



GOVERNMENT OF THE GAMBIA

NATIONALLY APPROPRIATE MITIGATION ACTIONS

Final Agreed List of NAMAs for The Gambia:

1. *Develop a Low Carbon Development Strategy (LCDS) of The Gambia;*
2. *Increase energy production from renewable sources (Solar & wind)*
3. *Promote the use of energy-efficient cooking stoves*
4. *Reduce energy consumption by reducing transmission and distribution system losses to 15% by 2030*
5. *Improve storage facilities and promote the use of post-harvest technologies*
6. *Restore degraded grazing land through the multiplication and popularization of forage seed planting of multipurpose seed in grazing areas*
7. *Promote and integrated crop-livestock system by planting nitrogen fixing crops and encourage spot and zero burning practices*
8. *Promote the cultivation of high-yielding rice*
9. *Restore and rehabilitate degraded forest lands, protect and conserve wetlands, and develop greenbelts around human settlements, national forests, wildlife parks and protected areas through afforestation and reforestation activities.*
10. *Integrated Management of urban and peri-urban solid and liquid Waste*



GAMBIA NAMA TEAM

Acknowledgments

The Government of The Gambia wishes to express its deep gratitude to the African Development Bank (AfDB), particularly the Natural Resources and Environment Management Division, for the technical and financial support provided to The Gambia.

We also wish to recognize the valuable work put into producing this national report by the Gambia NAMA Team and Mr. Bubu Pateh Jallow, the National Consultant for the process to develop this NAMA.

The Government of The Gambia expresses its deep appreciation to Pa Ousman Jarju, the UNFCCC Focal Point and Director of the Department of Water Resources for negotiating this and other supports for and on-behalf of The Gambia.

Foreword



Climate change impacts on natural systems and resources identified in the reports of the Intergovernmental Panel on Climate Change, and the National Communications and the National Adaptation Programme of Actions (NAPA) of The Gambia put additional burden to achieving sustainable development, long-term prosperity and the Millennium Development Goals in

The Gambia. The linkages between climate change and the many dimensions of equitable development and growth present both a crisis that must be tackled and an opportunity that must be seized. The adequate response to these challenges needs to be aligned with national and regional strategies for development, poverty alleviation, economic growth and the enhancement of human wellbeing, while increasing resilience to the physical impacts of climate change.

The greenhouse gas effect, the emissions and concentrations of trace gases in the atmosphere as the root causes of global warming must be tackled. Science has told us that GHG emissions reductions of about 40 to 60 per cent of 1990 levels is needed to avoid dangerous climate change. The UNEP Emission Gap Report confirms that the current mitigation pledges are not ambitious enough to avoid the world moving on the course for global warming of over 2°C. Further to this, there is indication that temperature rises will be progressively higher in Africa with other climate related effects such as the frequency of extreme weather events placing considerable pressure on livelihoods and economies across the continent.

This NAMA document has therefore been prepared towards this end and contains information on what needs to be done as Gambia's contribution to the global efforts in meeting the Long Term Goal of keeping global temperature to 2°C. The Gambia NAMA is proposed as a "Supported" NAMA and includes information on technological, financial and capacity building needs as well as opportunities for effective actions towards sustainable development.

This Gambia National NAMA document relies heavily on insights from the 2003 First National Communications of The Gambia, and the 2000 Greenhouse Gas Inventory and the GHG Mitigation chapters, which are part of the Second National Communications of The Gambia to be submitted to the UNFCCC in 2012.

It is my hope that this "Supported" NAMA will meet the expectations of Bilateral and Multilateral Partners to spur their collaboration and cooperation in supporting the requests for financial, technological and capacity building enablers that accompany the document.

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Honourable Jato Sillah, Minister
Ministry of Forestry and the Environment (MoFEN), Gambia

Preface



The 2000 National Greenhouse Gas Inventory of The Gambia shows national emission total of about 20.02 Million Tons CO₂ Equivalent (TCO₂E) and per capita emissions of 13.5 TCO₂E. This is insignificant compared to other country emissions. However, as a Party to the Climate Change Convention and its Kyoto Protocol, Gambia is willing to participate in mitigating global emissions and their concentrations in the atmosphere with the first step of conducting a mitigation assessment and developing this NAMA document.

Trend analysis of climate data from 1951 to date shows a progressively warming and drier Gambia. Using General Circulation Model outputs, national temperatures are projected to increase by about 0.3°C in 2010 to about 3.9°C in 2100. Rainfall is also projected to decrease by about 1% in 2010 to about 54% in 2100. This confirms previous results of in the First National Communication that with increase in temperatures under a warming climate, rainfall in The Gambia would correspondingly decrease.

The development challenges of The Gambia will be significant as the country faces complex economic, social and technological choices based on the climate change impacts already enumerated in the preceding paragraph. This is compounded by the inadequate capacities, inadequacies in the existing technologies and the non availability of domestic funding from both the public and private sectors for climate change.

However, the climate change political process provides unique opportunities on finance, technology transfer and capacity for developing countries including The Gambia to transform our climate change challenges into development opportunities. It is our belief that our first NAMA on the development and implementation of Gambia's Low Carbon Development Strategy will help the country 'leapfrog' the carbon intensive phase of development and move directly to cleaner and more advanced energy, transport, agriculture, waste management and natural resources solutions to the climate change challenge. With the availability and implementation of a LCDS of The Gambia, we can proactively shape the sustainable development of our national infrastructure and services.

The contents of the Gambia NAMA document include:

1. Background and broad sectoral policy considerations particularly in Finance, Agriculture, Energy (electricity, renewable and petroleum), Tourism Sector, Transport (*road, river, air and Railway*), Natural Resources and Environment and Local Government and Decentralization;
2. Rationale of the Gambia NAMA;
3. Description of the Gambia NAMA;
4. Implementation barriers
5. Needs assessment and proposed interventions that include finance, capacity building and technology enablers. Technology needs identified are based on the NAMAs included in this document. They include solar photovoltaic, wind energy technologies, improved cook stoves, waste management technologies (*land-filling*), post harvest technologies, food processing and preservation technologies (*drying, freezing, vacuum packing, canning and bottling*).
6. Emission reduction benefits and other socio-economic and sustainable development co-benefits
7. Costs and financing options for further development of the NAMA Profiles included in this document
8. Monitoring, Review and Verification Plan including performance indicators; and
9. Actors, actions and timing.

The Gambian NAMA document has been developed through an extensive consultative process involving representatives from public and private sectors, local government authorities and elected representatives, civil society organizations and women groups. On behalf the UNFCCC Focal Secretariat, the Department of Water Resources, I would like to thank them for their tremendous contribution and we will all continue to implement the convention at the national level.

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Pa Ousman Jarju
Director, Department of Water Resources and
UNFCCC Focal Point of The Gambia

NATIONALLY APPROPRIATE MITIGATION ACTIONS OF THE GAMBIA

1: BACKGROUND AND EXISTING POLICIES/MEASURES

The Government of The Gambia has been committed to reducing poverty and improving the well-being of its population since designing its first development strategy in 1994. This commitment is driven by the government's long-term strategy, Vision 2020 whose goal includes promotion of free market policies and guaranteeing a well-balanced ecosystem. Vision 2020 is being executed through a series of five-year development plans. The most recently developed Plan is the Programme for Accelerated Growth and Employment (PAGE) which is the Gambia's development strategy and investment programme for 2012 to 2015.

The PAGE recognises that the main drivers of economic growth for The Gambia remain the agriculture sector and tourism industry and that the recent fluctuations in GDP are largely attributable to the effect of climate conditions on agricultural output and variable growth in other key sectors.

With financial and technical support from the Climate and Development Knowledge Network (CDKN), climate change concerns and issues have been integrated in the Gambia PAGE and a costed Climate Change Action Plan has been produced and included in the strategy to implement the PAGE. The PAGE specifically makes references to and builds on the climate change implementation efforts and documents produced and submitted to the Secretariat of the Climate Change Convention. These include Gambia's First National Communication in 2003 and the National Adaptation Programme of Actions in 2007 which currently, serve as strategic documents to guide the implementation of climate change in The Gambia. The National Communication contains a chapter on Gambia's National Inventory of Greenhouse Gas Emissions and a chapter on Mitigation Measures to be taken to reduce national emissions and enhance sinks and contribute to the global efforts to reduce the concentration of greenhouse gases in the atmosphere. The PAGE also recognizes the efforts underway to produce the Second National Communication of The Gambia to the UNFCCC which has assessed the National Inventory of Greenhouse Gas Emissions for the year 2000 and also identified Mitigation Options to reduce these emissions.

However, climate change and its adverse impacts continue to affect the poor and vulnerable communities of The Gambia most severely. The PAGE also recommends the development the Gambia Low Carbon Development Strategy (LCDS) and for the mainstream climate change in national development frameworks (plans, programmes and policies).

The broad policy considerations as represented in the PAGE document include the following.

- a) Accelerating and sustaining economic growth by consolidating the macroeconomic framework, strengthening the main sources of economic growth, and increasing investment opportunities.
- b) Improving and modernising infrastructure through heavy public and private sector investments in the following three sectors:
 - i. **Transport** through effective, efficient and affordable transportation infrastructure that benefits people both directly and indirectly;
 - ii. **Energy** through an adequate, affordable and reliable supply of energy that is crucial for socioeconomic development; and
 - iii. **Information and communications technology** which the Government of The Gambia considers pivotal for economic growth and employment.
- c) Improving human capital stock and enhancing access to social services which will be achieved through strategies to improve access, equity and equality, and by financing education, health, and water and sanitation.
- d) Improving governance and increasing economic competitiveness that will involve closer collaboration between Government and the private sector and development partners and will focus on public service, decentralisation, public financial management and improvement of the business sector.
- e) Reinforcing social cohesion through creation of better employment opportunities, closing the gap between education and the job market, enhancing social protection, improving food security, facilitating gender equality and integrating environment and climate change into national development, paying particularly attention to the green economy initiative and green investment opportunities to foster green growth and green jobs.

Sector specific policies include the following:

- (i) **Finance Sector:** Government of The Gambia will consolidate the macroeconomic framework which is a prerequisite for local and foreign investments as well as economic growth. This will include the improvement of the fiscal balance, sound monetary and exchange rate policies to keep inflation below 5 per cent and strengthening of the financial system.
- (ii) **Agriculture Sectors:** The government's vision for the agriculture sector is to transform The Gambia into a major supplier of agricultural products to local and international markets between 2012 and 2015 by:
 - Increasing food security and boosting the income-generating capacity and the nutritional status of farmers, especially women and youths;
 - Transforming the agricultural sector from a traditional subsistence economy to a modern market-oriented commercial sector;
 - Increasing and sustaining agricultural production and productivity; and
 - Enhancing beneficiaries' productive capacity through supervision, coordination, regulation and advice.

Recent technology development of short cycle and low input crops such as the NERICAs, strengthening the capacity and the establishment of a National Agricultural Research

Institute (NARI), the Department of Agriculture, and others will help address adverse trends in the farming systems. The development and delivery by these institutions of improved practices and/or technologies will reduce the adverse impact of farming systems. The Participatory Integrated Watershed Management (PIWAMP) interventions using dual-purpose bunds/dykes for runoff checks, water retention and introduction of bund stabilization dikes using multipurpose tree species with good root matting are promising as evident in the project sites (NARI 2006).

- (iii) **Tourism Sector:** The government's vision for the Tourism Sector is to make The Gambia a world-class tourist destination and business centre by developing new niche markets, especially ecotourism, cultural tourism, sport tourism and conference tourism;
- (iv) **Energy Sector:** In the **energy** sector, fuel wood obtained from biomass represents over 80% of the total primary needs of the country (NAPA, 2007). The Government of The Gambia envisions a diversified energy system that is reliable, efficient, affordable and environmentally friendly and improvement will focus on electricity, renewable energy and petroleum.
 - a) **Electricity:** The government intends to increase electricity generation, access and efficient operation through promotion and enhancement of private sector participation using appropriate and reasonable incentive and facilitation processes; promoting the use of renewable energy resources such as wind and solar for electricity generation; promoting more operational efficiency of electricity utility companies; and greatly reducing electricity losses by upgrading and replacing the aging transmission and distribution infrastructure;
 - b) **Renewable energy:** To increase the percentage share of renewable in electricity generation, the government intends to put in place a Renewable Energy and Energy Efficient Act; development of the human capital; raise awareness about renewable energy technologies and their potentials, provision of more incentives such as tax holidays.
 - c) **Petroleum:** For the Upstream Division of this Energy sub-sector, the government has in place a Petroleum Exploration, Development and Production Act and has started building a human resource base for the Division. However, the Downstream Division lacks legislation and skilled personnel. The government plans to develop legislation and regulatory regimes for the downstream aspects of petroleum production. In addition, it is developing a strategy for strengthening and building up institutional capacities to ensure effective petroleum resource managements. The legislation, regulations and strategies being developed should take into consideration related environmental issues that include both surface and atmospheric pollution. Both upstream and downstream activities lead to surface pollution such as from oil spills and discharge of effluents, and atmospheric pollution including the emissions of greenhouse gases.

(v) **Transport Sector:** According to the Gambia PAGE, The transport sector has the potential to support the productive capacity and long term expansion of the economy. It is an objective of the government to improve the transport sector's adaptation to climate change and mitigation of greenhouse gas emissions through improvement to public transport, a better road maintenance regime, well maintained vehicles and through the use of more water based transport. The government will continue to take significant steps towards the attainment of this goal through investment projects to improve road, maritime, river and air transport. For the Transport Sector, the following issues stand out clear:

- a) **Road transport infrastructure:** The National Roads Authority (NRA) will continue to construct, maintain and manage the road network of the country to the standard that facilitates the social and economic welfare of the country within the framework of the PAGE and Vision 2020. In addition, the government will strengthen greenhouse gas mitigation efforts in the road sector by ensuring that adequate funds are available for construction and periodic and timely maintenance of roads and other relevant facilities.
- b) **Improve the public transportation system.** The strategy for the Government with regard to public transport system is to attract the private sector investment and local government authorities participation in the provision of Public transport Services. This strategy should include the establishment of a sustainable mass transport system based on a Dedicated Bus System (DBS) to serve the whole country, but particularly settlements served by the country's First Class Trunk Road Network. This should include *updating the National Transportation Policy* and improvement of the road data system taking into consideration the sector's contribution to current and future national emissions and future mitigation efforts of greenhouse gases.
- c) **Marine and River transport.** The Government of The Gambia is committed to strengthening the position of the port as the gateway to The Gambia and the West African region. In addition, it wants to use river transport as a support for economic activities in the country. River transport could open up a whole new vista of commercial opportunities through the flow of commodities and produce to markets and as a major enhancement for tourism. River transport is thus a good agent of decentralization and equitable distribution of markets and amenities, as exemplified during the colonial period. Therefore, the government will:
 - (i) Expand the use of maritime transport through the rehabilitation of the Port of Banjul;
 - (ii) Procure new generation ferries that can segregate freight and passengers;
 - (iii) Encourage and facilitate private sector participation in the revival of river transport; and
 - (iv) Improve safety measures within its maritime sector.
- d) **Air transport:** The government's ambition is to make Banjul International Airport a hub in the sub region, and also to comply with International Civil Aviation Organization (ICAO) standard regulations and requirements. Government should carry out an assessment of the possibility of introducing air cargo services within the

sub-region as a step towards alleviating the impacts of the undesirably frequent border closures on the re-export trade.

- e) **Railways:** Much of the pollution and traffic congestion experienced on the roads could be alleviated with a railway system that is efficient, environmentally friendly and can serve as an alternative to road transport. The government intends to develop an efficient railway transportation system that has the potential for promoting economic growth and employment generation, in addition to its environmentally friendly nature such its little contribution of greenhouse gas emissions and build-up in the atmosphere.

(vi) Natural Resources and Environment Sector:

The unregulated and non-sustainable use of the natural resource base has negatively impacted on this natural wealth of the country. The negative impacts include loss of forest cover, declining fish stock and sizes, decreasing biological diversity leading to increased by-catch of marine mammals with resultant poverty, extinction, and habitat degradation. The 1977 comprehensive policy statement entitled the “*Banjul Declaration*” was made as a result of Government’s recognition of the alarming rate of loss of Gambia’s fauna and flora. The Banjul Declaration gave birth to the 1977 Wildlife Conservation Act that led to the establishment of the then Wildlife Conservation Unit and later in 1981 to the fully fledged Department of Parks and Wildlife Management (DPWM). DPWM is charged with the responsibility of sustainably managing wildlife resources and setting aside protected areas as wildlife sanctuaries.

In the late 80s and the 1990, the Department of Forestry developed and implemented the Community Forest Management (CFM) concept as a new approach involving community participation in forest management. The CFM has registered major successes and has recently won The Gambia recognition and an Award by the United Nations General Assembly. The implementation of the 1995 – 2005 has registered some progress. The Department of Forestry is currently implementing the 2006 – 2016 Policy and hopes to achieve the target of 30% of the land to be forested. Currently, about 76,029 hectares (ha) are being managed as Community Forest and State forest reserves while the Department of Parks and Wildlife Management is managing 45,800ha including a proposed Biosphere Reserve estimated at 80,000ha of terrestrial and Wetland ecosystems.

In a concerted effort to address the environmental and natural resources management problems of the 1970s and 1980s, the government prepared and adopted the GEAP in 1992. The objective of the GEAP is to provide a legislative and policy framework for the management of Gambia’s environment. It identified the major environmental issues of concern and proposes government actions to address them. The GEAP was implemented over a 10-years period commencing in 1993 and registered major achievements in terms of capacity building, institutional strengthening and improved coordination of the different actions and strategies of government institutions, NGOs and the private sector.

As part of her commitment to participate in the global efforts to management the environment, The Gambia ratified many international Multilateral Environmental Agreements (MEAs) such as the Convention on Biological Diversity, United Nations Framework Convention on Climate Change and the UN Convention to Combat Desertification including their associated protocols.

The Convention on Biological Diversity (CBD) was ratified in June 1994 and the subsequently the National Biodiversity Strategy and Action Plan (NBSAP) was completed in 1999. The NBSAP is now the main framework for biodiversity management in The Gambia addressing all the areas affecting biodiversity in the country including such important areas as in-situ conservation and benefit sharing arising from the exploitation of biodiversity resources. Subsequent to the NBSAP, a new Wildlife Policy was developed in 1998 and has one of its objectives, to increase the area of the country under national parks from its present level of 4.1% to 10% of the total land area of the country by 2015 in accordance with the national target for MDG 7. The protected areas, which are managed by the Department of Parks and Wildlife Management, represent the last remaining samples of the different ecosystems that once existed in the Gambia.

The Gambia is also seriously affected by land degradation/deforestation. The Gambia ratified the UN Convention to Combat Desertification in 1996 and completed the National Action Plan (NAP) for desertification control in 2000. The NAP is a comprehensive action plan encompassing all the major areas contributing to the process of desertification in the country and is to be implemented over a period of 15 years. The major problem affecting NAP implementation in the Gambia is the lack of sufficient funds for practical implementation.

As a Least Developed Country (LDC) greatly affected by the adverse impacts of climate change, The Gambia attaches great importance to climate change issues. The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by the Gambia in June 1994. The Gambia's commitment to tackling the effects of climate change is reflected in its First National Communication to the United Nations Framework Convention on Climate Change (NCC, 2003), the National Adaptation Programme of Action (NCC, 2007), the National Capacity Self Assessment Report and the Gambia PAGE (GOTG, 2011) and the Second National Communications (SNC, *in preparation*). These national reports, which are submitted to the UNFCCC and development partners, contain capacity building, technological and financial strategies and enablers to support The Gambia in her efforts to implement the Climate Change Convention at the national, regional and international levels.

(vii) Local Government and Decentralization Policy

The recent Local Government Reform and Decentralization Programme (GRDP) is timely and pertinent in supporting the implementation of the policies and strategies on

natural resources and environment at the local and district levels. The GRDP seeks to empower local communities and to strengthen community management approaches of natural resources. In that way, natural resources will be community owned as opposed to being an open resource and is expected to address the undesirable state of the natural resources. The GRDP is supported by the development and implementation of the decentralization policy, which places management of natural resources including forestry, fisheries, wildlife and biological diversity under the responsibility of the Local Communities.

2: RATIONALE OF THE GAMBIA NAMA

In 2007, the Bali Action Plan (Dec. 1/CP.13) introduced Nationally Appropriate Mitigation Actions (NAMAs) as a central concept for a new international climate regime (UNFCCC, 2008). Under the Cancun Agreements (Dec. 1/CP.16), the UNFCCC Conference of Parties (COP) agreed that developing country (Non-Annex I) Parties will take nationally appropriate mitigation actions in the context of sustainable development, supported and enabled by technology, financing and capacity-building, aimed at achieving a deviation in emissions relative to 'business as usual' emissions in 2020 (UNFCCC, 2010). Also in Dec. 1/CP.16, the COP decided that internationally supported mitigation actions will be measured, reported and verified domestically and will be subject to international measurement, reporting and verification in accordance with guidelines to be developed under the Convention. It is also expected that the support (capacity building, technology and finance) will be subjected to Measurement, Reporting and Verification (MRV) based on rules and procedures that are being negotiated.

The international community, including Africa, has recognized that Africa has severely lagged behind other continents on the uptake of CDM projects, which could reduce GHG emissions and generate an alternate income stream from the sale of certified emission reductions (CERs) for project owners on the continent. Africa should and is learning from this unfortunate experience and could use the concept of NAMAs to correct the situation. NAMAs are perceived to take a prominent place in international politics for mitigating GHG emissions. This perspective is likely to encourage African countries to better prepare and position themselves to take advantage of the opportunities offered under the NAMA mechanism.

Following the request from the General Secretariat of the UNFCCC, 55 countries have submitted proposals for NAMAs, 20 of which are from Africa (as at 31 July 2011). In their submission African countries expressed their need for financial, technological and capacity-building support for full participation in the NAMA mechanism.

Recognizing this low submission of NAMAs to the UNFCCC by the African countries, the African Development Bank (AfDB) prepared a proposal suggesting ways to support Regional Member Countries (RMCs) in developing and implementing NAMAs. The AfDB organized a side event and a one-day training workshop during the Africa Carbon Forum that took place in July 4-7, 2011 in Marrakesh, Morocco. Both the side event and the training workshop aimed at improving the understanding of RMCs in the preparation of NAMAs and build their capacities to

design and implement NAMAs in preparedness for and to take advantage of the Green Climate Fund when it becomes effective. Twenty four RMCs attended the Marrakesh side event of which 11 have submitted their NAMAs. The AfDB, following the discussions with the UNFCCC Focal Points or their representatives at this Side Event, decided to support the remaining 13 RMCs that attended the meeting and have not yet submitted their NAMAs to accelerate the process of developing and submission of NAMAs to the UNFCCC.

The Republic of The Gambia was one of the RMCs that participated in the Side Event and is yet to submit a NAMA to the UNFCCC. Thus, through this grant and consultancy, AfDB is supporting Republic of The Gambia to submit a proposal for NAMAs to the UNFCCC Secretariat in advance of the 17th Conference of the Parties (COP 17, Durban, 28th November to 9th December, 2011). The task is to identify a proposed list of NAMAs for The Gambia through a consultative and participatory manner on the basis of a summary document, approved at the national level, which summarizes the national policy for reducing greenhouse gas emissions and highlights the mitigation potential existing in each sector.

Three kinds of NAMAs are currently being recognized: (i) autonomous actions by developing countries without outside support; (ii) actions undertaken with support from developed country parties; and (iii) actions that could be partially or fully credited for sale in the global carbon market. As a Least Developed Country (LDC), Gambia has prepared and is ready to implement this “*Supported*” NAMA that will lead to a reduction of greenhouse gas emissions and contribute to sustainable development in the country. Successful implementation will depend on the availability of the capacity, technological and financial support identified and being requested in the document.

The implementation of this Government of The Gambia/African Development Bank (GOTG/AfDB) project follows series of consultations with relevant stakeholders through effective communication, inception workshop, scoping meeting and iterative review of the generated documents. Extensive use has been made of data and information generated by GHG Inventory and Mitigation studies conducted by the National Climate Committee under the First and Second National Communications projects and projections have been produced for the future.

The rationale for the Gambia NAMA is to join global efforts to mitigate greenhouse gas emissions and lower the cumulative build-up of greenhouse gases in the atmosphere. For The Gambia this would mean reducing the year 2000 national emissions of about 3,623 Gigagrams or 20.02 Million Tons CO₂ Equivalent (TCO₂E).

3: DESCRIPTION OF THE GAMBIA NAMA

The Gambian NAMA is a list of eight priority mitigation projects and two mitigation/adaptation projects. The process of development of the NAMA has been very inclusive and commitment from relevant stakeholders was secured. Stakeholder consultation has been applied and group of stakeholders (central and local government, private sector and civil society organizations) were involved from the beginning and at the right level of decision making. Collective analysis and

decisions as to which NAMAs are priorities and which are most likely to attract support was arrived. Opportunities for mitigation actions were assessed by Sectoral Teams and these were packaged as potential NAMAs.

The list of mitigation actions was assessed in terms of cost-effectiveness, socio-economic and environmental benefits, feasibility of implementation and sustainability. Concept Notes for the ten prioritized list of NAMAs are included in Annex I. Full NAMA proposals beyond the concepts will be developed which will contain enough detail and more analytic results to form the basis for donor support and implementation. The fully developed NAMA proposals will contain adequate information on mode of implementation; stakeholder institutions to be involved in the implementation; and the proposed monitoring, reporting and verification processes that will be utilized during and after the implementation. The implementation plan will contain a list of all sub-actions with associated actors including their roles, responsibilities and timelines for action with dependencies.

The Gambian NAMA is the Supported Category requiring adequate funding, capacity building and technology transfer as enablers. The following bulleted information provides a summary of the ten NAMAs.

- a. The Low Carbon Development Strategy (LCDS) is meant to fill the void presented by the non-availability a climate change policy and strategy which leads to ad-hoc and non-sustainable implementation of the Climate Change Convention in the Gambia. When developed, the LCDS of The Gambia is expected to spell out the required institutional structures and human capital, the planning and implement a broad range of mitigation activities and emissions pathways, provide a comprehensive outlook on policies, measures, strategies and actions at the national level that facilitate a shift to low carbon development.
- b. The NAMA on increasing the share and uptake of renewable energy sources in the national energy mix is planned to install small wind turbines of 150-200KW along the coastal line and centralize Solar Plants mainly for provincial power generation. It is projected to increase by 20% the share of renewable sources in the electricity mix. It will displace most of the fossil fuel that is planned to be installed in the local communities as part of the Rural Electrification Programme. This project has high potential to reduce greenhouse gas emission in the next 20 to 30 years.
- c. About 85% of the energy consumed by the Gambian population comes from woody biomass from the forests and rangelands. The dependency on forest to meet the cooking fuel needs of the population is very great and is rapidly depleting the vegetation cover of the country. The production and utilization of two hundred thousand (200,000) improved cooking stoves under this NAMA is expected to save about 450,000 and 419,000 tons of wood and charcoal respectively. Substantial financial and health benefits for the communities are projected. Over 9 Million tons of GHG emission will be saved by 2030 compare to the reference.
- d. Losses in transmission and distribution of generated electricity imply that a lot more fossil fuel is consumed to meet demand. The Project will improve electricity infrastructure, reduce losses due to poor transmission and distribution infrastructure,

improve the quality of life, and promote greater economic growth and equity. The project will also reduce emissions through cut in the energy consumption of generating plants.

- e. The NAMA on the acquisition and utilization of postharvest and food processing technologies has both adaptation and mitigation characteristics. This project aims to improve food availability and food security as adaptation to climate change. The increase availability of food will reduce clearing of virgin lands for cultivation of more food. The clearing of virgin lands, most of which are forest and rangelands leads to reduced sinks and increased emissions of greenhouse gases into the atmosphere. Thus, this project also serves a NAMA and reduce emissions of greenhouse gases from forest clearing for new farm lands.
- f. Rangelands are mostly communal with little or no forage for the animals during the long dry season when most of the pastures are lost to bush fires and other human induced calamities. Consequently animal productivity is drastically reduced and numbers dwindling due mainly to hunger and diseases. Substantial reduction in the productivity of natural pastures, due to human and climatic factors, call for the adoption of the new approaches to livestock production. Improvement of animal genetics would lead to less numbers of animals and a higher level of productivity. The targeted dual purpose Ndama cattle of the Gambia produces a maximum of 1.5 liters of milk a day; and an average of 250kgs live-weight at the age of 5 year. Sustainability and benefits include poverty alleviation, food self sufficiency and genetic improvement of indigenous breeds.
- g. Restoration of degraded grazing lands through the multiplication and popularization of forage seed planting of multiple purpose plants in grazing areas is a greenhouse gas mitigation measure that encourages production of various multipurpose plants in the degraded areas, reseeded of multipurpose plants, the planting of multipurpose plants and better utilization of re-established degraded areas through better grazing management and sensitized livestock producers on improved feed conservation and preservation techniques. Fire belt development, protection from premature grazing, promote and practice appropriate harvesting, storage, utilization and preservation techniques, provide animal watering facilities in degraded areas institutionalize a taskforce comprised of appropriate line department and institutions
- h. The Government of The Gambia is implementing the Rice Expansion and the New Rice for Africa (NERICA) projects. Most of the upland soils of The Gambia are sandy with low nutrient content and poor water holding capacity. NERICA has been found to do very well in these upland fields. Because it grows in upland sandy soils very little greenhouse gases are emitted. This project therefore has dual objectives. It aims to promote and facilitate the expansion of the cultivation of NERICA and thus increase food security. The project will also lead to reduction of emissions of greenhouse gases, particularly methane which is produced from flooded rice fields.
- i. The policy framework for sustainable natural resource management put an adequate forest cover at the centre front. The forest policy (1995-2005) advocates a forest cover of 30% which will be sufficient for maintaining an ecological balance necessary for sustainable growth. 75% of the total forest cover, amounting to 200,000 ha should be managed by local communities and the private sector in partnership with Government. The Gambia German Forestry Project (GGFP) of the 1990s introduced the community

forestry initiative to involve the local populace in the management of the forests on a sustained basis. Over forty thousand hectares of protected wetlands and thirty thousand hectares (34,000 ha) of natural forests have been put under community management by 2007. Those communities experienced a significant reduction in forest fires and increase in biomass stock. However, in none community based managed districts loss of forest cover continued and the Forest Category of The Gambia has now changed from a sink to a source of carbon. The proposed NAMA is intended to expand community-based forest management concept to all districts and bring most of the existing wildlife and biodiversity reserves and national parks under community management. New reserves and parks will also be created and placed under community-based management.

- j. Waste management is a rapidly developing sector whose current management is inadequate. There is an increase in waste generation as a result of increase urbanization, affluence and rapid population growth. Proliferation of illegal dumpsites is common and littering is widespread and very difficult to control despite the recent introduction of the Anti-littering Regulations. Currently about 49% of our total population lives in the urban and peri-urban areas of the greater Banjul area and this is projected to increase significantly leading to increased generation and dumping of household, commercial and industrial waste. Hence, enhanced action is required to manage the waste in order to reduce its pollution and health impacts on the communities and the atmosphere. The proposed NAMA is expected to reduce the business-as-usual projected greenhouse gas emissions of GHG about 49MtCO₂eq by 2030 by more than 60%.

4: IMPLEMENTATION BARRIERS

The priority NAMAs presented in this national document have to be effective in meeting policy goals and enhance efforts to reduce emissions of greenhouse gases and sustainable development. During the stakeholder consultations on the identification of the NAMAs, participants identified barriers to implementing the actions and evaluated how difficult or easy it will be to overcome these barriers during implementation. Thus, the resulting list of ten NAMAs has softer residual barriers that still need to be understood and taken into consideration before and during their implementation. Some of these include:

- a. Lack of clarity in the future funding of the NAMAs especially taking into consideration that most of these activities have been identified in previous national reports including the National Communications, National Adaptation Programmes of Action and National Capacity Self Assessments;
- b. None availability of the enablers (finance, capacity building and technologies) needed for the implementation of the NAMAS;
- c. Delay in the operationalization of the Green Climate Fund, the proposed “new market-based mechanisms” and the finalization of the rules and procedures related to the monitoring, reporting and verification of actions and support provided for the implementation of the NAMAs;
- d. Inadequate institutional and policy frameworks at the national for in-country NAMA implementation;
- e. None involvement of the most important stakeholders (local communities, women, youths and local leaders) in the process from the start;

- f. Inadequate analysis and information on the outputs and outcomes of the implementation of the NAMAS particularly on emissions reduction potential, contribution to sustainable development, alignment with national development and sector goals, market and technology potentials, impacts of actions, financial feasibility and development benefits.

5: NEEDS ASSESSMENT AND PROPOSED INTERVENTIONS

Enabling Finance

Section 7 below gives an indicative cost of implementing the Gambian NAMA. More accurate analysis and information can be achieved during the full development of the Project Proposals. However, financing the implementation is crucial and critical prerequisite of the NAMA.

Enabling Capacity Building:

All the NAMAs presented in this document will require technical and institutional capacity building for implementation. Specifically, it will be required to build the capacity of the NAMA Team in the development of the Low Carbon Development Strategy and on analysis of the incremental costs of investments required to support implementation, over the period 2010-2030. The Team will also benefit from analysis to project national and sectoral greenhouse gas emission for the same period.

Enabling Technologies

Solar Photovoltaic Technology:

Solar Photovoltaic Technology is used to provide electricity supplies of various forms and uses. Stand alone PV systems are usually installed in remote areas, where there is no main grid or it is difficult or impossible to use any other source of power supply. Off grid PV systems can be used to generate free electric energy. Because solar modules only produce electric energy during daytime, it is necessary to store energy for the night or for cloudy days using battery storage systems, there are no moving parts, so the system's lifetime is very long and it is virtually maintenance free. Off grid PV systems provide safe and reliable power without the expense of installing utility power. The solar array tilt is easily adjustable to maximize solar energy output. The systems are mounted on galvanized steel structures or trailers engineered to withstand harsh environments and high wind loads, These fully-integrated, galvanized units use DC primary power to charge a 12, 24 or 48 VDC sealed battery bank while powering the DC load, or AC load with integral inverter option.

Portable PV systems can be used when the electrical power is subject to outages or unreliable as an uninterrupted power supply (UPS) or back up power unit.



Solar Home System for lighting



Figure 4a: Solar Street Lighting



Figure 4b: Solar Street Lighting

On a larger space scale solar photovoltaic technology is used to power street lighting (Figure 4a, b above) in many parts of the globe but particularly in developing countries where cost of petroleum products is beginning to be beyond the national budget system. This will be particularly useful in The Gambia especially for the Rural Electrification Programme.

Wind Energy Technologies

Windmills (Figure 8a, b) may have been around for almost 1500 years, but it was not imagined that wind power would become affordable enough to compete with fossil fuels. Indeed it has. Wind energy is found to be cheaper than any other new electric generation except natural gas which emits one pound of greenhouse gases for every kilowatt-hour of electricity it generates. Wind power is now the world's fastest growing energy source and has also become one of the most rapidly expanding industries. Switching from fossil fuel to wind generators is feasible along the coastal zone of The Gambia where wind speeds are relatively high to operate the equipment. Wind has been used in these areas for pumping water from water points such as wells. The economics of a wind system are very sensitive to the average wind speed in the area, and to a lesser extent, the cost of purchasing electricity. As a general rule of thumb, if economics are a concern, a turbine owner should have at least a 10 mph average wind speed and be paying at least 10 cents/kWh for electricity. Wind turbines produce no pollution and by using wind power you will be offsetting greenhouse gases that would have been generated by your utility company. Over its life, a small residential wind turbine can offset approximately 1.2 tons of air pollutants and 200 tons of greenhouse gases (carbon dioxide and other gases which cause climate change).



Figure 8a: Typical Windmill used in western (e.g., Brufut) and eastern parts of The Gambia



Modern Windmill for electricity production

Improved Cook Stove

For mitigation of greenhouse gas emissions and their cumulative buildup in the atmosphere the Department of Energy proposed the use of improved cook stoves to reduce quantity of wood harvested in the forest. The Improved Cook Stove (Figure 9a, b) is a popular technology that reduces quantity of fuel consumption and also vents the smoke out of the house through a chimney, thus dramatically improving a family's health. The improved cook stove technology reduces the pressure placed on local forests by reducing the amount of wood the stoves consume. Additionally, the money a family spends on wood or charcoal translates into less money being available to be spent on food, education, and medical care. There are various types of improved cook stoves employed in The Gambia. The '**Greenie**' Cook Stove is a fuel efficient wood-burning domestic stove that is designed to use wood and other alternative bio-fuels in briquette format. It only comprises of 4 simple parts, its use is easy to learn and safe and it can be manufactured with tools available on industrial and local levels from new or used steel and parts. For the same amount of fuel twice as much heat is generated for cooking. In effect only one third of the fuel is needed in comparison to an open fire to achieve the same result.



Improved Cook Stove common in The Gambia



Briquette used in 'Greenie' Cook Stove



Improved Lorena Stove adopted by the Department of Community Development in The Gambia

Improved Lorena Cook Stove

The Lorena Cook Stove (Figure 10) is the latest generation of improvement in cook stove technologies. It is a simple biomass stove built around an insulated, elbow-shaped combustion chamber which provides more intense heat and cleaner combustion than an open fire, meaning that it consumes less fuel than a three-rock stove, removing smoke from the house.

Waste Management Technologies

Solid waste management continues to be critical issue for the Gambia especially in the city of Banjul, Kanifing Municipality and the Provincial Growth Centers. Solid waste is generated from households, offices, shops, markets, restaurants, public institutions, industrial installations, and agricultural activities. The basic problem is the lack of proper final disposal sites, inadequate equipment for storage, collection and transportation and the low level of awareness. Solid waste management practices include: collection, temporary storage, informal recycling, solid waste disposal on land, and open burning of waste. Informal recycling is normally done at the dumpsite where scavengers collect whatever they can find use for and it is small scale. Waste management practices and technologies that have been recommended for application in The Gambia include Land-filling.

Land-filling Technology: A landfill, also known as a dump or rubbish dump, is a site for the disposal of waste materials by burial and is the oldest form of waste treatment. Historically, landfills have been the most common methods of organized waste disposal and remain so in many places around the world. Many landfills are also used for other waste management purposes, such as the temporary storage, consolidation and transfer, or processing of waste material (sorting, treatment, or recycling). Typically, to operate non hazardous waste landfills in The Gambia as a waste management technology predefined specifications and techniques need to be applied by which the wastes are confined to as small an area as possible, compacted to reduce their volume and covered (usually daily) with layers of soil. Gases are produced in landfills due

to the anaerobic digestion by microbes on any organic matter. This gas can be collected and used to generate electricity in a gas fired power plant, referred to as Gasification and considered as a mitigation technology (Methane Recovery) in this report. Landfill gas monitoring can be carried out to alert for the presence of a build-up of gasses to a harmful level.

Post harvest technologies

Postharvest handling is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing. The most important goals of post-harvest handling are keeping the product cool, to avoid moisture loss and slow down undesirable chemical changes, and avoiding physical damage such as bruising, to delay spoilage. Sanitation is also an important factor, to reduce the possibility of pathogens that could be carried by fresh produce, for example, as residue from contaminated washing water.

After the field, post-harvest processing is usually continued in a packing house. This can be a simple shed, providing shade and running water, or a large-scale, sophisticated, mechanized facility, with conveyor belts, automated sorting and packing stations, walk-in coolers and the like. In mechanized harvesting, processing may also begin as part of the actual harvest process, with initial cleaning and sorting performed by the harvesting machinery.

Initial post-harvest storage conditions are critical to maintaining quality. Each crop has an optimum range for storage temperature and humidity. Also, certain crops cannot be effectively stored together, as unwanted chemical interactions can result. Various methods of high-speed cooling, and sophisticated refrigerated and atmosphere-controlled environments, are employed to prolong freshness, particularly in large-scale operations.

Regardless of the scale of harvest, the basic principles of post-harvest handling for most crops are the same and include handle with care to avoid damage (cutting, crushing and bruising), cool immediately and maintain in cool conditions and cull to remove damaged items.

Food processing and preservation techniques and technologies

Food Processing Technologies

Food processing is the set of methods and techniques used to transform raw ingredients into food or to transform food into other forms for consumption by humans or animals either in the home or by the food processing industry. Food processing typically takes clean, harvested crops or slaughtered and butchered animal products and uses these to produce attractive, marketable and often long shelf-life food products. Similar processes are used to produce animal feed.

The Technology includes a Processing Line used to produce fruit and vegetable chips from variety of fresh fruits and vegetables by low-temperature vacuum frying. The chips maintained the original colour, flavour and nutrition of the fruit and vegetable and without the use of

chemical additives. This Fruit Juice Extractor is suitable for extracting juice from grape, tomato, fruits and vegetables. Its range of extracting ratio is very wide and residue is automatically separated from juice.

Food preservation Technologies

Food preservation is the process of treating and handling food to stop or greatly slow down spoilage (loss of quality, edibility or nutritive value) caused or accelerated by micro-organisms. Some methods, however, use benign bacteria, yeasts or fungi to add specific qualities and to preserve food (e.g., cheese, wine). Preservation usually involves preventing the growth of bacteria, fungi, and other micro-organisms, as well as retarding the oxidation of fats which cause rancidity. It also includes processes to inhibit natural ageing and discolouration that can occur during food preparation. Some preservation methods require the food to be sealed after treatment to prevent recontamination with microbes. Others preservation methods, such as drying, allow food to be stored without any special containment for long periods. Common methods of applying these processes include drying, spray drying, freeze-drying, freezing, vacuum-packing and canning.

Drying food preservation

One of the oldest methods of food preservation is by drying using a Process Dryer, which reduces water activity sufficiently to prevent or delay bacterial growth. Drying also reduces weight, making food more portable. Most types of meat can be dried and many fruits can also be dried such as mangoes. Drying is also the normal means of preservation for cereal grains such as maize, rice, millet and groundnuts.

Food preservation freezing

Freezing is also one of the most commonly used processes commercially and domestically for preserving a very wide range of food including prepared food stuffs which would not have required freezing in their unprepared state. Cold stores provide large volume, long-term storage for strategic food stocks held in case of national emergency in many countries. A typical Freeze Drier uses thin/wiped film evaporation to dry liquids or slurries to a free-flowing solid powder in a single pass. The system eliminates the pre-concentration step often needed prior to spray drying and eliminates the significant energy required to heat up large volumes of air needed for spray drying. It can minimize or eliminate the need for expensive dust collection systems.

Vacuum packing Food preservation

Vacuum-packing stores food in a vacuum environment, usually in an air-tight bag or bottle. The vacuum environment strips bacteria of oxygen needed for survival, slowing spoiling. Vacuum-packing is commonly used for storing nuts to reduce loss of flavor from oxidation. The Height Controlled Nozzle Type Vacuum and Gas Flushing Sealer does sealing, vacuum and gas flushing packaging.

Canning and bottling food preservation

Canning is a method of preserving food in which the food is processed and sealed in an airtight container. The packaging prevents microorganisms from entering and proliferating inside. To prevent the food from being spoiled before and during containment, quite a number of methods are used: pasteurization, boiling, refrigeration, freezing, drying, vacuum treatment, antimicrobial agents that are natural to the recipe of the foodstuff being preserved, a sufficient dose of ionizing radiation, submersion in a strongly saline, acid, base, osmotically extreme (for example very sugary) or other microbe-challenging environments. Marginal fruits such as tomatoes require longer boiling cycle and addition of other acidic elements. Low acid foods, such as vegetables and meats require pressure canning. Food preserved by canning or bottling is at immediate risk of spoilage once the can or bottle has been opened.

The Double Seamer Canning Machine is specially fabricated from graded cast iron and is suitable for seaming cans between 202-700 diameter ranges. The seaming operation is fully automatic after the can is placed and pedal is pushed. Double seamer machines are available with standard capacity of seaming 30-35 cans/min. The Vacuum Bottle Filling Machine is specially designed to fill ketchup, hot syrups, etc. The machine is fitted with storage tank fabricated using quality stainless steel and is perfectly suitable for filling all sizes and types of bottles to a predetermined level. It has a filling capacity of 10 - 15 bottles/minute

6: BENEFITS: EMISSION REDUCTION AND CO-BENEFITS

- a) The development and implementation of a LCDS in The Gambia will afford the country with the technical and technological capacity to develop sustainably. Appropriate policies and regulations with sustainable indicators will be available and implemented. Implementation of this strategy and all the NAMAs presented by The Gambia will help deviate from the business-as-usual projected emission shown in the Table below.

Country	1990	1995	2000	2005	2010	2015	2020	2025	2030
TOTAL (Excluding Forestry)	3.564	4.171	4.862	5.619	6.347	7.114	7.920	8.766	9.635
Energy	0.060	0.075	0.069	0.069	0.076	0.081	0.087	0.094	0.101
Agriculture	0.733	0.741	0.800	0.895	0.943	1.007	1.061	1.117	1.176
Industrial Processes	0.000	0.000	0.001	0.003	0.005	0.008	0.013	0.023	0.031
Forestry			636	829	1081	1409	1837	2395	3122
Waste	2.770	3.355	3.992	4.652	5.322	6.018	6.759	7.533	8.327

- b) It is projected to increase by 20% the share of renewable sources in the electricity mix. With the baseline greenhouse emissions scenario, a total of 9,071,230.50 tons of GHG emission will be saved by 2030 compare to the reference. The results from this Scenario show that major saving in both CO₂ emissions and energy consumption will be realized by simply popularizing the use of improved cooking stoves that saves up to 100,000 TOE fuel wood by 2030.
- c) By promoting and utilizing improved food storage facilities and post-harvest technologies, expansion of farmlands through encroachment into forests and virgin lands will be reduced. Reductions in emissions are expected to come from the Forestry Category based on the area and carbon stock whose destruction is avoided. This NAMA also serves an adaptation option to increase food security.
- d) Refurbishment, upgrading and expanding the electricity transmission and distribution lines and networks will deliver power efficiently. Benefits include loss reduction, ensure affordability, reduce emissions through cut in the energy consumption of generating plants, increase access, increase system reliability and ensure network stability.
- e) In the 2000 National Inventory, animal production produced 12.3Gg CH₄ or 64% of the total emissions from agriculture, 0.39Gg CH₄ or 2% came from crop residue burning and 0.25Gg CH₄ or 1% came from savannah burning. Also about 83% (10.2Gg CH₄) of the total methane emissions from animal production (12.3Gg CH₄) was produced by cattle rearing. The other animal categories (sheep, goats, donkeys, horses, mules, swine and poultry) combine produced the remaining 17% (2.1Gg CH₄). By 2030 emissions are projected to be about 3.8MtCO₂eq. The implementation of this NAMA is expected to lead to reduce the amount of methane produce within a given population. The planting of nitrogen fixing crops and the encouragement of spot and zero burning practices would significantly reduce GHG emission by enhancing carbon uptake. Other benefits include improved forage/rangelands, reduced bush fire incidence, improved milk quality and quantity, improved source of protein, increase source of income and employment opportunities. Thus this NAMA can also be categorized as an adaptation option.
- f) In 2000 National Inventory of The Gambia, 51% of the total emissions from agriculture were methane emissions from animal husbandry, rice cultivation, savannah burning and burning of crop residues. Rice cultivation produced 6.40Gg CH₄ or 33% of the total methane emission from agriculture. Projected emissions from the Agriculture Sector are about 8.473 MtCO₂eq and it is proposed to reduce these emissions by about 33% through the implementation of this project. Other benefits include poverty alleviation, food self sufficiency, availability of food storage and processing facilities to reduce food losses, improvement in the quantitative and qualitative availability of food for the population, increased food security, reduced social conflict, reduced domestic funding of export bills, improvement in the economy, and reduction in susceptibility to health and thus improved health standards of the population. Thus, this NAMA has the dual benefit of serving as a mitigation and adaptation measure.

- g) Through the Community Forest Management Concept about 43,772 ha protected wetlands and 34,000 ha of natural forest have been under community management. Reduced loss of vegetation cover from savannah burning, illegal harvesting of forests products is halted and conversion of forest lands to other land uses is at a minimal. In the Forestry sector alone, net emission of CO₂ was 3,698 Gg specifically from the forest and grasslands categories. Despite the lack of capacity to projected emissions from the LULUCF category this is assumed to be very high in the future under business-as-usual. However the major goal of the NAMA intervention is to reverse the emission category of the Forestry Sector from a Source to a Sink. Other benefits include forest conservation, wetland Conservation, agroforestry, commercial plantations, landscaping and beautification; ecotourism and trans-boundary activities, carbon offset, employment, food security, poverty alleviation, improved biodiversity, and desertification reversal.
- h) Population in the Greater Banjul Area (GBA) and Growth Centres in the Provinces is projected to increase to about 2 million by 2030. In this regard, solid waste generation increases from 200,000 tons to 400,000 tons. Combine wastewater discharge into coastal waters from Banjul and tourism resort is expected to grow from 4,000 cubic meter per day to 5,000 cubic meters per day. Thus, methane emission from the organic component of solid waste will increase from 6.5Gg CH₄ to 13Gg CH₄, and 1.75Gg CH₄ to 3.5Gg CH₄ from wastewater. The absence of local and national waste management frameworks and lack of waste treatment infrastructure are serious constraints and challenges in waste management and limiting of greenhouse gas emissions from the waste category. Projected emissions of GHG under the Waste Management category of The Gambia is about 49MtCO₂eq to 2030. Implementation of this project is meant to deviate from this projection by more than 60%. Other benefits include reduced emissions of methane, employment creation, and reduced expenditures on health by both the Government and the population.

7: COSTS AND FINANCING OPTIONS

The proposed funding for the 10 NAMAs identified in Annex I is US \$118,144,000. Details of the cost of the activities will be broken down into more specific actions during the development of the full proposals. Since this document represents a “Supported” NAMA from The Gambia the funding options will include the funds under the UNFCCC process and any bilaterally available grants which are open to MRV under the UNFCCC COP decisions.

8: MRV PLAN INCLUDING PERFORMANCE INDICATORS

During the process of development of the full project proposal beyond the profiles presented in Annex I, a detailed monitoring, reporting and verification plan and procedures will be developed and agreed. The MRV plan and procedures will be guided by the outcomes of negotiations and decisions arrived for Supported NAMAs at the relevant sessions of the UNFCCC Conference of

Parties. The plan will include performance indicators for both the donor and the recipient project proponent.

9: ACTORS, ACTIONS AND TIMING

Each of the NAMAs has identified and presented a very brief implementation plan and information on monitoring and evaluation. The implementation plan identified the Lead institution for the implementation of the NAMA, the executing agency and partners. Partners to be involved in the national and international monitoring and evaluation of project activities have also been identified. During the development of the NAMA Profiles in Annex I, more details will be provided based on the requirements of the country and the donor partner. Detailed work plans with appropriate costing, schedule of deliverables, achievement indicators and roles and responsibilities of partners will be developed.

10: FURTHER READING MATERIALS:

UNFCCC (2008) *Decision 1/CP.13 Bali Action Plan*, FCCC/CP/2007/6/Add.1*, March 2008, available at <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3>

UNFCCC (2009) *Non-paper 51: Nationally appropriate mitigation actions by developing country Parties*, Contact group on enhanced action on mitigation and its associated means of implementation, November 2009, http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf

UNFCCC (2010) *Decision 2/CP.15 Copenhagen Accord*, FCCC/CP/2009/11/Add.1, March 2010, available at <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf#page=4>

UNFCCC (2011a) *Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention*, FCCC/AWGLCA/2011/INF.1, March 2011, <http://unfccc.int/resource/docs/2011/awglca14/eng/inf01.pdf>

UNFCCC (2011b) *Decision 1/CP.16 The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention*, FCCC/CP/2010/7/Add.1, March 2011, <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2>

UNFCCC (2011c) *Views on the items relating to a work programme for the development of modalities and guidelines listed in decision 1/CP.16, paragraph 66 FCCC/2011/MISC.7 (including Add1 and Add2)* Available at <http://unfccc.int/resource/docs/2011/awglca14/eng/misc07.pdf>

ANNEX I: Profiles of ten NAMAs identified in The Gambia

Project title: Development and Implementation of a Low Carbon Development Strategy of The Gambia

Current Situation: The Gambia has submitted its First National Communications (FNC) to the UNFCCC in 2003, its National Adaptation Programme of Actions (NAPA) in 2007 and is currently finalizing its Second National Communication (SNC) for submission to the UNFCCC in 2012. These reports contain information on the level of greenhouse gas emissions, mitigation measures to reduce the emissions, projected impacts of climate change, proposed adaptation options to address the impacts, and proposed international cooperation measures. However, Gambia has no climate change policy and no set strategy for the implementation of the Climate Change Convention. There are set institutional structures that are also not adequate as these are functional only during project implementation. There is no domestic funding for the full-fledged functioning structure.

Justification: The absence of a climate change policy and strategy makes the implementation of the Climate Change Convention in the Gambia an ad-hoc process that has no sustainability. The institutional structures in place are not adequate as these are functional only on ad-hoc basis without domestic funding and so are only active during project implementation such as the development of National Communications. This is also the result of the absence of Climate Change Policy, Regulations and a Strategy. The institutionalization of a Policy, Regulations and a Strategy will lead to the legal establishment of the appropriate institutional structures that are mandated by law to operate in the country and will therefore be funded through the domestic budget. As part this NAMA submission to the UNFCCC, The Gambia proposes to develop her Low Carbon Development Strategy (LCDS) to plan and implement a broad range of mitigation activities and emissions pathways some of which are part of this submission. The process of development and implementation of the Gambian LCDS will open up a lot of new avenues to fully establish appropriate institutional and legal structures for the effective and sustainable implementation of the Climate Change Convention and its Protocol. The availability of the Gambian LCDS will also provide a comprehensive outlook on policies, measures, strategies and actions at that national level that facilitate a shift to low carbon development. The National GHG inventories submitted under the First and Second National Communications of The Gambia to the UNFCCC will be an important factual information component that would allow any future tracking of progress in moving towards low carbon development.

Timeframe: The development of the Gambia LCDS will take about 18 months and the implementation will take another period of about 5 years.

Baseline Scenario: The total national emissions in 2000 were about 3,623 Gig or 20.02 Million Tons CO₂ Equivalent (TCO₂E), giving per capita emissions of 13.5 TCO₂E. The Gambia is will to participate in the global efforts to reduce her current national emissions and development and implement policies and strategies to develop sustainably and thus contribute minimally to future global warming.

Expected Emission Reduction: Specific emission reductions will be assessed during the development of the Low Carbon Development Strategy. During the development of this NAMA document assessment of the expected emission reduction has not been possible due to time constraint and limited human, technical and technological capacity. However, some targets of deviation are proposed in the next section.

Description and Specification of Target: The proposed targets include revision of the greenhouse gas emission levels from the forestry sector to uptake levels (source to a sink); reduction of the emissions from Waste Management category by 50% of the year 2000 by 2030; reduction of the emissions from Animal Husbandry and Rice Cultivation by 50% of the year 2000 emission by 2030; and reduction of the emissions from the Transport Sector by 50% of the year 2000 values by 2030.

Sustainable Development Impacts: The development and implementation of a LCDS in The Gambia will afford the country with the technical and technological capacity to develop sustainably. Appropriate policies and regulations with sustainable indicators will be available and implemented.

Requested Funding and Support: The cost of the development of the Strategy is about US1,850,000 and this support is requested. Other support requested include capacity building, technical and technological requirements.

Implementation Plan and Partners: The development of the LCDS is the highest priority NAMA of The Gambia. Its implementation is foreseen to begin in early part 2012 with the availability of the support requested above. The UNFCCC Focal Secretariat, the Department of Water Resources will lead the coordination and execution of the development of the strategy. Sectoral institutions (Finance, Agriculture, Energy, Education, Forestry and Environment) will be responsible to lead the development of the sectoral components of the LCDS.

Monitoring and Evaluation: Monitoring and Evaluation of the development of the LCDS of The Gambia will have national and international monitoring and evaluation components. The Donor will fill in monitoring and evaluation Mission to The Gambia and will work with the UNFCCC Focal Point to conduct the exercise. National monitoring and evaluation will be conducted by the UNFCCC Focal Secretariat.

Project Title: Increase energy production from renewable sources (Solar & wind)

Description of current situation of the energy sector: In the Gambia, electricity is generated through the use of thermal power generators using either heavy or light fuel. In the process of generating electricity, lot of GHG is emitted in the atmosphere. Though the use of renewable energy has being promoted by the Ministry of Energy and other stakeholders, the use of renewable energy still remains very low mainly due the very high initial cost.

Justification of proposed project: The rate of electrification is about 35% and the government aimed 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.

Project time Frame: 2000 – 2030 during which time 75 MW of renewable sources will be installed in the Greater Banjul Area (GBA) and 10MW will be installed in the Provinces.

Baseline Scenarios indicate high fossil fuel consumption for electricity generation. This fossil fuel is imported and expensive. It is not sustainable. There are large emissions per unit electricity produced. In 2000, the Energy Sector emitted 218Gg CO₂, 4.93Gg CH₄, 3.31Gg NO_x, 75.71Gg CO, 9.46Gg NMVOC) and 3,032Gg SO₂. Projected GHG emission from the Energy Sector to 2030 is 0.711MtCO₂eq.

Expected Emission Reduction: It is projected to increase by 20% the share of renewable sources in the electricity mix (20%*525MW); 30MW Wind & 75MW solar.

Full or incremental Cost Estimate: Difference between the cost of thermal generator and solar & Wind technology.

Description and Specification: This project intents to increase the share of renewable (solar and wind) in the electricity generation mix. It is planned to install small wind turbines of 150-200KW along the coastal line and centralize solar Plants mainly for provincial power generation.

Requested funding and other Support; US\$18.32 Million is requested for project financing, capacity building and provision of appropriate technologies.

Implementation: The Department of Energy under the Ministry of Energy will be responsible for the implementation of this project in close collaboration with the National Water and Electricity Corporation (NAWEC). A 6MW of renewable energy is projected to be installed per year.

Monitoring and Evaluation: The UNFCCC Focal Secretariat and the Department of Energy will conduct national level monitoring and evaluation. External monitoring and evaluation will be based on the MRV system in place according to COP Decisions and procedures

Project Title: Promote the use of energy-efficient cooking stoves

Description of current situation of the energy sector: The Gambia derives its energy from four sources. These are fuel wood, petroleum products, electricity and renewable energy. According to 2005 Household Energy Survey (HES) 2005, fuel wood accounted for more than 80% of the total energy consumed. The same survey reveals that fuel wood accounts 97% (95% firewood and 2% charcoal) of the total household energy consumption and petroleum products 1.60% (1.09% kerosene and 0.51% LPG), electricity 0.9% and renewable biomass 0.4%. This shows the level of pressure on the forest resource.

Justification of proposed project: The dependency on forest to meet the cooking fuel needs of the population is very great. This demand has significantly depleted the forest. Besides the issue of the forest, households' expenditure on cooking fuel is significant. Two hundred thousand (200,000) improved cooking stoves (100,000 of charcoal and firewood stoves) are targeted to be distributed by 2030. This policy intends to train four persons (2 for charcoal and 2 for firewood) per region in making improved cooking stoves. The cost of each improved cooking stove will also be \$7 in order to make it more affordable. With the implementation of this scenario, 452,453.36 and 419,486.11 tons of wood and charcoal will be saved. This policy will save households a sum of \$135,914,230.07 within the timeframe set for the implementation of this policy. Therefore the benefit in terms of money this project will save for the households far outweighs the cost of implementing the project. In addition to the monetary saving to the households, it will greatly reduce indoor pollution and its related health implications, thus money spent in the health sector. The rate of deforestation and its effects will also be minimized with this policy.

Project time Frame: 2000-2030

Baseline Scenarios: With the baseline scenario, emissions from the use of fuel wood (firewood and charcoal) are expected to reach 41,510,894 tons of GHG emissions by 2030

Expected Emission Reduction: A total of 9,071,230.50 tons of GHG emission will be saved by 2030 compared to the reference. The results from this scenario show that major saving in both CO₂ emissions and energy consumption will be realized by simply popularizing the use of improved cooking stoves that saves up to 100,000 TOE fuel wood by 2030. The cumulative saving for wood and charcoal for the urban households will be around 850,000 TOE

Description and Specification: This project aims to produce two hundred thousand (200,000) improved cooking stoves (100,000 of charcoal and firewood stoves) are targeted to be distributed by 2030. The project intends to train four persons (2 for charcoal and 2 for firewood) per region in making improved cooking stoves. The cost of each improved cooking stove will be subsidized at \$7 in order to make it more affordable. With the implementation of this scenario, 452,453.36 and 419,486.11 tons of wood and charcoal will be saved. A total of 9,071,204.80 tons of GHG emission will be saved with the implementation of this policy scenario by 2030. The project also intends to sensitize the general public on the benefit of using improved cooking stoves through preparing informative leaflets, TV and radio panel discussion.

Requested funding and other Support; The implementation of this policy is estimated at \$1,405,000. Other support requested includes capacity building and technical and technological requirements for the implementation of the project.

Implementation: The project will be implemented within 5 years and implementation will be led by the Department of Energy with close collaboration with the Department of Community Development and relevant NGOs.

Monitoring and Evaluation: The UNFCCC Focal Secretariat and the Department of Energy will conduct national level monitoring and evaluation. External monitoring and evaluation will be based on the MRV system in place according to COP Decisions and procedures

Project Title: Reduce encroachment into forests and virgin lands through improvement of food storage facilities and promotion of the use of post-harvest technologies

Description of Current situation of the sector: The current Agricultural and Natural Resource (ANR) policy is developed base on the vision 2020 and the 5-year development plans used to operate the Vision. This policy aims to transform agriculture in a robust, market oriented sector aligned to the macro-economic framework of the country that will contribute to sustainable poverty reduction, economic growth and food security. Food production and food produced are seasonal.

Justification of the proposed Project: For some particular seasonal crops and fruits a lot is produced that cannot be consumed and a lot is spoilt due to lack of proper postharvest and storage facilities and technologies. Postharvest handling is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing. The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate. Post-harvest treatment largely determines final quality, whether a crop is sold for fresh consumption, or used as an ingredient in a processed food product. Food processing typically takes clean, harvested crops or slaughtered and butchered animal products and uses these to produce attractive, marketable and often long shelf-life food products. This project aims to promote and facilitate the procurement of and utilization of post harvest and food processing technologies to improve food availability and thus reduce clearing of virgin lands for cultivation of more food. The clearing of virgin lands, most of which are forest and rangelands leads to reduced sinks and increased emissions of greenhouse gases into the atmosphere.

Project time Frame: 2012 - 2025

Baseline Scenario: Of the total emissions from agriculture, 51% were methane emissions from animal husbandry, rice cultivation, Savannah burning and burning of crop residues. Emissions of Carbon Monoxide from burning of savannahs and burning of crop residues constituted 38% of the emissions from agriculture. Nitrous Oxides emissions came mainly from agricultural soils, burning of savannahs and burning of crop residues and constitute 10% of the total emission from agriculture. About 0.5Gg or 1% of the total emissions from agriculture were nitrogen oxide emissions.

Expected Emission Reductions: Reductions in emissions are expected to come from the Forestry Category based on the area and carbon stock whose destruction is avoided.

Sustainable Development Impact include Poverty alleviation, food self sufficiency, availability of food storage and processing facilities to reduce food losses, improvement in the quantitative and qualitative availability of food for the population, increased food security, reduced social conflict, reduced domestic funding of export bills, improvement in the economy, reduction in susceptibility to health and thus improved health standards of the population.

Requested funding and other support includes a project cost of US\$ 3.25 Million financing, capacity building and technology required for implementation and sustainability of the project/programme

Implementation Plan: The Department of Agriculture will implement this Project. The Ministry of Agriculture will serve as the Executing Agency. The UNFCCC Focal Point will closely collaborate with these institutions.

Monitoring and Evaluation: The UNFCCC Focal Secretariat and the Department of Energy will conduct national level monitoring and evaluation. External monitoring and evaluation will be based on the MRV system in place according to COP Decisions and procedures

Project Title: Reinforce transmission and distribution system to reduce losses to 15% by 2030

Description of current situation of the energy sector: The current Transmission and Distribution network is characterized by aging lines and transformers resulting in a high level of losses. The network requires expansion to enable production to be offloaded to reach consumers and create access for growth and development. Current transmission network is at the 33Kv level that requires upgrading to 132Kv to ensure stability to minimize losses due to outage. The main Electricity Utility Company, the National and Water and Electricity Corporation (NAWEC) operates in both the Greater Banjul Area and the Provincial Growth Centres. The electricity gross production was 234 GWh in 2009 and 248GWh in 2010. Total LFO consumption both the GBA and the provinces in 2009 was 5 million litres. Total HFO consumption in 2009 was 56 million litres for both KPS and BPS. National figures for access to services are 35% in GBA and 19% countrywide.

Justification of proposed project: The Project will contribute to advancing the theme of unleashing The Gambia's growth potential by expanding electricity infrastructure that is constraining growth. By targeting public facilities and low-income, peri-urban and rural households for electrification, the Project supports the theme of reducing inequality and social exclusion. The Project will contribute to the achievement of the following: (a) improving electricity infrastructure, (b) expanding access to health care, education and basic infrastructure services. The Project will help to improve the quality of life, particularly in poor areas in Greater Banjul. This improvement will come from either direct electricity access or indirect access to improved services resulting from the Government's program to electrify priority loads, including clinics, schools, and trading centers. The consequent improvements in these social services could include improved instruction through the use of computers and other equipment in schools; extended hours for health clinics, due to electric lighting; and improved services in trading centers, such as battery charging, machines for the grinding of grain, etc. By providing affordable electricity to more people and improving the quality of supply, the Project will promote greater economic growth and equity. The expansion of the power grid will allow The Gambia to provide electricity service to areas and groups of people that previously were unreachable due to NAWEC's limited Transmission & Distribution infrastructure.

Sustainability and Benefits: Loss reduction, ensure affordability, reduce emissions through cut in the energy consumption of generating plants, increase access, increase system reliability and ensure network stability

Project time Frame: 2000 – 2030

Baseline Scenarios: Power transmission is entirely based on 33KV lines which are the highest voltage in The Gambia. The 33kV lines from Kotu Power Station (KPS) through a small dispatch centre with a transmission capacity of 48MVA. The transmission lines from the two power stations are rated at 20MVA each, thus a transmission capacity of 40MVA. These existing transmission lines are not adequate to off-load the growing power demand and the current power flow problem in The Gambia. The use of Climate change funding to minimize losses through the refurbishment, upgrading (from 33Kv to 132Kv) and expanding (link GBA to provinces networks).

Expected Emission Reduction: Further analysis to be conducted

Description and Specification: The scope of the project will include rehabilitation, upgrading, refurbishment and expansion the Country's transmission and distribution network. The linking of provincial and the GBA network to ensure stability. Specific activities include upgrading and replacement of transformers, upgrading of the transmission line from 33kv to 132kv, linking provincial centre with the GBA networks at 132kv level, build a dispatch centre and increase the sub-stations.

Requested funding and other Support includes 145 Million Dalasi (US\$ 5 Million) for equipment and works

Implementation: In implementing this project, aging network would be replaced and more substation built and each substation would be metered to keep track of the electricity supply and consumed.

Monitoring and Evaluation: On a monthly basis, quantity of electricity dispatched will be compared to the quantity sold to determine the level of loss

Project Title: Promote an integrated crop-livestock system by planting nitrogen fixing crops and encouraging spot and zero burning practices

Description of Current situation of the sector: Agriculture accounts for about 30 percent of GDP and provides employment for about 75% of the population. Agricultural development in the Gambia has gone through a number of and stages by virtue of the country's historical realities and changes in the global environmental and economic climate. Hence agricultural policies and strategies have been elaborated in an effort to achieve agricultural and social economic development and food security. Currently a new agricultural and natural resource (ANR) policy is developed base on the vision 2020, PRSP I and II strategies and MDGs. This policy aims to transform agriculture in a robust, market oriented sector aligned to the macro-economic framework of the country that will contribute to sustainable poverty reduction and economic growth. Government's support to the livestock sub-sector has been on the increase in view of its contribution to food and nutrition security. Livestock contributes about 20% of total agricultural output and slightly about 6% to GDP. However the sub-sector has great potential for development and diversification activities such as processing milk, cream, butter etc. Thus the livestock sub-sector needs further improvement. The system of livestock production in the Gambia is mostly extensive with animals roaming freely in the wild for food and water. Under this system, animals trek long distances in search of food and this exposes them to several hazards including disease vectors. Range lands are mostly communal with little or no forage for the animals during the long dry season when most of the pastures are lost to bush fires and other man made calamities. Consequently animal productivity is drastically reduced and numbers dwindling due mainly to hunger and diseases which can be addressed through the intervention proposed.

Justification of the proposed Project: Substantial reduction in the productivity of natural pastures, due to human and climatic factors, call for the adoption of the new approaches to livestock production. The ongoing genetic improvement programme of the local breeds such as cattle, sheep and goats; which is now at the farmer level. The improved genetics would lead to less numbers of animals and a higher level of productivity. The targeted dual purpose Ndama cattle of the Gambia produces a maximum of 1.5 liters of milk a day; and an average of 250kgs Live-weight at the age of 5 year.

Sustainability and benefits: Poverty alleviation, food self sufficiency and genetic improvement of indigenous breeds

Project time Frame: Twenty-five years

Baseline Scenario: Substantial reduction in the productivity of natural pastures, due to climatic factors, call for the adoption of the new approaches to livestock production. The targeted dual purpose Ndama cattle of the Gambia produce a maximum of 1.5 liters of milk a day; and also produce an average of 250kgs Live-weight at the age of 5 years. In the 2000 National Inventory, animal production produced 12.3Gg CH₄ or 64% of the total emissions from agriculture, 0.39Gg CH₄ or 2% came from crop residue burning and 0.25Gg CH₄ or 1% came from savannah burning. Also about 83% (10.2Gg CH₄) of the total methane emissions from animal production (12.3Gg CH₄) was produced by cattle rearing. The other animal categories (sheep, goats, donkeys, horses, mules, swine and poultry) combine produced the remaining 17% (2.1Gg CH₄).

Expected Emission Reductions: In this scenario animal numbers per area would go down since productivity would have been enhanced which includes growth rates and milk output of the first generation of improved breeds. This would directly result to methane reduction. The target weight for improved breeds at aged five could go as high as 400kgs, as compared to 1.6 animals to attain a weight of 400kg. This by itself would reduce the amount of methane produce within a given population. The planting of nitrogen fixing crops and the encouragement of spot and zero burning practices would significantly reduce GHG emission.

Sustainable Development Impact include improved forage/rangelands, reduced bush fire incidence, improved milk quality and quantity, improved source of protein, increase source of income and employment opportunities.

Requested funding and other support includes a project cost of US\$ 1.839 Million financing, capacity building and technology required for implementation and sustainability of the project/programme

Implementation Plan: The Department of Livestock Services and the Department of Agriculture will implement this Project. The Ministry of Agriculture will serve as the Executing Agency. The UNFCCC Focal Point will closely collaborate with these institutions.

Monitoring and Evaluation: The UNFCCC Focal Secretariat and the Department of Energy will conduct national level monitoring and evaluation. External monitoring and evaluation will be based on the MRV system in place according to COP Decisions and procedures

Project Title: Restore Degraded Grazing Land through Multiplication and Popularization of Forage Seed Planting of Multiple Purpose Plants in Grazing Areas

Brief Introduction: Agriculture contributes about half of the global emissions of two of the most potent non-carbon dioxide greenhouse gases – nitrous oxide and methane. Nitrous oxide emissions from soils (from fertilizer application and manures) and methane from livestock production. Mitigating climate change requires identifying effective ways to reduce greenhouse gases produced and released to the atmosphere. Various mitigation options have been considered in the agricultural sector. These include: livestock management, manure management, grazing land management, and pasture improvement. Livestock accounts for nearly half of all greenhouse gas emissions from agriculture and land use. Innovations such as rotational grazing, manure management, methane capture for biogas production, and improved feeds and feed additives can reduce livestock-related emissions.

Objectives of the project are to encourage production of various multipurpose plants in the degraded areas, encourage reseeded of multipurpose plants, encourage the planting of multipurpose plants, encourage better utilization of re-established degraded areas through better grazing management and sensitized livestock producers on improved feed conservation and preservation techniques.

Methodology: Livestock farmers will be sensitized and encouraged to reseed, plants, and better utilize established multipurpose plants. Better grazing management, and improved feed conservation and preservation techniques to reduce greenhouse gas emission in the country.

Expected Output: Most of the livestock farmers in country would be practicing reseeded, and planting of multipurpose plant in degraded areas, would better utilizing re-established multipurpose plant through appropriate grazing management techniques and would be sensitized on improved feed conservation and preservation techniques.

Requested Support: A financial project budget US\$2,460,000 (13.17 Million Dalasi), capacity building and technologies.

Major Activities: Identify degraded areas, sensitize communities in the identified degraded areas, form community based-management committees and facilitate their sustainability, select suitable and quality multipurpose seeds, train and demonstrate reseeded and replanting techniques, establish and appropriately manage multipurpose plants in degraded areas through weeding, fire belt development, protection from premature grazing, promote and practice appropriate harvesting, storage, utilization and preservation techniques, provide animal watering facilities in degraded areas institutionalize a taskforce comprised of appropriate line department and institutions.

Project Title: Promote the cultivation of Upland High-yielding Rice varieties.

Description of Current situation of the sector: The country's consumption requirement of rice (a staple food) is 160,000 metric tonnes per year, of which only about 7,400 metric tonnes of clean rice is produced locally. This means that The Gambia only produces 4.6 percent of its annual requirements. The Sahelian droughts of the 1970s and the 1980s have contributed to this low production of rice. Rice growing has migrated to flooded fields. Most of the upland rice fields have been abandoned and the rice varieties grown have been lost. Cultivation in the flooded fields produces a lot of methane emissions into the atmosphere and these emissions can be mitigated by reintroducing varieties that are tolerant to the poor sandy soils.

Justification of the proposed Project: The agriculture sector has the potential to become a pathway by which The Gambia can reach its long-term development goals, especially as regards reducing poverty and achieving food security. In the last decade, the Government of The Gambia has embarked on a series of interventions to address food security issues. Some of the projects it has launched in collaboration with its development partners include the Rice Expansion and the New Rice for Africa (NERICA) projects. Most of the upland soils of The Gambia are sandy with low nutrient content and poor water holding capacity. NERICA has been found to do very well in these upland fields. Because it grows in upland sandy soils very little greenhouse gases are emitted. This project therefore has dual objectives. It aims to promote and facilitate the expansion of the cultivation of NERICA and thus increase food security. The project will also lead to reduction of emissions of greenhouse gases, particularly methane which is produced from flooded rice fields.

Project time Frame: 2012 - 2020

Baseline Scenario: In 2000, 51% of the total emissions from agriculture were methane emissions from animal husbandry, rice cultivation, Savannah burning and burning of crop residues. Emissions of Carbon Monoxide from burning of savannahs and burning of crop residues constituted 38% of the emissions from agriculture. Nitrous Oxides emissions came mainly from agricultural soils, burning of savannahs and burning of crop residues and constitute 10% of the total emission from agriculture. About 0.5Gg or 1% of the total emissions from agriculture were nitrogen oxide emissions. Rice cultivation produced 6.40Gg CH₄ or 33% of the total methane emission from agriculture.

Expected Emission Reductions; Projected emissions from the Agriculture Sector are about 8.473 MtCO₂eq and it is proposed to reduce these emissions by about 33% through the implementation of this project.

Sustainable Development Impact include Poverty alleviation, food self sufficiency, availability of food storage and processing facilities to reduce food losses, improvement in the quantitative and qualitative availability of food for the population, increased food security, reduced social conflict, reduced domestic funding of export bills, improvement in the economy, reduction in susceptibility to health and thus improved health standards of the population.

Requested funding and other support includes a project cost of US\$ 5.5 Million financing, capacity building and technology required for implementation and sustainability of the project/programme

Implementation Plan: The Department of Agriculture will implement this Project. The Ministry of Agriculture will serve as the Executing Agency. The UNFCCC Focal Point will closely collaborate with these institutions.

Monitoring and Evaluation: The UNFCCC Focal Secretariat and the Department of Energy will conduct national level monitoring and evaluation. External monitoring and evaluation will be based on the MRV system in place according to COP Decisions and procedures.

Title of Project: Restore and rehabilitate degraded forest lands, protect and conserve wetlands, and develop greenbelts around human settlements, national forests, wildlife parks and protected areas through afforestation and reforestation.

Current situation: The forestry sector accounts for around 0.8% of GDP OF The Gambia and about 85% of the populations derive their daily energy supply from forest resources. Women are highly involved in small-scale forest product commercialization. They sell firewood, fruits, herbs and leaves. Though these products are of low economic value in comparison with high value products like timber and split firewood sold by men, they provide an important alternative source of income for the women folk. Charcoal production was banned in The Gambia in 1980 but large quantities of charcoal are imported and consumed in the country. Land-use changes also result in GHG emissions through the burning of forest cover among others for farm clearing or game poaching. In converting forests to croplands a large quantity of the soil carbon can be released. As well, loss of forests results in the potential of reducing/loss of the absorbing capacity as sink of atmospheric gases such as, CO₂, CH₄, NA₃, NO₂, etc.

Justification: For the past 40 years, the structure of The Gambian economy has not changed significantly and may, for analytical or descriptive purposes, be categorized into: (1) agriculture and natural resources, (2) services delivery, and (3) industrial development. Within the last five years, agriculture and natural resources-based economy activities account on average for 26.8 percent of GDP, whilst industry accounts for 14.5 percent and services accounts for 58.7 percent (source Draft Second national Communication, SNC, 2011). Notice in particular that key sectors of the economy: agriculture, livestock, forestry, energy and tourism contribute 34% of GDP. The Government recognized the prospects of a balanced ecosystem for advancing the socio-economic development of the country. The policy framework for sustainable natural resource management put an adequate forest cover at the centre front. The forest policy (1995-2005) advocates a forest cover of 30% which will be sufficient for maintaining an ecological balance necessary for sustainable growth. 75% of the total forest cover, amounting to 200,000 ha should be managed by local communities and the private sector in partnership with Government. The communities in The Gambia recognized the pivotal role forests play in their daily lives as well as the national economy contributing 1% to the gross domestic product (GDP). In the past, the management protection and control of the forests rest solely on the Department of Forestry (DoF). Around 1990, it was felt necessary to involve the local communities in the management of the forests. In 1952, 66 forest parks were demarcated to provide future wood requirement for the local communities the exploitation of which will be on a sustained basis. The Gambia German Forestry Project (GGFP) introduced the community forestry initiative to involve the local populace in the management of the forests on a sustained basis. The first community forest management agreement was signed in 1991 involving the community of Berefet. Community managed forests have increased from 450ha in 1991 to over 23,501.6ha in 2002 and 2005 to almost close to 40,000 ha. However, over 100,000 ha of closed and open woodland have been converted to subsistence agricultural land. The rate of forest conversion to farmland stands at 1.3% or 14,000ha per annum.

Timeframe: From 2000 to 2030

Baseline Scenario: 34,000 ha under community management in 2007 and 43,772 ha protected wetlands in 2006. Drop in forest fires and less than 70% forest cover burns annually affecting more than 20,000 people. In the Forestry sector alone, the combination of the net emissions of the CO₂ gas was 3,698 Gg specifically from the forest and grasslands. Around 0.013 Gg of CO₂ comes from Agricultural soils. The gas removal through forest activities and cover was 2,421 Gg while 757.6 Gg was from forest abandonment (draft SNC report 2011). Therefore, emissions and gas removals of CO₂ from Land Use, land Use Change (LULUCF) categories in The Gambia from 1994-2000 has indicated that forest sector serves as a CO₂ sink. This reveals that forest cover has a direct correlation fro CO₂ sink in The Gambia.

Expected emission reduction: There is inadequate capacity to calculate emission reduction of this project but the major goal of the intervention is to reverse the emission category of the Forestry Sector from a Source to a Sink.

Description and specification of target: Forest conservation, Wetland Conservation, Agro forestry, Commercial Plantations, Beautification; Ecotourism and trans-boundary activities

Sustainable development impact: Carbon offset, employment, food security, poverty alleviation, improved biodiversity, desertification reversal, etc.

Requested funding: USA \$10.5 million

Implementation Plan and Partners: January 2012 through December 2030; Department of Forestry – Lead Agency; Department of Water Resource – UNFCCC Focal Point; Department of Parks and Wildlife; Stay Green Foundation; National Disaster Management Agency (NDMA); NATC; NEA; LGAs

Monitoring and evaluation (M&E): Integrated participatory M&E involving Project staff, the Donors and the communities

Project Title: Integrated Management of Urban and Peri-Urban Solid and Liquid Waste

Description of Current Situation of sector with definition of boundaries policies: Waste management is a very important sector of Environmental Management in the Gambia. Its implication in relation to health and the environment is vital to our national development. It is a developing sector whose current management is inadequate. There is an increase in waste generation as a result of increase urbanization, affluence and rapid population growth. Proliferation of illegal dumpsites is a common sight/feature in the greater Banjul area. Littering is widespread and very difficult to control despite the introduction of the Anti-littering Regulations.

Justification of the Proposed Project / Programme: Waste is one of the sectors identified as a major emitter of Green House Gas in The Gambia. There are landfills officially designated but their management is inadequate. It is projected that there would definitely be an increase urban population in The Gambia. At this moment 49% of our total population lives in the urban and peri-urban areas of the greater Banjul area. It is also projected that there would be increase household waste and commercial generation in these settlements. Therefore, if no action is taken the norm would persist – uncontrolled dumping of waste in landfills and illegal dumpsites. There is sorting to minimize GHG and there is rampant burning of waste. Waste has become a significant hazard to health in the urban area.

Project Timeframe: 15 years

Baseline Scenarios: Urban and peri-urban population continuous to increase from an estimated 1.1 million to 2 million by 2030. In this regard, solid waste generation increases from 200,000 tons to 400,000 tons. Combine wastewater discharge into coastal waters from Banjul and tourism resort is expected to grow from 4,000 cubic meters per day to 5,000 cubic meters per day. Thus, methane emission from the organic component of solid waste will increase from 6.5Gg CH₄ to 13Gg CH₄, and 1.75Gg CH₄ to 3.5Gg CH₄ from wastewater. Waste management is constrained by inadequate Waste Management Framework, unplanned and illegal dumpsites designated as legal landfills, burning of most of the waste during the dry season, no sorting or recycling of waste, inadequate capacity to manage the waste and lack of waste treatment infrastructure in communities.

Expected Emission reductions; Projected emissions of GHG under the Waste Management category of The Gambia is about 49MtCO₂EQ to 2030. Implementation of this project is meant to deviate from this projection by more than 60%.

Sustainable Development impact included reduced global warming, employment creation, reduced expenditures on health by both the Government and the population.

Requested funding and other support; US \$68 million is requested to finance the Project. Other support requested include capacity building and technology required for implementation and sustainability of the project / programme

Implementation plan: The project will be implemented by the National Environment Agency in close collaboration with Local Government and Municipal Councils

Monitoring and Evaluation: Monitoring and evaluation at the national level will be conducted by the UNFCCC Focal Point and the NEA. International level monitoring and evaluation will be conducted by well trained and qualified personnel n waste management.