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Climate-Smart Agriculture in The Gambia: Current Status and Support Needs to Better Integrate CSA into the GNAIP

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Executive Summary

The agriculture sector is characterized by subsistence-based rain-fed mixed-crop (mainly groundnuts, coarse grains, rice and cassava) farming, traditional livestock rearing, semi-commercial groundnut and horticultural production, small cotton and a large artisanal fisheries sub-sector. This type of farming system is carried out mainly by small-scale resource poor farmers who use labour-intensive traditional production practices on less than one-hectare average farm size plots (usually fragmented). The poor farmers in the six Regions (Banjul, West Coast Region, North Bank Region, Lower River Region, Central River Region, and Upper River Region) of the country participate, generally, in different farming activities like cereal crop, vegetable crop, and livestock production. The temperature and amount of rainfall recorded every year vary in each region.

The Gambia is one of the countries that is most vulnerable to climate change. As a low-lying country, climate change poses major development challenges as productive sectors such as agriculture, forestry, wildlife (would be affected by erratic rainfall) and tourism would be adversely affected by rises in sea level. The degrees of exposure to climate change, degrees of sensitivity to climate change impacts, adaptive capacity, and resulting vulnerability differ in each region. In most cases, these parameters are the same in all the regions because the ecology of The Gambia is almost the same. In terms of current status and diagnosis of climate change impacts in the regions, the progress made so far range from building sea walls to conducting weekly or monthly radio programs on climate change impacts; some fo the difficulties encountered range from insufficient capital to combatting climate change impacts; while the needs for support range from funding to refurbishing community radio stations for effective climate information dissemination.

The Gambia's CSA in the context of national sectorial programs focuses on Gambia National Agriculture Investment Programme (GNAIP), National Action Plan for Adaptation to Climate Change (NAPA), upcoming National Plan for Adaptation- Global Support Programme (NPA-GSP), and Integrated Water Resources Management-Action Plan (IWRM-AP). The Gambia's most important blueprint for agricultural development is The Gambia National Agricultural Investment Programme (GNAIP) 2011-2015. Fully aligned with the goals of The Gambia Vision 2020, the plan guides pro-poor investments. As the main pathway to sustainable development, it looks towards changing the orientation of the agricultural and natural resource sector from subsistence to commercial production, with a focus on smallholders. GNAIP thus serves as a basis for all donors in the sector to match their future interventions with government plans and priorities. The estimated investment required to achieve full implementation of GNAIP is more than US$200 million for the GNAIP's six main programs. The government of The Gambia prepared and submitted its National Action Plan for Adaptation to Climate Change (NAPA) to the secretariat of the UNFCCC in December, 2007. Agriculture and food security were identified as key priority areas in The Gambia's NAPA. Consequently, The Gambia's NAPA identified projects to reduce the vulnerability of the agriculture sector to the impacts of climate change and to improve the livelihood and food security situation of the population which depends on it directly or indirectly. Because of the daunting challenges of erratic rainfall and saline-water intrusion in crop growing areas of The Gambia, Integrated Water Resources Management (IWRM) approaches are thus a key prerequisite for developing adaptation strategies that take all relevant sectors and stakeholders and the complex relationships between them into account.

In recognition of the ad-hoc and fragmented nature of The Gambia's implementation of obligations under the UNFCCC, with financial support from the Climate and Development Knowledge Network (CDKN), climate change was mainstreamed into the Program for Accelerated Growth and Employment (PAGE), the successor to the Gambia's Poverty Reduction Strategy Paper II. The PAGE is the four-year (2012 to 2015) blueprint for the implementation of The Gambia Vision 2020. The Gambia government made it imperative that climate change is mainstreamed into development policies and program, including PAGE 2012-2015 as the new

development blueprint. The Gambia joined the Economic Community of West African States (ECOWAS) to initiate Climate Smart Agriculture (CSA) and incorporate CSA into her agriculture development agenda. In 2011, a first report evaluated the past, current (i.e. 2015), and projected GHG emissions from different sectors of The Gambia's economy. The Gambia prepared and submitted eight (8) Nationally Appropriate Mitigation Actions (NAMA) including, in March 2013, the Low Carbon Emission and Climate Resilient Development Strategy for adequate funding and capacity building and technology transfer as enablers to the UNFCCC secretariat. 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 industries. It will further proactively shape the sustainable development of our national infrastructure and services. The NAMA has five specific objectives.

Facilitating multi-stakeholders dialogue is a key strategy for improving a conducive and an enabling environment, including governance. This means that all stakeholders in this CSA drive and hold regular meetings where they exchange views and ideas on advancing the CSA agenda. Good and efficient governance of The Gambia's natural resources and the equitable and transparent distribution of benefits of those natural resources will lead to the success of The Gambia climate-smart agriculture system. An inclusive environment is needed, in which multi-stakeholders dialogue about CSA is effective. So far, this happens during monthly or sometimes quarterly meetings. Other forms of sub-groups are formed that cater for strategy development or the coordination of regional bodies, among others. Coordination, synergy, and integration between sectorial development plans (i.e. GNAIP, NAPA, NAMA, and IWRM Roadmap) are envisaged to be in place. However, sometimes coordination is a challenge due to low capacity of staff to fully understand and appreciate the value of climate smart agriculture in the context of national development. In order to mainstream CSA in the GNAIP, The Gambia government would seek support from ECOWAS in the areas like CSA policy development, financing, adaptation, research, and mitigation.

To strengthen inter-institutional dialogue and inter-sectorial coherence on CSA, the existing legal and policy frameworks on GNAIP, NAPA, NAMA, and IWRM Roadmap need to be looked into carefully in order to reinforce their coordination and coherence vis-à-vis CSA in The Gambia. Series of meetings and workshops need to be held, including national workshops and provincial consultations with representatives from governments, NGOs, academia, the business sector, local governments, and communities. It is recommended that The Gambia holds a meeting for experts to further refine the indicators of the CSA Program.

1. The Territories of Agriculture Climate Change Adaptation in The Gambia

1.1 Presentation of the territories

The agriculture sector is characterized by subsistence-based rain-fed mixed-crop (mainly groundnuts, coarse grains, rice and cassava) farming, traditional livestock rearing, semi-commercial groundnut and horticultural production, small cotton and a large artisanal fisheries sub-sector. This type of farming system is carried out mainly by small-scale resource poor farmers who use labor-intensive traditional production practices on less than one-hectare average farm size plots (usually fragmented). The farming system, in general, results in low outputs and causes a gradual decline in soil fertility.

In The Gambia, six territories of agriculture climate change adaptation are to be considered (see Map 1 below), based on the availability of types of crops mainly grown in that region, annual rainfall amounts, and daily temperature regimes:

1) ***Greater Banjul Area – GBA*** (Banjul[1]): Very little agriculture production takes places in this area. The main agriculture-related activity is fishing and oyster harvesting. The annual rainfall amount is around 1,000mm. Temperature ranges between 23^{o}C and 35^{o}C;
2) ***West Coast Region – WCR*** (Brikama): Fruit and horticultural production are the main agriculture activities in this territory. Rainfall is over 1,000mm per year (the highest in the country because of the existence of dense vegetation in this territory). Temperature ranges between 25^{o}C and 40^{o}C;
3) ***North Bank Region – NBR*** (Kerewan): Characterized by extensive mangroves, woodland, rice, and upland cereals (corn, millet, and sorghum) production. The daily temperature ranges between 25^{o}C and 45^{o}C. The annual rainfall is around 700mm (considered the driest Region of The Gambia);
4) ***Lower River Region – LRR*** (Kerewan): Savannah woodland, mangrove belts, upland cereal production, and livestock production. Daily temperatures range between 30^{o}C and 45^{o}C. Annual rainfall is about 800mm;
5) ***Central River Region – CRR*** (Georgetown now called Janjangbureh) : Rice and upland cereal production and animal husbandry. Temperature ranges between 35^{o}C and 45^{o}C. Rainfall ranges from 800mm to 1,000mm annually;
6) ***Upper River Region – URR*** (Basse): Rice, upland cereal, and animal production. It has the largest number of livestock (i.e. cattle in the country) population. Temperature could range between 35^{o}C and 45^{o}C. Rainfall ranges from 800mm to 1,000mm annually;

Map 1: Territories of agriculture climate change adaptation in The Gambia.

[1] The names of cities in bracket are the administrative seats of the respective Regions.

1.2 Analysis of the Vulnerability of the Territories to Climate Change

The Gambia is among those countries most vulnerable to climate change. As a low-lying country, climate change poses major development challenges as productive sectors such as agriculture, forestry, wildlife (would be affected by erratic rainfall) and tourism would be adversely affected by rises in sea level. Table 1 below provides vulnerability analysis for each of the 6 territories of agriculture climate change adaptation in The Gambia.

Table 1: Analysis of the Vulnerability of the Territories to Climate Change in The Gambia

Territory	Degrees of exposure to CC	Degree of sensitivity to CC impacts	Adaptive capacity	Resulting vulnerability
Greater Banjul Area (GBA)	**High:** ● Sea level rise	**High:** ● Low-lying coast ● Heavy sand mining and high loading of sediments in drainage areas	**High:** ● High level knowledge on CC information ● Some amount of resources (from climate change projects) to adapt to CC impacts	**High:** ● Flooding of drainage systems and homes ● Inadequate availability of medical resources to treat disease outbreak during flooding
West Coast Region (WCR)	**Medium:** ● Saline water intrusion in rice growing fields near the mangrove areas ● Occasional flooding of rice fields	**Medium:** ● Medium vegetative cover	**Medium:** ● Medium accessibility to climate change information through radio and TV information ● Minimum amount of resources to adapt to CC impacts	**Medium:** ● Occasional flooding of rice fields ● Limited anti-saline water intrusion structures built in rice fields
North Bank Region (NBR)	**High:** ● Less vegetative cover ● Frequent drought ● Low underground water table	**High:** ● Soil erosion and sedimentation ● Insufficient drinking water for livestock during the dry season ● Saline-water intrusion in rice fields	**Low:** ● Inadequate knowledge on CC information ● Minimum amount of resources to adapt to CC impacts	**High:** ● Loss of upland crops and livestock as a result of drought ● High soil erosion and sedimentation ● Low rice production as a result of saline-water intrusion in rice fields
Lower River Region (LRR)	**High:** ● Low rainfall amount ● Low vegetative cover ● Saline-water intrusion in rice fields	**High:** ● Insufficient forage for livestock ● Low rice production	**Low:** ● Low level knowledge on CC information ● Minimum amount of resources to diversify livestock production, and to	**High:** ● Loss of upland crops and livestock as a result of drought ● Increase in bush fires ● Low rice production as a result of saline-water

			reduce occurrence of bushfires.	intrusion in rice fields
Central River Region (CRR)	**Medium:** ● Less vegetative cover in some areas. ● Low rainfall	**Medium:** ● Insufficient forage for livestock grazing	**Low:** ● Low level knowledge on CC information. ● Minimum amount of resources to diversify livestock production and combat saline water intrusion in rice fields	**Medium:** ● Loss of upland crops and livestock as a result of drought. ● Increase in bush fires
Upper River Region (URR)	**Medium:** ● Less vegetative cover in some areas ● Low rainfall	**Medium:** ● Insufficient forage for livestock grazing	**Low:** ● Low level knowledge on CC information. ● Minimum amount of resources to diversify livestock production and introduce irrigation agriculture	**Medium:** ● Loss of upland crops and livestock as a result of drought ● Increase in bush fires

1.3. Current Status/ Diagnosis of Climate Change Adaptation in these Territories

Table 2: Current Status/ Diagnosis of Climate Change Adaptation in these Territories

Territory	Progress observed	Difficulties encountered	Needs for support at the local level
Greater Banjul Area (GBA)	● Continues to build new and improved drainage systems ● Beach nourishing and construction of sea wave breakers are continuing	● Insufficient capital and financial resources ● Lack of modern technology in building new sea wave breakers	● More financial resources to come from many sources ● More technical support and capacity building for local civil engineers
West Coast Region (WCR)	● Weekly radio programs on CC impacts and adaptation ● New agriculture projects are established to help in saline-water dike construction	● Cost incurred in running the radio shows ● Slow start of the new agriculture projects	● Improve maintenance and provide new equipment for community radio stations at the local level ● Expedite start of new agriculture projects
North Bank Region (NBR)	● Monthly radio programs on CC impacts and adaptation ● Planting of trees is an on-going activity	● Outdated community radio equipment ● Low-level of training for community radio staff ● Operating cost of	● Refurbish community radio equipment ● Provide more training for community radio staff

		community radios is high	● Provide more funding to increase the number of trees planted per year
Lower River Region (LRR)	● Many CC sensitization activities conducted at the local level ● Many agriculture projects are implemented in the territory	● Attitudinal change toward bush fires is a challenge	● More funding to carry out many CC sensitization programs and training of CC field staff
Central River Region (CRR)	● Many CC sensitization activities conducted at the local level ● Many agriculture projects are implemented in the territory	● Attitudinal change toward bush fires is a challenge ● Low level participation of farmers in CC adaptation activities.	● More funding to carry out many CC sensitization programs and training of CC field staff
Upper River Region (URR)	● Many CC sensitization activities conducted at the local level ● Many agriculture projects are implemented in the territory	● Attitudinal change toward bush fires is a challenge. ● Insufficient and untimely availability of livestock vaccines	● More funding to carry out many CC sensitization programs and training of CC field staff

2. CSA in the Context of National Sectorial Programs (GNAIP, NAPA and upcoming NAP-GSP, IWRM-AP)

2.1. Current Situation / Diagnosis of the Adaptation Component of National Sectorial Programs

The Gambia National Agricultural Investment Plan (GNAIP)

The Gambia's most important blueprint for agricultural development is The Gambia National Agricultural Investment Programme (GNAIP) 2011-2015. Fully aligned with the goals of The Gambia Vision 2020, the plan guides pro-poor investments. As the main pathway to sustainable development, it looks towards changing the orientation of the agricultural and natural resource sector from subsistence to commercial production, with a focus on smallholders. GNAIP thus serves as a basis for all donors in the sector to match their future interventions with government plans and priorities. The estimated investment required to achieve full implementation of GNAIP is more than US$200 million for the GNAIP's six main programs:

- *Program 1: Improved Agricultural Land and Water Management* aims to increase food security, income generating capacity and nutritional status of the farmer beneficiaries especially women and youth through the use of sustainable land and water management practice for the cultivation of 25,000 ha of land. The Program comprises three components: (i) Lowland Development for Rice Production; (ii) Irrigation for Horticulture and Upland Crops; and (iii) Capacity Building of Support Services Institutions ;

- *Program 2: Improved Management of the Other Shared Resources* aims to improve livelihoods and food security, and reduce poverty of populations that depend on The Gambia's other shared natural resources (including rangelands, forests, fisheries, parks and wildlife) through sustainable management and use of these resources. The Program comprises three components: (i) Management of Rangelands and Organization of Transhumance; (ii) Sustainable Management of Forest Resources; and (iii) Ensuring Sustainable Management of Fisheries Resources ;
- *Program 3: Development of Agricultural Chains and Market Promotion* aims to transform the agricultural sector from a traditional subsistence economy to a modern market-oriented commercial sector with well integrated food chains and a viable agro-processing private sector, resulting in increased incomes of agricultural value chain actors (including farmers, input suppliers, processors, traders and exporters). The Program comprises three components: (i) Development of Agricultural Marketing Chains (including food crops, groundnut, horticulture, agro-forestry food products, short-cycle livestock, dairy products and fisheries products); (ii) Strengthening of National Operator Support Services and Structures; and (iii) Development of Domestic, Intra-regional and Extra-regional Markets ;
- *Program 4: National Food and Nutritional Security* has the objective to improve national and household food security and adequate nutritional levels, including during periods of disaster, with Gambia National Agricultural Investment Plan (GNAIP) attention to targeting the most vulnerable groups and households of rural and urban communities. This will be achieved through two components: (i) National Food Security; and (ii) Disaster Risk Management ;
- *Program 5: Sustainable Farm Development* aims to achieve increased and sustained agricultural production and productivity growth by introducing agricultural practices through people-centered learning processes that enhance and conserve local natural resources and the environment, and help smallholder farmers to adapt to climate change. The Program comprises three components: (i) Sustainable Farm Management; (ii) Land Use Suitability and Land Tenure Security; and (iii) Capacity Building of Support Services and Farmer Organizations ;
- *Program 6: GNAIP Coordination, Monitoring and Evaluation* is a precondition for effective implementation of the Technical Programs 1-5 and achieving the stated objectives. It comprises four components: (i) Institutional Arrangements and Coordination; (ii) Financing Mechanisms; (iii) Monitoring and Evaluation; and (iv) Implementation Capacity Building.

Main institutions involved in implementing the overall GNAIP include: the National Council of Ministers (NCM), the Programme Steering Committee (PSC), the Programme Coordination Office (PCO) and Regional, District, Ward and Village Committees. Climate change adaptation and mitigation measures are key features of the GNAIP and mainstreamed throughout the programmes. This includes developing irrigation; promoting sustainable management of land, water and other natural resources; strengthening of early warning systems; and raising awareness which will all build resilience of the population to effects of climate change.

The Ministry of Agriculture currently has 9 active projects in the areas of food security, land and water management, livestock development, and climate smart agriculture (disaster risk reduction, resilience, adaptation and mitigation). Total GNAIP costs over the five-year period (2011-2015) are estimated at US$ 296.7 million. Taking into account existing projects and

programmes implemented by the government or outside the government that will directly support GNAIP, the estimated financing gap over the five-year period amounts to US$ 201 million. The financing gap could be as a result of the government and other donor agencies not being able to meet their own quota of financing. Sources of financing for the GNAIP include: (i) Government Budget (with an expected increase of ANR Sector budget to 10 percent of total budget by 2015); (ii) the Beneficiaries; (iii) Micro-Finance Institutions including the Village Savings and Credit Associations (VISACAs), National Association of Cooperative Credit Unions (NACCUG) and Social

Development Fund (SDF); (iv) Commercial Banks, which would be encouraged to contribute through favourable policies; (v) the Gambia government grant aid accounts; (vi) Non-Bank Private Sector; and (vii) development partners. Numerous economic, social, environmental, and institutional benefits, including CSA (through sustainable farm development and improved agriculture land and water management), are expected from the GNAIP programme.

The Gambia Integrated Water Resources Management (IWRM) Roadmap

Agriculture in The Gambia is rain-fed and like natural resources, highly sensitive to the climate system, particularly to the extremes of the climate system. Irrigation in The Gambia uses surface water resources primarily from River Gambia and is used only for rice production while mixed crops (vegetables and fruits) are either rain-fed or irrigated by using groundwater resources. A global warming trend will have serious impacts on agricultural production since the resilience of the agricultural system depend heavily on strategic approaches to water management capable of addressing climate change impacts on future renewal rates of groundwater resources, flow and salinity regime of River Gambia. Because of the daunting challenges of erratic rainfall and saline-water intrusion in crop growing areas of The Gambia, integrated water resources management (IWRM) approaches are thus a key prerequisite for developing adaptation strategies that take all relevant sectors and stakeholders and the complex relationships between them into account. The following are the key adaptation measures that are pertinent to the water resources status and management functions[2]: Flow regulation to increase fresh water flows, Embankment/dikes to protect sensitive areas, Resettlement of people or relocation of activities away from the flood plains, Changes in pumping policies of fully penetrating aquifers along the coastline in order to reduce the risk of saline intrusion, Increase water column in wells due to decrease in recharge; Artificial recharge (by ponding) / improve management of urban storm-water runoff and promote collection of rain water; and licensing and permits for withdrawal of river water for irrigation.

A specific project to be highlighted regarding the link between IWRM and CSA is the Participatory Integrated Watershed Management Project (PIWAMP), funded by the GEF. It aims at contributing to the realization of optimal global environmental benefits, including reducing land degradation, conserving biodiversity and improving the adaptive capacities of Gambian farmers to respond to climate change. The PIWAMP is an on-going project that expires in 2016. Since its official inception in 2007, the project planted a total of 4, 800 tree species (Acacia, Gmelina, Mango, Cashew and Eucalyptus) in three Regions (Lower River Region, North Bank Region and West Coast Region) of the country and another set of 6, 342 tree species (Acacia, Mango, Eucalyptus, Cashew, Mahogany, Dimba and Gmelina) had been transplanted in Central River Region (South), Central River Region (North) and Upper River

[2] Source : National Adaptation Plan Global Support Programme (NAP-GSP) and NAP-GSP countries.

Region, respectively. This means that a total of 11,142 different tree species have been transplanted successfully in 18 Sustainable Land Management Project (SLMP) sites throughout the country. The aim of this tree planting exercise is to increase farmers' income and also increase their adaptive capacities in a changing climate. The trees also serve as mitigation pathways in reducing the effects of greenhouse gases (GHGs) in the environment.

Besides, in terms of watershed development to increase rice production at the project intervention sites, PIWAMP has constructed a total of 12,066 m of dike length as at end of June, 2012 out of an annual target of 10,000 m, representing over 120% of the annual target. The dikes impound rain water and prevent salt-water intrusion in low-lying rice fields so that farmers can expand their land area under rice production. The dike construction serves as an adaptation measure. In all these project intervention sites, women also actively participate in both tree planting and rice cultivation exercises. In tree planting, women farmers prefer fruit tree seedlings such as mango and cashew at the top of the list for extra income-generation, as opposed to men farmers who would rather have timber product trees first for extra income-generation. The construction of conservation bunds and diversions on the upland fields reduce soil erosion by increasing water infiltration in the soil for increased crop production and preventing flooding of the villages and settlements as well. PIWAMP has also provided rice seeds to farmers countrywide on loan to assist the beneficiaries in connection with 2011 poor harvest due to drought. For example, PIWAMP purchased 53.5 tons of rice seed and distributed to about 45 intervention sites as support for the failed 2011 cropping season. The FASDEP Project, *Nema* (Resilient) Project and Commercialization Project are into similar activities in different parts of the country.

At the institutional and legal plan, the government of The Gambia is committed to the global and regional agenda to move away from traditional (mostly sectoral) to an integrated approach to water resources management, and is implementing the National Water Policy (adopted in 2007) through the development of appropriate legal and institutional arrangements, water resources management tools and wide ranging human resources capacities necessary for the application of IWRM in The Gambia.

In that respect, the government has adopted in 2009 The Gambia IWRM Roadmap as a milestone towards a future IWRM Action Plan for the Country. It is setting the path for The Gambia to revise the legal and institutional framework to facilitate efficient, effective and equitable water resources management throughout the country and support economic growth and improve livelihoods so as to reduce poverty. To this end, the Ministry of Fisheries and Water Resources is implementing a National Water Sector Reform Project to implement the IWRM Roadmap. So far, this initiative has enabled to prepare a legislative briefing paper and an outline of the first draft water bill; as well as to prepare the first set of institutional options for Water Resources Management Agency (WRMA) and to develop a draft organizational development plan for WRMA. These were discussed at a stakeholder consultative workshop held on 20 June 2013. Following agreement on the preferred institutional arrangement, a Cabinet Paper will be drafted for Cabinet's approval.

At last, following the assessment of the existing hydrogeological monitoring network and the establishment of a groundwater related data inventory and collation into one database, a robust groundwater model, well suited for The Gambian aquifer setting, was specified and developed for areas of potential water supply and irrigation development. To strengthen water resources knowledge and information system, an IWRM information management system has also been developed. Besides, the main stakeholders in IWRM have been identified and their role and knowledge assessed, a draft National IWRM Strategy was developed by the Country

Water Partnership (CWP). The stakeholders were also mobilized to discuss the institutional options and legislative implications of the proposed water sector reform.

In 2007, The Gambia developed the IWRM road map and adopted it in May 2009. The road map comprises of target outputs and timeline for establishment of IWRM in the water sector. The IWRM Roadmap consists of sets of activities that are organized in five themes:- (i) facilitation of reform/transition process; (ii) stakeholder engagement; (iii) rejuvenating enabling environment; (iv) capacity building; and (v) action/project planning and execution. Implementation of IWRM in The Gambia faces a number of challenges. There is lack of supportive legal and institutional framework; the existing legislation is not in harmony with new policy, and sector institutions are not structured and organized to be able to implement IWRM. The policy also lacks an effective strategy for its operationalization. The other problem is severe shortage of suitably qualified staff required for IWRM functions: sector planning, water resources assessment, management of hydro-meteorological data and information systems. On top of this, water information and knowledge management suffer due to shortage of equipment and facilities for data collection, processing, and dissemination. Furthermore there is need for an efficient water resources management information system to respond to the requirements for IWRM and eventually CSA (Source: The Gambia Support for National Water Sector Reform: Appraisal Report; March, 2010).

The Gambia National Adaptation Programme of Action (NAPA)

The Gambia signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and ratified it in 1994 and has since developed and submitted various strategic documents that include First and Second National Communications, the National Adaptation Program of Actions (NAPA), the National Capacity Self Assessment (NCSA) and the Nationally Appropriate Mitigation Actions (NAMA) to the UNFCCC Secretariat.

The government of The Gambia prepared and submitted its National Adaptation Programme of Action (NAPA) to the secretariat of the UNFCCC in December, 2007. Agriculture and food security were identified as key priority areas in The Gambia NAPA. Consequently, The Gambia NAPA identified projects to reduce the agriculture sector's vulnerability to the impacts of climate change and to improve the livelihood and food security situation of the population which depend on it directly or indirectly. Regarding agriculture, some of the areas identified in the NAPA are:

- Diversification and intensification of agriculture production;
- Processing;
- Marketing;
- Establishing irrigation schemes;
- Promoting crop diversification;
- Enhance crop breeding and adoption of appropriate cultivars;
- Establishing food processing plants;
- Improve storage facilities ;
- Promote the use of post-harvest technologies;
- Restore degraded grazing land;
- Promote and integrate crop-livestock systems; and
- Promote the cultivation of high-yielding rice.

The rationale for The Gambia NAPA, among other things, is to increase food production in a sustainable manner so that the lives and livelihoods of Gambians in general and the poor rural population in specific can be resilient to the impacts of climate change. The main objectives

of this agriculture NAPA is to promote an integrated crop-livestock system, promote sustainable development, reduce poverty (especially rural poverty), and other co-benefits. The specific objectives of the NAPA include:

- Promotion of the restoration of degraded grazing lands through the multiplication and popularization of forage seed planting of multi-purpose plants in grazing areas;
- Promotion of intensive animal husbandry through the adoption of the new approaches to livestock production such as improvement in genetics. Improvement of animal genetics would lead to more animal production;
- Facilitation of further crop diversification and cultivation in Central River Region (CRR) and Upper River Region (URR). Some crops such as NERICA have been found to do very well in the upland soils of The Gambia that are sandy and have low nutrient content and poor water holding capacity;
- Facilitation of the acquisition and utilization of post harvest and food storage and processing technologies to improve food availability and food security in the country.

The projects in the NAPA are priority interventions of the Government to adapt to climate change and will be implemented through the existing institutional arrangements for the preparation of the NAPA for The Gambia. The implementation arrangements are at three levels:

- *The Central Government* for policy development and implementation: Policy Focal line Ministry for UNFCCC (Ministry of Fisheries and Water Resources), and National Climate Committee (NCC). The Ministry of Fisheries and Environment (MoFE) has overall policy and technical oversight for the implementation of the projects and the technical functions will be executed by the National Climate Committee (NCC) chaired by the Director of Water Resources (Technical Focal Point of UNFCCC). The NCC is assisted in its coordination functions of the day-to-day implementation, management and administration of the project by a Project Management Unit headed by a Project Coordinator in the lead technical institution. The collaborating technical departments is responsible for the day-to-day implementation management and administrative functions of the project through contact persons for the various projects;
- *Regional level* for Coordination at the Regional scale: Divisional Development Committee and Climate Change Committee. At the regional level, the Regional Coordinating Committee (RCC) has the overall regional policy and technical oversight for the implementation of the project. Its technical coordination functions are provided by the Climate Change Committee chaired by the Governor. The Committee is guiding and supervising the implementation process of the project at the regional level. Responsibility for implementation will lie with the relevant technical departments, NGOs, local authorities and participating community-based organizations;
- *Community level* (or Ward level) for full implementation: Ward Development Committees and Village Development Committees.

The NAPA budget runs in millions of US dollars and the funding level (as of writing this document) is unavailable from the funding sources. Two agriculture projects are considered: i) diversification and intensification of agriculture production, processing, and marketing whose objective is to enhance food security, nutrition, and socio-economic livelihoods through agriculture diversification and intensification under increasing concentration of greenhouse gases in the atmosphere; and ii) improved livestock and rangeland management

for food security and environmental sustainability; the objective is to enhance livestock-based livelihoods to counter the threat from climate change) are identified under the NAPA. The agriculture projects are funded. Some of the NAPA bottlenecks include The Gambia debt payment problems, delays in implementation as a result of delay in fund disbursement or overspending of NAPA funds[3].

The 2012–2015 Programme for Accelerated Growth and Employment (PAGE)

In recognition of the ad-hoc and fragmented nature of The Gambia's implementation of obligations under the UNFCCC, with financial support from the Climate and Development Knowledge Network (CDKN), climate change was mainstreamed into the Program for Accelerated Growth and Employment (PAGE), the successor to the Gambia's Poverty Reduction Strategy Paper II. The PAGE is the four-year (2012 to 2015) blueprint for the implementation of The Gambia Vision 2020.

Indeed, The Gambia government made it imperative that climate change is mainstreamed into development policies and programmes, including PAGE 2012-2015 as the new development blueprint. In that respect, among other actions, a cost Climate Change Action Plan has been produced and included in the PAGE implementation strategy. It refers to, and builds upon, the climate change implementation efforts and documents produced and submitted to the secretariat of the UNFCCC, including the NAPA and the Second National Communication (SNC) that serve as strategic documents to guide the implementation of climate-related work.

The Climate Change Priority Action Plan (CC-PAP) of the PAGE was costed at about US$47 million and includes activities to enable mainstreaming of climate change into the national development process through the development of Low Carbon Strategy, integration of climate change into national and sectoral policies and programmes, integration of climate change into education curricular from basic to higher education and to try and address the climate data needs of the country.

The total cost of implementing PAGE is 19.02 billion Dalasis which is equivalent to US$651.52 million over the period 2012-2015. The Gambia government will commit 35 per cent of this amount and the rest will be financed through loans, grants, and private sector participation (Source: Gambia PAGE 2012-2015 Document). All the five pillars of the PAGE document have been implemented. Out of those five, the following are the results: (a) Public Financial Management Reform, (b) Civil Service Reform, (c) Judicial Reform, and (d) Decentralization Reform (Source: The Gambia's PAGE (2012-2015): Introducing the PAGE and the Role of The Gambia's Insurance Industry within the PAGE Framework. Challenges remain for increasing food production as a result of climate change impacts and low fertility of Gambian soils.

2.2. Current Situation / Diagnosis of the Mitigation Component of National Sectorial Programs, and connection with NAMA

In 2011, a first report evaluated the past, current (i.e. 2015), and projected GHG emissions from different sectors of The Gambia economy (see Table 3 below).

[3] Source: The Gambia NAPA Document.

Table 3: Projections of Greenhouse Gas Emissions ($MtCO_2eq$) from The Gambia.

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

Source: US EPA (2011) excluding forestry.

Later on, The Gambia prepared and submitted eight (8) Nationally Appropriate Mitigation Actions (NAMA) including, in March 2013, the *Low Carbon Emission and Climate Resilient Development Strategy* for adequate funding and capacity building and technology transfer as enablers to the UNFCCC secretariat. 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 industries. It will further proactively shape the sustainable development of our national infrastructure and services.

In facilitating the development of climate strategy, UNDP supported the preparation of a *background paper* on low carbon emission and climate-resilient development strategy that was validated in 2013. Among other things, the paper spells out the required institutional structures and human capital. The paper further calls for the country to take a more responsible attitude in interacting with the environment and take decisive steps towards departing from conventional, unsustainable systems of production and living, towards the realization of a *green economy* with a focus on the creation of *green jobs*.

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

With support from African Development Bank, the Gambia elaborated a full NAMA for the Agricultural Sector entitled *"Mitigating Greenhouse Gas Emissions and Concentrations in the Atmosphere through the Strengthening and Promotion of an Integrated Crop-Livestock System in The Gambia"*. The main objective of this agriculture NAMA is to reduce greenhouse gas emissions through the promotion of an integrated crop-livestock system and promote sustainable development, poverty reduction and other co-benefits.

Specific objectives of this NAMA include:

a) Promotion of the restoration of degraded grazing lands through the multiplication and popularization of forage seed planting of multi-purpose plants in grazing areas; better utilization and management of re-established grazing lands and protection from premature grazing; fire belt development and management; promotion and application of appropriate harvesting, storage, and preservation techniques; provision of animal watering facilities in degraded areas and sensitization of livestock producers on improved feed conservation and preservation techniques;

b) Promotion of intensive animal husbandry through the adoption of the new approaches to livestock production such as improvement in genetics. 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;
c) Facilitation of further crop diversification and cultivation in CRR and URR. Some crops such as NERICA have been found to do very well in the upland soils of The Gambia that are sandy and have low nutrient content and poor water holding capacity. Because it grows in upland sandy soils very little greenhouse gases are emitted as opposed to deep water and flooded cultivation. Thus, the project will lead to reduction of emissions of greenhouse gases, particularly methane, and also increase food security;
d) Facilitation of the displacement of fossil fuel (diesel/gasoline) powered pump irrigation by solar and wind powered irrigation systems, and expansion of tidal irrigation. Wind turbines produce no pollution and by using wind power it is possible to offset greenhouse gases that would have been generated by the national utility company or by private generators. Over its life, a small 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). Solar Photovoltaic Technology is used to provide electricity supplies of various forms and uses particularly from lifting water from source for irrigation. This will do very well for irrigation from surface water and ground water sources;
e) Facilitation of the acquisition and utilization of post harvest and food storage and processing technologies to improve food availability and food security in the country. 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, the ultimate outcome will be reduction in emissions of greenhouse gases from forest clearing for new farm lands, food security and poverty reduction.

In the 2000 National Inventory Report of the Gambia, animal production produced 64% of the total CH_4 emissions from agriculture, 2% came from crop residue burning and 1% came from savannah burning. Also about 83% of the total methane emissions from animal production was produced by cattle rearing. The other animal categories (sheep, goats, donkeys, horses, mules, swine and poultry) combine produced the remaining 17%. In that field, the implementation of this NAMA is expected to lead to reduce the amount of methane produced within the sector. 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.

Furthermore, 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 33% of the total methane emission from agriculture. Projected emissions from the Agriculture Sector are about 8.473 $MtCO_2eq$ and it is proposed to reduce these emissions by about 33% through the implementation of this NAMA. 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. An updated quantitative targets of GHG emissions and reductions in The Gambia's economy is being developed right now in a document called Intended Nationally Determined Contributions (INDC) which will be submitted to the UNFCCC by end of March, 2015. This INDC is expected to be funded through many international funding agencies like Green Climate Fund (GCF), Global Environment Facility (GEF), and Least Developed Countries Fund (LDCF).

3. Inter-Institutional Dialogue and Inter-Sectorial Coherence for CSA

As mentioned earlier, The Gambia government made it imperative that climate change is mainstreamed into development policies and programmes. That is the reason for The Gambia to join the Economic Community of West African States (ECOWAS) to initiate Climate Smart Agriculture (CSA) and incorporate CSA in her agriculture development agenda.

3.1. Related Issues and Needs Regarding CSA

Facilitating multi-stakeholders dialogue is a key strategy for improving a conducive and an enabling environment, including governance. This means that all stakeholders in this CSA drive hold regular meetings where they exchange views and ideas on advancing the CSA agenda. Good and efficient governance of The Gambia's natural resources and the equitable and transparent distribution of benefits of those natural resources will lead to the success of The Gambia climate-smart agriculture system.

It is important to take an integrated response to addressing food and nutrition security, agricultural productivity, and climate change. Agriculture measures are key components of national climate change strategies. Agriculture, through NAMA and NAPA, and rural development should be integrated into green growth strategies as well as into other national political processes, supported by assessment (including climate change assessment) at the local level. This integrated approach is important to achieve the Millennium Development Goals, particularly MDG1 to reduce hunger and malnutrition.

3.2. Related Existing Mechanisms for CSA: Description, Progress and Bottlenecks

An inclusive environment is needed, in which multi-stakeholders dialogue about CSA is effective. So far, this happens during monthly or sometimes quarterly meetings. Other forms of sub-groups are formed that cater to strategy development or the coordination of regional bodies, among others.

Besides, as part of a broader capacity development approach, agricultural innovation systems with public and private research as well as extension and advisory services play a key role in supporting the transition towards CSA by documenting, generating, blending and sharing indigenous and scientific knowledge. Such services facilitate learning processes as well as

network-based development and innovation. Knowledge networks and platforms generated through the NAPA, NAMA, GNAIP, and IWRP provide a venue in which the various actors can connect. They take various forms depending on their target group. For example, the forms could be global or regional platforms for coordination, knowledge exchange or advocacy. One good example called Aggregation (ex. through farmer unions, cooperatives or value chains) is a key strategy to minimize transaction costs and upscale CSA activities in The Gambia. Moreover, the roles, responsibilities and capabilities of both men and women need to be well understood to ensure that both men and women benefit from innovation systems supporting the transition to CSA. Methodologies and approaches for gender sensitive research as well as extension and advisory services on CSA should be highly strengthened.

Coordination, synergy, and integration between sectoral development plans (i.e. GNAIP, NAPA, NAMA, and IWRM Roadmap) are envisaged to be in place. However, sometimes coordination is a challenge due to low capacity of staff to fully understand and appreciate the value of climate smart agriculture in the context of national development.

4. Support Needed and Requests Addressed to ECOWAS

4.1. To Mainstream CSA in the GNAIP

In order to mainstream CSA in the GNAIP, The Gambia government would seek support from ECOWAS in the following areas:

1) *Policy:* To assist draft Climate Smart Agriculture response strategies and investment frameworks;
2) *Financing:* To enhance knowledge on domestic financing;
3) *Adaptation:* Promote Climate Smart Agriculture among farmers and national taskforces and enhance their ICT skills in Climate Smart Agriculture initiatives;
4) *Research:* Promote research in research themes such as REDD+, modeling projections from GHG emissions, climate resilient practices, etc.;
5) *Mitigation:* Help develop and implement a REDD+ pilot-Model such as Climate Smart Livestock Rangelands, Fires, livestock.

4.2. To Strengthen Inter-Institutional Dialogue and Inter-Sectorial Coherence on CSA

The existing legal and policy frameworks on GNAIP, NAPA, NAMA, and IWRM Roadmap need to be looked into carefully in order to reinforce their coordination and coherence vis-à-vis CSA in The Gambia. Series of meetings and workshops need to be held, including national workshops and provincial consultations with representatives from governments, NGOs, academia, the business sector, local governments, and communities. A meeting of experts also needs to be held to further refine the indicators of the CSA program.