented. For accessing the CDM Adaptation Fund for mitigation, a Designated National Authority is required, and guidelines are available on what is expected. To access funding for technology, a Designated National Entity (DNE) has been established at the GTTI. It is important to define institutional competence in measurable terms such as organisational mandate, staffing, resource budgets, information systems, pilot actions, even sectoral leadership and local champions.

7.3.3 Resourcing the Private and Market Climate Change Finance Window (PMCCFW).

The PMCCFW can be resourced from funds mobilized from national and international private and business sector financiers and from funds accrued from carbon markets. Examples include (a) the Africa, Latin America and the Caribbean Fund (AFLAC); (b) the Africa Capitalization Fund, which invests in banks in Africa; (c) the *Green for Growth Fund* (GGF); (d) the Climate Catalyst Fund; (e) the Africa Climate Change Fund hosted by AfDB; (f) the EU's Emissions Trading Scheme; and (g) the World Bank's Community Development Carbon Fund (CDCF). All efforts should be made at the national level to put in place relevant structures and instruments to facilitate linkage and cooperation with the Private Sector Facility of the Green Climate Fund.

It is recommended that the management of affairs of the Private and Markets Climate Change Finance Window of the GCCF must be in conformity with the management of GCCF itself. It is proposed that a Private Sector Working Group, to be led by the The Gambia Chamber of Commerce, be setup to manage and direct the initial structuring and operations of the PMCCFW and also design the financial instruments of the Window. The instruments setup for the operations of the PMCCFW must ensure transparency and consistency, with low transaction costs and at speeds that are consistent with private sector decision-making. Such instruments will facilitate the mobilization of private investment and capital. Membership of the Working Group must be balanced and should include the public and private sector entities and civil society, with gender balance taken into consideration. Such a balance in membership is required to protect the public interest while enhancing innovation and leverage, greater cost and value consciousness, and speedier decision-making. The Working Group and the structures will be accountable to GCCF. Emphasis must be placed on getting the PMCCFW running quickly without

compromising efficiency. The Window should be ready to receive and disburse funds at the same time that the overall GCCF becomes operational.

The leadership of the Private Sector Working Group by the The Gambia Chamber of Commerce is expected to bring private sector skills and experience in the activities of the Group and the operations of the Window. Risks in the operations of the Working Group may include conflicts of interest and lack of trust which can undermine the effectiveness of engagement. These risks can be managed through careful design and selection processes. Selection criteria and processes must be rigorous to ensure members are independent and selected on the basis of individual skills and experience, not by constituency. The selection criteria must also ensure that at least 50% of the membership is held by individuals who bring deep experience from markets and they have previous experience with companies or organizations which operate within the sub-region.

7.4 International Cooperation

The LECRDS and its Action Plan must contain a systematic “climate check” designed to ensure that cooperation between development partners and The Gambia contributes to climate protection and to improving the adaptation of The Gambia and her citizens to the effects of climate change. This is particularly true and important in the building and strengthening the capacity (see 7.5 below) of The Gambia so that the country and her citizens can largely take over ownership of the task of adapting to climate change, planning and implementing the most appropriate measures that support transitioning to a green economy. This includes expanding climate research capacity, identification and adoption of most appropriate technologies relevant to climate change response strategies in The Gambia, and setting up the climate finance portfolio and most appropriate resource mobilisation strategies required for implementation of this LECRDS and its Action Plan.

Implementation of the LECRDS and its Action Plan requires the creation and strengthening of the institutional capacity required for the enhancement of international cooperation. International cooperation is an important and necessary prerequisite for leveraging of inputs – investment, financial assistance, technical support, capacity building, etc – for the implementation of the LECRDS and NCCAP. Enhancing international cooperation, linking with international and regional programs, receiving international supports in terms of experience and technology relating to climate change mitigation and adaptation in different areas of the economy will enhance implementation and monitoring and evaluation. International cooperation with bilateral governments and multilateral organizations and institutions are required in order to mobilize resources such as knowledge, experiences and funds for implementation of the LECRDS and NCCAP, promote international collaboration in scientific and technological activities, and effectively apply and transfer climate friendly technologies.

A good example is the close collaboration between the World Meteorological Organisation (WMO) of the United Nations and the National Meteorological Services around the world. The WMO has its own strategy for supporting adaptation measures. The Environment Protection Agency in close collaboration with the National Meteorological Agency will provide key information for the development of successful and sustainable adaptation measures. The Government of The Gambia will continue to make resources available to assist it in performing these tasks. Cooperation between the Government of The Gambia through the National Meteorological Agency will enable the provision of technical and technological expertise between the Government of The Gambia and Governments and Multilateral Organizations that are members of WMO and/or close collaborators of WMO.

7.5: Capacity Building and Strengthening

The identification of capacity building needs for implementation the Climate Change Convention and its Kyoto Protocol is a continuous process and a recent assessment was conducted during the validation of the National Communication. Of highest priority are capacity constraints due to inadequate data and information; inadequate institutional capacity and skills for development of National Inventory of greenhouse gases; assessment of Mitigation of Greenhouse Gases; Vulnerability and Adaptation assessment; low level of scientific and technical/capacity for effective climate change management; and inadequate, weak and ineffective research bodies and programmes in the country. Of second order priority are capacity constraints related to lack of enabling environments for an effective climate change management; low level of means of implementation of adaptation measures; inadequate national policy- and decision-making processes for sustainable climate change management; and low national capacity for diagnosis of environmental problems. Other identified needs that are more of cross-cutting nature that need to be addressed on a continuous bases include public sensitization and awareness raising; citizen, community, media and private sector engagement; poor information management for planning and monitoring; poor networking between climate and climate change actors at the national and sub-national levels; inadequate access to climate and climate change implementation enablers such as finance, technologies and capacities; limited number of experts with climate change negotiation and project development skills and the need to integrate climate change risks and responses in national and sub-national programmes and projects and to mainstream climate change in national and sectoral policies.

Through the resource mobilisation strategies and partnerships proposed above the Government will undertake activities to strengthen the human and institutional capacities for the implementation of the strategy. It will also pursue an active communication strategy to increase public awareness and understanding of climate change particularly on mitigation.

7.5.1: Capacity building and strengthening for gathering, processing, and providing and communicating meteorological and socio-economic data and information

All research endeavours and assessments rely on a body of data collected with the aid of specialized instrumentation. Basic data is gathered from a network of sensors monitoring changes in atmospheric, oceanographic and terrestrial variables over The Gambia's territorial jurisdiction. The efficient and sustainable management of climate change, environment and natural resources of The Gambia will benefit from the continuous availability of data and information relevant for decision making, planning and implementation of national programmes including the LECRDS and the NCCAP of The Gambia.

Capacity building for data gathering, processing and exchange of information is necessary and beneficial to all facets of life. Capacity building activities will include the rehabilitation and expansion of the data collection networks, provision of infrastructure and equipment for processing the data to provide relevant information, identification and development of data and information exchange strategies and infrastructure, identification of the most efficient and effective channels of communication and exchange of the data and information generated, and finally the institutionalization of monitoring and feedback mechanism on the accessibility to the data and information, the impacts of the data and information and means of enhancing the positive impacts.

7.5.2: Improving National GHG Inventories and Assessments of GHG Mitigation and Climate Change Adaptation Technologies

Compiling a national greenhouse gas (GHG) inventory requires a fairly lengthy and interconnected series of tasks, including collecting emission factors and activity data, selecting appropriate methods, estimating GHG emissions and removals, implementing uncertainty assessment and quality assurance/quality control procedures, reporting the results, and documenting and archiving all relevant data and procedures (Braatz, Barbara V. and Michiel Doorn, 2005). The greenhouse gas inventory process requires fundamental decisions about data and methods, the establishment of a network of contacts for accessing data and reviewing results and the design of a system for data management, quality assurance, quality control, documentation and archiving. The inventory process should be planned, operated and managed to ensure optimal quality and efficiency, given available resources.

The UN defines mitigation in the context of climate change, as a human intervention to reduce the sources or enhance the sinks of greenhouse gases.¹⁷ Mitigation measures include voluntary emission reduction efforts, project-level emission reduction efforts, reductions for regulatory compliance, and reductions for some form of credit. Assessment of greenhouse mitigation measures involves quantification of baseline, business-as-usual, types of emission reductions, project scope, lifecycle analysis, accuracy and reliability, additionality, and verification. Examples include using fossil fuels more efficiently for industrial processes or electricity

¹⁷<http://mra.org.mt/climate-change/mitigation-of-greenhouse-gas-emissions/>

generation, switching to renewable energy (solar energy or wind power), improving the insulation of buildings, and expanding forests and other “sinks” to remove greater amounts of carbon dioxide from the atmosphere.

The development and publishing of National Inventory and National Mitigation Reports, as part of the National Communications are strategic and logical approaches that are continuous and should be sustainable and institutionalized. Mitigation assessment reports must include the provision of transparency and enhancement of the understanding of underlying strengths and weaknesses, and detailed approaches and methods used in developing the quantification of the mitigation measures. The availability and sustenance of human and institutional capacity to undertake the process of inventory and mitigation reports development and publishing on a sustainable manner are critical but not easy to come by in a developing country such as The Gambia. The Gambia’s capacity to sustain the development of greenhouse gas inventory and mitigation assessment is severely hampered by a number of factors and these can only be lifted through capacity building and strengthening.

Building the human and institutional capacity of The Gambia to produce high-quality national GHG inventories on a sustainable basis would include the creation of a critical mass of experts qualified to estimate emissions on all IPCC source and sink categories. These experts would then use their expertise in the execution of IPCC methodologies to develop high quality, well-documented inventory, and a sustainable inventory management system. The capacity-building activities must be highly targeted, focusing on specific, measurable, and realistic outcomes with the ultimate goal of preparing a complete, transparent, accurate, consistent, and comparable national GHG inventory that provides a solid foundation for developing future national mitigation assessment data, projects, information and reports that are relevant for the review and revision of the LECRDS and NCCAP. Typical example of capacity building for greenhouse inventory development that would be useful for The Gambia is the US EPA (EPA/USAID, 2011) approach through:

1. **Institutional Arrangements for National Inventory Systems (IA)** where inventory teams are assisted in assessing and documenting the strengths and weaknesses of existing institutional arrangements for inventory development to ensure continuity and integrity of the inventory, institutionalization of the inventory process is promoted, and prioritization of future improvements is facilitated.
2. **Methods and Data Documentation (MDD)** where inventory teams are assisted in documenting and reporting the origin of methodologies, activity datasets, and emission factors used to estimate emissions or removals.
3. **Description of Quality Assurance and Quality Control Procedures (QA/QC)** where countries are guided through the establishment of a cost-effective QA/QC program to improve transparency, consistency, comparability, completeness, and confidence in national GHG inventories.

4. **Description of Archiving System (AS)** by which an archive system is established that allows estimates to be easily reproduced, safeguards against data and information loss are provided, and the development of subsequent inventories by future inventory staff is facilitated.
5. **Key Category Analysis (KCA)** approach supports the identification of the sources and/or sinks that have the greatest contribution to national emissions, and thus should be the focus of improvement efforts.
6. **National Inventory Improvement Plan (NIIP)** development provides synthesis of findings and describes specific priorities for future capacity-building projects based on the needs identified in the first five steps, and facilitates continual inventory improvements.

7.5.3: Improving climate Vulnerability (impacts and adaptation) Assessment

Vulnerability to climate change is 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 to climate change is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. Vulnerability to climate change is determined by the sum of impacts of climate change and adaptive capacity. Assessments of impacts and adaptive capacity are scenario and model dependent both of which also require highly qualified and technically skilled human resources. The capacity of the National Climate Committee (NCC) of The Gambia needs to be built to undertake Vulnerability Assessment on sustainable basis.

Capacity building for sustained vulnerability assessment requires that the NCC receives adequate training and relevant tools for the development of socioeconomic and climate scenarios for better projections of the future climate of The Gambia and to serve as input into biophysical models for better climate change vulnerability (impacts and adaptation) assessments. The availability of socioeconomic observations also provides data for integrated, coupled, human/geophysical models at national and sub-nation levels. It is necessary to integrate demographic data with critical climate data and information using geographic information systems (GIS). Demographic data need to be processed in reference to the geography of climate hazards using the opportunities provided by the major advances in GIS infrastructure.

7.5.4: Engaging Extension Agents, Civil Society and the Media in partnerships

Generating weather, climate and climate change data, and developing information such as weather forecasts, advisories and warnings is the beginning of a process of providing climate services. These data and information provided by scientists and scientific organizations such as meteorologists at the National Meteorological Services are often too technical and scientific for the understanding of the most vulnerable communities at the grassroots level. The format and

mode of communication of the information is also not helpful in decision making at the policy making level.

To alleviate this challenge, the Government of The The Gambia has been and must continue to embarked on a process to enhance climate change information dissemination and communication to end users by developing information and communication capacities at the NMS for packaging and sharing weather forecasts and early warning messages in ways that capture the interest and attention of specific and targeted stakeholders and by using, in addition to the television, which is most popular media of information dissemination, other media to access a greater number of stakeholders.

Many channels and methods of mass communication that can be useful in reporting climate change warnings and advisories must be identified and should be employed in a sustained information, education and communication as well as advocacy and social marketing and mobilization venture. There is the need to employ the totality of all available channels in this effort.

The providers and users must be linked. The providers are scientists and technician who do not understand the language of the users. The majority of users are illiterate who do not understand the technical and scientific language of the providers. Partnerships with intermediaries between the providers and users must be developed and sustained to promote the effectiveness and efficiency of the provision of climate services. The Extension Agents from both the public and private sectors and civil society can serve as the most appropriate organ to link the providers and users of weather, climate and climate change information and warnings. Capacity building and training of these Agents throughout The Gambia will prove to be useful and will enhance the performance in sensitization of communities and the communication of forecasts and early warning information effectively.

The Non-formal education sector provides means of educating the less fortunate in obtaining formal western education through adult education and the translation of English text into local language. Most of the population in rural areas of The Gambia speak and communicate in the local languages. Partnership between the National Meteorological Services and the Non-formal Education Department of the Ministry of Education can provide a translation of the most common meteorological and weather terms in the leading local languages and the capacities of the local community to understand the weather forecasts and warnings provided in the media can be enhance through training media reporters and communities on the translated terms and their communication to the public. The involvement of the National Radio and Television Services and Community and FM radios will be beneficial.

CHAPTER 8

FURTHER ACTIONS- LEGISLATIVE, REGULATORY AND POLICY

LECRDS seeks to integrate climate change mitigation and adaptation strategies into development activities, a process which will require domestic and multilateral policies to integrate low emission and resilience concerns into the development framework. Already the Government has put in place a number policy measures that can contribute to the reduction of GHG emissions such as the NCCP, the SPRC and the INDC. Whilst these developments are important, further policy and regulatory actions are required in some sectors to support the transition process to a low emission and resilient development pathway. Below are some of the measures that will need to be taken.

8.1 Legislative Measures

With the adoption of the NCCP it is now necessary to establish the different organs, notably the as provided for in the Policy. Also important is the creation of the Fund that will be expected to play an important role in the mobilization of the huge resources required to address climate change impacts.

8.2 Policy Measures

8.2.1 Energy

To encourage a greater use of renewables in the energy mix the Government should be encouraged to set renewable targets as already recommended in previous studies. Such strategy should aim to have either a renewable electricity target of 5% by 2025 and 10% by 2030 or with regional hydropower, over 50% of demand to be met by renewable electricity by 2030 (The draft Electricity Strategy and Action Plan (AF-MERCADOS EMI, 2012). The mitigation potential for this course of action has already been discussed above (Chapter 3)

8.2.2 Agriculture

The NAMA for the agriculture sector will enhance efforts to reduce emissions of greenhouse gases from the agriculture sector. In the new/ revised policy it will be important to provide a strong institutional and policy frameworks at the national level for in-country NAMA implementation which should promote greater involvement of the stakeholders (local communities, women, youths and local leaders) all through the process from the start whilst supporting the improvement of farmer knowledge base on the new programmes and facilitating farmer access to information on climate change and the mitigation of GHG emissions.

8.2.3 Transport sector

The Ministry of Works is currently developing a policy for the transportation sector and it will be important to include objectives that address the reduction of GHG emission. However, to ensure significant emission reductions from the transportation sector, especially in the short term, and taking account of the country's technological development it is recommended that the new policy includes actions in the following areas in order to reduce GHG emissions from the transportation sector:

- **Enforce periodic vehicle inspection for emissions and roadworthiness:** This is geared towards reducing emissions from vehicles. This is important due to the type, age and condition of imported vehicles in The Gambia. This policy is needed because of the high possibility for economic growth and prosperity that will lead to increased vehicle importation and use;
- **Vehicle Fuel Efficiency:** The policy action in this area will help reduce greenhouse gas emissions and promote sustainable development in the transport sector through the implementation of a fuel efficiency initiative that includes the development of policies and regulations that will promote the use of more efficient vehicles.
- **Improve the efficiency of public transport system for GBA:** This action is intended to improve efficiency of public transport while saving and reducing emissions associated with public transportation in GBA. This is important as urbanization increases and many of the provincial growth centres are gradually developing into major urban centres.

8.2.4 Waste Management

Waste management has been found to be generally unsatisfactory thus requiring a comprehensive policy and legislative framework for integrated management of municipal solid waste. Such a framework will address waste management from collection, storage and disposal whilst clearly defining roles and responsibilities for each of the agencies involved in the waste management.

To ensure a greater understanding and participation of the public such a policy should also have a communication strategy to sensitize the population on these procedures, as well as climate change and health related impacts. In the regulations the municipalities may also consider revising taxes on waste which are generally too low for the municipalities to generate enough income for waste management in an environmentally friendly way that reduces GHG emission.

An area to address in the policy is private sector involvement. Already there is private sector participation in waste collection and it will be necessary to see how this could be encouraged and supported. There is also the possibility of privatization, in for example newly developed areas and in under- served areas and particularly in the areas where the municipality has not been providing service through their own labour force. Of course the regulations will have to provide that the contracts include a provision of penalty for failure to perform the contractual obligation.

By way of incentives the policy may encourage private sector by way of long term contracts and other tax incentives.

Another area to be considered in the new policy is the possibility of tapping carbon finance. The release of methane gas from landfills provides opportunities for the sale of emission reductions under the Kyoto Protocol's Clean Development Mechanism. The resulting carbon finance could provide potentially significant economic incentives for improving waste management operations.

8.2.5 Low Emission Capacity Building (LECB)

National capacity to adopt and implement green technologies remains a critical factor in pursuing a green development pathway. There is therefore a need for a policy to promote capacity development to improve the human resources and improve the technology base for a more effective adoption of new technologies. This capacity development can range from the installation and maintenance of large scale solar and wind generating technologies to the development of appropriate skills for the manufacture of simple improved cook stoves. Existing technical institutions could be strengthened in this respect to take up this responsibility in conjunction with what is being done on a modest but important scale in the private sector.

8.2.6 Strengthening the Adoption of ICS

The creation of a Clean Cooking Alliance is an important development in promoting improved cook stoves and improved fuel. However, to expand and popularize the adoption of clean cooking especially at institutional levels (restaurants, schools, etc.) some policy measure will be required that provides incentives at that level and in the general public. Some of these may include enhancing access to finance for producers to improve, strengthen, and expand production capacity, improve quality of the cook stoves, and encourage the decentralization of the production and distribution of cook stoves. The policy should also facilitate the development of standards and testing in The Gambia in line with regional and ISO international process to ensure performance and quality improvement over time which necessary to ensure customer satisfaction and confidence. (National Clean Cooking Action Plan, 2014).

8.3 Regulatory Measures

Already the Renewable Energy Law provides a regulatory and governance framework for renewable energy development in The Gambia. However, there are, as already indicated in previous studies (), a need to address a number of gaps which include:

- The provision for tax exemptions for eligible renewable energy equipment as provided for in the GIEPA Act needs to be reviewed and extended from 5 to 15 years or to 5 years, renewable for 3 times. Similarly, the same extension should also be applied to the import sales tax waiver which should be for one year per commissioning of an

installation. This is because, under the NAMA, one enterprise may install a number of ventures over a course of years. As already explained in earlier studies () this will take account of instances where one enterprise may install a number of ventures over the course of years as provided in the NAMA. Another recommendation is the revision of the applicability of the GIEPA Act to include approved PPPs, where the *total* (i.e. not just the investment of the private party) investments for the ventures exceed US\$ 250,000. This would provide an added incentive for the private sector participation.

- There is also need for regulations requiring specialized expertise in designing, installation and maintenance of both solar PV and solar water heating systems. These together with those related to product and technology standards, need to be addressed in order to increase uptake of the technologies. Legislative/regulatory actions such as setting standards and establishing regulatory mechanisms to ensure compliance will also need to be addressed in this policy.
- Energy efficiency standards and labeling are highly cost effective means to reduce energy demand and greenhouse gas emissions. Minimum Energy Performance Standards (MEPs) specify the minimum set level of energy performance that appliances, lighting and electrical equipment must meet or exceed before they can be sold to consumers. Development of MEPs will be supported towards realization of this key result area.
- For the improved cook stoves it will be necessary to develop a legal and regulatory framework (tariff and duties) and improve price structures for cooking energy. Such regulation should also address the development of standards and testing in line with regional and ISO international process to ensure performance and quality improvement over time
- New regulatory and licensing framework for LPG market, Improve standards of cylinders plants

CHAPTER 9

MONITORING, REPORTING AND VERIFICATION OF THE IMPLEMENTATION OF THE LECRDS AND ITS ACTION PLAN

Monitoring, evaluation, reporting and verification will be critical activities of the implementation of this The Gambia LECRDS and its Action Plan. These activities are expected to ensure that implementation actions of the strategies and projects identified in this document are effective. Activities under the LECRDS and its Action Plan put more emphasis on pathways to transitioning to sustainable, low-carbon and green economy development; and integration of climate change risks and responses into development frameworks. These activities should be able to influence and effectively contribute to the achievement of sectoral, national and regional development objectives and goals and also complement national efforts and on-going and planned initiatives by other bi-lateral and multilateral development partners.

The overarching objectives of the Monitoring and Evaluation (M&E) System will be to track the transition of The Gambia to a low carbon and climate resilient economy. This will include:

1. Provision of a clear picture of the various response measures included in climate change mitigation and adaptation areas;
2. Providing an assessment of the effectiveness of these response measures;
3. Applying a consistent approach to these assessments to allow for greater comparability;
4. Increasing co-ordination of climate change response measures;
5. Demonstrating impact of response measures to Government and development partners;
6. Increasing transparency on financial flows relating to climate responses; and
7. Increasing awareness of observed and projected climate impacts.

It will be necessary to develop and apply an integrated framework for measuring, monitoring, evaluating, verifying and reporting results of response (mitigation and adaptation) actions and the synergies between them. Effective implementation of the LECRD Action Plan is highly dependent on the internal “feedback” generated through monitoring, reporting and verification (MRV) processes. The framework must be able to assess the effectiveness of investment in mitigation and adaptation actions because the mobilization and continuation of financial and technological support are contingent on the effectiveness of the MRV framework. National, bilateral and multilateral financial partners and other providers of finance need the results of the MRV system to validate the effectiveness of funds they provide. Therefore, securing further financial support for the implementation of the LECARDS and its Action Plan will be dependent on the successful establishment and implementation of a MRV framework.

Such an ideal MRV framework for The Gambia should:

1. Build on existing institutions and skills;
2. Take into account the planned climate change governance structures;
3. Provide guidance on the implementation of climate change response actions, whether in the form of policies, projects, programmes or investment ventures;
4. Help The Gambia fulfil her international reporting obligations;
5. Demonstrate The Gambia's climate finance readiness; and
6. Provide a strong platform for attracting international climate finance flows from multilateral and bilateral development partners.

For effective and efficient monitoring, reporting and verification, criteria with quantitative and qualitative indicators disaggregated according to gender and covering various sectors and levels of the national economy need to be developed and utilized in the monitoring process. Particular attention should be paid to coverage of the activity whether it be at the grassroots level community, sub-national and/or national; agriculture, water resources, ecosystem, etc; local level, middle-level and high-level decisions-makers and national policy-makers. The monitoring and evaluation criteria must also include the assessment of the impacts of the activity on the community and at the national levels such as change in knowledge and awareness on climate change, access to low-carbon and climate resilient technologies, and improvement in the livelihoods and influence on decision and policy making at the local and national levels.

Indicators to be developed for the MRV system should include for example institutional adaptive capacity indicators that provide measures of the effectiveness of national initiatives to build institutional adaptive capacity at the county level such as the number of Ministries and Departments, Civil Society Organizations, Youth and Women Groups, Media Agents, etc, that have received training for staff operating at district/ward and national levels on the cost and benefits of adaptation to climate change. The indicators should also include vulnerability indicators that may be a mixture of process-based and outcome-based indicators and should measure the effectiveness of local and national level initiatives to reduce vulnerability at the national level. Such indicators include (a) number of people (disaggregated according to gender) permanently displaced by climate change induced floods due to storm surges and/or sea level rise; (b) percentage of roads and other relevant infrastructure maintained or rehabilitated; and (c) number of households that are in need of support such as pipe-borne water, food aid and shelter.

Win-win and/or synergistic indicators where mitigation and adaptation responses support each other or provide trade-offs and also enhance sustainable development should also be determined and applied. Typical win-win indicators are (a) ton of soil carbon per hectare in agricultural land targeted for conservation tillage practice; (b) improved human health from improvements in vehicle efficiencies and reduced air pollution and replacement of kerosene lamps with renewable lamps in the home; (c) food shortages and price rises for cereals caused by increased growth of biofuels; (d) improvements in passenger vehicle emissions resulting in lower mobility for the

poor if cost passed onto consumer; and (e) the restoration of land in flood plains by planting trees, which helps to reduce impacts of floods, improve water quality, and lead to co-benefits such as restoring biodiversity and sequestering greenhouse gases.

The monitoring and evaluation framework in this LECRDS (Table 7) determines actions, responsibilities, indicative timeframe, baselines and year by which the Priority Action Plans under this LECRDS can be achieved in The Gambia, including the involvement of stakeholders. The indicative timeframe, baselines and year and percentages are based on those contained in Nationally Determined Contribution (NDC/iNDC) of the country. It is to facilitate the Measuring, Reporting and Verification of the LECRDS and contributing to the tracking of the implementation of the NDC.

Table 7: Monitoring and evaluation of the Outcome/Priority Action Plans of the LECRDS

OUTCOME/ PRIORITY ACTION PLANS	EXPECTED RESULTS	BASELINE YEAR 2010	TARGETS	PERFORMANCE INDICATORS	RESPONSIBLE INSTITUTION	INDICATIVE TIMEFRAME	ASSUMPTIONS / RISKS
Administrative and Cross-cutting actions to support transition to low emissions and climate resilient economy in The Gambia	Institutionalization of coordination, monitoring, reporting and verification of climate change issues through a strengthened Climate Change Secretariat for effective and efficient provision of technical policy advice to the Government and people of The Gambia for relevant decision making in transitioning to green economic growth.	N/A	Ministry of Fisheries, Water Resources and National Assembly Matters; Ministry of Environment, Climate Change & Natural Resources	Coordination, monitoring, reporting and verification of climate change issues are institutionalized in the Ministries	Ministry of Fisheries, Water Resources and National Assembly Matters; Ministry of Environment, Climate Change & Natural Resources	By December 2018	Approval by Cabinet of the National Climate Change Policy will expedite the achievement of this priority action
	Transformation of the National Meteorological Services of The Gambia into an Authority and strengthening of Climate Change Early Warning System of The Gambia	N/A	Ministry of Fisheries, Water Resources and National Assembly Matters Dept. Water Resources	The National Meteorological Services are transformed into an Authority and the Climate Change Early Warning System of The Gambia strengthened	Ministry of Fisheries, Water Resources and National Assembly Matters Dept. Water Resources	By December 2019	The passing of the National Meteorological Authority Bill by Parliament is important in the achieving this action plan
Priority GHG Mitigation Actions and Technologies for a Low Carbon Development of The Gambia	Minimize transmission losses through the refurbishment and upgrading (from 33Kv to 161Kv) of distribution lines and networks and linking provincial network and the Western Area network to ensure stability.	0.1% 0.0% 9.0%	Energy: 29.9% by 2025; 31.6% by 2030 Transpt.: 29.2% by 2025; 41.2% by 2030 Agri.: 61.3% by 2025; 59.7% by 2030 IPPU: N/A	Transmission losses are Minimized; Networks are expanded and linked to provincial networks	Ministry of Energy; NAWEC Ministry of Transport Ministry of Agriculture; Department of Agriculture	by 2025 and 2030 by 2025 and 2030	Current electricity expansions in the main urban centres and planned hydro-electric dam by OMVG will facilitate to achieve this priority. Increasing population in the main urban centres

	<p>Reduce waste management constrains with strengthen adequate Waste Management Framework,</p> <p>Increase capacity to manage the waste with waste treatment infrastructure in the communities</p>	<p>0.0%</p> <p>0.0%</p>	<p>Waste: 36.1% by 25; 14.8% by 2030</p>	<p>Waste management constrains are reduced with strengthened adequate Waste Management Framework.</p> <p>Capacity is increased to manage the waste with waste treatment infrastructure in the communities</p>	<p>Councils and Regional Administrations</p>	<p>by 2025 and 2030</p>	<p>coupled with inadequate dumping sites and wastes management facilities and technologies is a huge challenge</p>
<p>Priority Actions for Climate Resilient Development of The Gambia</p>	<p>Adoption and application of climate-smart and conservation agriculture that allow minimum disturbance and year-round maintenance of soil and soil cover, including the use of leguminous crops to boost soil nitrogen;</p>	<p>N/A</p>	<p>60% of upland farmers</p>	<p>Climate-smart and conservation agriculture that allow minimum disturbance and year-round maintenance of soil and soil cover, including the use of leguminous crops to boost soil nitrogen is applied and adopted in most part of the country</p>	<p>Ministry of Agriculture; Department of Agriculture, National Research Institute (NARI), NGOs</p>	<p>By 2030</p>	<p>Existence of inadequate knowledge experience and materials in the field could be a challenge</p>
	<p>Adoption of new crops, crop rotation and/or crop varieties and adjusting the time of planting/harvesting;</p>	<p>N/A</p>	<p>60% of upland & lowland farmers</p>	<p>New crops, crop rotation and/or crop varieties and adjusting the time of planting/harvesting are adopted</p>	<p>Ministry of Agriculture; Department of Agriculture, National Research Institute (NARI), NGOs</p>	<p>By 2030</p>	
	<p>Introduction of integrated soil-fertility management systems that cater to the nutritional needs of the crop without polluting the environment;</p>	<p>N/A</p>	<p>60% of upland & lowland farmers</p>	<p>Integrated soil-fertility management systems that cater to the nutritional needs of the crop without polluting the environment is introduced to most farmers in the country</p>	<p>Ministry of Agriculture; Department of Agriculture, National Research Institute (NARI), NGOs</p>	<p>By 2030</p>	
	<p>Management of rangelands and pastures by managing grazing systems and grazing intensity with, fire management and pasture rehabilitation</p>	<p>N/A</p>	<p>60% of upland & lowland farmers</p> <p>40% of livestock</p>	<p>Grazing systems and grazing intensity are managed and rehabilitated</p>	<p>Ministry of Agriculture; Department of Agriculture, National Research Institute (NARI), NGOs</p>	<p>By 2030</p>	

	<p>Integrated management of crops and Livestock including the modification of herd composition (variation of species/breeds) and adaptation of grazing management practices to increase soil carbon.</p> <p>Reduction of greenhouse gas emissions from livestock by improving animal nutrition, breed selection and manure management.</p> <p>Restoration of degraded lands with high production potential, application of erosion control, soil and water conservation, organic amendments, perennial or deep root crop systems; improvement of land and soil, including drainage, desalinization, addition of gypsum to renovate sodic soils.</p> <p>Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems and aquaculture in areas inundated by rising sea levels.</p> <p>Promotion and facilitation of disaster management through strengthening and improvement of climate early warning systems, drought</p>	<p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>owners in Upper Region and Central River Region</p> <p>40% of livestock owners in Upper Region and Central River Region</p> <p>40% of livestock owners in Upper Region and Central River Region</p> <p>50% degraded lands in North Bank Region, Upper Region and Central River Region</p>	<p>Management of crops and Livestock are integrated</p> <p>Greenhouse gas emissions from livestock are reduced through improving animal nutrition, breed selection and manure management</p> <p>Degraded lands with high production potential restored in affected Regions</p> <p>Coastal and fisheries resources are managed through promotion of non-destructive fishing</p>	<p>Ministry of Agriculture; Department of Agriculture, National Research Institute (NARI), NGOs</p> <p>Ministry of Environment, Climate Change & Natural Resources; Ministry of Agriculture; Ministry of Lands and Regional Govtmt</p>	<p>By 2030</p> <p>By 2030</p> <p>By 2030</p>	<p>Encroachment into the grazing lands as settlements and new farm lands expand</p> <p>Cultural belief a major challenge</p> <p>Upcoming projects on restoration of degraded lands are an opportunity</p>
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	contingency plans, response to drought and flooding, sensitisation and awareness-raising, and promotion of weather-indexed risk insurance.	N/A	90% use of non-destructive fishing techniques 40% aquaculture practice 50% coverage	techniques to maintain resilience of marine ecosystems and aquaculture in areas inundated by rising sea levels Disaster management is promoted and facilitated through strengthened and improved climate early warning systems, drought contingency plans, response to drought and flooding, sensitisation and awareness-raising, and promotion of weather-indexed risk insurance	Ministry of Fisheries, Water Resources and National Assembly Matters Ministry of Environment, Climate Change & Natural Resources; Dept. of Fisheries ; Dept. of Forestry; Ministry of Fisheries, Water Resources and National Assembly Matters; Office of the Vice President; National Disaster Management Agency; Department of Water Resources	By 2030 By 2025 By 2030 By 2025 By 2030	Current climate change early warning project is an opportunity
						By 2030	

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

The strategies and activities proposed in this LECRDS (Chapter) and the LECRD Action Plan (Chapter 5) are intended to transition the economy of the Gambia to low emissions and enhance resilience of the economy and citizens to climate change. Together, the LECRDS and its Action Plan set the framework for future strategies and actions to alleviate the adverse effects of climate change, to raise awareness within the local population about the challenges ahead and to establish Government's commitment to work in partnership with the wider community to achieve a more sustainable and low-carbon green economy future for the country and her citizens.

As global greenhouse gas emissions are continuing unabated, climate change impacts are likely to intensify an already precarious situation into the future. If no action is taken to reduce or minimize expected impacts from climate change, the costs to society and the economy will be immense. The Gambia LECRDS therefore identifies the sectors that are most vulnerable to climate change impacts and proposes interventions to reduce or mitigate these impacts, while promoting a low-carbon economy and climate change-resilient production systems. In addition, the Strategy lends support to the establishment of a dedicated climate change secretariat that will oversee its implementation.

Activities identified in the LECRDS Action Plan require substantial additional and adequate financial resources for their implementation, and funding is therefore from both domestic and international sources. Partnerships must be forged and all stakeholders should mainstream climate proofing and climate change responsive activities in their activities and in their programmes and projects.

Whilst The Gambia stands to benefit from the advanced technology of developed countries, efforts should be made to support local technology generation and application through institutional capacity building programmes. Consequently, new and additional resources are needed to support The Gambia's research, development as well as strengthen academic institutions.

Tracking and measuring progress towards low-emissions and climate resilient economy in The Gambia will not be easy because the links between the biophysical, economic and social relationships are not clearly understood. Ultimately, the objective would be to institute an ongoing process of policy monitoring and evaluation which could become a tool to increase collective knowledge about how policies contribute to green growth.

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Annex 3: Terms of Reference for the Development of a Low Emission Climate Resilient Development Strategy (LECRDS) for The Gambia.

Background

Climate

The Gambia has a Sahelian climate, characterized by a long dry season (November to May of the following year) and a short wet season (June to October). Significant rainfall is recorded between June and October with mean annual rainfall of about 860mm with the highest monthly mean of about 290mm recorded in August. Solar radiation is highest in the months of March to June with evaporations at their highest.

Average temperatures of The Gambia range from 18° to 30°C during the dry season and 23° to 33°C during the wet season. Average relative humidity (RH) is about 68% in coastal areas and 41% in the hinterland during the dry season, and generally above 77% throughout the country during the wet season. Temperatures are projected to increase from a current value of about 28°C to 30 - 32°C in 2100. Rainfall is projected to decrease by about 13 - 300 mm by 2100.

Emissions

In 2000, total emissions of greenhouse gases were about 3,623 Gg or 20.02 million tons CO₂equivalent (tCO₂e), giving per capita emissions of 13.5 tCO₂e. Total CO₂ emissions were about 329Gg CO₂ with 66% (218Gg) coming from the energy sector. In 2010, Total Energy Supply (TES) in The Gambia was 407,926 tons of oil equivalents (toe) according to UNIDO figures. Of the total CO₂ (437.575 Gg) emitted from the Energy Sector in 2010 the Transport sub-sector accounted for 46% (MoE/TNC, 2015). Recently, the forestry sector has also shifted from being a sink to a source of greenhouse gas emissions. All the economic sectors of The Gambia have great potential for emissions abatement and greening with the land-use (agriculture and forestry) sector and energy sector, particularly transport, being the most promising candidates.

Projections

The projected reduction in rainfall, higher temperatures and higher evaporation rates will lead to additional water stress due to reduction in recharge of water reservoirs and aquifers. A rapid decline in biomass production from forests and rangelands is projected. The rate of decrease in biomass production is climate scenario dependent, with production decreasing fastest, in general, under warmer scenarios. Simulation of irrigated rice shows yield increases in the order of 0.2 to 0.3 tones/ha under a cooler climate but about 16% or 6.3 tonnes/ha reduction under warmer climate change scenarios. Production of all coarse grains (millet, maize, etc) is projected to decrease but production of groundnuts is projected to increase. A large chunk of the coastal land and resources is projected to be lost to coastal erosion due to sea level rise. Susceptibility to health risks will amplify for both people and the livestock population in The Gambia.

Internationally

The Republic of The Gambia is classified as a Least Developed Country (LDC) with minimal contribution to the global greenhouse effect, global warming and climate change but, as indicated above, will face serious and adverse impacts of climate change. As a Party to the UN Framework Convention on Climate Change (UNFCCC) since 1994, The Gambia has made significant efforts to implement the Convention.

A climate change integrated four-year development plan for the implementation of VISION 2020 of The Gambia entitled “Programme for Accelerated Growth and Employment (PAGE)” was launched in 2011; a Nationally Appropriate Mitigation Actions (NAMA) document was submitted to the UNFCCC in 2011; and the Second National Communications of The Gambia is submitted to the UNFCCC in December 2012.

Nationally

In 2014 the Government decided to establish a climate change portfolio within the Ministry of Environment and moved the technical arm for climate change implementation (Department of Water Resources) to be under the same Ministry to facilitate the smooth coordination and implementation of climate change activities at the national and regional levels. In early 2016, a National Climate Change Policy (NCCP) was finalized and submitted to Government for Cabinet approval and ratification by parliament. The NCCP will establish a climate change secretariat and a national climate change fund and define a strategic framework for the implementation of the policy. The Gambia has also embarked since the latter part of 2015 on a project for Technology Needs Assessment (TNA) for mitigation and adaptation with the final documents expected in 2017.

All of these national efforts and reports have identified activities that Gambia needs to implement as part of her contribution to addressing climate change now and in the future. However, lack of enablers such as finance, technology and capacity continue to constrain and challenge the effectiveness of these efforts of The Gambia.

Despite these constraints and challenges, The Gambia is committed to address climate change in its development efforts. It is against this background that the Government of The Gambia, through the Ministry of Environment, Climate Change, Water, Wildlife and Fisheries through its technical arm; Department of Water Resources have found it necessary to develop a Low Emissions Climate Resilient Development Strategy (LECRDS) of The Gambia.

Meanwhile, in November 2014, a background paper on Low Emissions Climate Resilient Development Strategy (LECRDS) of The Gambia was finalized to serve as a foundation for the full LECRDS document.

Objective

The major objective of this assignment is to define a process and develop the LECRDS of The Gambia. The LECRDS should aim at a socially, economically and environmentally sound collective approach to holistically deal with issues of climate change at the national level with a number of partnerships established at the regional and global levels. It will determine the interventions, strategies and lines of action by which this objective can be achieved in The Gambia. These include a general concept as well as concrete assignments of responsibilities and time frames, giving special attention to wide stakeholder involvement. The LECRDS, when developed and implemented, is expected to move The Gambia from its brown development pathway, particularly the planned urban and rural electrification and transport sector modernization to a green growth path. It is also expected to lead The Gambia in achieving the objectives in her Nationally Determined Contributions submitted to the UNFCCC under the Paris Agreement.

Specific Objectives

In particular, the Consultancy should be able to use the information in the Background Paper on the LECRDS, NAPA, National Communications, NAMAs, INDC and other relevant national documents to:

1. Describe the geographical context and general economic and demographic data on which analyses and scenarios will be built;
2. Detail key development issues and priorities;
3. Outline past and on-going climate change and related risk management actions;
4. Project possible climate scenarios at relevant spatial and temporal scales (2050/2075/2100);
5. Develop a Multi-Stakeholder Planning Process and identify major stakeholders that are key in the implementation of the LECRDS in The Gambia;
6. Document the linkages to and synergies with National and Sectoral Development plans, programmes, policies and strategies;
7. Prepare Climate Change Profiles and Vulnerability Scenarios elaborating on details of climate and climate change risks affecting the Gambian economy with historical perspective of the major sectors and zones of the country that are most affected;

8. Identify and elaborate on the current coping strategies and actions to address climate variability and change and determine how these can be upscaled to meet the climate change adaptation needs of The Gambia;
9. Identify and elaborate on the sustainability needs of the LECRDS through the identification and mobilization of the required local and political will, inculcating the national and local ownership and country drivenness during the inception and process of development of the Strategy, and canvassing for and executing the mainstreaming of climate change into national plans, programmes, strategies and policies;
10. Identify Strategic Options Leading to Low-Emission Climate-Resilient Development Trajectories;
11. Define a process for the elaboration of a cost-effective, participatory, inclusive and transparent implementation strategy and plan, containing agreed categories of deliveries and time bound schedules, fundraising and financial mobilization strategies, and comprehensive monitoring and evaluation schemes at sectoral, local and national levels;
12. Identify Policies and Financing Options to Implement Priority Climate Change Actions; and
13. Prepare a Low-Emission Climate-Resilient Development Roadmap

Scope

The Consultancy will involve a wide consultative and participatory process at all levels of the Gambian citizenry and desk research to identify needs, gaps and actions. The LECRDS will address both climate change adaptation and mitigation issues, including aspects of structural, institutional and stakeholder involvements; The Gambia's regional and international concerns and obligations; cross cutting issues, policy and legal frameworks; education/training/awareness and capacity building; research, development and demonstration; other environmental issues and financial resource opportunities.

Coordination and management:

The Ministry of Environment, Climate Change and Natural Resources (MECCNAR), as the Lead Ministry for the policy level implementation of the UNFCCC will execute, while the Department of Water Resources, in its capacity as the UNFCCC Focal Secretariat will coordinate the implementation of the development of the LECRDS. The Ministry will constitute and chair the Project Steering Committee (PSC) with membership drawn from key ministries and international partners. The UN Resident Coordinator will represent the UN System on the PSC. The National Climate Committee, chaired by the UNFCCC Focal Institution (DWR), will be responsible for technical implementation of the development of the Strategy.

The consultant will be responsible to the Government of The Gambia and will generally be responsible for:

- A thorough review of the initial report with the aim of identifying additional gaps in the required information and the stakeholders;
- Completion of all the identified gaps taking into consideration and incorporating all of the relevant comments already made on the initial report;
- Review of the formulated work programme with a view of improving on it where necessary.
- Maintaining communication with GoTG and the funding organization as well as with relevant stakeholders

Specifically the consultant Tasks are:

- Identification of additional gaps in the initial report with a view of completing them and incorporating the comments already made;

Analysis of the trends of GHG emissions in the Gambia;

- Additional socio-economic information on the impacts of CC in the coastal areas of The Gambia;
- A more comprehensive description of the initiatives (objectives, expected results) and their shortcomings vis-à-vis what needs to be done so that the LECRDS will build upon the initiatives and provide recommendations for additional actions to move Gambia towards a Green LECRD pathway;
- Improving on the strategy framework taking into consideration the comments made on the document with regard to the strategy;
- A summary of the main drivers of vulnerability for each section;
- Propose a vision for the strategy up to the horizon of 2030;
- Additional discussion with stakeholders
- Submit final report approved by the client

Deliverable

- An improved Low Emissions Climate Resilient Development Strategy report which is ready for use.

Duration

The consultant will be contracted for a period not exceeding 6 months, starting after signing the contract.

Contents of the Low Emissions Climate Resilient Development Strategy

The formulated strategy shall contain the following elements:

- Situation analysis stipulating the key issues and problems
- Vision and mission
- Strategic objectives, principles and proposals
- Strategic outcomes and targets
- Key actions (with a roadmap with short-term, medium-term and long-term intervention options and prioritization)
- Implementation plan including responsibility and accountability including concretely defined roles, contributions and responsibilities of various actors to achieve the targets;
- Funding and other resources (e.g. skills needed)
- Description of further needed legislative and regulatory, policy measures
Monitoring and evaluation with indicators for measuring progress in achieving the targets.

Qualifications of Consultant(s)

The Consultant should fulfil the following requirements:

- A minimum of a Master's degree or equivalent in a relevant natural and/or social science
- Familiarity with Gambian development agenda and Legal Framework
- A minimum of 5 years of work experience in climate change issues with familiarity with UNFCCC process.
- Experience in strategy development
- Experience in multi-stakeholder and participatory approaches
- Proven organizational and management skills
- Sound moderating and coordination skills
- Experience with project development and management
- Experience working with national and international institutions
- Good communication skills and cross cultural sensitivity are essential
- Sound knowledge of English is essential