GUINEA-BISSAU FIRST BIENNIAL UPDATE REPORT

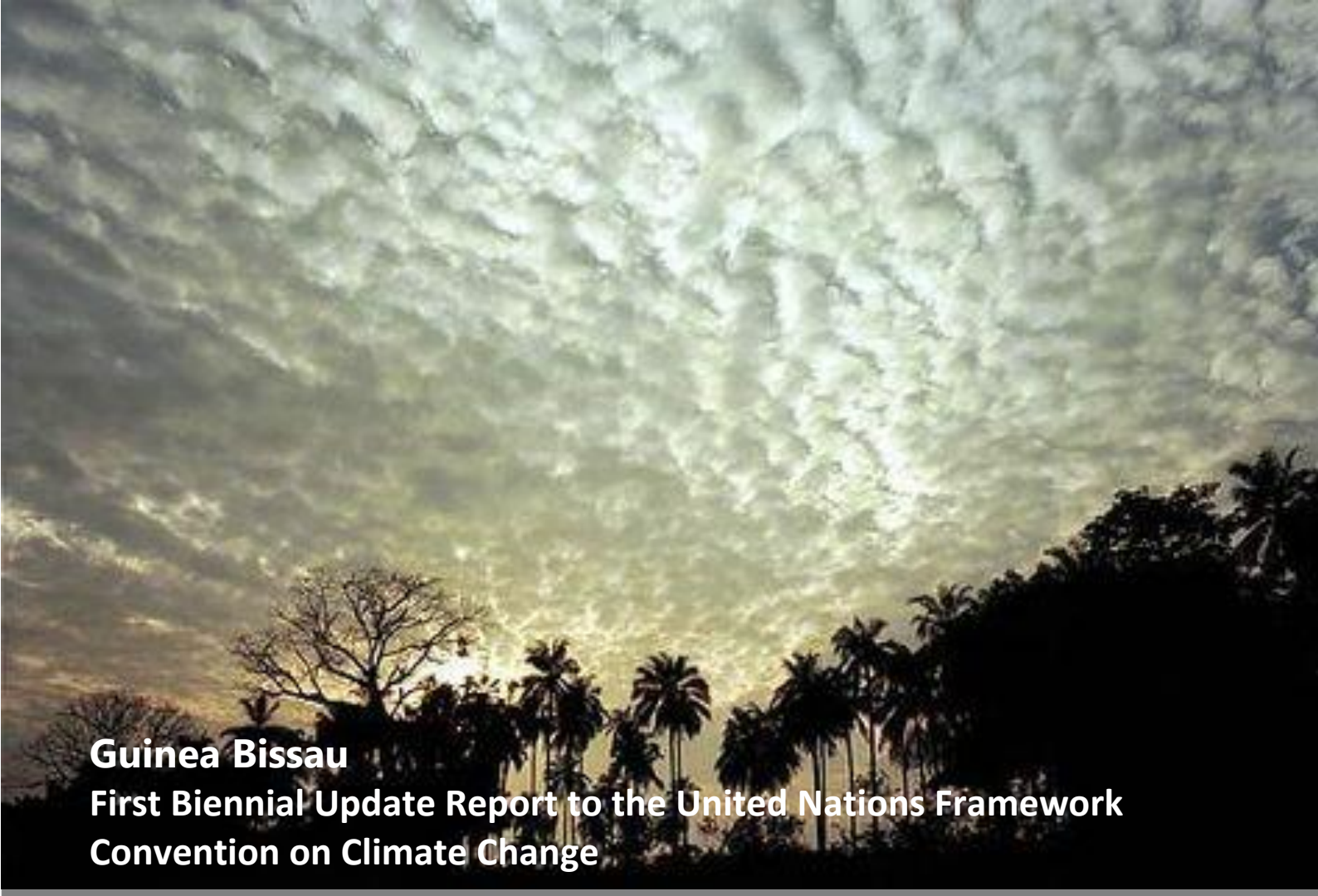
To the United Nations Framework Convention on Climate

Bissau, December, 2019

Republic of Guinea-Bissau

Guinea Bissau First Biennial Update Report to the United Nations Framework Convention on Climate Change

Report to the
United Nations Framework Convention on Climate Change



Guinea Bissau
First Biennial Update Report to the United Nations Framework Convention on Climate Change

© Directorate General of Environment, Secretary of State of Environment and Biodiversity, 2019

All rights reserved. No part of this publication may be produced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without prior permission by the Secretary of State of Environment and Biodiversity (SSEB) and the United Nations Environment.

Suggested citation
Republic of Guinea-Bissau (2019). Guinea Bissau First Biennial Update Report to the United Nations Framework Convention on Climate Change. Republic of Guinea-Bissau, Bissau.

Contact
Directorate General of Environment (DGA), Secretary of State of Environment and Biodiversity (SSEB).
Avenida dos Combates da Liberdade da Pátria, Palácio do Governo - BISSAU - República da Guiné-Bissau
Tel: + (245) – 691 20 07/ 590 82 87
E-mail: cassamavilus@gmail.com
Web: http://environment.gov.gb

Photo in page cover: Archipelago Bolama-Bijagós in Guinea-Bissau is a UNESCO Biosphere Reserve.
Image: Powell.Ramsar (http://www.nationsonline.org/oneworld/guinea_bissau.htm)

https://www.speco.pt/images/Artigos_Revista_Ecologia/revistaecologia_4_art_2_1.pdf

Contents

http://www.eosnap.com/public/media/2011/11/guineabissau/20111126-guineabissau-full.jpg

Table of Contents

Foreword

Guinea-Bissau as a Party to the United Nations Framework Convention on Climate Change (UNFCCC) has respected its commitments based on its common but differentiated responsibilities, specific national and regional development priorities and national objectives and circumstances. It is within this context that on behalf of the Government of The Republic of Guinea-Bissau I wish to present the Country's Guinea Bissau First Biennial Update Report to the United Nations Framework Convention on Climate Change.

The report covers insightful data and information as well as an analysis on financial, technical and capacity building support received versus the identified constraints and gaps, financial, technical and capacity-building needs. As a signatory to the UNFCCC, the Republic of Guinea-Bissau has already been implementing domestic policies and actions to tackle climate change. The PRSP II proposal TERRA RANKA Strategic Document 2015-2025 takes a firm stance regarding climate change by advocating low carbon and climate-resilient development strategies to promote sustainable development. Guinea-Bissau reaffirms its commitment under the INDCs to reducing our greenhouse gas emissions through the expansion of national protected areas and a moratorium to ban the felling and export of timber.

The findings of this Guinea-Bissau First Biennial Update Report (BUR) to the United Nations Framework Convention on Climate Change although preliminary, they reveal also an ecstatic landmark that the country has achieved by expanding the size of protected areas from 15% to 26.34% (2017) of the country's territory becoming a sanctuary for the preservation of biodiversity and contributing towards emission reductions and sustainable development. However, this BUR has likewise exposed the priority areas in need of adaptation as well as the current gaps for an effective mitigation. It is clear that amongst other measures the country needs to put a strong emphasis on strengthening human capacities that have a direct effect on improving decision making and planning for integral management of low carbon development, by focusing on the necessary techniques and technologies - reforestation and conservation of forests and power generation systems from renewable energy (hydroelectric, photovoltaic, wind).

Therefore, Guinea-Bissau believes that with support of the International Community the attainment of these actions will contribute towards a greener economic growth trajectory for the country and simultaneously heighten the county's environmental safeguard for years ahead for the benefit of the people of Guinea-Bissau.

Hon. Quite Djata
Secretary of State of Environment and Biodiversity

Acknowledgements

The Government of the Republic of Guinea-Bissau first and foremost, special thanks goes to the Global Environment Facility and the United Nations Environment for the financial support in the preparation and publication of the of this Guinea Bissau First Biennial Update Report (BUR1) to the United Nations Framework Convention on Climate Change of the Republic of Guinea-Bissau.

The development of this Guinea Bissau First Biennial Update Report to the United Nations Framework Convention on Climate Change was carried out under the guidance and leadership of the Secretariat of State of Environment and Biodiversity - Directorate General of Environment to meet Guinea-Bissau's obligation to prepare and submit Biennial Update Report to the United Nations Framework Convention on Climate Change (UNFCCC). For this purpose, several key stakeholders and experts in both the public and private sector have been involved. We therefore acknowledge the effort made by all the institutions and individuals who contributed in many ways to produce the results now published in this report. Our appreciation and gratitude go to all sectorial ministries, government departments, local government authorities, research and academic institutions, private sector, nongovernmental organizations, civil society and other keys institutions for participating in the development of this BUR1.

Finally, I would like to take this opportunity to thank to Prof Timoteo Ferreira and his team for their technical and scientific assistance in the compilation and edition, which undoubtedly raised the quality of this BUR1.

Viriato Cassama, MSc
Directorate General of Environment,
Secretariat of State of Environment and Biodiversity

BUR1 Preparation Team and Contributors

BUR1 COMPILATION AUTHORS
Timoteo C Ferreira, PhD
Maria Luisa Fernández Marcos, PhD

BUR1 PROJECT COORDINATION:
National Project Director: Viriato Cassama, MSc
National Project Coordinator: Eng Alexandre Cabral, MSc

MAIN CONTRIBUTORS:

Ministry of Environment and Sustainable Development (MADS):
- Directorate General of Environment (DGA);
- Directorate of the IBAP

Ministry of Agriculture –
- General Directorate of Livestock
- Directorate-General of Forests and Fauna
- General Directorate of Agriculture;

Ministry of Fisheries and Maritime Economy

Ministry of Economy and Finance
- National Institute for Statistics (I.N.E.)

Ministry of Public Health
Ministry of Tourism;
Ministry of Public Works, Construction and Urban Development
Ministry of Transport
- National Institute of Meteorology of Guinea-Bissau (INM-GB

Acronyms and Abbreviations

ACCC	Integrated Coastal Zone Management	LDC	Least Developed Country
AD	Activity data	LEDS	Low Carbon Development Strategy
AfDB	African Development Bank	LULUCF	Land-Use Change and Forestry
AFOLU	Agriculture, Forestry and Other Land Use	MADS	Ministry of Environment and Sustainable Development
AMPCIU	Área Marinha Protegida Comunitária das Ilhas de Urok	M&E	Monitoring and Evaluation
AND-GB	National Designated Authority for Kyoto Mechanisms	MNRE	Ministry of Natural Resources and Energy
		MRV	Measurement, Reporting and Verification
APs	Protected Areas	NAMA	Nationally Appropriate Mitigation Action
BADEA	Arab Bank for Development African States	NAEZ	National Agro-Ecological Zoning System
		NAP	National Adaptation Plans
BAU	Business as usual	NAPA	National Adaptation Programme of Action
BOAD	West African Development Bank	CNs	National communications
BUR	First Biennial Update Report	NCCC	National Climate Change Committee
CBD	Convention on Biological Diversity	NDCs	Nationally Determined Contributions
CBOs	Community Based Organizations	NEMP	The National Environmental Management Plan
CDM	Clean Development Mechanism	NGO	Non-Government Organisation
CH4	Methane	NIS	National GHG Inventory System
CILSS	Permanent Interstate Committee for Drought Control in the Sahel	N2O	Nitrous oxide
		NOx	Nitrogen oxides
CO2	Carbon dioxide	NMVOCs	Non-methane volatile organic compounds
COP	Conference of Parties	NPCCC	National Programme on Climate Change Committee
DBT	Complexo Dulombi, Boé e Tchetche		
DNA	Designated National Authority for the Kyoto Mechanisms	OMVG	Organisation pour la Mise en Valeur du fleuve Gambie
DGA	Directorate General of the Environment	PA	Protected Areas
ECOWAS	Economic Community of West African States	PAC	National Action Plans Renewable Energies
		PANER	Project Advisory Committee
EF	Emission factor	PNC	Project National Director
EU	European Union	PND	Parque Nacional de Cantanhez
EWS	Early Warning System	PNLC	Parque Natural das Lagoas da Cufada
FAO	UN's Food and Agriculture Organisation	PNMJVP	Parque Nacional Marinho João Vieira e Poilão
FIAL	Fund for Local Environmental Initiatives	PRCM	Regional Coastal and Marine Conservation Partnership in West Africa
GEF	Global Environment Facility		
GCF	The Green Climate Fund	PRSP II	National Poverty Reduction Strategy
GDP	Gross Domestic Product	QA	Quality Assurance
GHG	Greenhouse Gases	QC	Quality Control
GIS	Geographical Information System	RCPs	Representative Concentration Pathways
GoGB	Government of Guinea-Bissau	RAMSAR	Convention on Wetlands of International Importance
GNI	Gross National Income		
HDI	Human Development Index	SEAB	Secretariat of State Environment and Biodiversity
IAC	Annual Carbon Increment	SIDS	Group of Small Island Developing States
INC	Initial National Communication	SNAP	National System of Protected Areas
INDC	Intended Nationally Determined Contribution	TL-GHGI	Team Leader for GHG Inventory
		UEMOA	Union Economique and Monétaire Ouest Africaine
IBAP	Institute for Biodiversity and Protected Areas	UNEP	United Nations Environment Programme
		UNESCO	The United Nations Educational, Scientific and Cultural Organization
IPCC	Intergovernmental Panel on Climate Change	UNFCCC	United Nations Framework Convention on Climate Change
IPPU	Industrial processes and product use		
INE	National Institute for Statistics	UNICEF	United Nations International Children's Emergency Fund
INM	National Institute of Meteorology		
ITCZ	Inter-Tropical Convergence Zone	UNIDO	The United Nations Industrial Development Organization
IUCN	The International Union for Conservation of Nature	ZCIT	Inter Convergence Zone

Executive Summary

http://www.didinho.or

Executive Summary

Executive Summary

1.1. Introduction

Guinea-Bissau is a non-Annex-I Party and a signatory to the United Nations Framework Convention on Climate Change and the Kyoto Protocol and as laid down in Art. 2, Paragraph 1 of the Kyoto Protocol, is committed to engage and seek to achieve quantified emission limitations and reduction of GHG emissions in order to promote sustainable development, minimizing the social, environmental and economic impacts of anthropogenic activities that contribute to emissions of greenhouse gases and thus to global warming. In order to meet its reporting obligations, Guinea-Bissau has already prepared and submitted systematically: i) The First Inventory and the Initial National Communication in 1996, the reference year 1994; ii) The Second Inventory and subsequent Second National Communication in 2011, the base year 2000, the Third Inventory and now the First Biennial Update Report and consequently, within this framework, the reporting guidelines, adopted during COP 8 for the preparation of National Communications from Parties not included in Annex I to the Convention and contained in decision 17/CP.8 have been adopted for the preparation of this Guinea Bissau First Biennial Update Report to the United Nations Framework Convention on Climate Change, In 2015 the country has been submitted the INDC serving as the basis for the Paris Agreement.

1.2 National Circumstances

Guinea-Bissau, located in Western Africa (12° 00' N, 15° 00' W), between Cape Roxo (latitude 12º 20' N), the Cajete Ponta (latitude 10° 59' N) and the meridians 13° 38' and 16° 43' W bordering the North Atlantic Ocean, with a surface area of 36,125 km2. It is bordered to the North with the Republic of Senegal and to the East and South with the Republic of Guinea and is bathed by the Atlantic Ocean to the West. The country comprises a continental and an insular part — the Bijagós archipelago, consisting of 88 Islands and Islets of which only 21 are inhabited. In addition to these islands, there are also other islands separated from the continent only by narrow rias, such as Bolama, Komo, Melo, Peicixe and Geta. Guinea-Bissau is a country with a considerable natural capital. It has important water resources translated into 130 km3/year of surface water and 445 km3/year of groundwater, a vast and rich maritime territory (54,000 km^2 in 270 km of coast), a biodiversity of a considerable level in West Africa. Almost 10% of its territory is covered with Mangal, perhaps the most important proportion of the world. Currently approximately 26% of its land and sea territory is a sanctuary for the preservation of biodiversity. The Bijagós archipelago, an exceptional natural site with approximately 88 islands and islanders, is a candidate for the UNESCO's Man and the Biosphere (MAB) Programme. Several other national localities (ponds of Cufada Natural Park, Wendus and other areas) are classified as RAMSAR sites (wetlands of International Importance).

The Bijagós archipelago, Poilão Island, home to one of the largest populations of nesting green turtles in the world. Credits: MVarela

1.2.1 Climate variability in Guinea-Bissau

Climate unpredictability will remain an overriding aspect of climate in Guinea-Bissau. Temperature projection scenarios systematically signal increased average daily temperatures of up to + 1.4°C for the period 2016-2045, potentially reaching up to + 2.2°C in the 2046-2075 period, per a low emissions assumption. Under a high emission scenario, the changes are in the order of + 1.6°C to + 3.1°C for the period 2046 to 2075.

The monthly precipitation values (%) during the months of June, July, August and September of the most recent time series (1981-2017) indicate that in general there is a tendency for the values of monthly precipitation to reduce (~10%) with great interannual variability. Guinea-Bissau rainfall series indicates (Figure 1.2) that there have been three main trends between 1950 and 2017: prevalence of wet years between 1950 and 1970: prevalence of dry years between 1970 and 1990: and from 1990 onwards: marked shifts between wet and dry year

1.2.2 Socio-Economy

Between 2005 and 2017, GuineaBissau's HDI value increased from 0.396 to 0.455, an increase of 15.0 percent (Table 1.2). Guinea-Bissau's life expectancy at birth increased by 8.7 years, mean years of schooling increased by 0.7 years and expected years of schooling increased by 6.8 years (UNDP, 2018). The vulnerability of the economy is twofold. In one hand, the high dependence on agriculture (almost 60% of GDP) in particular, the cashew industry alone, the main source of export revenue and a significant share of government revenue. On the other hand, the long period of political instability.

1.2.4 Agriculture and Livestock

The agricultural sector is the backbone of Guinea-Bissau economy, a source of income for 85% of the population. Agriculture plays an important role in the country's external accounts, and therefore has a significant impact on macro-economic stability of Guinea-Bissau. Agricultural exports account for over 98% of total exports of goods. Production and export of cashew nuts and rice cropping are the major activities coupled with extensive livestock. In 2012, the area under cashew cultivation was 223 000 ha with an annual production of 130 000 tons of raw cashew nuts (FAO, 2015)[i].

1.2.5 Energy and Water Resources

Energy consumption in Guinea-Bissau is mainly based on biomass (90%), oil products (8%) and electricity (2%). Biomass energy resources encompasses wood, coal and agricultural / forest products. At the level of subsistence communities, the collection and use of wood / coal for heating and cooking uses enormous resources in biomass and hand labour. The country's water resource consists of surface water, rainwater, and groundwater. From the three categories of water resources the following quantities are estimated (DGRH, 2016): Surface water resources: 13,820 million m3 (estimated); Rainwater resources: 45 million m3; Groundwater resources: 1 756 million m3 of statistical reserves (estimated). These resources have an estimated renewable annual rate of 180 million m3. The surface water includes major rivers and its tributaries (the main ones being from North to South, Cacheu, the Mansoa, the Geba, the Corubal, the Catio, the Rio Grande de Buba, the Cumbijã and Cacine) and estuaries

1.2.6 Coastal Zone and Biodiversity

Bijagós Archipelago is one of the Guinea-Bissau's protected areas made of a collection of 88 islands that guard the country's capital Bissau. A UNESCO Man and Biosphere Reserve (UNESCO,2017). the archipelago contains both national protected areas (Orango, João Vieira-Poilão) and community reserves (Urok)[ii] all haven for hundreds of species of birds, fish, and mammals. Poilão is amongst the 10 most important nesting sites for green turtle population (Figure 1.3) making one of the greatest biodiversity values of Guinea-Bissau.

1.2.7 Forests and Land Use

Guinea-Bissau continues to have huge agricultural and forestry potential, including arable land estimated at about 1.5 million hectares, of which 80% is on plateaus, 200,000 in freshwater valleys, 106,000 in salt water valleys and more than 100,000 square metres of areas with industrial wood (macauhub.com. 2018) The savannas dominate the land cover, accounting for about 45 percent of the country's land surface in Guinea-Bissau. More than 70 percent of the country is forested —more than 45 percent of which is primary forest. The South of the country consists essentially of clump forests with some of the country's best-preserved forest patches, probably housing the most dense northern forest area in West Africa. The human pressure in search of spaces for agriculture, construction and commercial purposes, and of woody material (firewood, coal) for the production of energy, etc., have led in particular to the degradation of the clump forests of the southern zone. Deforestation, that is, the use of forest resources for other purposes, is responsible for issuing a large amount of CO2 by the atmosphere. The estimates point to a decrease in the order of 625,000 m3 per year, from the forest surface of the country (The National Strategic document – Terra Ranka (2015-2025)), i.e.:

— Reduction of 30% of the dense humid forests of Tombali;
— Reduction of 57% of the savannah forests of Bafatá, Oio and Gabú;
— Reduction of 19% of Mangrove forests.

1.2.8 Biodiversity and The National Protected Areas

Compared to the neighbouring countries in the West Africa the biodiversity of Guinea-Bissau is still relatively rich, diversified and unique. This can be

seen from the data below of species count by taxa for Guinea-Bissau.

Animal / plant group	Species count
Birds	456
Amphibians	21
Reptiles	69
Fishes	677
Mammals	123
Vascular plants	1000

Source: Amphibians - amphibiaweb; Reptiles - reptile-database; Fish - fishbase; Birds - birdlife; Mammals - IUCN; and Plants - World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC).

There are however several factors of pressure on biodiversity mostly originated by human activities. Among others the (i) effects of extensive livestock practiced in the country, mainly in the east and northeast zones, (ii) forest fires sometimes uncontrolled, which have negative impact on the fauna and floristic composition; (iii) the pressure of the exponential growth of population with rapid urbanisation with corresponding needs, including that of woody fuel (firewood and coal), (iv) the practice of the traditional agriculture based on slash and burn; the wild expansion of cashew orchards; the growing production and firewood search and vegetable coal for domestic use as source of energy (v) wood exploitation leading to a frightening degradation of the forest potential taking place particularly in the east frontier zones, namely Pirada, Canquelifá, Pitche and surroundings, accentuating climate change impacts (GoGB, 2015). The Government of Guinea-Bissau (GoGB) aware of the current challenges of this sector has put forward an Action Plan for the Strategy for the Biodiversity of Guinea-Bissau with the objective to identify solid measures to accomplish its goals.

A ploughshare tortoise listed as endangered. | Credit: Beth Devler/Getty

The creation of the Protected Areas for the conservation and management of natural resources, is one of the greatest achievements of the country. The National System of Protected Areas of Guinea-Bissau corresponds to seven protected areas (SEA. 2019): Parque Natural das Lagoas da Cufada (PNLC), Parque Nacional de Cantanhez (PNC), Complexo Dulombi, Boé e Tchetche (DBT), Parque Nacional das Ilhas de Orango (PNO), Parque Natural dos Tarrafes de Cacheu (PNTC), terrestrial part of Parque Nacional Marinho João Vieira e Poilão (PNMJVP) and Área Marinha Protegida Comunitária das Ilhas de Urok (AMPCIU). The national protected areas system now covers 26.3% of the national territory, with an extension of approximately 750,000ha representing 12.4% of marine protected areas and 13.9% of terrestrial protected areas, which is by and large compliant with the Aichi Targets of the Convention on Biological Diversity (CBD).

1.3 National Greenhouse Gas Inventory

The inventory carried out from 1978 to 1985 showed that the forest space had decreased about 31,500 ha in this period being Afzelia africana, Khaya senegalensis and Pterocarpus erinaceus the three species most sought. However more recent data indicate an alarming scenario on forest degradation in the country. Deforestation measured as tree cover loss assessed from 2001 to 2018 for different "tree cover threshold" used for defining the tree cover area from dense forests (≥75% close canopies) to open forests (≥10% sparse canopies) indicate systematic losses across all threshold values. Forest degradation in open canopies are extremely high with more than 230,000 ha lost in the open forests of Guinea-Bissau. Yearly average losses varied from 6064 ha during the 2001-2010 period to 21,176 ha between 2011 and 2018. Forest degradation gradually decreases with increasing cover threshold (≥75% close canopies) reaching 1,213 ha of tree cover within the 18 years period. The results from these emissions calculations indicate that the bulk of GHG emissions in the energy Sector, in the referential year of 2010, was concentrated in the residential subsector and represented by carbon dioxide emissions (94%). These results also suggest a high consumption of firewood and charcoal in households both in urban centres and in rural areas. Emissions are attributable to the

combustion of fossil fuels, but also to the burning of plant biomass, i.e. firewood and charcoal. The Agriculture and Livestock subsector show positive emissions of methane (CH4) which contributed with a total of 102.7 Gg CO2 equivalent in two subcategories of Enteric fermentation and Manure Management and 9.6. Gg CO2 equivalent for burning of biomass subcategory. This represented a total of 112,3 Gg CO2.

Notwithstanding the above expected rises in GHG emission, the Land Use, Land-Use Change and Forestry (LULUCF) is still the highest single sector acting as a net sink of GHG amounting to -10718 Gg for the year 2010. Therefore, Guinea-Bissau is and will remain as an absolute sink of greenhouse gases, given the high potential for sequestration by the Forestry sub-sector and the Framework Law on sustainable development promoting the expansion of the national Protected Areas as well as the implementation of the country's biodiversity protection policy.

1.4 Mitigation Actions

Guinea-Bissau's main national bodies relevant to the climate change mitigation legal framework are:

1. The National Authority designated for the Kyoto Mechanisms (DNA that deals with the approval and monitoring of the implementation of projects under the Clean development Mechanism and REDD framework.
2. The National Committee on Climate Change (NCCC) supervised by The Secretariat of State of Environment and Biodiversity (SEAB) consists of an advisory board, a Scientific Council and a technical committee.

The Guinea-Bissau's emission pattern is such that Land Use, Land-Use Change and Forestry (LULUCF) is still the highest single sector acting as a net sink of GHG in 2010. By contrast, GHG emissions from oil products and transport are significant in the Energy Sector and so does the GHG emissions from land cultivation and livestock in the Agriculture and Livestock sectors. Deforestation is also responsible for the release of large amounts of CO2 by loosening up carbon stored in forest soils, increasing the chances it will return to the atmosphere as carbon dioxide and by reducing the carbon sequestration capacity of the country.

The Guinea-Bissau mitigation strategy encompasses the implementation of unconditional actions and policies complemented by other conditional measures supported mainly by bilateral or international funding. Since the mitigation actions available, such as natural regeneration, short-spin forestry and bioenergy for replacing fossil fuels, are not currently practicable mitigation options, the Government of Guinea-Bissau has capitalized efforts to Mitigation in the action of forest protection mitigation with a focus on the establishment and effective management of protected areas (APs). Additionally, with the implementation of the LEAP SCREENING program based on the above-mentioned scenarios, the following GHG mitigation options have been selected in the energy sector:

- The mitigation scenario by replacing traditional stoves of three stones or charcoal stoves, for gas stoves. In this option the country would avoid the issuance of 163,038 TE CO2 at a sale price of $5.2/ ton of carbon; The mitigation scenario, through the construction of the dams of Saltinho and Cussilintra (the country would divert the emission of 1,130,338 TE CO2 at a sale price of $7.78/ ton of carbon);
- The scenario of mitigating the decentralisation of rural electrification by using a photovoltaic system (the country could protect itself against the emission of 47,312 TE CO2 at a sale price of US $6.24/ ton of carbon);

The mitigation scenario that encompasses the interconnection of the electricity grid and Sambagalou and Kaleta (the country would avoid the issuance of 645,170 TE CO2 to $126.72/ ton of carbon sales price).

The mitigation scenario based on the development and establishment of a legal framework through a national strategy for the development of low carbon in the long term.

1.5 Financial, Technology, Capacity Needs and Support Received for Climate Change Activities

In the current economic, social and environmental situation of the country, identifying constraints and the financial, technical gaps, and capacity-building needs required for the preparation of BUR 1 is a challenging exercise. However, some country needs for financial, technical and technological support and capacity building were identified in order to be able to address gaps in handling climate change issues. Thus, financial support is required for:

- Strengthen the financial capacity of the state and of the research institutions to collect, archive and

analyse climate data and renewable natural resources;

• Allocate financial resources for the purchase and acquisition of certain data and software essential for vulnerability assessment and formulation of adaptation strategy;

• Provide the country with financial resources to build capacity and set up a regular vulnerability assessment system and climate change adaptation and mitigation programs and strategies, among others. According to the Guinea-Bissau Sustainable Energy Investment Plan 2015-2030, approximately €680,458,000 would be required in the Energy sector, of which €630,000,000 would be invested in renewable energy; €3,103,000 in Bioenergy; €36,000,000 in Energy Efficiency and €11,355,000 in Favourable Environment (Institutional and regulatory capacity building).

Alternatively, the country should strengthen its capacity at national and local levels to plan and implement measures to increase the resilience of its communities, equipment and ecosystems to climate change. At local level, communities should identify and prioritize measures and undertake programs and projects that incorporate capital gains into their livelihoods; activities that reduce their vulnerability, in particular as regards climate change and climate variability.

1.6 Information on domestic MRV of Domestically supported NAMAs

Reporting and verification are important for ensuring transparency, good governance, accountability, and credibility of results, and for building confidence that resources are being utilized effectively. The National Objective is to set up a Measurement, Reporting, and Verification (MRV) system integrated into the current Monitoring and Evaluation (M&E) process at national, sectoral and probably district level whenever possible.

The National Appropriate Mitigation Actions (NAMAs) concept is still in the evolution phase and can be implemented differently depending on the type of support expected by developing countries. NAMAs promise to become a primary mechanism for achieving "common but differentiated responsibilities" in the fight against climate change. Guinea Bissau has developed legal and institutional arrangements for the implementation of NAMAS. The National Designated Authority for Kyoto Mechanisms (AND-GB) was established by Decree No. 11/2006 of the Council of Ministers. Since then several initiatives were undertaken not exactly as NAMAs but in the context of Low Emissions and Development Strategies - LEDS initiatives.

Low Emissions and Development Strategies - LEDS initiatives provides a direct link between mitigation and achieving sustainable development, while climate change is a cross-cutting issue across all the sustainable development goals (SDGs) particularly the SDG 13 (climate action). , Guinea Bissau has received a number of international aid over time, some of which are of assistance to the sectors involved in fight against the impacts of climate change.

1.7 Additional Information

The PRSP II proposal TERRA RANKA Strategic Document 2015-2025 takes a firm stance with regard to climate change by promoting ***Development strategies*** *for different growth sectors should become* ***low carbon and climate-resilient development strategies*** *to promote sustainable development.* In this context the Biodiversity and Natural Capital axis aims to preserve and value the country's natural resources in a sustainable way. Mitigation measures are contemplated by the proposed increase in the percentage of protected areas from 15 to 26%, according to the National Protected Areas Strategy enhancing the capacity of carbon sinks; and the programmed investments for the power system to increase its installed capacity by 60%. Furthermore, Guinea-Bissau is currently seeking funding to draw up its NAMA Strategy and REDD + Strategy.

In terms of adaptation to climate change impacts the National Strategic Plan prioritises the sectors with the highest exposure: agriculture with 57%, followed by livestock and health both with 54%, and the fisheries with 51% and infrastructure with 46%. It also focusses on most vulnerable groups (54%), followed by livestock farmers (49%), waged workers living in large cities (46%) and fishermen (34%).


Smoke
Bissau
Rio Corubal
Bijagós Archipelago
N

Chapter 1:
National Circumstances

Chapter 1
National Circumstances

Teak tree (*Tectona Grandis*) – Bissau – Guinea Bissau
Photo credit: T C Ferreira, 2015

Chapter 1:
National Circumstances

1.1 Introduction

Guinea-Bissau, located in Western Africa (12° 00' N, 15° 00' W), between Cape Roxo (latitude 12º 20' N), the Cajete Ponta (latitude 10° 59' N) and the meridians 13° 38' and 16° 43' W bordering the North Atlantic Ocean, with a surface area of 36,125 km2. It is bordered to the North with the Republic of Senegal and to the East and South with the Republic of Guinea and is bathed by the Atlantic Ocean to the West. The country comprises a continental and an insular part — the Bijagós archipelago, consisting of 88 Islands and Islets of which only 21 are inhabited. In addition to these islands, there are also other islands separated from the continent only by narrow rias, such as Bolama, Komo, Melo, Peicixe and Geta. (Figure 1.1)

Figure 1.1 - Geographic Location of Guinea-Bissau including the Bijagós archipelago

Guinea-Bissau is a country with a considerable natural capital. It has important water resources translated into 130 km3/year of surface water and 445 km3/year of groundwater, a vast and rich maritime territory (54,000 km^2 in 270 km of coast), and a considerable biodiversity at level of West Africa.

Almost 10% of its territory is covered with Mangal, perhaps the most important proportion of the world. Currently approximately 26% of its land and sea territory is a sanctuary for the preservation of biodiversity. The Bijagós archipelago, an exceptional natural site with approximately 88 islands and islanders, is a candidate for the UNESCO's Man and the Biosphere (MAB) Programme. Several other national localities (ponds of Cufada Natural Park, Wendus and other areas) are classified as RAMSAR sites (wetlands of International Importance).

This Chapter presents the national circumstances of Guinea-Bissau, also includes information on features of its geography, demography, climate and economy as well as key features of the main economic sectors (Agriculture, Livestock, Forestry, Water Resources, Public Health, Energy and Waste) to provide a sense of the overall national context in which climate change mitigation and adaptation challenges are being dealt with.

1.2 Geography and Climate profile

The climate of Guinea-Bissau is predominantly determined by factors such as the influence of the geographic location of Guinea-Bissau, the anticyclone of the Azores, the neighboring Sahelian climatic zone; the trade winds; the "Harmattan"; the action of the Inter Tropical Convergence Zone (ITCZ) associated with the African summer monsoon; the action of the oceanic currents, namely the continuity with the High Atlas chain of the Canary Islands (current of the North + current of Morocco + current of the Azores) and the influence of the cold current during the northern winter that diverges to NW in the Atlantic region neighboring Guinea Bissau and lastly, the influence of the warm Contra-current (guinea current) during the northern summer.

1.2.1 Rainfall

Guinea-Bissau has two very pronounced seasons: the hot and rainy season, which lasts from May to November, and the hot and dry season from November to April. On average, about 80% of annual rainfall occurs during the months of July, August and September Precipitations during monsoon stations can be intense, with more than 500 mm/month recorded in August, which represents the median of a quasi-normal distribution with values close to 400 mm/month in July and September. The smallest amount, close to zero (0.1 mm), occurs during the months of December to April (dry season). The climate in general is tropical maritime with an average temperature of 27 º C and Monsoon conditions (May to November) and the Winds "Harmattan" (hot dry air, and laden with dust from the Sahara) during the dry season (November to April). These climatic characteristics induce variations in precipitation in relation to the geographic location of the country (South: > 1800 mm/year; West: 1550-1800 mm/year; Northwest: 1300-1550 mm/year; North-northeast: ≤ 1300 mm/year) and Southeast: 1300-1550 mm/year.

1.2.2 Temperature

Unlike precipitation the temperature in Guinea-Bissau is subject to minor variations although the average monthly temperature varies regularly throughout the year, with maximum values

between April (28.5 º C) and May (28.7 º C) and minimum values between December and January (25.4 º C). Interestingly, unlike the past situation, the monthly thermal amplitude is now considerably reduced during the particular rainy months between July and September when the minimum temperature reaches 23 º C and maximum temperature reaches minimum annual values (30.4 º C-29.8 º C) in July and August respectively with average monthly temperature varying between 24 º C and 30 º C. Over a year, the daily temperature typically varies from 18 º C to 35 ºC and is rarely less than 17 º C or above 37 ºC. Spatially, the average (1981-2017) monthly values of the air temperature range from 29.7 ºC to 39.4 ºC (maximum) and from 16.3 ºC to 23.8 ºC (minimum) among the main regions of North, South and East central regions. Spatially and in terms of homogeneity the thermal regime divides the country by means in two distinct zones with average temperature values above 27.5 º C to the east towards the interior in the Bafatá zone and below this value to the West and south towards the coast in the area of Bissau and Bolama.

Temperature series (1950-2001) indicate that there has been an increase in the average temperature values at a rate of 0.0155 °c/year in the last 50 years, leading to an approximate average rate of variation (°c/century) of 1.55 °c. Thus, this temperature behaviour reflects the regional pattern of temperature variation in recent decades, which indicates that temperatures are increasing faster than the global average. This increase ranged between 0.2 and 0.8 ° C since the end of the decade of 1970.

1.2.3 Climate variability in Guinea-Bissau

Throughout the year, the climate of Guinea-Bissau is mainly conditioned by the situation, movements and impacts of the Intertropical Convergence Zone (ZCIT or ITCZ of the English acronym) in relation to the territory and the subsidiary actions of the semi-permanent cells of high Pressure, commonly known as anticyclone of the Azores in the North Atlantic and anticyclone of Santa Helena in the South Atlantic, and also by the low summer thermal that settles on the Sahara Desert. Changes in the behaviour of the general air circulation systems such as the abnormal oscillation of the ITCZ or the increase of the sea surface temperature (SSTs) that takes place when there is a cool in the northern tropical Atlantic, and a little warm up in the South Atlantic, the region of the Sahel where Guinea Bissau tends to become drier with decreased precipitation. On the other hand, human anthropogenic action by reducing vegetation cover, increasing atmospheric carbon dioxide and air pollution in the northern hemisphere has also been pointed out as being at the origin of climate change in the Sahel region and surrounding area such as Guinea-Bissau. These changes are particularly notable in the variability of precipitation with delays in early rains, increased extreme events of precipitation, reduction of total and the number of days of precipitation, appearance of dry periods at half of rainfall season, strong winds, increased temperature, increased heat waves, decreased thermal amplitude with rise of the minimum temperature and number of warm nights (with values oscillating in about 10% in some cases).

1.2.4 Temperature variability

Climate unpredictability will remain an overriding aspect of climate in Guinea-Bissau. Given that these qualms are present in the socio-economic life of the country, planning for increases in temperature together with the development of resilient planning for extreme events of drought will be required, particularly in the eastern portion of the country (Bafatá), and flood along the coastal zone and uncertainty over precipitation levels. Temperature projection scenarios systematically signal increased average daily temperatures of up to + 1.4°C for the period 2016-2045, potentially reaching up to + 2.2°C in the 2046-2075 period, per a low emissions assumption. Under a high emission scenario, the changes are in the order of + 1.6°C to + 3.1°C for the period 2046 to 2075.

1.2.5 Rainfall variability

The monthly precipitation values (%) during the months of June, July, August and September of the most recent time series (1981-2017) indicate that in general there is a tendency for the values of monthly precipitation to reduce (~10%) with great interannual variability. Guinea-Bissau rainfall series indicates (Figure 1.2) that there have been three main trends between 1950 and 2017: prevalence of wet years then between 1950 and 1970: prevalence of dry years between 1970 and 1990: and from 1990 onwards: marked shifts between wet and dry years.

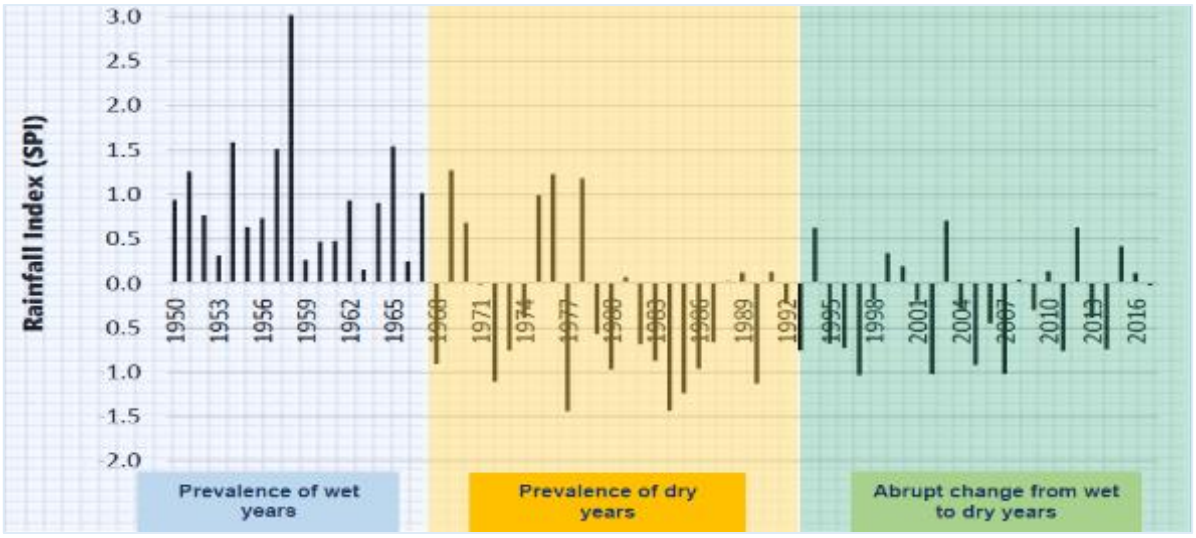


Figure 1.2 - Change in rainfall index (SPI) for Guinea-Bissau between 1950 to 2017 (Data Source: Ferreira, T C & Lona, J T. 2018 with data from INM-GB, 2018).

1.3 Population, Economic and Social Development

Guinea Bissau's population is estimated to climb to 1.92 million in 2019, compared to 1,842 million (est 2017) and 1,514 million at the 2014 census. The population density of Guinea Bissau increased from 44.21 people per square kilometer as of, 2000 to 64,57 in 2016 (Table 1.1). Concentration of urban population is also taking place in other major cities such as Gabú 43,556 (2009) and Bafatá 34,760 (2010). Population of urban areas in Guinea-Bissau has been growing at considerable rate and recent data indicate that urbanization stands at 4.28% (2010-2016 est.). This means that in general considerable amount of people is migrating to urban areas. Urban population (% of total) in Guinea Bissau stand at 43.4 % in 2018 est (World Fact Book, 2018). Approximately one-fifth of the population lives in the capital city of Bissau along the Atlantic coast; the remainder is distributed among the eight other, mainly rural, regions. The population of Guinea-Bissau is expected to grow in 2019 and reach 2,000,000 by the end of 2020 (populationof.net. 2019).

Table 1.1 - Guinea-Bissau's population and demographic trends based on consistent time series data (sources: GNB BUR Sectoral Report 2018 with data from INE, 2009; WB, 2016).

Indicator	2000	2010	2012	2013	2014	2015	2016	*2017*
Total population[1]	1.243	1.555	1.638	1.681	1.725	1.770	1.815	*1.842**
Annual population growth (%)	1,82	2,50	2,60	2,61	2,60	2,56	2,52	-
Annual growth urban population (%)	4,09	4,46	4,41	4,35	4,27	4,16	4,05	-
Annual growth of pop-rural (%)	0,53	0,91	1,02	1,05	1,05	1,03	1,00	-
Population density (inhab/km^2)	44,21	55,33	58,26	59,80	61,37	62,96	64,57	-
Birth rate (Gross/1000 inhab.)	41,33	39,25	38,58	38,15	37,68	37,15	-	-
Mortality rate (Gross/1000 inhab.)	14,04	11,99	11,52	11,27	11,03	10,78	-	-
Average life expectancy (years)	52,23	55,00	55,76	56,15	56,55	56,95	-	-
Infant mortality rate (/1000 birt.)	105,20	72,40	66,50	63,90	61,60	59,60	57,80	-

[1] In 2009, the population was 1.520.830, According to the official census (INEC, RGPH, 2009)

1.3.1 Demography

In 2015 the population age distribution was such that 39.6% of the population is under 15 years old, 55.0% between 15 and 60 years old and 5.4% of the population is 65+. Guinea-Bissau's young and growing population is sustained by high fertility; approximately 60% of the population is under the age of 25. Its large reproductive-age population and total fertility rate of more than 4 children per woman offsets the country's high infant and maternal mortality rates. The latter is among the world's highest because of the prevalence of early childbearing, a lack of birth spacing, the high percentage of births outside of health care facilities, and a shortage of medicines and supplies. Predominantly, the population of Guinea-Bissau is rural based, with about 56.6 percent of Guinea-Bissau's population living in rural areas and the number of urban residents being around 743 402.

1.3.2 Socio-Economy

Guinea-Bissau's HDI value for 2017 is 0.455— which put the country in the low human development category—positioning it at 177 out of 189 countries and territories. Between 2005 and 2017, GuineaBissau's HDI value increased from 0.396 to 0.455, an increase of 15.0 percent (Table 1.2). Guinea-Bissau's life expectancy at birth increased by 8.7 years, mean years of schooling increased by 0.7 years and expected years of schooling increased by 6.8 years (UNDP, 2018).

Standard of living measured by Gross National Income (GNI) per capita expressed in constant 2011 international dollars converted using purchasing power parity (PPP) conversion rates have shown a steady increase from 1,335 in 1990 to 1,552 in 2017 (UNDP, 2018). However, the GDP per-capita of Guinea-Bissau as an indicator of country's economic strength, has reached 692.60 US dollars in 2011 and went through a mostly stable period picking up to 614 in 2010 then reaching 620.21 US dollars in 2016 and this represents a GDP per Capita equivalent to 3% of the world's average.

The vulnerability of the economy is twofold. In one hand, the high dependence on agriculture (almost 60% of GDP) in particular, the cashew industry alone, the main source of export revenue and a significant share of government revenue. On the other hand, the long period of political instability.

Table 1.2 -. Guinea-Bissau's HDI trends based on consistent time series data and new goalposts (UNDP, 2018).

Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP$)	HDI
1990	49.1	3.7		1,335	
1995	51.0	5.2		1,343	
2000	52.3	6.7		1,320	
2005	53.4	8.5	2.3	1,312	0.396
2010	55.1	9.9	2.6	1,394	0.426
2015	57.0	10.5	2.9	1,485	0.449
2016	57.4	10.5	3.0	1,540	0.453
2017	57.8	10.5	3.0	1,552	0.455

1.4 Sectoral Development

1.4.1 Agriculture and Livestock

The agricultural sector is the backbone of Guinea-Bissau economy, a source of income for 85% of the population. Agriculture plays an important role in the country's external accounts, and therefore has a significant impact on macro-economic stability of Guinea-Bissau. Agricultural exports account for over 98% of total exports of goods. Production and export of cashew nuts and rice cropping are the major activities coupled with extensive livestock. In 2012, the area under cashew cultivation was 223 000 ha with an annual production of 130 000 tons of raw cashew nuts (FAO, 2015)[3]. In 2013, cashew nuts accounted for 87.7 percent of the country's total exports. The industry has been increasing since the late 1990s, and now 85 percent of people living in rural areas depend on these orchards in some way for their livelihoods[4]. This has allowed for great economic improvement, yet the lack of biodiversity involved with this monocultural practice leaves citizens extremely vulnerable. If crops failed or were struck by disease, hundreds of thousands of citizens would be negatively affected.

The country's climate and soil make it feasible to grow a wide range of cash crops, fruit, vegetables, and tubers; however, cashews generate on average more than 80% of export receipts and are the main source of income for many rural communities. Guinea-Bissau also exports to Asia non-fillet frozen fish and seafood, peanuts, palm kernels, and timber (The World Fact Book, 2019). License fees for fishing in their sea-zone (Gulf of Guinea) provide the government with some revenue. Rice is the major crop and staple food. Commercial cashew nut growers have 15% of cashew plantations (15 000 hectares) whilst the remaining 85% (88 000 hectares) belong to traditional farmers. Rice is another strategic crop in Guinea-Bissau and is the staple food of more than 95 percent of the population. In 2014, the country produced 133 000 tonnes of this cereal. However, for over ten years, there has been a growing deficit, which was estimated at over 100 000 tons in 2009/2010, with domestic production covering only 47% of consumption. In Guinea-Bissau, the livestock sector contributes 17% to the national GDP and 32% of the agrarian sector GDP. According to the livestock census conducted in 2009 by the Directorate General of Livestock (DGP) under the PRESAR / BAD, it is estimated that the total number of cattle rounds 1 325 412, distributed mainly in eastern and northern areas[5].

N'Dama cattle breed

1.4.2 Fishing

The Exclusive Economic Zone (EEZ) runs along 270 km of coastline and has 105.740 square kilometres for a continental shelf of 45 000 km². The fisheries sector is one of the most important for the country's economy and directly employs around 15 000 people or indirectly 120 000 workers. Fishing contributes to about 7-10% to GDP and around 3.9% in exports contributing with 40% to the state budget (The World Bank, 2018). Fishing in Guinea-Bissau has a potential estimated at around 523 160 tons, corresponding to a pelagic potential of around 212 500 tons and demersal (bottom dwelling) species equal to 310 660 tons. Artisan fishery accounts to about 35 000 t (2010). Artisan fishery has incorporated some technical innovations, such as certain kinds of nets, new refrigeration techniques and, mostly, motorization with the introduction of outboard motors. This fishery is done in a complex, fragile and mobile marine ecosystem (Nahada, et al., 2012).

1.4.3 Energy

Energy consumption in Guinea-Bissau is mainly based on biomass (90%), oil products (8%) and electricity (2%). Biomass energy resources encompass wood, coal and agricultural / forest products. At the level of subsistence communities, the collection and use of wood / coal for heating and cooking uses enormous resources in biomass and hand labour. The hydroelectric potential of Guinea Bissau is high, however only 33.84MW of hydropower capacity has been identified so far (including Saltinho (14MW) and Cusselinta (13MW)) in studies carried out in the 1980's. Therefore, in Guinea-Bissau the production of electricity is excessively dependent on imported diesel fuel. The country's energy strategy pursues to increase reliance on local energy sources, by placing more emphasis on the utilization of renewable energies to gradually lessen the dependency on the traditional energy sources, especially oil importation. Guinea Bissau has only one solar photovoltaic power plant of 314kW to produce electricity (which was expected to start operating in 2014), and a pilot projects for energy cogeneration with cashew shells, whose energy sources or resources are abundant in the country. In addition, there are projects being developed in the context of hydroelectric plants, for example, the OMVG[2], (the Gambia River Basin Development Organization) Saltinho/Cusselinta and Banbadinga.

[2] Organisation pour la Mise en Valeur du fleuve Gambie

1.4.4 Coastal Zones and Biodiversity

Guinea Bissau's biodiversity constitutes a significant natural asset for the country that, if protected, has the potential to serve as the backbone of a future tourism industry. Possessing an incredibly diverse set of eco-systems ranging from dense tropical forests to mangrove swamps, Guinea-Bissau has become increasingly more conscious of the value of its natural wealth, investing substantially in conservation to the extent that approximately 26% of its national territory is protected (The World Bank, 2015).

Guinea-Bissau's Bijagós Archipelago is one of these protected areas made of a collection of 88 islands that guard the country's capital Bissau. A UNESCO Man and Biosphere Reserve (UNESCO, 2017). the archipelago contains both national protected areas (Orango, João Vieira-Poilão) and community reserves (Urok)[6] all haven for hundreds of species of birds, fish, and mammals. Poilão is amongst the 10 most important nesting sites for green turtle population (Figure 1.3) making one of the greatest biodiversity values of Guinea-Bissau. At the same time, the coastal zone also provides valuable ecosystem services now, including nursery and breeding grounds for commercial fish stocks, carbon stocks and a buffer to mitigate against the impacts of climate change. Two additional terrestrial national parks (the Dulombi and Boé parks) and three environmental corridors (the Tche-Tche, Salifo, and Cantabane Corridors), which connect areas and permit wildlife movement while buffering human communities, were recentlt added. At present, vegetative cover along the coastline in the identified hotspots has been degraded for several climate and anthropogenic-driven reasons. In Guinea Bissau mangroves are exploited to smoke fish and have reduced mangrove cover that otherwise function as a natural protective barrier to coastline erosion and sustain fishing activity.

Green Turtle

Figure 1.3 - Green turtle in Poilão protected area - Guinea-Bissau's Bijagós Archipelago (Seminoff, J.A. 2004)

1.5 Water Resources, Land Use and Forest

1.5.1 Rivers

The country's water resource consists of surface water, rainwater, and groundwater. From the three categories of water resources the following quantities are estimated (DGRH, 2016): Surface water resources: 13,820 million m3 (estimated); Rainwater resources: 45 million m3; Groundwater resources: 1 756 million m3 calculated reserves (estimated). These resources have an estimated renewable annual rate of 180 million m3. The surface water includes major rivers and its tributaries (the main ones being from North to South, Cacheu, the Mansoa, the Geba, the Corubal, the Catio, the Rio Grande de Buba, the Cumbijã and Cacine) and estuaries. In addition, there are important stationary water bodies including lakes (like Cufada pond with an area of 35 000 hectares), lowlands (bas-fonds) and often temporary water bodies (Vendus) a common structure found in the East of the country. Some of the important rivers have a highly seasonal flow and many streams and rivers can dry up during the latter part of the summer. The Geba, the Farim and the Corubal Rivers are the most important in the country, and the first two almost cease to flow in the dry season. The Corubal River has an important dry season flow (11 m^3/ s on average) becoming the most important surface water resource in the country. The Geba River contribution is more modest, but with dramatic reduction of the flow of some of its tributaries during the dry season. Water Resources of main water Basins in Guinea-Bissau including the average annual volume is shown in Table 1.3.

Table 1.3 - Water Resources of Main Water Basins (DGRH, 2016).

Water Basin	Station	Surface Area (Km^2)	Average Annual Volume (Mm^3/Ano)	Dry Year Volume Recurrence 5 Years (Mm^3/Year)	Annual Volume Decadal (Mm^3/Year)
Corubal	Saltinho	23 840	13 200	8 100	6 380
Geba	Bafata	10 325	820	-	375
Geba	Gambiel	590	58	-	-
Cacheu	Jumbembem	1 722	96	-	34
Catio	Balana	150	90	-	-

1.5.2 Groundwater

The renewal of the water resources depends largely on the intensity and regularity of rainfall, whose parameters have been worsening gradually over the years. Groundwater and surface water reserves (free aquifers) are estimated to be several hundred m³ / year (from 10 to 250 m³ / year, depending on the zone). However, with high rates exploitation and salinity problems while much of the river network is actually an estuary with tides there is a significant saltwater intrusion extending 175 km upriver within the territory. This causes significant saltwater intrusion into the aquifer, which can cause problems during the dry season, if the extraction exceeds the water filling the aquifer. There is a huge water potential in the regions of Biombo and Cacheu Oio. However, cases of pollution of aquifers by saltwater, are most common in these regions. Deep aquifers, though little known in the South, have more limited exploitable renewable resources in the order of 10 to 30 Mm³ / year. The current exploitation of aquifers is estimated at 15 Mm³ / year and only 14% of deep aquifers are exploited in the region (DGRH, 2012).

1.5.3 Land Use

Guinea-Bissau continues to have huge agricultural and forestry potential, including arable land estimated at about 1.5 million hectares, of which 80% is on plateaus, 200,000 in freshwater valleys, 106,000 in salt water valleys and more than 100,000 square metres of areas with industrial wood (macauhub.com. 2018) The savannas dominate the land cover, accounting for about 45 percent of the country's land surface in Guinea-Bissau. Although the total savanna land surface has remained nearly unchanged, the underlying dynamic is not so simple. The rate of deforestation has increased from about 2 percent per year between 1975 and 2000 to 3.9 percent over the 2000 to 2013 period. Overall, Guinea-Bissau lost about 77 percent of its forests between 1975 and 2013; only 180 sq km remain, mainly in the south near the Guinea border. Likewise, woodlands regresed by 35 percent over the 38 years, a loss of 1,750 sq km (eros.usgs.gov. 2013).

1.5.4 Forests

More than 70 percent of the country is forested —more than 45 percent of which is primary forest. The south of the country consists essentially of clump forests with some of the country's best-preserved forest patches, probably housing the most dense northern forested area in West Africa. The forests of Guinea-Bissau contribute 6% in national GDP and contribute 6.2% in the country's export revenues. While Guinea-Bissau's net deforestation rate has been relatively low at 0.5 percent per year between 2000 and 2005, there is concern about increasing growth and development, especially in a new era of relative political stability. In particular, coastal mangrove swamps—some of the most important in Africa—are giving way to rice fields and hydroelectric projects. Slash-and-burn agriculture, coal production, fires, fuelwood cutting, and logging for timber have resulted in forest loss and subjected Guinea-Bissau to serious soil degradation. Actually, new data (Mongabay, 2018) shows that the area of tree cover (1,022,708 ha) in 2018 in relation to land area (3,402,910 ha) stands at 30.1% (Mongabay, 2018). Annual loss (ha) of primary forest cover and tree cover for Guinea-Bissau is rapidly changing as is shown in Table 1.4. The human pressure in search of spaces for agriculture, construction and commercial purposes, and of woody material (firewood, coal) for the production of energy, etc., have led in particular to the degradation of the clump forests of the southern zone.

Table 1.4 - Annual loss (ha) of primary forest cover and tree cover for Guinea-Bissau by year from 2000 to 2018.

Year	Primary forest	Tree cover (30%[7])
2001		2,368
2002	137	6,081
2003	14	1,022

2004	76	3,550
2005	76	3,550
2006	49	2,019
2007	65	6,054
2008	69	3,255
2009	138	7,975
2010	139	4,909
2011	149	4,284
2012	110	3,517
2013	476	20,735
2014	448	12,885
2015	408	12,693
2016	527	16,140
2017	504	16,465
2018	451	14,412

Source:https://rainforests.mongabay.com/deforestation/archive/Guinea-Bissau.htm

Deforestation, that is, the use of forest resources for other purposes, is responsible for issuing a large amount of CO2 by the atmosphere. The estimates point to a decrease in the order of 625,000 m3 per year, from the forest surface of the country (The National Strategic document – Terra Ranka (2015-2025)), i.e.:

- Reduction of 30% of the dense humid forests of Tombali;
- Reduction of 57% of the savannah forests of Bafatá, Oio and Gabú;
- Reduction of 19% of Mangrove forests.

The forest area of Guinea-Bissu is around 2 072 000 ha (CARBOVEG Project, 2007). However, between 60,000 and 80,000 hectares (Sardinha, 1993) of Guinea-Bissau forest are lost every year due to deforestation, illegal logging, uncontrolled forest fires and charcoal production. The wood is the dominant biomass fuel for domestic consumption, with a demand that probably exceeds 500 000 tonnes per year. The vast majority of the population still cooks on firewood and charcoal and on average, 60 000 hectares (Bianchi et. al., in 1986) of land are cleared and/or burned every year in Guinea-Bissau. The disappearance of the forest and mangroves, and the impact on sequestration of the GHGs produced through fires and smoke form charcoal and wood as household energy may probably lead to serious atmospheric consequences.

1.5.5 Conservation and Management of Biodiversity

Compared to the neighboring countries in the West Africa the biodiversity of Guinea-Bissau is still relatively rich, diversified and unique. This can be seen from the data below of species count by taxa for Guinea-Bissau (Table 1.5).

Table 1.5 - Species count by taxa for Guinea-Bissau.

Animal / plant group	Species count
Birds	456
Amphibians	21
Reptiles	69
Fishes	677
Mammals	123
Vascular plants	1000

Source: Amphibians - amphibiaweb; Reptiles - reptile-database; Fish - fishbase; Birds - birdlife; Mammals - IUCN; and Plants - World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC).

Nevertheless, the pressure has been increasing on the renewable natural assets, in these most recent years, driven not only by natural factors, but mainly by the anthropological activities, which have been increasing intensively every year due to market demands and the extremely poor people's need for survival. As the flora of Guinea-Bissau is very rich, plants are intensively used in the traditional pharmacopoeia; this practice is deeply rooted among the rural communities of the country. These medicinal plants are essentially for the cure of the most frequent diseases, such as: malaria, diarrhea, skin diseases, hepatitis, hypertension, diabetes, snake bites, among others. There are however several factors of pressure on biodiversity mostly originated by human activities. Among others the (i) effects of extensive livestock practiced in the country, mainly in the east and northeast zones, (ii) forest fires sometimes uncontrolled, which have negative impact on the fauna and floristic composition; (iii) the pressure of the exponential growth of population with rapid urbanisation with corresponding needs, including that of woody fuel (firewood and coal), (iv) the practice of the traditional agriculture based on slash and burn; the wild expansion of cashew orchards; the growing production vegetable coal for domestic use as source of energyl and firewood search, (v) wood exploitation leading to a frightening degradation of the forest potential taking place particularly in the east frontier zones, namely Pirada, Canquelifá, Pitche and surroundings, accentuating climate change impacts (GoGB, 2015). Therefore due to all these pressures there are currently several species under threat in Guinea-Bissau (Table 1.6).

Table 1.6 - Data on threatened species in Guinea-Bissau as of 2017.

Taxa	Species count
Threatened mammals (2018)	14
Threatened birds (2018)	12
Threatened fishes (2018)	41
Threatened higher plants (2018)	6

The Government of Guinea-Bissau (GoGB), aware of the current challenges of this sector has put forward an Action Plan for the Strategy for the Biodiversity of Guinea-Bissau with the objective to identify solid measures to accomplish its goals which include:

- Reduce the direct pressures on biodiversity and to promote its sustainable use;
- To address the fundamental causes of the biodiversity loss, making sure that concerns about the biodiversity are integrated and are appropriate for the government and for the society in general;
- To improve the biodiversity situation, protecting ecosystems, species and genetic diversity;
- To increase the biodiversity benefits and ecosystem services for all;
- To increase the implementation of the Action Plan through participating planning, knowledge and training management.

This action plan includes, not only measures of the national responsibility, but also activities to be undertaken by the regions and the local communities and by other actors that interact with the biodiversity and that benefit from the services rendered by the ecosystems.

1.5.6 The National Protected Areas

The creation of the Protected Areas for the conservation and management of natural resources, one of the greatest achievements of the country and was expected to rise to 24% by 2015 and now set at 26.3% in 2017. Indeed the Government of Guinea Bissau has established new protected areas, including the Dulombi-Boe-Tchétché complex that consists of two national parks and three ecological corridors. So far, the investment priorities of the country in the area of conservation related to the creation of protected areas along the coastal and island area (the Bijagos Archipelago) covering almost 15% of the national territory. In order to protect a more complete and representative sample of key habitats, efforts made in recent years consisted in developing the national parks of Boé and Dulombi on the country's mainland, close to the border with Senegal and Guinea. These parks now offer protection for a remarkable biodiversity such as lions, panthers, chimpanzees or elephants. Comprising of a Ramsar site, called Wendu Tcham, that is home to major waterbird populations, in addition to three (3) wildlife corridors, the Boé National Park ensures connectivity between the two parks and with the Lagoas de Cufada Natural Park and the Cantanhez National Park.

The National System of Protected Areas of Guinea-Bissau corresponds to seven protected areas (SEA. 2019): Parque Natural das Lagoas da Cufada (PNLC), Parque Nacional de Cantanhez (PNC), Complexo Dulombi, Boé e Tchetche (DBT), Parque Nacional das Ilhas de Orango (PNO), Parque Natural dos Tarrafes de Cacheu (PNTC), terrestrial part of Parque Nacional Marinho João Vieira e Poilão (PNMJVP) and Área Marinha Protegida Comunitária das Ilhas de Urok (AMPCIU). The national protected areas system now covers 26.3% of the national territory, with an extension of approximately 750,000ha representing 12.4% of marine protected areas and 13.9% of terrestrial protected areas, which is by and large compliant with the Aichi Targets of the Convention on Biological Diversity (CBD).

This set of protected areas (Figure 1.4) and their respective area of influence contain the most relevant forest, woodland and mangrove patches of the country Institute for Biodiversity and Protected Areas (IBAP) has been working in close collaboration with many partners to manage these areas, including the Fondation BioGuinée, now at the capitalisation stage, which will provide an essential sustainable funding tool for the proper management of protected areas (prcmarine, 2019).

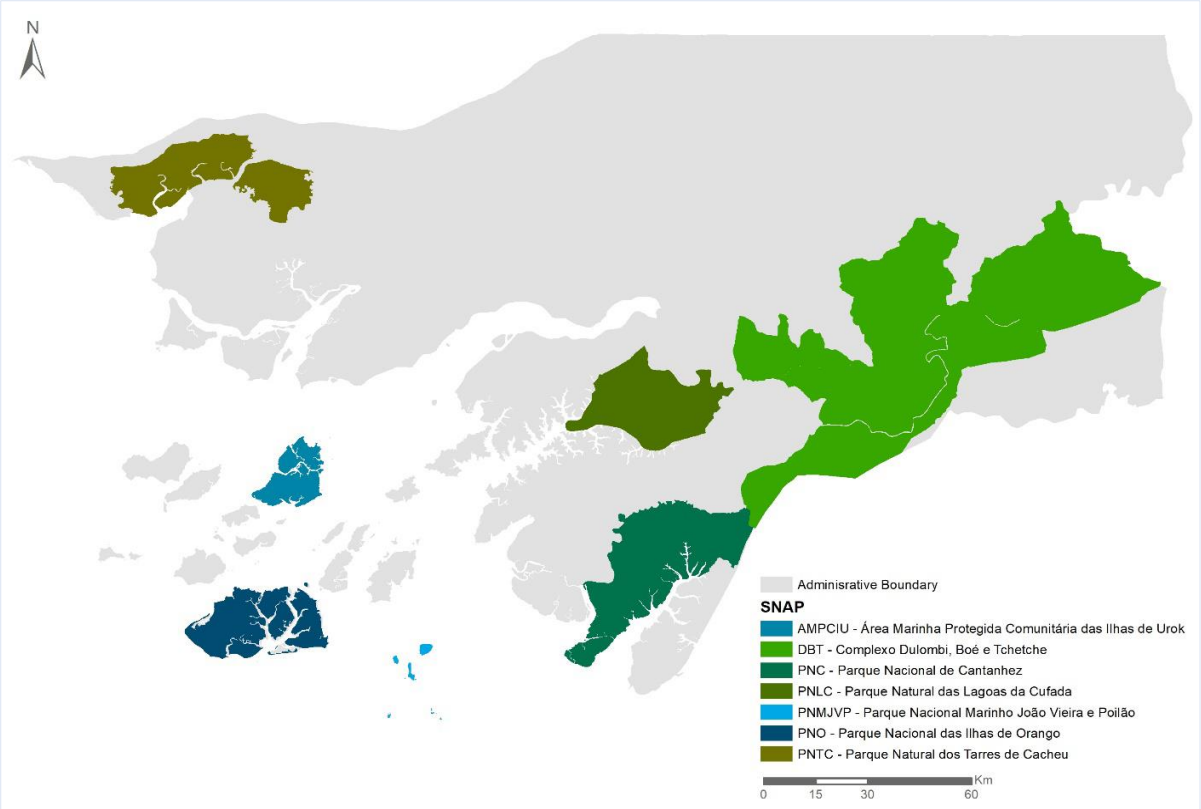


Figure 1.4 - The National System of Protected Areas of Guinea-Bissau with corresponding seven protected areas (Source: SEA. 2019).

1.6 Key development policies relevant to climate change

1.6.1 Mitigation Policies

The Government of Guinea-Bissau has elaborated and implemented a wide range of policies that relate directly or indirectly to climate change and GHG mitigation.

• The Terra law was approved by the National Assembly. This instrument regulates the management of space in the national territory and, in particular, brings discipline and minimizes the problems associated with land concessions for different purposes. However, this law recognizes two fundamental aspects: Forest reserves and the recognition of customary law of community land management.

• Framework Law on Protected Areas (PA), an instrument that aims above all to create a legal framework conducive to the conservation of fragile ecosystems in Guinea-Bissau. It also regulates the classification system and the declassification of protected areas at national level.

• Forestry Law: This law updates the rules and forest taxation and are being applied throughout the national territory. This new forestry law attaches great importance to aspects of reforestation, overexploitation in areas where there are sawmills and areas with potential problems of land degradation.

• Mining and Minerals Law. This Law regulates the different forms of exploitation of mineral resources in the country. Most minerals in the country are in forest areas susceptible to degradation in case of poor management. The law can contribute to meet the standards of concern for environmental protection. The holder of the operating license must, under penalty of sanctions, strive to reconcile the work of exploitation with the environment. For example, the operating licenses granted to quarries in general will only be issued if they are discovered that do not adversely affect the environment.

• The National Forest Action Plan contains a detailed analysis of the situation based on which policies are defined, strategies, actions and goals to be achieved, to use durable forestry resources, It

also defines the means necessary for its implementation in the following main issues:

- Techniques for the use of forest space by the population to combat food insecurity;
- Burning for changing in cultivation and for hunting;
- Extensive livestock and increased transhumance;
- The use of fire as the main instrument of deforestation and renovation of pastures;
- The process of deforestation to create new agricultural land for cash crops (especially cashew nuts, peanuts and cotton);
- Overexploitation of forest species of high commercial value;
- Increase in hunting sites and illegal hunters;
- Increase in population density and appearance of new Tabancas (small villages) in the wildlife corridors.

• The National Environmental Management Plan (NEMP), the main document and regulator of environmental issues in Guinea-Bissau. This document contains the main concerns of other development sectors, not only in terms of conservation, but also of development itself. The plan, through programs and projects, seeks solutions to ensure food security, poverty eradication, pollution control and environmental sanitation; conservation of natural resources and control of the spreading of desertification and soil erosion, in addition to minimizing the anthropic impacts that influence climate change. (NEMP, 2002).

• The Agenda of action for sustainable Energy for all in Guinea-Bissau, accession to the initiative of THE UN Secretary-General, in November 2011, on Sustainable Energy for all;

• National Action Plans: Renewable Energies (PANER); investment in sustainable energy and energy efficiency in Guinea-Bissau, 2015-2030; In the framework of accession to ECOWAS/UEMOA regional policies through the white Paper on renewable energy policy and energy efficiency.

1.6.2 Strategies, plans and objectives linked to climate change

In order to stabilize the concentration of greenhouse gases (GHG) in the atmosphere at levels that prevent dangerous interference with the planet's climate system, the United Nations Framework Convention on Climatic Changes (UNFCCC) was adopted at 1992. The Kyoto Protocol, currently ratified by 192 parties, entered into force in February 2005, and constitutes an instrument that concretizes a global reduction of GHG emissions of 5% in the period 2008 to 2012, compared to emissions recorded in 1990. Guinea-Bissau ratified the UNFCCC on 27 October 1995, thus becoming a Contracting Party to the Convention, and undertook to develop, update and report to the Conferences of the Parties (COP) The national inventories of GHG emissions and removals. The country ratified the Kyoto Protocol on 18 November 2005. Being part of the UNFCCC is thus committed to participate in the GLOBAL GHG reduction efforts, that is, to prevent the planet's temperature from increasing 2ºC and cause irreversible damage to the balance of natural systems. Guinea-Bissau has been making efforts internally to become resilient to the effects of climate change, namely:

- Drafted national reports on National Communications 1, 2 and 3, the National Action plan for Adapting to Climate Change;
- The expansion of its national system of terrestrial and marine protected areas is under way, which will pass from around now 12% of the national territory to 26% in 2020;
- Finalized the National Action Plan for REDD+ as a contribution to the mitigation of greenhouse Gases;
- The effort to integrate environmental dimension into public policies, promotion and introduction of environmental education in school curricula and in the preparation of the National Strategy for Sustainable Development, to influence the Socio-economic development based on respect for environment paradigms.
- In 2012 the United Nations Programme (UNDP) financed a consultation work aimed at identifying barriers, gaps and capacity needs at institutional, human and systemic level for a successful formulation of Strategy Development to low carbon emission (LEDS), NAMAs and MRV system.

This work has laid the foundations for adopting the country with a national greenhouse gas emission Reduction (GHG) strategy.

With regard to the implementation of the Kyoto Protocol, the CARBOVEG-GB project was implemented which brought to light data on the quantification of stored carbon and the sink capacity of the forest vegetation of the country. However, the rate of deforestation at national level points to worrying parameters, and the main reasons for this dynamic are itinerant farming, over-

grazing-exploitation, logging, excessive use of firewood and coal as a source of energy mitigation and proliferation of cashew monoculture, among others.

1.6.3 Institutional arrangements relevant to climate change

The country ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 27 October 1995 and ratified also the Kyoto Protocol on 18 November 2005 (IGEE, 2008) thus becoming a contracting Party to the Convention, committed to develop, update, publish the National Communications on Climate Change and other strategic documents on the same theme and participate in the Conferences of the Parties (COP). The national structure that the Guinea-Bissau Government has put in place for the regular preparation and reporting of national communication to UNFCCC had evolved from ad-hoc working groups that were set up aiming at attaining permanent decentralized institutional representations (see Figure 1.4). The institutional arrangements for national communications and Biennial Update Reports are intertwined and integrated into the superstructure for coordination of planning and implementation of climate change. Linkages have been established with the National Programme on Climate Change Committee (NPCCC) and the National Climate Change Commission, research and knowledge generation structures.

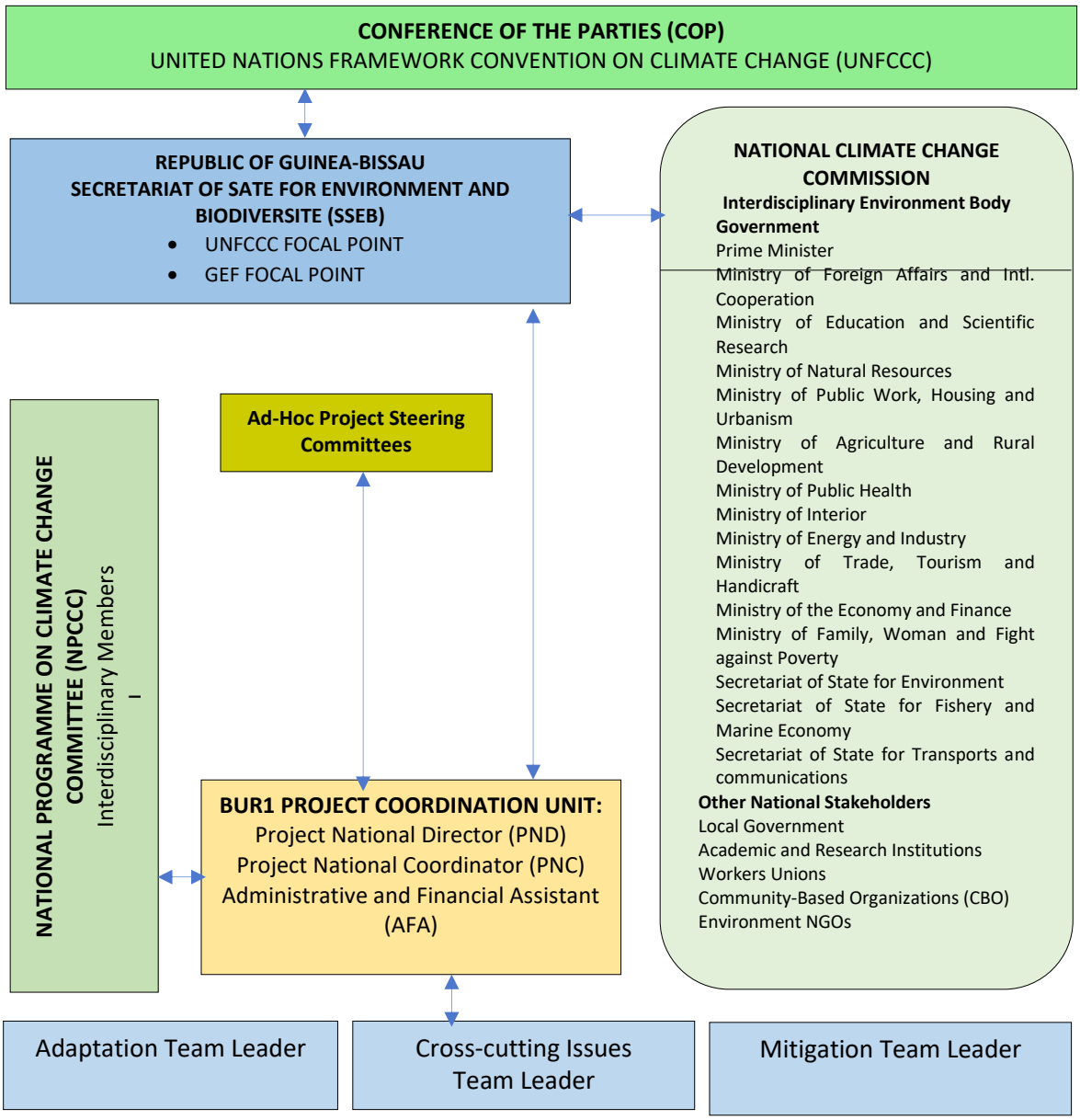


Figure 1.4 - Institutional arrangement for preparation of BUR 1 in Guinea-Bissau

Below in Table 1.4 is the description of the main stakeholders involved in the preparation of the BUR 1 as well as their main responsibility.

Table 1.4. Main stakeholders involved in the preparation of the Guinea-Bissau's BUR 1.

Name of key stakeholders	Responsibility/Expertise
National Climate Change Commission	It is chaired by the Prime Minister himself or his representative and it is responsible for formulation and implementing environmental agreement across government.
Secretariat of State for Environment	Governmental institution which is responsible for implementation of international environment agreements (including UNFCCC) to which Guinea-Bissau is Party. Based on this responsibility the Secretary of State assigns the function of Focal Point for each of these individual environment agreements (including GEF Operational Focal Point), to the Secretariat of State departments (through its directors) or to individual Staff members, whom operate under his leadership.
National Programme on Climate Change Committee (NPCCC)	It's a multidisciplinary forum where technical assessments and recommendations are made regarding issues related with UNFCCC implementation.
BUR 1 Project Steering Committee	The Coordinator is fully responsible for activities related to the implementation of UNFCCC decision in the country including BUR1.
BUR 1 Project Coordination Unit	Is responsible for execution management (technical, administrative and financial).
The Team Leaders	They Assist the BUR 1 Project National Coordination Unit in execution of BUR 1 technical activities with specific expertise on adaptation, mitigation and cross-cutting issues.
The Sectoral Focal Points	They are in other sectoral ministries responsible and entry point of climate change issues. Their role in BUR 1 implementation is capital as they contribute with technical inputs from respective sectors.
Civil Society	They comprise environment NGOs, CBOs, Workers Unions, etc. they provide inputs from local and communitarian level.

1.7 References and Footnotes

- DGRH, 2016. Diagnóstico de Necessidades e Gaps de Capacidades nas Entidades Gestoras de Serviços de Águas. http://www.ppa.pt/wp-content/uploads/2016/10/GuineBissau-1.pdf.
- Eros.usgs.gov. 2013. https://eros.usgs.gov/westafrica/land-cover/land-use-land-cover-and-trends-guinea-bissau
- FAO. 2015. Global Forest Resources Assessment (FRA) 2015. http://www.fao.org/3/a-i4808e.pdf
- Ferreira, T C & Lona, J T. 2018. Componente 3 do Projeto BUR 1: "Políticas e medidas para mitigação/atenuação das alterações climáticas e seus efeitos" Projecto SB-001119.13 - Elaboração do Primeiro Relatório de Actualização Bienal da implementação da Convenção-Quadro das Nações Unidas sobre as Alterações Climáticas. Componente 3 do Projeto BUR 1. 60pp.
- GoGB. 2015. Estratégia e Plano Nacional da Diversidade Biologica. Secretaria de ESatdo do Ambiente. Bissau. 155p
- MRN/DGA. 2007. Projeto CARBOVEG-GB – Quantificação do Carbono Armazenado e da Capacidade de Sumidouro da Vegetação Florestal da Guiné-Bissau.
- Mongabay. 2018. "Deforestation statistics for [selected country name]". Accessed on 06.10.2019 from rainforests.mongabay.com.
- Nahada V., Sobrino I., Rodríguez S., 2012. Extraordinary Joint Scientific Committee Meeting Report Guinea-Bissau – EU. Bissau. Reunião do Comité Científico Conjunto entre a República da Guiné-Bissau e a União Europeia.
- Partenariat Régional pour la Conservation de la zone côtière et Marine en Afrique de l'Ouest. 2019. Guinea Bissau: protected areas coverage up from 15% to 26.3%. Accessed on 06.10.2019 from prcmarine.org/en/guinea-bissau-protected-areas-coverage-15-263. Acessed
- Sardinha, R. 1993. O papel da arvore nos sistemas agrarios da Guine-Bissau". Primeiras Jornadas sobre a agricultura na Guine-Bissau, Comunicações, Lisboa, Secretaria de Estado da Ciência e Tecnologia, 183-206.
- SEA. 2019. Proposed Forest Reference Emission Level for The National System of Protected Areas of Guinea-Bissau – Secretariat of State for the Environment. Reducing Emissions from Deforestation in the National System of Protected Areas- REDD+ Results-Based Payments under the UNFCCC - Bissau | January 2019
- Seminoff, J.A. (Southwest Fisheries Science Center, U.S.). 2004. Chelonia mydas. The IUCN Red List of Threatened Species 2004: e.T4615A11037468.
- STRATEGIC AND OPERATIONAL PLAN FOR 2015-2020 "Terra Ranka". Guinea-Bissau 2025. Executive Summary & Portfolio of Projects. Organisation for Economic Co-operation and Development. 03-Dec-2015. 31p
- The World Bank. 2015. http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation.
- The World Bank. 2018. IMPLEMENTATION COMPLETION AND RESULTS REPORT. Second APL (APL-B1) West Af. Reg. Fisheries Program (Guinea Bissau) (P119380). 83p
- The-world-factbook. 2018. https://www.cia.gov/library/publications/the-world-factbook/geos/print_pu.html. Accessed 31.08.2019.
- UNDP. 2018. Human Development Indices and Indicators: 2018 Statistical Update. Guinea-Bissau. https://www.populationof.net/guinea-bissau/. Accessed 31.08.2019.
- Unesco. Org. 2017. (http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-andbiosphere- programme/)

Footnotes and others

[1] Food and Agriculture Organization [FAO]. 2015. FAOSTAT. FAO, Rome, Italy. http://faostat3.fao.org/browse/Q/QC/E [Accessed Jan 5, 2015].

[2] Sustainable Agriculture in Guinea-Bissau Increasing Production. 2018. https://borgenproject.org/sustainable-agriculture-in-guinea-bissau/

[3] Projecto de Dinamização dos Sistemas de Produção Pecuários nos Sectores de Pitche e Gabu BALAL GAINAKO (contrato DCI-NSAPVD 2010 / 257–105). Accessed on 25th April 2016 http://www.plataformaongd.pt/conteudos/File/Recrutamento/TdREstudo032011.pdf

[4]http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation

[5] Tree cover "threshold" is used for defining the tree cover area. 30% includes all areas with more than 30% tree cover.

Teak tree (*Tectona Grandis*) – National Parque of Cantanhez – Guinea Bissau

https://kalmasoul.com/en/tourism/parks/parque-nacional-de-cantanhez/

Chapter 2:
National Greenhouse Gas Inventory

Chapter 2
National Greenhouse Gas Inventory

Coastal Erosion - Varela Beach – Guinea-Bissau
https://en.wikivoyage.org/wiki/Guinea-Bissau#/media/File:A_Varela_Beach_06-10-2007.jpg

Chapter 2:
National Greenhouse Gas Inventory

2.1. Introduction

Guinea-Bissau is a non-Annex-I Party and a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. National communications (CNs) and the biennial update reports (BUR) are part of all the obligations of the country's parties to the UNFCCC, through which they disclose the state of implementation of the Convention at national level in its different modalities. While the CNs provides Information on GHG emissions, vulnerability and climate change adaptation measures, mitigation or emission mitigation options, etc., bi-annual reports (BUR) on their side seek to update and strengthen the information contained in the CNs. Consequently, within this framework, Guinea-Bissau is preparing its First Biennial Update Report to the United Nations Framework Convention on Climate Change to the COP. This First Biennial Update Report (BUR) seek to update and strengthen the information contained in the Third National Communication. Therefore, the inventory estimate carried out under this BUR covers anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol and greenhouse gas precursors and include carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) and the indirect gases nitrogen oxides (NOx). This section of the report presents a summary of the GHG results for the period 2006 -2012 (based on emission inventory statistics from 2010).

2.2. Socio-economic characterization of the country

Bissau the capital, is the largest urban centre and economic and institutional centre of the country with approximately 20% of the total population. The other major urban centres are the cities of, Gabu, Bafatá, Canchungo and Bassorã, where there are some important economic activities in the agricultural areas and the main transport routes. Besides these, there is another group of secondary centers that in the past reflected some economic glow, such as Catió, Cachéu, Bolama and Bubaque.

Bissau City Center Bissau, - Francisco Mendes Avenue

The economy of Guinea-Bissau is mainly based on the primary sector and international aid. The agriculture sector (mainly cashew cultivation) and fisheries contribute to about half of GDP, with services being the second main contributor. The industry sector is very poorly developed and contributes less than 15% to the formation of national GDP (Figure 2.1).

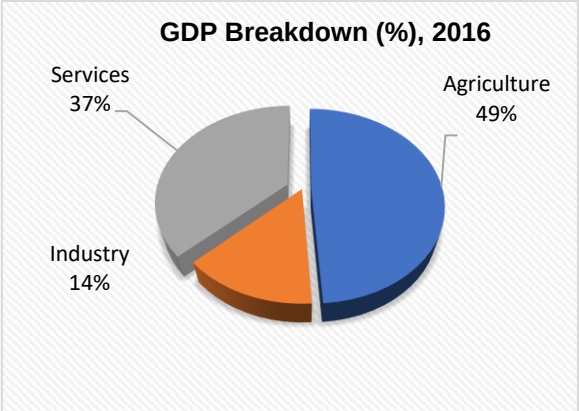


Figure 2.1 – Guinea-Bissau's GDP breakdown for 2016.

The trade balance (imports/exports) was always negative, although it had presented a positive trend in recent years. Unilateral bank transfers represent an important part of GDP, taking into account that they also include transfers for commercial purposes. The following table presents some economic and social indicators relevant to the context of the present study. (Table 2.1).

Table 2.1 - Macro-economic and social indicators of Guinea-Bissau (sources: INE, 2009; BM, 2016).

Indicator	2000	2010	2012	2013	2014	2015	2016
GDP (actual US$x10^6)	370,17	850,63	989,88	1 046,12	1 055,19	1 036,13	1 164,94
Annual GDP Growth (%)	5,43	4,72	-1,71	3,26	0,96	6,13	5,76
GDP per capita (actual US$)	297,75	546,72	604,27	622,14	611,44	585,21	641,60
Annual GDP growth per capita (%)	3,52	2,14	-4,23	0,59	1,62	3,45	3,13
Import of goods and services (% in GDP)	33,12	35,24	25,70	25,82	32,13	32,90	27,05
Export of goods and services (% in GDP)	21,76	19,91	15,56	18,44	22,27	27,86	26,11
Agriculture, Value added (% in GDP)	42,74	46,95	48,67	45,65	43,10	49,45	49,13
Industry, Value added (% in GDP)	14,45	13,68	14,06	14,92	15,10	13,22	13,54
Services, Value added (% in GDP)	42,81	39,36	37,27	39,44	41,80	37,32	37,34
Unilateral bank transfers (% GDP)	24,87	26,66	30,55	31,35	46,26	50,05	48,52

2.3. The energy sector characterization

The energy Sector of Guinea-Bissau is among the least developed in the West-African sub-region, reflecting the low level of access of its populations to modern energy. In fact, the rate of access to energy of 16% in 2015 versus 11.5% in 2010 (of which only 10% relative to the network) reveals the undeniable delay of the country in relation to the same context in the sub-region and evidences, in particular, the perverse effects of erratic socio-economic development status of the country over the last decades. Apart from the fossil energy resources to be confirmed, it is considered that Guinea-Bissau is a country with many primary energy resources, especially renewable, such as sun, wind, water and forests. The latter are the most exploited resource, due to the low technical and financial costs associated with its exploitation. It is important to underline that given the weak level of access to energy in Guinea-Bissau, all the production of primary energy is normally consumed in its entirety. According to the Energy Master Plan of 2013, the

in-country supply of energy is mainly based on woody biomass (firewood and coal), which represents 87% (360.21 ktoe) of total primary energy production, supplemented by petroleum products (13%, corresponding to 52.38 ktoe) which the latter is mostly imported (Figure 2.2).

2.3.1 Electricity

The energy Sector of Guinea-Bissau is among the least developed. The national electricity sub-sector has evolved in line with the country's socio-economic development profile, often with abrupt declines following timid progress. Since its independence, Guinea-Bissau has known countless socio-political crises that have had as its outcome recurrent periods of instability in the sector's policies and legislations/regulations. The investments for their development were postponed and delayed for decades, mainly due to the lack of confidence of the private sector and development partners. However, currently the Government launched The National Action Plans for Renewable Energy and Energy Efficiency to provide a coherent vision how to achieve universal access to sustainable energy services so to rapidly reduce the country's dependence on diesel imports for power generation.

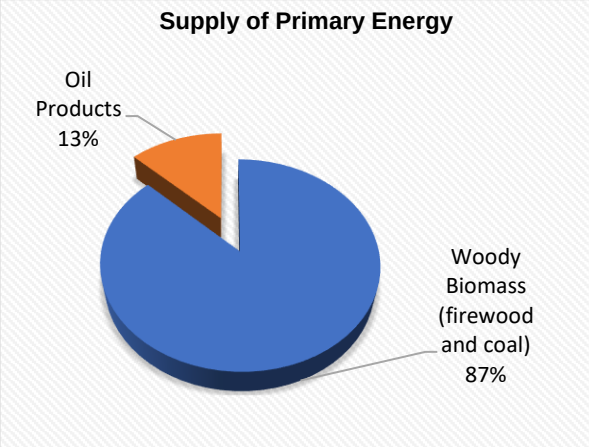


Figure 2.2 – Partitioning of supply of primary energy in Guinea-Bissau for 2013.

2.3.2 Energy consumption

Energy consumption in Guinea Bissau is still dominated by the Residential Sector, with almost 92%, corresponding to 339 ktoe, followed by the Transport Sector.

Residential Sector — Biomass (firewood) continued to determine domestic consumption, with more than 95%, followed by oil derivatives with about 5%.

The country's weak electrification rate has continued to constrain household access, especially in rural areas, to modern electricity services, justifying negligible electricity consumption. Firewood is by far the main fuel, with a demand of the order of 89% of total consumption of biomass in rural households. Next comes the charcoal, fuel mainly used in the capital Bissau and which leads to exaggerated quantities of wood being cut from national forests. Petroleum fuels, whether kerosene, diesel or domestic gas, are rarely used in the kitchen. Kerosene and diesel fuel are mainly used for home lighting, which reflects the low consumption of electricity. But butane gas (LPG) is also mostly used in urban centres, particularly in the capital, although not massively, as most city dwellers remain dependent on coal and firewood, such as the bakery, military barracks and hospital centres (Figure 2.3).

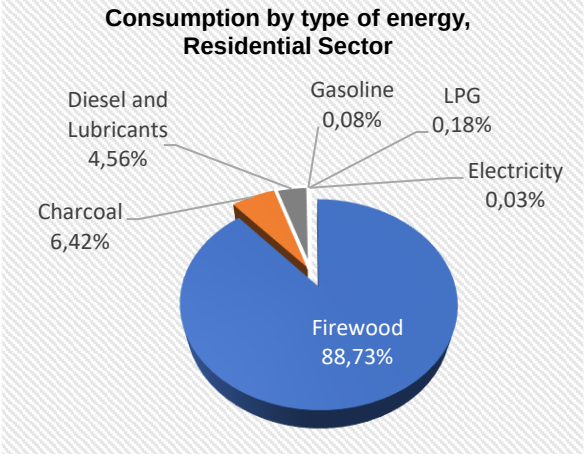


Figure 2.3 – Consumption by type of energy in the Residential Sector of Guinea Bissau.

Transport Sector — In the Transport Sector, energy consumption is dominated by the Road Transport Subsector (83%) in the form of diesel and gasoline, followed at a distance (6%) by the Air Subsector (Jet A or Gasoline Aviation) and by 1% of inland Maritime Navigation. essentially characterized by cabotage and artisanal fishing. In total, the final energy consumption of the Transport Sector reached 34.07 ktoe in 2010.

2.4. Agriculture, Forestry, and Other Land Use (AFOLU)

The inventory estimate carried out in the context of this BRU1 covers anthropogenic emissions by anthropogenic sources and removals by sinks of all GHG not controlled by the Montreal protocol and the precursors of gas greenhouse effect and includes carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) and indirect gases oxides of nitrogen (NOx).

Forest resources constitute more than 87% of the country's domestic energy needs, of which wood is the most used by the population. Problems in this sector are related to deforestation, pastoralism, soil erosion, irregularity and reduced rainfall and increasing population in forest areas, in short, pressure on biodiversity.

Whether from clearing for cultivation, local harvesting of wood, or for external commercial markets, the forest resources have been heavily degraded by rapid exploitation. The rate of deforestation has increased from about 2 percent per year between 1975 and 2000 to 3.9 percent over the 2000 to 2013 period. Overall, Guinea-Bissau lost about 77 percent of its forests between 1975 and 2013; only 180 sq km remain, mainly in the south near the Guinea border. Likewise, woodlands regressed by 35 percent over the 38 years, a loss of 1,750 sq km (USAID, 2015). Successive cutting of the trees and their commercialization by the population is currently under way to guarantee the financial means for their subsistence in rural areas. Even with the extensive practice of pastoralism, logging, the traditional practice of highland agriculture on tree cutting and burning of forests are major causes of forest degradation in the country. According to Government authorities, it is estimated that between 50,000 and 80,000 ha of forests are burned annually for farming and hunting. The inventory carried out from 1978 to 1985 showed that the forest space had decreased about 31,500 ha in this period being Afzelia africana, Khaya senegalensis and Pterocarpus erinaceus the three species most sought.

However more recent data indicate an alarming scenario on forest degradation in the country. Deforestation measured as tree cover loss assessed from 2001 to 2018 for different "tree cover threshold" used for defining the tree cover area from dense forests (≥75% close canopies) to open forests (≥10% sparse canopies) indicate systematic losses across all threshold values (Figure 2.4).

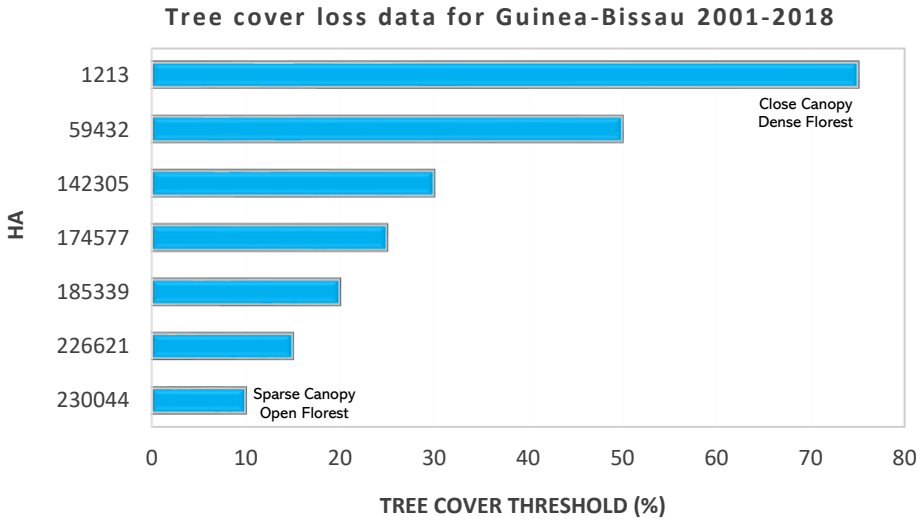


Figure 2.4 – Deforestation measured as tree cover loss assessed from 2001 to 2018 for different "tree cover threshold" for Guinea-Bissau 2001-2018 (Data Source: https://rainforests.mongabay.com/deforestation/archive/Guinea-Bissau.htm)

Forest degradation in open canopies are extremely high with more than 230,000 ha lost in the open forests of Guinea-Bissau. Yearly average losses varied from 6064 ha during the 2001-2010 period to 21,176 ha between 2011 and 2018. Forest degradation gradually decreases with increasing cover threshold (≥75% close canopies) reaching 1,213 ha of tree cover within the 18 years period. (Table 2.2).

Table 2.2 - Tree cover loss data for Guinea-Bissau between 2000 and 2018.

Tree cover threshold (%)	Total area (ha)	Tree cover Extent in 2000 (ha)	% land area	Tree cover Extent in 2010 (ha)	% land area	Tree cover Extent in 2018 (ha)	% land area	Tree cover loss 2001-2018 (ha)	% tree cover loss since 2000	Avg tree cover loss/year (ha)	Avg loss/year 2001-2010 (ha)	Avg loss/year 2011-2018 (ha)
10	3402910	2915832	85.70	2916184	85.70	2746776	80.70	230044	7.90	12780	6064	21176
15	3402910	2699465	79.30	2633076	77.40	2465021	72.40	226621	8.40	12590	5857	21007
20	3402910	1681194	49.40	1755876	51.60	1618435	47.60	185339	11.00	10297	4790	17180
25	3402910	1506869	44.30	1579703	46.40	1451489	42.70	174577	11.60	9699	4636	16027
30	3402910	1071797	31.50	1128748	33.20	1027617	30.20	142305	13.30	7906	4117	12641
50	3402910	314558	9.20	203824	6.00	161965	4.80	59432	18.90	3302	1757	5232
75	3402910	3472	0.10	4925	0.10	4697	0.10	1213	34.90	67	99	29

These changes in the forest cover are related to the different stands and uses of the forest wood. Around 45 percent of the country's land surface is covered by savannas. Even though the total land surface covered by savanna has stayed virtually unaffected, the underlying dynamic is not so simple. The Agricultural areas have doubled since 1975 covering 13 percent of the national land surface in 2013 and becoming the second most extensive land cover class. Forest clearance for cultivation has infringed into natural habitats in all of Guinea-Bissau's ecoregions except the Zone de Colline de Boé (ZCB – Boé Hill or Upland Zone). Whereas agricultural expansion explains the loss of about 2,500 sq km of savannas (or 16 percent of their 1975 total land surface), the degradation of woodlands and forests from logging and clearing has produced open landscapes that take on the characteristics of tree and wooded savannahs, increasing the area mapped as savannah in the same period. Deforestation for wood production is responsible for 65 percent of forest habitat losses (forests, woodlands, gallery forests), or 1,700 sq km of forest that have become savannahs in 2013.
Agriculture in shallows and recession, in particular rice cultivation, colonizes alluvial floodplains in the Zone des Estuaires (E-GB – Estuary Zone) and the Zone Côtière (ZC-GB – Coastal Zone). Rice cultivated areas have slightly increased in Guinea-Bissau since 1975, encroaching into wetlands, gallery forest and mangroves. Mangroves are one of the major land cover classes in Guinea- Bissau, accounting for over 9 percent of the country's land surface. This fragile ecosystem is critical to coastal people who take advantage of its rich fisheries and wood resources. They also use the tidal flats for traditional rice cultivation (Corcoran, Ravilious, and Skuja, 2007). Between 1975 and 2013, mangroves decreased by 6.4 percent, or 220 sq km. Bowé, lateritic landscapes that characterize Guinean plateaus, cover 3.2 percent of the country's land surface and are mainly found in the Colline de Boé (ZCB – Boé Hill or Upland Zone) ecoregions. These rocky, impenetrable soils are usually devoid of woody vegetation but support an herbaceous cover during the rainy season. As a result, bowé is one of the most stable landscapes in Guinea-Bissau. Bowé is ill-suited to agriculture but conducive to grazing (USAID, 2015). All these partial losses in the various types of forest stand explain the staggering amount of total tree cover loss of 1,019,531 ha within the 18 years period which leads to an average yearly rate of tree cover loss of 56, 640 ha/year.

Guinea-Bissau is an essentially agricultural and subsistence economy and agriculture remains a dominant economic activity contributing to over 50% of GDP and over 80% of exports and employing around 82% of the working population. Rice ranks first in the government's medium- and long-term priorities for its place in Guinea-Bissau's food and economy. According to estimated data from the Ministry of Agriculture and Rural Development (MADR) Agricultural Statistics Department, the country has 1,410,000 ha of arable land (agricultural potential), of which 200,000 ha of land with rice (bas-fonds rice), 106,000 ha of land with mangrove rice, and 110,000 ha land with pam pam rice, where forests are also found (Table 2.3).

Table 2.3 - Agricultural Statistics of the country.

Average surface area by region 2013 in hectares									
Crops	Bafatá	Gabú	Biombo	Cacheu	Oio	Bolama	Quinara	Tombali	Country
Pam-pam	4095	2885	1683	3126	7405	2182	2529	4029	27934
Sweet Rice	6122	5775	1319	4491	7534	6	2874	5856	33977
Salty Rice			2402	2416	2192		2986	9334	19330
Total Rice				**10033**					81241
Bacil Corn	755	1191	200	738	839	198	1001	842	5764
Corn horse	2941	8183	68	607	3079	15	356	75	15324
Black Corn	3030	3233	0	1419	2231	41	414	117	10484
Fundo	61	61	0	234	243	0	0	0	599
Total Other cereals				**2998**					32171
Total Cereals				**13030**					
Yam									
Sweet Potatoes	1230	138	0	92	102	4	68	174	1807
Cassava	786	128	168	127	135	119	138	562	2163
Manfafa									
Peanuts	12643	9226	2216	8818	5448	1246	3781	476	43855
Beans	409	114	47	367	360	24	160	226	1707
GLOBAL TOTAL				**22433**					276356

However, a growing expansion of cattle ecosystem (Table 2.4), and cashew cultivation, with the appearance of uncontrolled burning of forests that can significantly alter these data. This practice of extensive cattle ranching has caused many conflicts between cattle breeders and farmers and other impacts (positive and negative) in the agricultural system.

Table 2.4 - Evolution of National livestock herd (extrapolated data 2013).

Evolution of National livestock herd (extrapolated data 2013), Growth rate 2,5%						
Regions	Cattle	Sheep	Goats	Horses	Piggery	Poultry
Tombali	12152,98	5027,868	38241,6	121,4194	7533,523	69577,74
Quinara	21831,21	520,9997	26078,68	100,447	19951,42	144798,2
Oio	247191,2	67895,53	191766,5	1048,622	216379,3	466128
Biombo	27641,68	376,4002	29035,8	0	23690,03	76432,42
Bolama	1065,179	248,3579	17279,09	0	35244,75	63963,75
Bafata	324598,3	85377,72	108231,1	726,3089	16882,82	233013,8
Gabu	722493	169268,6	213527,1	2762,844	1638,058	351243,2
Cacheu	96296,64	6958,436	89106,4	48,56777	43036,56	183795,9
S.A.Bissau	795,8491	707,5441	3201,057	0	15001,92	47606,35
Total	**1454066**	**336381,5**	**716467,3**	**4808,209**	**379358,4**	**1636559**
Source: MAFP/DGP						

2.5. Data and Source

The gaps in reliable and up-to-dated data that faithfully describe the sectoral processes and activities have constituted the largest problem of the National Communications (NCs) of Guinea-Bissau. The weak systemic and institutional capacity has not allowed the regular exercise of data collection and statistics in the energy sector, and the information has been compiled only in periods of preparation of the CNs. This way, it becomes

difficult, if not impossible, to establish the time series of the activity data, but also to make projections on future trends. To overcome this handicap and with a view to accomplish the objectives of the BUR1, an update of sectoral data and information was carried. Data was gathered from sources of activities through observations, interviews and surveys of the actors. During the interviews and surveys, the researcher collected two types of data: primary and secondary. The primary data were collected through interviews conducted at different public, private, NGO and community-based organizations, including women responsible for households. Teams financed by the BUR1 project, consisting of administration technicians, university students and young people residing in the visited locations, conducted the scheduled surveys according to a mobilization plan that was stretched to most representative centres of the national territory, involving not only the rural communities where the consumption of firewood is predominant and where the coal farmers produce the charcoal, but also the secondary centres (regional and sectoral capitals), and finally the city of Bissau, which concentrates the main economic activities using the final energy.

Wood Charcoal selling in Guinea-Bissau. Photo credit: LOPES J.R., 2018

According to the national communications prepared to date, the Energy Sector, has been considered one of the catalysts of economic development by the Strategic and Operational Plan for 2015-2020 – "TERRA RANKA" Therefore the energy Sector-is part of the preparation of the Biennial Update Report (BUR1) of Guinea-Bissau.

2.6. Methodology

According to the secretariat of the UNFCCC, the BUR of non-Annex I countries, of which Guinea-Bissau is part, will undergo an international verification process through international consultancy and analysis. The inventory is at the national level and covers all the IPCC sectors subject to availability of activity data. As per the IPCC 2006 Guidelines, emission estimates have been compiled for the four sectors: Energy, Agriculture, Forestry, and Other Land Use (AFOLU), Industrial Processes and Product Use (IPPU) and Waste. The gases covered in this inventory are the direct gases carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) and the indirect gases nitrogen oxides (NOx), carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs) and sulphur dioxide (SO2).

Emissions are attributable to the combustion of fossil fuels, but also to the burning of plant biomass, i.e. firewood and charcoal. Taking into account the uncertainties associated to the data used for the activity sectors, given the different constraints and structural gaps referred to in the preceding chapters, it was decided to apply the tier 1 (or Level 1) method, recommended in the manual "IPCC Guidelines, 2006 " for situations when the body in charge of the inventory has few resources and limited data gathering structures. This method is based in fuel, with the assumption that the attributable emissions from combustion sources can be calculated from the quantities of burnt fuels and the average emission factors (F). Emissions of gases other than CO2 contain small amounts of carbon. In relation to estimates of CO2 and, in Tier 1, it becomes more correct to base the calculation of CO2 in total amount of carbon contained in the fuel. In fact, while the total carbon in the fuel depends only on the type of fuel, emissions of other gases other than CO2 depend on numerous factors, such as the type of technology, maintenance, etc., which, in general, are not known. As known, the emission factors vary according to the type of gas under analysis Therefore, CO2 emissions can be accurately calculated based on the total quantity of burnt fuels and the average carbon content of the fuels.

2.7. National Greenhouse Gas (GHG) Inventory

2.7.1 National emissions and removals (Gg)

GHG emissions were calculated (Table 2.5) using the IPCC Inventory software program created for this purpose and based on information on the energetic balance (Reference Year: 2010). The results from these emissions calculations indicate that the bulk of GHG emissions in the energy Sector, in the referential year of 2010, was concentrated in the residential subsector and represented by carbon dioxide emissions (94%). These results also suggest a high consumption of firewood and charcoal in households both in urban centres and in Rural areas. Emissions are attributable to the combustion of fossil fuels, but also to the burning of plant biomass, i.e. firewood and charcoal.

Table 2.5 – Summary of Green House Gas Emissions in the Energy Sector (extrapolated data 2013).

Sectors of Activity	Energy consumed TJ	Greenhouse Gases emitted (Gg)		
		CO_2	CH_4	N_2O
1. Production (thermal) of electricity	15.7005	1.1634	-	-
2. Transport services	1,340.6552	98.2471	0.0164	0.0077
3. Residential	15,313.0672	1,640.7991	3.9783	0.0524
Total (GG)		1,740.2096	3.9947	0.0601
Total (Gg-Eq CO_2)[3]		1,740.2096	83.8887	18.6310
		1,842.73		

The above-calculated emissions do not include the air transport subsector, whose calculation cannot be made in compliance to IPCC 2006 guidelines, given that the country does not have a national airline.

After the Energy Sector the agriculture sector is another source of greenhouse gas emission in Guinea-Bissau. Table 2.6 illustrates the preliminary GHG emissions from the different sources of emissions from the Agriculture, Forestry and Other Land Uses sector in 2013. The Agriculture and Livestock subsector show positive emissions of methane (CH4) which contributed with a total of 102.7 Gg CO2 equivalent in two subcategories of Enteric fermentation and Manure Management and 9.6. Gg CO2 equivalent for burning of biomass subcategory. This represented a total of 112,3 Gg CO2.

Table 2.6 – Preliminary GHG emissions values from the different sources of emissions from the Agriculture, Forestry and Other Land Uses sector (AFOLU) in 2013

Summary of GHG emissions in the agricultural sector in 2010														
Gases	Sources													Total GHG Emission Gg CO_2 Eq/year
	Livestock			Land Use			Gas emissions n CO2 in burned land					Others		
	Enteric Fermentation	Manure management	Sub Total	Forest Land	Cropped Land	Sub Total	Burning of Biomass	Urea Application	N_2O - Direct Soi release	N_2O-Indirect soil release	Sub Total	Forest growth	Sub Total	
CO_2				-19822	-19252	**-569,5**		0,3			**0,3**	-3,6	**-3,6**	**-573.6**
CH_4	94	8,6	**102,7**				9,6				**9,6**			**112,3**
N_2O									7,4	0,14	**7,5**			**7,5**
CO														
NOx														
Total			**102,7**			**-569,5**					**17,4**		**-3,6**	**-453,8**

[3] GWP: CO_2 = 1; Ch_4 = 21; N_2O = 310 (*IPCC AR5, 2014*)

With the regard to non CO2 Gas emissions from burned land subsector, it contributed with 17.4 Gg CO2 through three distinct types of gases: CH4 - methane (9.6 Gg CO2eq), CO2 - carbon dioxide (0.3 Gg CO2eq) and due to application of fertilizers to the agricultural soils N2O - dinitrogen oxide was emitted also (7,5 of CO2eq).

The Forestland and Cropland categories are a net sink with -569 Gg CO2eq. The same net sink contribution was given by the Other Lan Use sub-sector with a negative value (absorption) of -3.6 Gg of CO2eq representing the forest growth (wood production), that is, the amount of CO2 absorbed by forests in their photosynthesis process.

Overall, the total result of - 453.8 shown in the table represents the remainder of CO2 after the total capture of the gases emitted in the AFOLU sector, ie the country's net emission is zero. The forest sector in Guinea-Bissau is still a net sink due to progressive forest conservation policies in especially the Forest Conservation. National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases (values in Gigagrams) for 2013 is presented in Table 2.7.

Table 2.7 – National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases (Gg).

Categories	Inventory Year: 2013 (Gg)					
	Net CO2 emissions / removals	Emissions				
		CH4	N2O	NOx	CO	NMVOCs
3 - Agriculture, Forestry, and Other Land Use	-572.923868	112.3821458	7.394495318	0	0	0
3.A - Livestock	0	102.7336458	0	0	0	0
3.A.1 - Enteric Fermentation	0	94.03508	0	0	0	0
3.A.1.a - Cattle	0	90.151131	0	0	0	0
3.A.1.a.i - Dairy Cows		0		0	0	0
3.A.1.a.ii - Other Cattle		90.151131		0	0	0
3.A.1.b - Buffalo		0		0	0	0
3.A.1.c - Sheep		1.10591		0	0	0
3.A.1.d - Goats		2.35551		0	0	0
3.A.1.e - Camels		0		0	0	0
3.A.1.f - Horses		0.173088		0	0	0
3.A.1.g - Mules and Asses		0		0	0	0
3.A.1.h - Swine		0.249441		0	0	0
3.A.1.j - Other (please specify)		0		0	0	0
3.A.2 - Manure Management (1)	0	8.6985658	0	0	0	0
3.A.2.a - Cattle	0	2.908101	0	0	0	0
3.A.2.a.i - Dairy cows		0	0	0	0	0
3.A.2.a.ii - Other cattle		2.908101	0	0	0	0
3.A.2.b - Buffalo		0	0	0	0	0
3.A.2.c - Sheep		0.4007606	0	0	0	0
3.A.2.d - Goats		0.938949	0	0	0	0
3.A.2.e - Camels		0	0	0	0	0
3.A.2.f - Horses		0.1995528	0	0	0	0
3.A.2.g - Mules and Asses		0	0	0	0	0
3.A.2.h - Swine		3.954674	0	0	0	0
3.A.2.i - Poultry		0.2965284	0	0	0	0
3.A.2.j - Other (please specify)		0	0	0	0	0
3.B - Land	-569.59595	0	0	0	0	0
3.B.1 - Forest land	-19822.45008	0	0	0	0	0
3.B.1.a - Forest land Remaining Forest land	-19822.45008			0	0	0

3.B.1.b - Land Converted to Forest land	0	0	0	0	0	0
3.B.1.b.i - Cropland converted to Forest Land	0			0	0	0
3.B.1.b.ii - Grassland converted to Forest Land	0			0	0	0
3.B.1.b.iii - Wetlands converted to Forest Land	0			0	0	0
3.B.1.b.iv - Settlements converted to Forest Land	0			0	0	0
3.B.1.b.v - Other Land converted to Forest Land	0			0	0	0
3.B.2 - Cropland	19252.85413	0	0	0	0	0
3.B.2.a - Cropland Remaining Cropland	19252.78667			0	0	0
3.B.2.b - Land Converted to Cropland	0.067466667	0	0	0	0	0
3.B.2.b.i - Forest Land converted to Cropland	0.067466667			0	0	0
3.B.2.b.ii - Grassland converted to Cropland	0			0	0	0
3.B.2.b.iii - Wetlands converted to Cropland	0			0	0	0
3.B.2.b.iv - Settlements converted to Cropland	0			0	0	0
3.B.2.b.v - Other Land converted to Cropland	0			0	0	0
3.B.3 - Grassland	0	0	0	0	0	0
3.B.3.a - Grassland Remaining Grassland	0			0	0	0
3.B.3.b - Land Converted to Grassland	0	0	0	0	0	0
3.B.3.b.i - Forest Land converted to Grassland	0			0	0	0
3.B.3.b.ii - Cropland converted to Grassland	0			0	0	0
3.B.3.b.iii - Wetlands converted to Grassland	0			0	0	0
3.B.3.b.iv - Settlements converted to Grassland	0			0	0	0
3.B.3.b.v - Other Land converted to Grassland	0			0	0	0
3.B.4 - Wetlands	0	0	0	0	0	0
3.B.4.a - Wetlands Remaining Wetlands	0	0	0	0	0	0
3.B.4.a.i - Peatlands remaining peatlands	0		0	0	0	0
3.B.4.a.ii - Flooded land remaining flooded land				0	0	0
3.B.4.b - Land Converted to Wetlands	0	0	0	0	0	0
3.B.4.b.i - Land converted for peat extraction			0	0	0	0
3.B.4.b.ii - Land converted to flooded land	0			0	0	0
3.B.4.b.iii - Land converted to other wetlands				0	0	0
3.B.5 - Settlements	0	0	0	0	0	0
3.B.5.a - Settlements Remaining Settlements	0			0	0	0
3.B.5.b - Land Converted to Settlements	0	0	0	0	0	0
3.B.5.b.i - Forest Land converted to Settlements	0			0	0	0
3.B.5.b.ii - Cropland converted to Settlements	0			0	0	0
3.B.5.b.iii - Grassland converted to Settlements	0			0	0	0
3.B.5.b.iv - Wetlands converted to Settlements	0			0	0	0
3.B.5.b.v - Other Land converted to Settlements	0			0	0	0
3.B.6 - Other Land	0	0	0	0	0	0
3.B.6.a - Other land Remaining Other land				0	0	0
3.B.6.b - Land Converted to Other land	0	0	0	0	0	0
3.B.6.b.i - Forest Land converted to Other Land	0			0	0	0
3.B.6.b.ii - Cropland converted to Other Land	0			0	0	0
3.B.6.b.iii - Grassland converted to Other Land	0			0	0	0
3.B.6.b.iv - Wetlands converted to Other Land	0			0	0	0
3.B.6.b.v - Settlements converted to Other Land	0			0	0	0
3.C - Aggregate sources and non-CO2 emissions sources on land (2)	0.296714	9.6485	7.394495318	0	0	0
3.C.1 - Emissions from biomass burning	0	9.6485	0	0	0	0
3.C.1.a - Biomass burning in forest lands		9.6485	0	0	0	0

3.C.1.b - Biomass burning in croplands		0	0	0	0	0
3.C.1.c - Biomass burning in grasslands		0	0	0	0	0
3.C.1.d - Biomass burning in all other land		0	0	0	0	0
3.C.2 - Liming	0			0	0	0
3.C.3 - Urea application	0.296714			0	0	0
3.C.4 - Direct N2O Emissions from managed soils (3)			7.255421205	0	0	0
3.C.5 - Indirect N2O Emissions from managed soils			0.139074113	0	0	0
3.C.6 - Indirect N2O Emissions from manure management			0	0	0	0
3.C.7 - Rice cultivations		0		0	0	0
3.C.8 - Other (please specify)				0	0	0
3.D - Other	-3.62463203	0	0	0	0	0
3.D.1 - Harvested Wood Products	-3.62463203			0	0	0
3.D.2 - Other (please specify)				0	0	0

2.7.2 Share of Sectors and Gases - Sectoral Description

The share of emissions/removals of the following four economic sectors were estimated: (1) energy, (2) industry, (3) agriculture, and (4) waste. In addition to the mandatory ' top-down ' approach for estimating GHG emissions from fuel combustion, the bottom-up methodology was used as much as possible for key inventory categories, using the existing databases available in Guinea-Bissau. The majority of GHG was emitted (Gg CO2eq) in the Energy and Agriculture and Livestock sectors. The contributions of Industry and Waste sectors were marginal. The summary of the results based on the data of 2010 is shown in Figure 2.5.

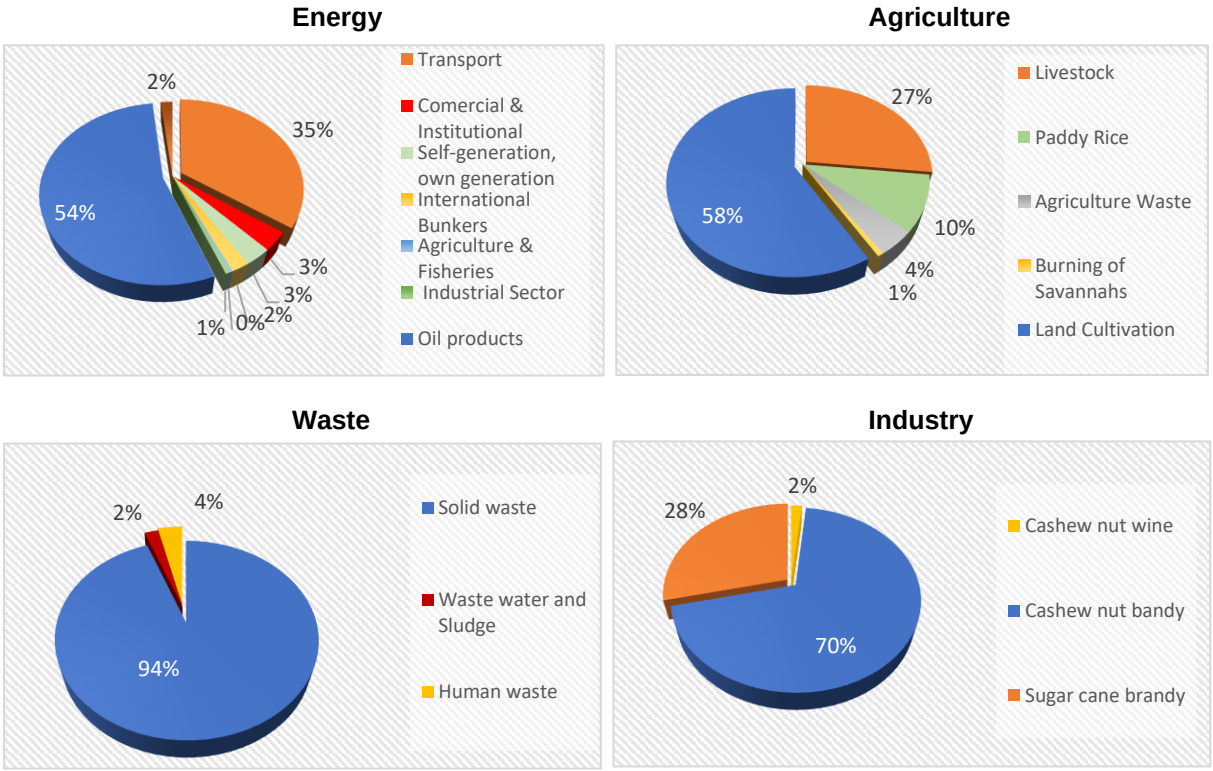


Figure 2.5 – The contributions of GHG emissions in the Energy sector, Agriculture, Industry and Waste sectors in Guinea-Bissau (2010).

The graphs below show the percentage values according to the contribution of different sub sectors that make up the AFOLU sector in Guinea-Bissau (Figure 2.6a) and the GHG emissions according to gases for 2010 inventory (Figure 2.6b).

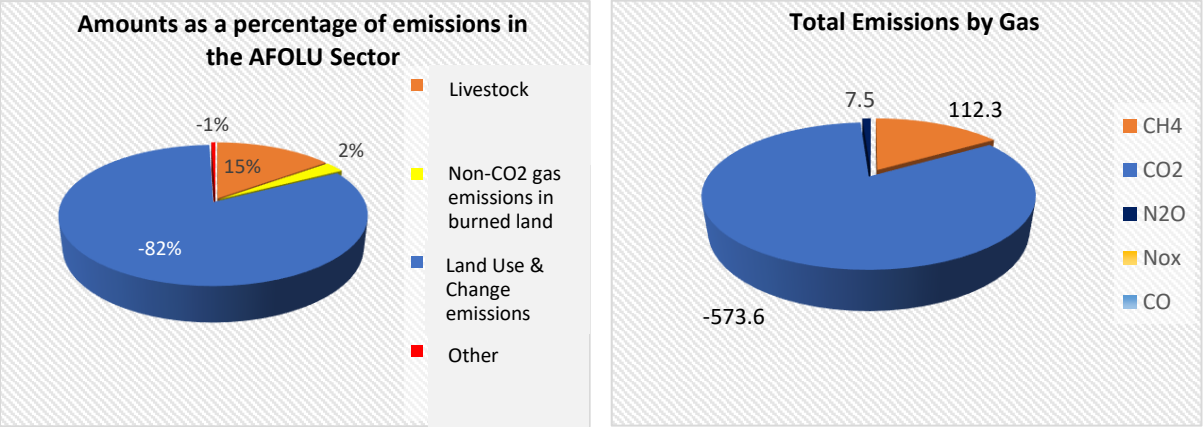


Figure 2.6 – a) The percentage contributions of the AFOLU sub sectors; and b) distribution of emissions by gas (2010).

It can be observed that GHG emission from Land Use and Change dominated the AFOLU sector followed by the Livestock sub sector. CO2 emissions dominate the total GHG emissions by representing -573.6 Gg CO2eq, followed by CH4 with 112.3, N2O with 7.5 and halogenated gases with 0.02.

2.8. Projections of Greenhouse Gases

The projection of GHG emissions serves to estimate the future evolution of the country's emissions profile in the context of the sector's activities and to make sure that they maintain their normal course and pace, without the need for interventions that may influence the socioeconomic activity. After the calculations using the IPCC methodology, the emission results for Guinea-Bissau and all these years ahead 2020, 2030 and 2050 correspond to zero (0). That is to say that, until the last year of this projection, Guinea-Bissau will not be a net emitter of none of the AFOLU-related greenhouse gases due to the high sequestration capacity of the national forests.

It is true that under the baseline scenario, all GHG emissions are projected to gradually rise from the base year (2010) to 2050 particularly in the Agriculture and Livestock and the Waste sectors, that are expected to experience a dramatic increase in GHG emission. These GHG emission increases are made markedly from an accentuated growth in CH4 gas. This can be seen in Figure 2.8 showing the evolution of GHG emissions for 1994, 2006 and 2010, aggregated in Gg CO2-eq and Gg by gas in Guinea-Bissau.

Table 2.8 – Emissions for 1994, 2006 and 2010, aggregated in Gg CO2-eq and Gg by gas in Guinea-Bissau.

Source	Base Year	Greenhouse Gas Emission			Total (Gg-Eq CO_2)[4]
		CO_2 (Gg)	CH_4 (Gg)	N_2O (Gg)	
NC 1	1994	178.58	0.36	0.99	179.90
NC 2	2006	156,00	79.59	6.20	241.79
BUR 1	2010	1338.79	87.26	130.58	1556.64

[4] The Total was obtained after application of the Global warming potentials of the Gees Referenced (GWP: CO_2 = 1; Ch_4 = 21; N_2O = 310, established by the IPCC in its report AR5 of 2014).

The rising demand for food (paddy rice crop and meat production) will drive the expected increases in emissions of CH4 in the baseline scenario especially in the Agriculture & Livestock sector. The release of CH4 will stem mainly from the decay of flooded organic matter in paddy rice crop and from enteric fermentation from the livestock sub-sector. GHG emission from enteric fermentation from Livestock sector will keep its growing pace as the Guinea-Bissau agriculture system is still dominated by the practice of extensive cattle ranching characterised by sedentary livestock breeding as well as transhumance livestock production. In addition, there are expectation that the Industry sector of Guinea-Bissau will increase, given the population growth and the technological advance expected to see happening in the current industry sectors and those new emerging activities so that the GHG emission in this sector may also increase. Furthermore, Deforestation is also responsible for the release of large amounts of CO2 by loosening up carbon stored in forest soils, increasing the chances it will return to the atmosphere as carbon dioxide and by reducing the carbon sequestration capacity of the country.

Notwithstanding the above expected rises in GHG emission, the Land Use, Land-Use Change and Forestry (LULUCF) is still the highest single sector acting as a net sink of GHG amounting to -10718 Gg for the year 2010. Therefore, Guinea-Bissau is and will remain as an absolute sink of greenhouse gases, given the high potential for sequestration by the Forestry sub-sector and the Framework Law on sustainable development promoting the expansion of the national Protected Areas as well as the implementation of the country's biodiversity protection policy.

2.9. References and Footnotes

- Manual IPCC Actualizado de 2006 para o cálculo do inventário dos gases, com efeito, de estufa.
- Guia de Boas Praticas para o sector de LULUCF-IPCC, (2003)
- Inventários das Emissões dos GEE na Guiné-Bissau. Anos de referência 2010.
- Anuário Estatístico de FAO. Produção de 2012 e 2013
- Dados da distribuição de fertilizantes do Projecto KR2 do MADR.
- Dados da evolução de superfície e de produção das diferentes culturas na Guiné-Bissau 2013 elaborado pela Divisão de Estatística Agrícola do MADR.
- Dados de evolução dos efectivos de animais fornecidos pela Direcção Geral de Pecuária do MADR 2009 extrapolado para 2013.
- IPCC, 2006: Guidelines for National Greenhouse Gas Inventories, prepared by the National Greenhouse Gas Inventories program. Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.
- Study of the plan Director for the development of infrastructures for production and distribution of electricity, CAbira, 2013 – Database – Vol. I
- National action Plan in the Renewable energy Sector (PANER) of Guinea-Bissau, 2015.
- Energy action Agendafor all in guinea-Bissau (SE4All), 2015.
- National Initial Communication of Guinea-Bissau on climate change, UNFCCC, 2004.
- Second National Communication on climate change, UNFCCC, 2008.

Footnotes and others

1. Programa de Acção Nacional de Adaptação as Mudanças Climáticas
2. Documento de Estratégia Nacional de Redução da Pobreza
3. Relatório Plano de Acção da Estratégia Financeira Integrado 2012 (MADR – Direcção Geral das Florestas e Fauna)
4. Entrevistas:
5. Rui Nene Djata Ex-Ministro de Agricultura, Director Geral da Engenharia Rural;
6. Lorenço Monteiro Carvalho de Abreu Director Nacional da Vulgarização Agrária.

Teak tree (*Tectona Grandis*) – National Parque of Cantanhez – Guinea Bissau

https://kalmasoul.com/en/tourism/parks/parque-nacional-de-cantanhez/

Chapter 3:
Mitigation Actions

Chapter 3
Mitigation Actions

Rapids of Saltinho – Bafatá Region – Guinea Bissau

Chapter 3:
Mitigation Actions

3.1 Introduction

Guinea-Bissau is a non-Annex-I country and a signatory to the United Nations Framework Convention on Climate Change in 1995 and as laid down in Art. 2, Paragraph 1 of the Kyoto Protocol, is committed to engage and seek to achieve quantified emission limitations and reduction of GHG emissions in order to promote sustainable development, minimizing the social, environmental and economic impacts of anthropogenic activities that contribute in emissions of greenhouse gases and thus to global warming.

This report aims to present a review on climate change actions and their effects and to systematically enunciate mitigation actions/measures, and to analyse policies and measures adopted by the Government of Guinea-Bissau for the Mitigation of the impact of climate change at national level informing the possible progress on implementation, expected outcomes and potential for estimated reduction, needs, type and level of assistance required.

3.2 Institutional and Legal Arrangements for Mitigation

Guinea-Bissau as a non-Annex I country and a signatory to the United Nations Framework Convention on Climate is not obliged to reduce its GHG emissions. However, Guinea-Bissau being committed to fulfil the objectives of article 2, of the Convention, specifically the "stabilisation of concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropic interference in the climate system", has developed several policies and strategies that guide its development agenda, promoting sustainable development, minimizing the social, environmental and economic impacts of anthropogenic activities that contribute to greenhouse gas emissions and, therefore, to global warming. Guinea-Bissau has been involved in various projects and activities aimed at reducing GHG emissions and increasing its sink capacity, particularly through its Energy, Forest and Biodiversity sectors.

3.2.1 The national mitigation System

Guinea-Bissau's National Mitigation System consists of an entire institutional, legal chain of processes and arrangement made to estimate emission reductions, as well as the reporting and archiving of mitigation information. The Directorate General for the Environment (DGA) of the Republic of Guinea-Bissau is the designated mitigation assessment agency and hosts the UNFCCC and GEF focal points. It is responsible for National Climate Change Communications and is also the state authority responsible for developing and promoting policies and strategies for mitigating / reducing greenhouse gas emissions in the country in the short, medium and long term through environmental protection, rational use of natural resources and biodiversity conservation. The other main national bodies relevant to the climate change mitigation legal framework are:

1. The National Authority designated for the Kyoto Mechanisms (DNA)-created by Decree No. 11/2006, dated August 22nd. DNA is a national body that deals with the approval and monitoring of the implementation of projects under the Clean development Mechanism and REDD framework.
2. The National Committee on Climate Change (NCCC)-is supervised by The Secretariat of State of Environment and Biodiversity (SEAB) and consists of an advisory board, a Scientific Council and a technical committee. The role of the NCCC is to stimulate the awareness and mobilization of Guinean Society for discussion and position in relation to the phenomenon of climate change, with the following main mitigation objectives:

- Discuss and validate the mitigation/mitigation measures of greenhouse gas emissions in the country, in the short, medium and long term;
- (b) Discussing and validating measures to adapt to the adverse effects of climate change;
- c) Discuss and validate the implementation of incentive instruments and measures to mitigate the impacts of climate change and natural disasters;
- d) Discuss and validate ways to stimulate the consumption or use of products with zero carbon content;
- e) Promote the implementation of projects under the Clean Development Mechanism (CDM) as well as other innovative forms of mitigation/reduction financing.

Within SEAB, the NCCC unit carries out the daily supervision of the mitigation assessment and is responsible for organizing and developing the activities included in the annual work plan for the sector mitigation teams, assisting in the request for data and Ensuring that tasks are submitted on time. This unit is also responsible for identifying the various institutions that constitute the mitigation assessment Working Group. The National mitigation Work Group includes ministerial representatives from the main sectors involved in the national mitigation inventory, such as energy, waste management, AFLOU and cross-cutting issues.

3.3 Voluntary Pledge

Notwithstanding the expected rises in GHG emission in Guinea-Bissau, as deliberated in the preceding chapter, the quantum of Guinea-Bissau's total GHG emissions (including LULUCF) in 2010 was: -10718 Gg/year. This level of emission is far lower than GHG emissions of China, USA, the EU and for example India's per capita GHG emission in 2010 which was 1.56 metric tonnes CO2eq. The Guinea-Bissau's emission pattern is

such that Land Use, Land-Use Change and Forestry (LULUCF) is still the highest single sector acting as a net sink of GHG in 2010. By contrast, GHG emissions from oil products and transport are significant in the Energy Sector and so does the GHG emissions from land cultivation and livestock in the Agriculture and livestock sectors.

Deforestation and wildfires are also responsible for emitting large amounts of CO2 into the atmosphere. It is therefore, under this background and in accordance with the provisions of Article 12, paragraphs 1(b) and 4, and Article 10, paragraph 2(a), of the Convention, that Guinea-Bissau communicated its voluntary pledge to reduce the emissions intensity. Consequently, the main mitigation measure to be adopted by the country, as a national contribution, is related to reforestation. The second sector that the country plans in using to contribute to the mitigation strategy is the Energy sector even though the average electrification rate of the country is about 12% and Guinea-Bissau remains one of the countries facing the greatest need of access to modern forms of energy in Africa and the world.

Wildfires in Guinea-Bissau

3.3 National Mitigation Policies

The above legal structure that supports the processes and arrangements to estimate the emission reduction, as well as the monitoring of the results, is sustained mainly in:

• The new forestry Law, Decree-Law 5/2011, establishes the rule of law concerning the management of forest heritage, forestry planning, sale of forestry products, forest management and exploration contracts, forest cleaning, prevention and combating Forest fire and community forests.

However, the Government of Guinea-Bissau has elaborated and implemented a wide range of policies that relate directly or indirectly to climate change and GHG mitigation:

• The Land Law ("Lei de Terra") was approved by the Popular National Assembly (ANP). This instrument regulates the management of space in the national territory and, in particular, brings discipline and minimizes the problems associated with land concessions for different purposes. However, this law recognizes two fundamental aspects. Forest reserves and the recognition of customary law of community land management.

• Framework Law on Protected Areas (PA), an instrument that aims above all to create a legal framework conducive to the conservation of fragile ecosystems in Guinea-Bissau. It also regulates the classification system and the declassification of protected areas at national level.

• Forestry Law-2011: The rules and forest taxation have been updated and are being applied throughout the national territory. This new forestry law attaches great importance to aspects of reforestation, overexploitation in areas where there are sawmills and areas with potential problems of land degradation.

• Mining and Minerals law. This Law regulates the different forms of exploitation of mineral resources in the country. Most minerals in the country are in forest areas susceptible to degradation in case of poor management. The law can contribute to meet the standards of concern for environmental protection.

Protected Area Cacheu - https://ibapgbissau.org/Home/Galeria?Length=4

The holder of the operating licence must, under penalty of sanctions, strive to reconcile the work of exploitation with the environment. For example, the operating licenses granted to quarries in general will only be issued if they are discovered that do not adversely affect the environment.

• The National Forest Executive Plan (National Forest Action Plan) contains a detailed analysis of the situation on which policies are defined, the strategies, actions and goals to be achieved, the use of durable forestry resources amongst others. It also defines the means necessary for its implementation in the following main issues:

-Techniques for the use of forest space by the population to fight food insecurity;
-Burning linked to shifting cultivation and hunting;
-Extensive livestock and increased transhumance;
-The use of fire as the main instrument of deforestation and renovation of pastures;
-The process of deforestation to create new agricultural land for cash crops (especially cashew nuts, peanuts and cotton);
-Overexploitation of forest species of high commercial value;
-Increase in hunting camps and illegal hunters;
-Increase in population density and appearance of new Tabancas (small villages) in the wildlife corridors.

• The National Environmental Management Plan (NEMP), the main document and regulator of environmental issues in Guinea-Bissau. This document contains the main concerns of other development sectors, not only in terms of conservation, but also of development itself. The plan, through programs and projects, seeks solutions to ensure food security, poverty eradication, pollution control and environmental sanitation; Conservation of natural resources and control of the spreading of desertification and soil erosion, in addition to minimizing the anthropic impacts that influence climate change. (NEMP, 2002).

• The Agenda of Action for Sustainable Energy for All in Guinea-Bissau, accession to the initiative of The UN Secretary-General, in November 2011, on Sustainable Energy for all;

• National Action Plans: Renewable Energies (PANER); investment in sustainable energy and energy efficiency in Guinea-Bissau, 2015-2030; In the framework of accession to ECOWAS/UEMOA regional policies through the white Paper on Renewable Energy Policy and the Energy Efficiency

3.4 Mitigation Policy Measures

The Guinea-Bissau mitigation strategy encompasses the implementation of unconditional actions and policies complemented by other conditional measures supported mainly by bilateral or international funding. Unconditional mitigation actions include legislative initiatives (laws, acts, policies, regulations and mandates) that are promulgated to protect and administer the environment and are adopted by the Government of the Republic of Guinea-Bissau to facilitate reduction of GHG emissions. In addition, this is complemented by the national implementation of specific energy-saving policies and the prolonged use of alternative energy sources, in accordance with the measures provided for in the existing national strategy papers. These strategic documents include the National Poverty Reduction Strategy (PRSP II) and the national strategic document-TERRA RANKA 2015-2025.

The mitigation measures are based on published documents and the consultation carried out by the national team with stakeholders for the development of the third communication. Due to the lack of detailed preliminary studies to formulate quantifiable concrete actions, the period up to 2020 should be devoted to in-depth studies to enable the implementation of measures in forestry, industry and energy. For example, reforestation, conservation of other forests and a program for the inclusion of renewable energy sources in the country's energy mix.

3.4.1 Mitigation measures in the Agriculture and Forestry sector (AFLOU)

In comparison with other countries in the sub-region, Guinea-Bissau seems to have preserved its environmental equilibrium. However, the intensification of economic activities in certain areas, such as agriculture and fisheries, and in the extractive industries in particular, can be a real threat to the ecosystem and the sustainability of natural resources. The problems of this specific sector are related to deforestation (through forest fires, illegal timber extraction, removal of firewood

used directly or to produce coal), excessive grazing, soil erosion, irregularity and decreased rainfall and increased population in forest areas, finally, pressure on forest and soil degradation and consequently the loss of biodiversity. Therefore, there is an urgent need to act in order to adapt and mitigate the adverse effects of climate change and anthropogenic damage to the country's natural resources.

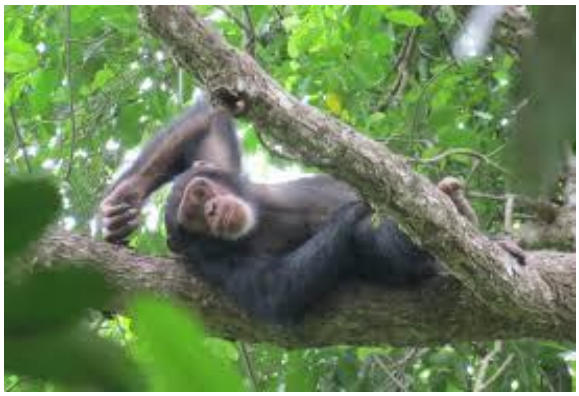
Protected Area - https://ibapgbissau.org/Home/Galeria?Length=4

Since the mitigation actions available, such as natural regeneration, short-spin forestry and bioenergy for replacing fossil fuels, are not currently practicable mitigation options, the Government of Guinea-Bissau has capitalized efforts to Mitigation in the action of forest protection with a focus on the establishment and effective management of protected areas (APs).

Protected Areas (APs) are areas normally classified by Decree with the purpose of safeguarding certain ecosystems as well as the populations of animals and plants that housed by them, their ecological diversity as well as promoting their sustainable social and economic use. The Guinea-Bissau National Protected Areas Network currently has six Marine and Coastal Parks, and the expansion process to 26.3% of the national territory was accomplished through the "Support Project for the Consolidation of a System of Protected Areas in the Forest Belt". Guinea-Bissau ", which aimed at the creation of the last five new Protected Areas in the Dulombi, Boé and Tchetche (DBT) complex. These new areas just being created retain biodiversity values of rare importance, such as chimpanzees and sub-humid Guinean forests with high development potentials, particularly in the tourism sector (ecotourism). Examples of Guinea-Bissau Protected Areas are:

- Bolama Bijagós Archipelago Biosphere Reserve
- Urok Islands Community Protected Marine Area
- Cantanhez National Park
- João Vieira Marine National Park and Poilão
- Orango Islands National Park
- Cufada Ponds Natural Park
- Cacheu Mangrove Natural Park ("Tarrafes")
- Dulombi, Boe and Tchetche Complex (DBT)

The above complex represents the National System of Protected Areas (SNAP). Currently, the National System of Protected Areas (SNAP) covers a total surface of about 750,000 ha, or about 26,3% of the National Territory, under the administrative responsibility of the Institute for Biodiversity and Protected Areas (IBAP). Two thirds of the protected surface correspond to marine or estuarine spaces. Marine Protected Areas and regulated fishing zones are at the centre of concerns of IBAP and other institutions in the subregion, grouped under a Regional Coastal and Marine Conservation Partnership in West Africa (PRCM). These areas play a central role in the reproduction and regeneration of fish, shrimp and shellfish stocks, ensuring the sustainability of the exploitation of these strategic resources.



Protected Area - https://ibapgbissau.org/Home/Galeria?Length=4

Two programmes are being used to start the construction of key and lasting structures, at the level of biodiversity in Guinea-Bissau: The Framework Law on Protected Areas and the strengthening of the Institute of Biodiversity and Protected areas (IBAP) under the supervision of the Secretariat of State of Environment and Biodiversity (SEAB) and the BioGuinea Foundation, which will complement the current financing model for the continuation of financial support through sustainable financial flows. IBAP is responsible for the management of the National System of

Protected Areas (SNAP) and the implementation of the country's biodiversity protection policy.

The entire set of protected areas and their respective range of influence covers a significant part of the territory (26,34%), containing the most important and more relevant countries forest and mangrove forest spots.

Protected Area - https://ibapgbissau.org/Home/Galeria?Length=4

The mitigation action involves the effective management and implementation of regulations on APs to improve biomass volumes and including the upgrading of deforestation and carbon emission baselines and field data collection for monitoring in two Protected areas: Cacheu and Cantanhez through the National System of Protected Areas (SNAP) this implies that the benefit of the carbon increment would be harvested through increases in biomass above the soil and in the soil carbon densities. The Annual Carbon Increment (IAC) has not yet been estimated, but the assumption is that above-ground biomass and soil carbon densities would increase annually and would be considered as potential carbon reduction resulting from the direct Forest protection or conservation action. As regards this issue and the additional mitigation measures undertaken by the Government of Guinea-Bissau in this sector, it is worth highlighting the following key milestones:

Forestry sector

The creation of protected areas for the conservation and management of natural resources, one of the largest achievements in the country that currently correspond 26.34%. Other key and relevant measures for Mitigation include:

- In spite of all deficiencies in combating illegal timber extraction and forest degradation, the government of Guinea-Bissau signed the United Nations Convention to Combat Desertification, which led to the creation of the Action Plan to fight Drought and Desertification in order to develop strategies and actions to combat the phenomena of desertification in the country;
- The development of the National Forest Action Plan in the years 90 at the legislative level;
- The recent launch of the Community Forestry Management initiative using integrated land management approaches in the Tabancas (small villages) (GITT);
- The approval of the new forestry law, encouraging the creation of community management forests at the level of the Directorate-General for Forest management;
- As described in above, the current extension process of protected areas, at national level, with the specific inclusion of the forests of Dulombi Boé and the respective corridors that interconnect, still in progress.

In short, this sector lacks the establishment and scheduling of a new forestry policy. The vision is a sustainable management of forest resources-including through the conservation and restoration of forests-to improve a socioeconomic balance that meets the needs of communities and guarantees their responsibility;

Livestock sector

Livestock products account for about 30% of agricultural GDP. Despite the importance of livestock farming in the economic, socio-cultural and nutritional level, the public investment portion planned for this subsector remained relatively low and steadily decreasing in the last 30 years. However, the Government has taken some measures that contribute to mitigating the effects of climate change. This includes:

- The outline of the Charter of Livestock Development Policy, which provides, among others, pastoral vocational areas and the conception of water withholding structures;
- The development of studies to support the development of production of short-cycle animals ensured mainly by women who can also decrease the CH4 emission of enteric fermentation.

3.4.2 Mitigation measures in the Energy sector

The widespread absence of basic infrastructure is, for many years, one of the most serious restrictions with which the national economy is confronted. The consumption of electricity in Guinea-Bissau is one of the lowest in the world: about 0.3 toe/person/year, and only 40% of the inhabitants of the capital, Bissau, have access to electricity compared to 20% of rural areas (PRSP II, 2011). In general, GHG emissions in the residential subsector are extremely dependent, on the pace of population growth and the number of households on the one hand, and on the other hand in the electrification rate, which usually determine the level of the emission category. Therefore, the projected growth in emissions of this sector corresponds to the energy demands of urban households, followed by the emissions of rural households and the use of energy in transportation (land, sea and air). In Guinea-Bissau, stoves for cooking fed on wood and coal constitute the largest source of emission, thus becoming a priority area of mitigation.

The general objectives of the Government's approach to the implementation of prioritized mitigation measures are to ensure the continuous reduction of GHG emissions while safeguarding sustainable growth and development. At this stage, the implementation of these actions is through:

i) integration of these mitigation objectives into national, district and sectoral plans and programmes;

ii) promotion of specific and personalized actions, involving the mobilization of adequate resources from international sources; and

III) facilitating the implementation of specific actions in the subcategories of energy production and consumption, domestic energy and renewable energy; and

IV) conducting studies on the energy potential of the country and defining the energy development by incorporating the greatest possible potential of renewable energies in the energy mix;

Energy production and consumption

• The recent approval of the Energy sector Development Policy Charter;

• The formulation of the National Policy for the Promotion of Renewable Energy (wind, solar, biomass);

• The implementation of programs financed by the CILSS and the World Environmental Fund, UNDP, which allowed the installation of small-scale solar panels to provide electrical energy and collective needs of the country (basic health centers, Schools and telecommunications);

• The ongoing construction of a new power plant to replace the current plant of Bissau, which does not comply with environmental regulations, particularly in terms of GHG emissions;

• Completion of the energy master plan to support the restoration and promotion of the electricity production system financed by the World Bank and the EU.

Domestic energy

Wood fuel (firewood and charcoal) provides approximately 90% of the energy consumed in the country. Currently, the country's forest formations suffer strong pressure due to increasing population demand and growth, especially in rural areas, which are heavily dependent on traditional energy (85-95% of the population uses coal and wood for cooking). The following steps have been taken so far, by the GoGB, to mitigate the GHG release associated with the production of wood fuel:

Firewood

• In this context, national authorities, NGOs and basic associations have undertaken various actions, such as monitoring, dissemination of improved stoves and braziers, improvement of carbonization techniques and promotion of other types of fuel, such as butane gas, solar energy, etc.;

• The Government also integrated its internal Energy Policy into the NEPAD Energy Strategy, which could substantially improve the achievement of domestic targets for reducing energy scarcity.

Renewable energy

Renewable energies (water, solar, wind, biomass) are potential sources for Guinea-Bissau, since the resources are abundant. In this sector, the following steps were undertaken to mitigate the GHG release:

• Three biomass-based energy production pilot units were built with the support of UEMOA (Union Economique and Monétaire Ouest Africaine);

• The Charter of the National Energy development Policy, now in force, was drafted in 2007 to (i) accelerate rural electrification by means of local initiatives; and (ii) prepare the guidelines for the wood fuel supply scheme;

• Organization of the Investment Program in the construction of the hydroelectric dam under the energy project of the Gambia River Basin Organization (OMVG) in West Africa;

• Three rural electrification projects based on solar energy and biofuels financed through the Energy facility II (European Union) mechanism;

• The planned development of two hydroelectric power plants identified so far: dams of Saltinho (14MW) and Cussilintra (13MW);

Bambadinca Solar Plant - Guinea Bissau
http://suniaenergy.com/trabajos/central-solar-de-bambadinca-guinea-bissau/

3.4.3 Mitigation measures in the Waste sector

In the solid waste category, the growing trend in emissions is closely linked to population growth, urbanization rate and population living standards. With a national population projected in Guinea-Bissau to be well above the 3 million in 2050 and with a per capita waste production of 0.32 kg/day, the total annual solid waste should reach more than 1 million tons per year. Therefore, the management of such generated waste volumes represents a major logistical problem and challenges the municipal financial capacity to solve the waste problem.

The main problem currently faced by urban centers in the main cities of Guinea-Bissau is the project of Clean Development Mechanism (CDM) projects for the construction of controlled dumps and sanitary landfills. Therefore, the Government should soon be able to complement the current efforts to build landfills with exploiting the recycling potential and derive energy production from waste. Waste recycling is a process of emission reductions, contributing to the development of agriculture, the production of electricity from biogas and fuel briquettes for cooking. In fact, local communities that are already aware of waste-related problems do not readily accept the creation of dumps/landfills in their respective communities. Thus, the degree of awareness of open-pit waste helps them to play a very important role in the acceptance or not of the development of the project.

Currently the technology used in Guinea-Bissau for the treatment of waste is rudimentary and restricted to the burning of open-air debris, with the emission of CO2, CO, N2O into the atmosphere. Therefore, there is a great need to implement sophisticated composting and incineration technologies, if possible, depending on the cost-benefit analysis and also the involvement of the private sector.

3.5 Mitigation Scenario

A mitigation scenario reveals a future in which explicit policies and measures are adopted to reduce the sources (or increase the sinks) of the GHGs. These measures can be carried out as a way of having the projects to be implemented in a specific sector or subsector of GHG.

3.5.1 Projects in the mitigation scenario

"Business as Usual" (BAU) is the base scenario for GHG emissions considered for the evaluation of projections of elected categories of GHG emission sources. This scenario assumes the continuation of general practices and relations at national level. The estimates of GHG projections were, therefore, obtained from the evolution of the variables usually responsible for emissions or removals. The fuel demands to meet future energy needs, projected number of vehicles, expected changes in land use, forest management and amount of waste generated are some of these variables considered. Other factors that could potentially affect the underlying stability in the evolution of GHG emissions and removals are the socio-economic dynamics. The projections in the basic scenario (BAU) for industrial production are associated with the growth of GDP, since it is such a dynamic sector, with new industries initiating operations and others closing as the country advances. The list of projects that Guinea-Bissau proposed during the initial communication is presented below (Table 3.1). Among them, there are several mitigation projects that still require funding to be implemented and contribute to a potential reduction of GHG emissions. Based on this valuation of GHG emissions and projections of this inventory, it is necessary a renewed cost and prioritization of mitigation projects and evaluation of the reduction or potential improvement of GHG during the years 2020, 2030 and 2050.

Table 3.1 – List of projects that Guinea-Bissau proposed during the initial communication.

Order of priorities	Project designation	Geographic area of intervention
1	Project supporting the diversification of production and diet (Quinara and Tombali regions)	Southern Province (Quinara and Tombali regions)
2	Rural Drinking Water Supply Improvement Project	Southern Province (Quinara and Tombali regions) Eastern Province (Bafata and Gabu regions)
3	Project for strengthening the Capacity for Protection of Mangrove rice fields against high tide Water Invasion	Southern Province (Tombali and Quinara Bolama/Bijagós region) Northern Province (Cacheu region)
4	Climate Change Impact Assessment Project for Producing Sectors	Northern Province (Cacheu) region South Province (Bolama region/Bijagós)
5	Coastal Zone Erosion Monitoring Project	Province of the north (Cacheu) Province of the South (Bolama region/Bijagós)
6	Evaluation of the impact of climate change on the project sectors of producers	Throughout the national territory
7	Small-scale Irrigation development Project over Geba and Corubal River Banks	East Province (Bafata and Gabu province) Northern Province (Oio region)
8	Natural Disaster Prevention Project	Throughout the national territory
9	Fisheries and Coastal Resources Protection, Conservation and Valorization Project	Coastal Zone (North and South Province)
10	Integrated Food Safety Information System (SISA) Project	Throughout the national territory
11	Coastal Environmental Education and Communication Project	Coastal Zone (North and South Province)
12	Project for Rehabilitation of Mangrove plots for rice growing in Tombali, Quínara, Bafatá and Oio	East Province (Bafatá region) Northern Province (Oio region) Southern Province (Quinara and Tombali)
13	Short Cycle Animal Production Support Project	East Province (Bafatá region) Northern Province (Oio region) Southern Province (regions of Quinara and Tombali)
14	Project for Reforestation of Degraded Areas	Eastern Province (Bafatá region)

3.6 State of Implementation of Mitigation Actions and their Effects in Guinea-Bissau

3.6.1 Consumption pattern in the Energy Sector

According to UNIDO (2017), Guinea-Bissau is confronted with serious energy supply problems, which are mainly occurring due to the need for importation of petroleum products to meet the demand of the transport, industry, part of mechanized agriculture and the residential sector (lighting oil and liquefied petroleum gas) and the excessive exploitation of biomass resources. The importation of petroleum products accounts for about 8% of the nominal GDP and 12% of the actual GDP and the depletion of the supply resources of the biomass amounts to about 82% of the total consumption of the country. In 2012, the final energy consumption increased by 23% compared to 2010, reaching 4,941.63 GWh (Table 3.2).

Table 3.2 – Final energy consumption by sector and by category (Adapted from UNIDO, 2017).

2012 GWh	Petroleum PRODUCTS	Electricity	Wood	Charcoal	Other	TOTAL PER SECTOR
Transport sector	240.63					240.63
Industrial sector	4.41	5.6	167.44			177.45
Tertiary sector	186.50	10.68	82.52	48.83	5.17	333.7
Agriculture and fisheries sector	8.81	1.2				10.01
Residential sector	19.3	5.16	*3,427.99*	*650.27*		*4,102.72*
Other sectors	2.72	4.85	26.05	21.41		55.03
No energy use	22.09	-				22.09
Total	**484.46**	**27.49**	**3,704.00**	**720.51**	**5.17**	**4,941.63**

As shown before in the emission section, the residential sector continued to be the sector that recorded the highest consumption, and responsible for almost all consumption in 2012 (83%) and in 2010 (94.8%). Firewood was the preferred form of energy used. This sector is followed by the tertiary sector (6.8%), by transport (4.9%) and the industrial sector (3.6%). Thus, the energy needs of the residential sector were ensured in its entirety by the consumption of firewood. Hence, firewood (3,704.00 GWh) and charcoal (720.51 GWh) were the forms of energy most in demand in 2012, followed by petroleum products (484.46 GWh), electricity (27.49 GWh) and others (5.17 GWh). Petroleum products are the energy form most used in the public electricity production of and transport sectors.

According to UNIDO, electricity demand in 2010 was about 141 GWh, with the residential sector accounting for about 56% of this. Between 2010 and 2013, electricity demand increased at an average annual rate of about 3.2%, reaching 182 GWh in 2013, and although the residential sector remains responsible for a large part of the demand, other sectors were responsible for the increase.

Electricity demand is expected to increase to 546 GWh by 2030 - which was estimated on the basis of last years' supply as well as the recorded output. Thus, there is an urgent need for mitigation actions targeted at the residential sector, particularly for projects leading to a decrease in the use of firewood and charcoal as sources of domestic energy

3.6.1 Mitigation Actions in the Energy Sector

Based on the BUR guidelines and as described in Decision 2 / CP.17, Annex III, Section IV information on mitigation actions and their effects will be reported here, as far as possible. However, due to

the lack of an ideal filing system in the country to track mitigation actions and record the results, including a quantitative estimate of avoided emissions, the latter information cannot be reliably provided. This has also resulted from the fact that the country still lacks sufficient activity data and knowledge to build the baseline information so to quantify emissions at various levels, notably at the level of manufacturing and other facilities or forest complexes. However, it is worth noting that this list of mitigation actions is not exhaustive due to the limitations in the preparation of this BUR1. In the Energy sector there is a set of pipeline projects to be implemented in Guinea-Bissau (Table 3.3).

Table 3.3 –Pipeline projects identified to be implemented in Guinea-Bissau (Adapted from UNIDO, 2017).

Pipeline 1 – Network (generation, transmission and distribution)

IP Code	Project Name	Tenderer's Name	Design Type	Project Implementation Period	Project Costs (Euro)
1.1	Construction of the hydropower plant of Saltinho and Cussilinta	OMVG/United	Investment Project	2017 - 2020	€153,120,000
1.2	10 mW Solar power plant connected to the network in Gardete	Suntrough Energy GB	Investment Project	2017 - 2021	€19 million
1.3	National transport network and distribution Electric Power	Ministry of Energy and Industry	Investment Project	2018 - 2025	€180,490,000
1.4	OMVG Project *	Government of Guiné-Bissau	Investment Project	Under construction – 2022	€94,870,000
1.5	Installation of photovoltaic solar system at Hotel Ledger	Thesis – Association for Development	Investment Project	2017 - 2018	To be defined
1.6	Fread	UEMOA/Prosolia/PPP	Investment Project	2018 - 2023	-
1.7	Construction of the BÔr diesel Thermal Power plant: PcctdB	Government of Guiné-Bissau	Investment Project	2017 - 2019	€23,210,000

Pipeline2 – Off-Grid (Mini-networks and isolated systems

IP Code	Project Name	Tenderer's Name	Design Type	Project Implementation Period	Project Costs (Euro)
2.1	Replication of the technical solution of Bambadinca in Bubaque Urbano	Thesis – Association for Development	Investment Project	2018 - 2020	€3,550,000
2.2	Replication of the technical solution of Bambadinca in Bolama Urbano	Thesis – Association for Development	Investment Project	2018 - 2020	€2,290,000
2.3	Construction of the Bissorã photovoltaic plant *	UEMOA/saBer/ /Ministry of Energy and Industry/United	Investment Project	2017 - 2019	€8.3 million
2.4	Rural Electrification: Procurement Installation of 10,000 Solar street lighting poles in the country.	GEF/United/Ministry of Energy and Industry	Investment Project	2018 - 2019	€ 23,080,000
2.5	Rural electrification of 14 localities From the transformer substations From OMVG	Ministry of Energy and Industry	Investment Project	2017 - 2020	€ 27,430,000

2.6	Rehabilitation and extension of the electrical infrastructures of the Guiné-Bissau regions	Ministry of Energy and Industry	Investment Project	2017 - 2019	€ 17,550,000
2.7	Installation of photovoltaic system in the Ministry of Energy	GEF/United/Ministry of Energy and Industry	Investment Project	2017 - 2018	€ 349,444,00
2.8	Rural electrification of 20 localities In isolated regions through Mini-grid network	Ministry of Energy and Industry	Investment Project	2018 - 2020	€ 45 million
2.9	Rural Electrification Project: team - 9	Government of Guiné-Bissau	Investment Project	2016 - 2018	€ 24 million
2.10	Construction project of Dams (central Mini-hídricas), multifunctional system	Ministry of Energy and Industry, and ministry of agriculture	Investment Project	2018 - 2020	€ 3.5 million
2.11	Renewable Energies for local Development	Adpp	Investment Project	2019 - 2023	€ 1,780,000
2.12	Renewable energy for rural development, Bolama-Bijagós	Adpp	Investment Project	2018 - 2023	€ 2,330,000
2.13	Renewable energy for agricultural development, Quinará	Adpp	Investment Project	2018 - 2025	€ 1.7 million
2.14	RenewableEnergy for Desocal involvementof the Cacheu region	Adpp	Development Project	2018 - 2023	€ 2,280,000
2.15	Teacher Training School for primary education or training schoolteachers and vocational training schools for clean energy	TheDpp	Development Project	2018 - 2023	€ 65,000,00
2.16	Photovoltaic Plant Contuboel *	Fres/EU	photovoltaic Plant Contuboel	2017 - 2019	-
2.17	Microsol	Uemoa	Investment Project	2017 - 2018	-
2.18	Contuboel Irrigation *	Thesis/EU	Investment Project	2017 - 2019	-

Pipeline 3 - Bioenergy and Cooking Projects and Programs

IP Code	Project Name	Tenderer's Name	Design Type	Project Implementation Period	Project Costs (Euro)
3.1	Licaju: Cogeneration Station project	Licaju/GeF/United	Project Investment	2017 - 2018	€490,000

3.2	Installation of the gasification system for cashew bark in arreY	ArreY Africa/GeF/ /United Kingdom	Technical and financial assistance	2017 - 2019	€225,000
3.3	NoBa saBi: Project Biomass Cogeneration Station	NoBa saBi/GeF/ /United Kingdom	Technical and financial assistance	2017 - 2018	€556,818
3.4	Production of electricity through bagasse in the distillery Barros	Destilaria Barros/GeF/ /United Kingdom	Technical and financial assistance	2017 - 2019	€430,000
3.5	Production of electricity through biogas in the distillery Barros	Destilaria Barros/GeF/ /United Kingdom	Technical and financial assistance	2017 - 2019	€97,000
3.6	Production of electricity through bagasse in the Jugudul distillery	Jugudul Distillery/GeF/ /United Kingdom	Technical and financial assistance	2017 - 2019	€130,000
3.7	Production of electricity through biogas in the Jugudul distillery	Jugudul Distillery/GEF/ /United Kingdom	Technical and financial assistance	2017 - 2019	€12,000
3.8	Production of electricity through bagasse in the Quinhamel distillery	Distillery/Quinhamel /Gef/united	Technical and financial assistance	2017 - 2019	€297,000
3.9	Production of electricity through biogas in the Qinhamel distillery	Distillery/Quinhamel /Gef/united	Technical and financial assistance	2017 - 2019	€10,000
3.10	Gasification of rice husk in Agrogeba plant	Agrogeba/GEF/Unite d	Technical and financial assistance	2017 - 2019	€60,000
3.11	Gasification of rice husk in Bafatá Central	Central Bafatá/GEF/ /United Kingdom	Technical and financial assistance	2017 - 2019	€170,000
3.12	Inita: Construction of plants/biogas plants	National Research Institute Applied Technology	Project Investment	2018 - 2019	€250,000
3.13	Operationalization of Research and Development Center For sustainable Energy In rural areas	Adpp	Project Development	2019 - 2021	€375,000

Pipeline 4 – Energy efficiency

IP Code	Project Name	Tenderer's Name	Design Type	Project Implementation Period	Project Costs (Euro)
4.1	Improvement of the electric service of the city of Bissau – PaseB	Government of Guiné-Bissau	Project Investment	2017 - 2019	€35,990,000
4.2	Urgency for the improvement of water services and electricity – PUasee	Government of Guiné-Bissau	Project Investment	To be identified	To be identified

4.3	Project to replace the lampposts of the LED streetlights, in the different streets of Bissau – Pree *	UEMOA/saBer/Mei	Project Investment	2016 - 2018	-
4.4	Replacing lamps in LED street lighting *	UEMOA/saBer	Project Investment	2016 - 2018	-

For each pipeline, the identified projects are prioritized according to their relevance to the country. The highest priority projects are those promoting access to energy, namely:

- Network extension and rehabilitation projects;
  Projects promoting Access to Energy for isolated populations (mini grids, isolated systems);
  Energy production projects through renewable energies.

Some of these projects have been tabulated (Table 3.4) according to the BUR1 mitigation action template.

Table 3.4 – Highlights of energy sector mitigation actions with highest priority (Adapted from UNIDO, 2017).

Name and description of mitigation measure	Quantitative Goals/Objectives	Status	Progress indicators	Methodologies/ Assumptions	Estimated GHG emission reduction, Gg CO_{2eq}	Coordination and Management/Type of support received
Name and description of the mitigation measure	Quantitative Objectives/objectives	Position (I, FP, c)	Progress indicators	Methodologies/ hypotheses	Estimated reduction of GHG emissions, Gg CO2eq	Coordination and management/type of support received
ENERGY						
Coverage – Reduction of CO2 and CH4 emissions by implementing energy efficiency measures/energy saving and introducing renewable energy sources)						
Energy Efficiency/ Construction of the Saltinho and Cussilinta Hydroelectric Power Plant	Enhancing electricity production in Guinea-Bissau	Ongoing	-Installation of the hydroelectric power plants of Saltinho and Cussilinta Amount of energy generated: estimated at 156 GWh/year; -Population with access to electricity reduction of GHG emissions. -Two hydropower water stations with a total power of about 27 MW (Saltinho 14 MW and	• Phase 1: Update the studies of the Corubal River basin for the construction of the Saltinho Cussilinta dams, for the production of electricity destined for the countries of the OMVG Treaty, including the execution of feasibility study, design and environmental and social impact study; • Phase 2: Construction of the hydroelectric plants of Saltinho and	Cross-cutting/mitigation	Total Project cost: € 153,120,000 Funded by: OMVG/United 2017-2020 Phase 1:2017 - 2018 Phase 2:2018 - 2020

			Cussilinta 13 MW); Contribution to the increase in the share of renewable energies in the energy matrix of the country Contribution to the energy Access goal (AE)	Cussilinta and supply of Renewable energy for Guinea-Bissau and/or for export		
Energy efficiency/ improvement of the electric service of the city of Bissau – PASEB	Promote access to electricity through: • Rehabilitation and extension of the MT and BT Electric network of Bissau • Construction of three injection points: Antula, power plant and Bra.	Implementation	Construction of injection points in Antula, power plant and Bra MT and BT Network extension	The following are the expected direct results: • Increased availability of electricity supply • Increase in the electrification and AE rate of the country The following are expected indirect results: • improvement of Life conditions of the population of Bissau and surrounding areas	Cross-cutting/mitigation	Project Total Cost: € 36,390,000 Values committed to the project: • AfDB/BAD: Donative 6.12 MUC corresponding to € 8,020,000 Loan 7.18 MUC corresponding to € 9,040,000 • The EIB: Loan 11.7 MUC corresponding to € 15,330,000. Amount to raise about 10% of the total 3.276 MUC corresponding to € 3,640,000 AfDB/BAD and EIB
Energy efficiency/ urgency for the improvement of water and electricity services – PUASEE	Promote access to electricity and water: • Rehabilitation and extension of the electric network MT and BT of Bissau • Construction of a 750 M3 reservoir and water network			The following are the expected direct results: • Increased availability of electricity and water supply. • Increase in the electrification and AE rate of the country The following are expected indirect results: • Life improvement of the population of the city of Bissau		

Rural electrification 14 localities from the transformer substations project OMVG	Contribute to the increase in the rate of access to electricity and improve the quality of services in the areas concerned. • Contribute to the improvement of the socio-economic conditions of the beneficiary communities. • Contributing to the financial equilibrium of the country's electricity subsector	In the start-up phase	350,000 inhabitants with access to electricity; Corresponding to approximately 22% of the country's population	Construction of the MT and BT networks in the localities of Mansoa, Mansaba, Bissorã, Quebo, Bambadinca, Djabicunda, Contuboel, Tantan Cossé, Saltinho, Mafanco, Buba, BraimaSori, Gabú and Bafatá use of the hydropower source of the OMVG project	Amount of electricity generated per year annual savings in diesel fuel	Total Cost: €27,430,000 (corresponding to about 18 billion FCFA) BOAD: €26,590,000 To raise: €840,000
Rural Electrification: Supply and installation of 10,000 solar streetlamps in the country. **PRODERE VOLET I of UEMOA, with installation of around 1,363 solar lamps poles**	• Seeks the supply and installation of solar public lighting poles in different localities of Guiné-Bissau, in order to create better living conditions and the movement of people and their goods in the different roads of the villages, to reduce the night muggings, vandalism in the villages.	Implementation	-Production of about 52.56 GWh/year of electricity in a renewable way. -Illumination of the villages of the country's interior. Allow savings in diesel, or the use of electrogenic groups for the production of electricity for public lighting.	-Acquisition and installation of the kits for public lighting. -Transportation, customs clearance. -Works of function and assembly of assessors	-Amount of electricity generated per year: 52.56 GWh/year -Annual savings in diesel fuel: 10 tons	Total Project cost: €23,080,000 (corresponding to approximately 15 billion FCFA) -MEI: Counterpart with exemptions -Value to raise: €23,080,000

However, from this long list of projects in Pipeline, those covering the Renewable Energy sector are highlighted, some of which are already underway and others with great potential for increasing the country's energy capacity (Table 3.4).

Table 3.4 – Renewable energy potential (Data obtained from UNIDO, 2017).

SOURCE/Project	Capacity	Annual production
Inventoried Biomass Resources	4.4 MW	10.3 GWh/
19th Micro-Dams	2.94 MW,	25.91 GWh
Sea -Driving and wave energy	4 MW,	35 GWh
Saltinho, Cussilinta and Surire (FAST) Dams	27 MW,	229.7
Bambadinca Sta Claro, IBAS, ADPP project	1.1 MW	
Gardete (Bissau),	10 MW	

Table 3.5 summarizes the energy sector, the consumption of diesel avoided in the year 2030 and the respective savings by implementing renewable energy projects in the IP (Investment Prospectus), as well as the emissions of Greenhouse gases (GHG) avoided by the implementation of these projects (assuming that renewable energies will replace the production of electricity through diesel).

Table 3.5 – Diesel Savings Highlights and GHG Reductions from Energy Sector Mitigation Actions.

2030	Diesel Consumption Avoided Per Year (LITERS/YEAR)	Savings Due to Diesel Savings (Euro/YEAR)	Avoided GHG Emissions (tCO2e/YEAR)
On the network	90 525 637	100 483 457	239 407
Off the grid	28 740 031	41 098 244	76 007
Total	**119 265 668**	**141 581 701**	**315 414**

As it can be seen, by 2030 Guinea Bissau will avoid the consumption of about 119 million litres of diesel per year, and about 315,000 tCO2 e / year in direct GHG emissions. Assuming that the cost of diesel for power generation in EAGB groups is around € 1.11 per litre and in off-grid systems around € 1.43 per litre, it is estimated that by 2030 with the implementation of renewable energy projects, Guinea Bissau would save about € 142 million

3.7 Mitigation on the AFLOU/LULUCF sector

According to the UNFCCC, international financial support should be provided to developing countries that enable voluntary mitigation and adaptation actions to be taken. Thus, Guinea-Bissau, in addition to being involved in government initiatives on climate change and resource efficiency, has also initiated several voluntary actions with the private sector. The Business Sector and the International Community present in the Country play a key role in the country's sustainable development efforts, and are committed to the voluntary participation of projects in the AFOLU and LULUCF sectors, some of which are listed below (Table 3.6):

Gã Quebo Community Forest

Table 3.6 – Highlights of Agriculture, forest and land use sector mitigation actions with highest priority (Adapted from UNIDO, 2017).

Name and description of mitigation measure	Quantitative Goals/Objectives	Status	Progress indicators	Methodologies/ Assumptions	Estimated GHG emission reduction, Gg CO_{2eq}	Coordination and Management/Type of support received
Name and description of the mitigation measure	Quantitative Objectives/objectives	Position (I, FP, c)	Progress indicators	Methodologies/ hypotheses	Estimated reduction of GHG emissions, Gg CO2eq	Coordination and management/type of support received
Agriculture, forest and land use						

Quantification of stored carbon and the sink capacity of the forest vegetation of Guinea-Bissau/project CARBOVEG-GB	-Contribute to the support of the forest sector in Guinea-Bissau in the emerging carbon market, both within the framework of the Kyoto Protocol and in the framework of voluntary carbon markets	Implemented	Forest/Cross-cutting Mitigation			Apa Project cost: 500,000 Euros
Regional Programme for the promotion of domestic energies and alternatives in the Sahel (PREDAS)	To ensure the supply of residential or urban and rural households in domestic fuels, on the basis of a participatory, integrated and durable management of the natural resources of the territory of the Tabancas, to accelerate and modernise the replacement of Woody Energies trade; Improve the living conditions of rural and urban populations, develop modern technologies and activities that generate jobs and incomes; Strengthen the coherence, coordination and efficiency of actions and develop the capacity for intervention of public, private, local actors in the execution of activities aimed at improving the sector of domestic energy.	Ongoing	Domestic/Cross-cutting energy Mitigation			
3rd national Communication on Climate Change/GEF/UNDP Project	Provide information (GHG inventory – emission and absorption sources; vulnerability assessment and climate change adaptation measures, mitigation or emission mitigation options, among others).	Implemented	Croos-cutting/described mitigation measures			Cost: 500,000 USD $ Funded by GEF/UNDP
Protected areas and Climate change resiliencies/mitigation Project	Reduce the vulnerability of populations and improve their resilience to climate change by supporting the country in its recent efforts towards sustainable development with low carbon emissions and climate-resilient	Ongoing	Cross-cutting/mitigation component			Project cost: 4 million Euros Funded by: EU/GCCA

Economic development project of the southern Regions (PADES)/IFAD	Boosting agricultural production, ensuring food security and providing opportunities for income diversification in the regions of Tombali, Quinara and Bolama-Bijagós in Guinea-Bissau	Ongoing	Cross-cutting/mitigation component			Total Project Cost: 18,990,000 -Government of Guinea-Bissau to contribute 2.3 million and a contribution of 1.7 million of the beneficiaries. -IFAD will offer 5 million additional dollars.
Programme to support the water sector and Rural Solar Hydraulics (PASA-HRS)/ Agriculture and water management	Making water available to rural communities with the use of pumping with solar equipment	Implemented	Cross-cutting/mitigation component			Total project cost: 4.5 million Euros -Funded by EU
Licaju: Cogeneration Station project	Construction of a cogeneration unit for the production of electric energy using the bark of Cashew nut that is available after processing Cashew Nut in Bolama. Demonstration design of associated cogeneration technology The industrial activity of cashew processing.	Development phase completed.	Contribution to the increase of the% of renewable energy in the national Energy matrix (about 1.1 GWh/year will be produced by the plant through the use of the nutshell peel of Cashew instead of diesel).	Production of about 1.1 GWh/year of electricity in a renewable way. Elimination of about 2,200 tonnes of cashew nutshell (process residue Production of cashew) for the production of energy. Annual savings of about 403,200 liters of diesel.	Amount of electricity generated per year; Annual Diesel Savings	Total Project cost: **€** 490,000 (corresponding to US $515,000) GEF/UK: **€** 57,000, 00 Licaju: **€** 142,000 ,00 To raise: **€** 291,000, 00

3.8 Specific and impactful mitigation actions

With the implementation of the LEAP SCREENING program based on the above-mentioned scenarios, the following GHG mitigation options have been selected in the energy sector:

• The mitigation scenario by means of replacing traditional stoves of three stones or charcoal stoves, by gas stoves. In this option the country would avoid the issuance of 163,038 TE CO2 at a sale price of $5.2/ ton of carbon;

• The mitigation scenario, through the construction of the dams of Saltinho and Cussilintra (the country would divert the emission of 1,130,338 TE CO2 at a sale price of $7.78/ ton of carbon);

• The scenario of mitigating the decentralisation of rural electrification using a photovoltaic system (the country could protect itself against the emission of 47,312 TE CO2 at a sale price of US $6.24/ ton of carbon);

Guinea-Bissau improved stove

The mitigation scenario that encompasses the interconnection of the electricity grid and Sambagalou and Kaleta (the country would avoid the issuance of 645,170 TE CO2 to $126.72/ ton of carbon sales price).

The mitigation scenario based on the development and establishment of a legal framework through a national strategy for the development of low carbon in the long term.

3.9. References and Footnotes

— Ferreira, T C & Lona, J T. 2018. Componente 3 do Projeto BUR 1: "Políticas e medidas para mitigação/atenuação das alterações climáticas e seus efeitos" Projecto SB-001119.13 - Elaboração do Primeiro Relatório de Actualização Bienal da implementação da Convenção-Quadro das Nações Unidas sobre as Alterações Climáticas. Componente 3 do Projeto BUR 1. 60pp

— Project CARBOVEG-GB (2007) – Quantification of stored carbon and the sink capacity of forest vegetation of Guinea-Bissau-MRN/DGA.

— Republic of Guinea-Bissau. 2015. Intended Nationally Determined Contributions (INDC).

—https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Guinea%20Bissau%20First/GUINEA-BISSAU_INDC_Version%20to%20the%20UNFCCC%20(eng).pdf

— http://chimbo.org/wp-content/uploads/2016/06/Annual-Report-2015.pdf

— UNIDO, 2017. GUINEA-BISSAU SUSTAINABLE ENERGY INVESTMENT PLAN. Ministry of Industry and Energy. 2015-2030 Period. 131p

— [1] https://ibapgbissau.org/img/FotosAreasProtegidas/PNTC/PNT%20CACHEU-Bolol-17%20octobre%202012-enhaut-R0090247.jpg

— http://guineabissau.sodepaz.org/galery/o-carvao-vegetal-a-energia-de-guine-bissau/show

— https://www.dw.com/pt-002/fogareiro-melhorado-revoluciona-guin%C3%A9-bissau/a-16699318

—https://www.google.pt/imgres?imgurl=http%3A%2F%2Fguineabissau.sodepaz.org%2Fuploads%2Fgalery%2Fimages%2F52aee172642941.24315948.jpeg%3F1536278406201&imgrefurl=http%3A%2F%2Fguineabissau.sodepaz.org%2Fgalery%2Fo-carvao-vegetal-a-energia-de-guine-bissau%2Fshow&docid=sOCnbLFUzOhrMM&tbnid=2ntE8anZ3aHr8M%3A&vet=10ahUKEwiawJHftZjeAhXEIsAKHRZ1C4UQMwgnKAAwAA..i&w=960&h=640&itg=1&bih=505&biw=1282&q=52aee172642941_24315948&ved=0ahUKEwiawJHftZjeAhXEIsAKHRZ1C4UQMwgnKAAwAA&iact=mrc&uact=8

— http://suniaenergy.com/trabajos/central-solar-de-bambadinca-guinea-bissau/

— https://ibapgbissau.org/Home/Galeria?Length=4

Island of Bubaque, Bijagos Archipelago, Guinea-Bissau

Chapter 4:
Financial, Technology, Capacity Needs and Support Received

Chapter 4
Financial, Technology, Capacity Needs and Support Received

Urok Community Protected Marine Area - , Bijagos Archipelago, Guinea-Bissau

Chapter 4:
Financial, Technology, Capacity Needs and Support Received

4.1 Introduction

Guinea-Bissau as a Party to the United Nations Framework Convention on Climate Change (UNFCCC) has respected its commitments based on its common but differentiated responsibilities, specific national and regional development priorities and national objectives and circumstances. - Article 4 of the UNFCCC. Thus, in the framework of the application of this Article 4 in conjunction with Article 12 - Decisions 10 / CP2 and 17 / CP8, the country is required to periodically submit its National Communications (NCs) by providing information through GHG inventories (emissions and absorption sources), vulnerability assessment and climate change adaptation measures, emission mitigation or mitigation options, among others. UNFCCC Decisions 1 / CP.16 and 2 / CP.17 urge Non-Annex I Parties to submit their Biennial Update Reports (BUR) to provide an update on the data and information contained in the most recent CNs on adjustments related to climate change. The Guinea-Bissau First Biennial Update Report (BUR 1) aims, on the one hand, to strengthen national technical and institutional capacities for the preparation of national circumstances and Biennial Update and, on the other hand, to update the data and information contained in recent NCs, in particular those related to national circumstances and institutional arrangements, Greenhouse Gas (GHG) inventories, constraints, gaps and needs related to technical and financial capacities, support received and all Monitoring information, Reporting and Verification (MRV).

This Chapter intends to report the results on identified constraints and gaps, financial, technical and capacity-building needs and to describe the support received for the implementation of Climate Change-related Activities / Projects / Programs, including the preparation and presentation of this BUR 1. This report aims also at presenting a review on climate change actions and their effects and to systematically enunciate mitigation actions/measures, and to analyse policies and measures adopted by the Government of Guinea-Bissau for the Mitigation of the impact of climate change at national level informing the possible progress on implementation, expected outcomes and potential for estimated reduction, needs, type and level of assistance required.

4.2 Identified Financial, Technology, Capacity Needs

In the current economic, social and environmental situation of the country, identifying constraints and the financial, technical gaps, and capacity-building needs required for the preparation of BUR 1 is a challenging exercise. The following tables summarize the identified needs for the financial support, technical support and capacity building needed in some areas of interest that will enhance Guinea-Bissau's organizational and technical capacity to develop its national communications in the future.

Table 4.1 – Financial needs including support on additional requirements

Type	Sector	Activities	Information on Required Support
Financial	AFOLU	Monitoring of the country's forests through a National Forest Monitoring System	- - Acquisition of Remote Sensing images (satellite / radar / aerial photography, etc.) - - Acquisition of image / photography and data processing software; - - Purchase of image / photo processing and ground data processing equipment
		Improving access to the CDM and the carbon market	- Development of a baseline based on UNFCCC standards; - Availability of credit buyers; - Implementation of CDM Projects in AFOLU sector
		Prepare the country to receive payment for forest conservation results (REDD +)	- Operation of the REDD + Working Group; - Development of National FREL - Development of the REDD + National Strategy - Receipt of forest conservation results
	Energy	Improving access to renewable energies	Access to renewable energy kits in concession values
		Improving access to the CDM	Implementation of CDM Projects in the Energy Sector
	All sectors	MRV of actions and financial resources received for the implementation of actions	Implementation and operationalization of a national MRV System

Table 4.2 – Technical and Technological Needs Assessment and Transfer requirements

Type	Sector	Activities	Information on Required Support
Technical and technological	AFOLU	Assessing the contribution of public policies to reduce deforestation	Development of methodologies and tools
		Establish a sustainable forest management mechanism	Development of pilot projects based on experience of community forests
	Energy	Investing on renewable energies (solar, wind, biomass)	Technological, regulatory and economic development
		Popularize the techniques of improved stoves and use of briquettes	*In situ* experiments, seminars
		Promote the use of biodigesters as an alternative energy source (biogas)	*In situ* experiments, installation and management of biodigesters, seminars
	All sectors	MRV of actions and financial resources received for the implementation of actions	Development of methodologies and tools
		Equip the national institutions carrying out research and systematic observation.	- Improvement in terms of space and equipment of research and data collection centres; - Creation of collection mechanisms, treatment, storage and dissemination of data
		Create a data file and documentation system	Development of a data and documentation file system
	Technology transfer	Support for Technology Capability Guidance and Needs Assessment (TNA)	Roadmap Development and Technology Transfer Action Plan

Table 4.3 – Capacity Building and Transfer requirements

Type	Sector	Activities	Information on Required Support
Capacity Building	AFOLU	Strengthening the capacities of key actors in the sector on GHG inventory, adaptation and mitigation	Seminars, workshops, exchange of experiences
		Encourage climate change research (knowledge of vulnerability and proposals for adaptation and mitigation measures)	Development of case studies
		Strengthen national capabilities in remote sensing forest monitoring and field work	Development of a training package
		Strengthen national forest carbon balance capacities	Development of a training package
		Strengthening communities ' capacity for sustainable forest management	Seminars, workshops, exchange of experiences
		Strengthen the technical, institutional and systemic capacities of key institutions in the field of AFLOU	- Review of AFOLU laws and regulations in line with new climate change requirements; - Integrate the climate change dimension into AFOLU key policy documents
	Energy	Strengthening the capacities of key actors in the sector on GHG	Seminars, workshops, exchange of experiences

		inventory, adaptation and mitigation	
		Strengthen villagers' ability to use organic digesters and briquettes as an alternative energy source	Seminars, workshops, exchange of experiences
		Develop a National Renewable Energy Program / Plan / Strategy	Road map development and Renewable Energy Action Plan
		Strengthening the technical, institutional and systemic capacities of key institutions in the field of energy	- Review of energy laws and regulations in line with new climate change requirements; - Integrate the climate change dimension into key energy sector policy documents
	All sectors	Strengthen the individual, institutional and systemic technical capacity of national institutions carrying out research and systematic observation in the field of environmental, agronomic, time and water sciences	Training needs assessment and development of a training plan
		MRV of actions and financial resources received for the implementation of actions	Training of public managers, exchange of experiences
		Implementation of MRV obligations under the UNFCCC, including the drafting of reports and other documents to be submitted to the Paris Convention Agreement	- Periodic capacity building to consolidate results and actions in the fight against climate change and preparation of reports and other documents to be submitted to the UNFCCC. - Regular and adequate international financial support is essential to ensure the quality, scope and frequency of work related to the fulfillment of MRV commitments under the UNFCCC and the Paris Agreement, the preparation of BURs and NCs as well as Guinea-Bissau's participation in the Enhanced Transparency Framework.

4.3 Needs Analysis

Some country needs for financial, technical and technological support and capacity building were identified in order to be able to address gaps in handling climate change issues. Thus, financial support is required for:

• Strengthening the financial capacity of the state and that of the research institutions to collect, archive and analyze climate data and renewable natural resources;

• Allocating financial resources for the purchase and acquisition of certain data and software essential for vulnerability assessment and formulation of adaptation strategy;

• Providing the country with financial resources to build capacity and set up a regular vulnerability assessment system and climate change adaptation and mitigation programs and strategies, among others.

According to the Guinea-Bissau's Sustainable Energy Investment Plan 2015-2030, approximately €680,458,000 would be required in the Energy sector, of which €630,000,000 would be invested in renewable energy; €3,103,000 in Bioenergy; €36,000,000 in Energy Efficiency and €11,355,000 in Favourable Environment (Institutional and regulatory capacity building).

Regarding technical and technological support, the following actions are important:

• Provide the meteorological, hydrological services with tools for carrying out systematic observation in the process of assessing climate vulnerability and risks:

• Increase the number of trained national officers able to deal with climate change issues;
• Create conditions for the establishment of an accessible and structured national database (hydrological, hydrogeological, forest inventory) for better vulnerability assessment and adaptation;
• Create conditions for the collection and availability of documentation and data archives;
• Invest to create coherent, specific and good resolution national models for vulnerability assessment and adaptation applicable to all sectors;
• Establish a Research Centre of Excellence on climate change research.

Regarding human capacity building, it is necessary to:

• Introduce the climate change aspect in training and research;
•Train more officers in GHG inventory methodologies, adequately assess vulnerability, propose climate change mitigation and adaptation measures;
• Train people in climate modelling;
• Provide the country with tools and a coherent, permanent and robust synoptic observation network;
• Train technicians in cost-benefit analysis of climate change mitigation and adaptation and methodologies for mainstreaming climate change into policy documents (mainstreaming);
• Promote permanent and systematic climate change Information, Education and Communication campaigns for different sections of society, especially policy makers;
• Strengthen national mechanisms for information exchange, promotion and dissemination.

4.4 Support received and additional requirements

Guinea-Bissau's economic, social and environmental situation makes it dependent on external resources to implement projects at all levels. In the context of climate change, Guinea-Bissau needs bilateral, multilateral financial, technical / technological and capacity building support from abroad to address climate change issues. As part of the UNFCCC Non-Annex I Party, of the Kyoto Protocol, Part of the Least Developed Country (LDC) and Small Island Developing States), Guinea-Bissau meets the criteria for access to different types of public funds and is eligible for various sources of funding. These funds focus on one or more of the three key aspects: (i) some are grants (Grant); (ii) others are loans (Loan) and (iii) some require co-financing, others not. The following table summarizes the main existing and eligible funds for Guinea-Bissau.

Table 4.4 – Sources of climate finance eligible for Guinea-Bissau

Fund	Fund type	Adaptation	Mitigation	REDD	Instrument type	Requires co-financing
Adaptation Fund (AF)	Multilateral framework of the UNFCCC	X			Donation	No. Finances total implementation costs for projects and programmes
Least Developed Countries Fund (LDCF)	Multilateral framework of the UNFCCC	X			Donation	Yes. It finances all costs with the preparation of NAPA and projects, but only covers additional costs for the implementation of projects and programmes
Special Climate Change Fund (SCCF)	Multilateral framework of the UNFCCC	X			Donation	Yes. It finances the additional costs of implementing projects and programmes.
GEF Trust Funds	Multilateral framework of the UNFCCC	X			Donation	Yes. It finances all costs with the preparation of reports and national communications, but only covers additional costs of adaptation measures.

Green Climate Fund	Multilateral	X	X		Loan	
Pilot Program for Climate Resilience (PPCR)	Multilateral, CIF WB	X			Donation and Loan	Yes
Clean Technology Fund (CTF)	Multilateral, CIF WB		X		Donation and Loan	Yes
Scaling-Up Renewable Energy Program for Low Income Countries (SREP)	Multilateral, CIF WB		X		Donation and Loan	Yes
Forest Investment Program (FIP)	Multilateral, CIF WB			X	Donation and Loan	Yes
Global Energy Efficiency and Renewable Energy Fund (GEEREF)	Multilateral, EU		X		Private Equity	Yes
Global Climate Change Alliance (GCCA)	Multilateral, EU	X	X	X	Donation	Unspecified
UN-REDD	Multilateral			X	Donation and Loan	Unspecified
Forest Carbon Partnership Facility (FCPF)	Multilateral			X	Donation (initial part) and Carbon Market 2a part	Yes
UK's International Climate Fund	Bilateral	X	X	X	Donation	Unspecified
Japan's Fast Start Finance	Bilateral	X	X	X	Donations and loans (private only)	Unspecified
Germany's International Climate Initiative	Bilateral	X	X	X	Donation and concessional loans	Yes. The mobilization of additional funds is a prerequisite for approval of the donation
Norway's International Climate and Forest's initiative	Bilateral			X	Donation	Unspecified

Source: Adapted from Overseas Development Institute, 2012

These above funds can:

• Contribute to the implementation of public policies and programs funded by the budget;

• Leverage private resources for low carbon and climate resilient investments;

• Support initiatives by Community Based Organizations and NGOs (Civil Society).

Understanding these flows is crucial to assessing past outcomes and improving future policy making in the context of climate change, optimizing the use

of available resources. In this context, the NCs and BUR 1 are considered as an important source of information for Guinea-Bissau to be able to look forward to its sustainable development.

4.5 Financial, technical and capacity-building support received

This Section provides information on resources received through bilateral and multilateral partners since the Initial National Climate Change Communication, in 2004. Despite the difficulties and constraints inherent to this exercise, this section attempts to provide, in table format, the most disaggregated information possible. Thus, the following table (Table 5) describes the financial, technical and capacity building support that Guinea-Bissau has received since the Initial National Communication for the implementation of Climate Change Projects / Programs (Mitigation, Adaptation and cross-cutting).

Table 4.5 – Financial, technical and capacity building support received - Summary Multilateral financial flows

Agreement	Sector	Type	Financing Institution	Project name	Objective	Total Funding €	Total funds in US $	Financ Instr.	Data
Bilateral	Forest/ Cross-cutting	Mitigation	(APA)	Project of quantification of stored carbon and the capacity of sink of forest vegetation of Guinea-Bissau-CARBOVEG-GB	Contributing to the support of the forest sector in Guinea-Bissau in the emerging carbon market, both within the framework of the Kyoto Protocol and in the framework of voluntary carbon markets	500.000		Grant	2007-2009
Multilateral	Forest	Mitigation	University of Twente (Netherlands/ TOD/ITC Institute and Enda Tiers Monde enegal/Enda Energy Program	Project Think Global and Local Action	Quantify live biomass above ground (BVAS), carbon stocked (CO_2) and EQUIVALENT Carbon (CO_2 eq) in some community forest reserves of Guinea-Bissau (Djalicunda and Madina Djalocunda)	35.000		Grant	2007-2009
Bilateral	Forestry/Cross-cutting	Mitigation	(APA)	Forest monitoring System of Guinea-Bissau (SiMoFlor-GB) (*)	Designing, developing and commissioning a system for monitoring forest, natural and planted vegetation, for the entire territory of Guinea-Bissau	1.000.000		Grant	In preparation
Multilateral	Productive Sectors.	Cross-cutting	GEF/UNDP	Initial national communication on climate change	Provide information (GHG inventory – emission and absorption sources; vulnerability assessment and climate change adaptation measures, mitigation or emission		500.000	Grant	2004

					mitigation options, among others).				
Multilateral	Productive Sectors	Cross-cutting	GEF/UNDP	2nd National communication on climate change	Provide information (GHG inventory – emission and absorption sources; vulnerability assessment and climate change adaptation measures, mitigation or emission mitigation options, among others).		500.000	Grant	2011
Multilateral	Productive Sectors.	Cross-catting	GEF/UNEP	3rd national communication on Climate change	Provide information (GHG inventory – emission and absorption sources; vulnerability assessment and climate change adaptation measures, mitigation or emission mitigation options, among others).		500.000	Grant	2016
Multilateral	Forestry/ ENERGY/ Cross-cutting	Mitigation	EU/CILSS	Regional Programme for the promotion of domestic and alternative energies in the Sahel (PREDAS)	To ensure the supply of residential or urban and rural households in domestic fuels, on the basis of a participatory, integrated and lasting management of the natural resources of the territories of the Tabancas, to accelerate and modernize the substitution of trade in Woody Energies; Improve the living conditions of rural and urban populations, develop modern technologies and activities that generate jobs and incomes, strengthen the coherence, coordination and efficiency of actions and develop the capacity to intervene Private, local actors in the implementation of activities with a	800.000		Grant	2005

					view to improving the sub of domestic energy.				
Multilateral	Forest/ Energy	Mitigation	UEMOA	Project Vulgarization of biogas production techniques and its durable use	The insure the regular, durable and less costly supply to the consuming populations of the biogas produced (domestic fuel)		34.500	Grant	Completed at 2011
Multilateral	Energy/ Cross-cutting	Mitigation	EU	Solar Regional Programme (PRS)	To fight poverty reduction within the scope of DENARP, to improve the living conditions of populations and to strengthen the national private photovoltaic sector.	4.000.000		Grant	Finalized
Multilateral		Cross-cutting	GEF/UNDP	National action Plan for Climate change	Know the country's vulnerability and propose adaptation measures through project Portfolios		200.000	Grant	2005-2006 Finalized
Multilateral	Cross-cutting	Mitigation	EU/GCCA	Protected areas and climate change resilience	Reduce the vulnerability of populations and improve their resilience to climate change by supporting the country in its recent efforts towards sustainable development with low carbon emissions and climate -Resilient	4.000.000		Grant	Ongoing
Multilateral	Cross-cutting	Adaptation	GEF/UNDP/ UNESCO	Draft adaptation to climate change and the Coastline: response to the change of coastline and its human dimensions in West Africa in the framework of integrated coastal zone management (ACCC)	Strengthen the adaptability of local communities and the resilience of coastal ecosystems in the five countries of the West African coast (Mauritania, Cape Verde, Senegal, Gambia and Guinea-Bissau) to climate change		421.000	Grant	Finalized
Multilateral	Cross-cutting	Adaptation	GEF/UNDP	Strengthening resilience project and the capacity to adapt the agricultural and water sectors to climate change in Guinea-Bissau	Strengthening the resilience of eastern communities in the face of climate change effects in the agrarian and water sectors		4.200.000	Grant	2011-2016

Multilateral	Cross-cutting	Adaptation	GEF/UNDP	Project to strengthen the resilience of coastal communities to climate change	Enhancing resilience and adaptability of communities and coastal investments to the impacts of climate change		12.000.000	Grant	2018
Multilateral	Agriculture/Water Management /Cross-cutting	Adaptation	FA/BOAD	Promoting a climate-smart agriculture in eastern Guinea-Bissau-Scaling up climate-smart agriculture in East Guinea Bissau	Strengthen farmers ' capacities on smart farming and simultaneously increase the planning and management capacities of adaptation and climate risks at all levels of governance.		10.000.000	Grant	2017-2020
Multilateral	Cross-cutting	Adaptation	UNDP/FAO	Guinea-Bissau resilience to climate change project and increased food security	Develop and operationalize a national system of Agro-ecological Zonagem-NAEZ for decision support in the management of land use, increase in agricultural productivity and decrease of vulnerability to climate change		6.000.000	Grant	In preparation
Multilateral	Cross-cutting	Cross-cutting	GCF/OSS	Preparation of Guinea-Bissau for climate finance and establishment of the GCF designated national Authority	Prepare Guinea-Bissau for climate finance and categorizers designated national GCF Authority		300.000	Grant	In preparation
Multilateral	Cross-cutting	Adaptation	GCF/UNDP	Using NAP in the Climate-Proofing of biodiversity, ecotourism and agrarian sectors Dto Guinea-Bissau.	(I)to adapt to climate change in vertical planning in the biodiversity, ecotourism and agrarian sectors of Guinea-Bissau		2.992.864	Grant	In preparation
Multilateral	Energy	Mitigation	UEMOA	Project to develop renewable energy and energy efficiency in the area of UEMOA (PRODERE)	Public lighting through solar and central hybrid power off the grid		2.000.000	Grant	Finalized
Multilateral	Energy	Mitigation	BAD/BOAD/ BED/BID /UEMOA/ESAO/OMVG	OMVG Sub regional interconnection line installation Project	Connecting hydroelectric dams to be created in the context of harnessing shared water resources from OMVG countries		20.000.000 (*)	Loan	Ongoing
Multilateral	Energy	Mitigation	EU/ONG TESE	Decentralized Rural Electrification	Build a 312-kW power plant and organise the		3.000.000 (*)	Loan	Finalized

				Project "Bambadinca Esta Claro"	Community electrical Management Service				
Multilateral	Energy	Mitigation	FRES/UE	Draft assembly of a Mini-grid system in Contuboel	Build a 45-kW photovoltaic power plant by the independent energy producer of FRES		2.500.000 (*)	Loan	Finalized
Multilateral	Energy	Mitigation	SABER / UEMOA	Regional Programme for the development of renewable energies in area II of UEMOA (PRODERE II)	Strengthen the solar public lighting of Bissau and build a 500-kW solar power plant in Bissorã		4.000.000 (*)	Grant	Running
Multilateral	Energy	Mitigation	GEF/ UNIDO	Project to promote investment in small and medium-sized renewable energy technologies in the electric sector of Guinea-Bissau	Reduce GHG emissions from the energy sector and promote access to modern energy by investing in renewable energy technology		2.700.000	Grant	Ongoing
Multilateral	Energy	Mitigation	GEF/UNDP	Project to promote better access to modern energy services through sustainable grids and low-carbon bioenergy technologies among forest-dependent communities in Guinea-Bissau	Reduce GHG emissions from the energy sector and promote access to modern energy in forest communities through investment in renewable energy technology		2.912.000	Grant	In preparation
Multilateral	Energy	Mitigation	BOAD	Construction project of 15 MW hybrid photovoltaic plant at Ponta Gardete in Bissau, 1 MW in Gabu and 1 MW in Canchungo	Enhancing electricity production in Guinea-Bissau		44.000.000 (*)	Loan	Ongoing
Multilateral	Agriculture and Water management	Cross-cutting	BID-UEMOA	Rural Hydraulics and Sanitation Program	Hydro agricultural planning to increase rice production and make water available for human consumption		10.500.000	Loan	2009-2012
Multilateral	Agriculture and Water management	Adaptation	UEMOA	Regional climate Change adaptation programme	Order about 1000 ha of Bas-Fonds for agrossilvopastoral and halieutic purposes.		4.855.000	Grant	2014
Multilateral	Agriculture	Cross-cutting	FIDA	Economic development project of the southern regions (PADES).	I Drive agricultural production, ensure food security and offer opportunities for diversification of		18.990.000	Loan/ Grant	2017

					incomes in the regions of Tombali, Quinara and Bolama-Bijagos in Guinea-Bissau				
Multilateral	Agriculture and Water management	Cross-cutting	EU	Sector Support Programme Water and Rural Hydraulics Solar (PASA - HRS)	Providing water to rural communities with the use of pumping with soalr equipment	4.500.000		Grant	2015
Multilateral	Water and sanitation	Cross-cutting	UNICEF	Work programme Continuous (PTC 2016/2017), Government GB/UNICEF	Strengthening the country's technical, institutional and regulatory capacity in the water and sanitation sector		7.347.000	Grant	2016-2017
Multilateral	Agriculture and Water management	Cross-cutting	UEMOA	Multifunctional hydraulic improvement Program for food safety	Hydroagricultural planning to increase rice production		1.940.000	Grant	Ongoing
Total						**14.835.000€**	**162.392.36$**		

Note: The conversion rate is $ 580 XOF

4.6 Support received for the preparation of the BUR 1

Considering UNFCCC Decision 1 / CP.16 and 2 / CP.17 Guinea-Bissau has received financial support from the Global Environment Fund (GEF) through the United Nations Environment Program (UNEP / UN Environment) for an amount USD 342,000 (+34,200 USD from the in-kind Government) totalling USD 376,200, to prepare its First Biennial Update Report which provides an update of the data and information contained in the most recent climate change NCs. The project estimated implementation time was from October 2016 to June 2018.

Table 4.6 – Capacity building and financial support received for the preparation of the BUR 1

Type of support	Activity	Period	Source	Information about supports received
Capacity building	Technical Workshop	2015-2017	CGE-UNFCCC	Technical instructions on the preparation of NCs and BUR 1
Capacity building	Technical Workshop	October 2018	UN Environment-GSP-UNFCCC	Technical instructions on the preparation of CNs and BUR 1
Capacity building	Technical Workshop	October 2018	UN Environment-GSP-UNDP-APA-GIZ-CPLP-Gov. Port-Gov. Brasil-be-AP Transparency Partnership	Second seminar of the Lusophone Cluster of partnership in the transparency of agreements of Paris. Technical instructions on the preparation of NCs AND BUR 1
Financial support	Hiring of consultants and services for the preparation of BUR 1	2016-2018	GEF	Funds received from GEF-UN Environment

4.7 Conclusions

With the implementation of some projects in the areas of adaptation, mitigation and cross-cutting issues in different sectors (energy, agrarian, etc.) Guinea-Bissau has contributed to the global effort to reduce global warming. The country has not yet estimated the cost-benefit of climate change (cost-effectiveness of adaptation, mitigation and technology transfer). Regarding adaptation, the

Project "Strengthening Resilience and Adaptability of the Agrarian and Water Sector Climate Change in Guinea-Bissau" carried out the cost-benefit analysis of adaptation in the Gabu region, considering the reference development trend. In this context it has been shown that Guinea-Bissau is not in itself able to financially support climate change adaptation efforts. Initiatives that may exist will most likely be through international programs and the efforts of some NGOs. Alternatively, the country should strengthen its capacity at national and local levels to plan and implement measures to increase the resilience of its communities, equipment and ecosystems to climate change. This will be done within the framework of a climate change resilience program, integrated into multisectoral rural development and based on up-to-date and accurate data and forecasts.

At national level, government agencies should assume a coherent leadership role within a strong legislative and policy framework. The national government should make an additional effort to effectively allocate human and financial resources to overall environmental management for climate resilience. The national government should be able to use greater capacity to absorb and attract new and additional climate-related international funding. National administrative and technical agencies, in partnership with international cooperation agencies and civil society organizations, can provide timely and accurate technical support to local governments and communities. This will be based on enough understanding of climate change, climate variability and its implications through a prioritization process.

At local level, communities should identify and prioritize measures and undertake programs and projects that incorporate captivities into their livelihoods; activities that reduce their vulnerability, in particular as regards climate change and climate variability. This will include physical construction and the development of protective measures, such as good practice in the most vulnerable sectors, ending with environmentally harmful practices, and further diversification of environmentally and socially sustainable livelihood activities. Communities should also use their increased knowledge of climate change to clearly articulate their demands with local and national government, and to secure additional funding for appropriate and effective activities

With regard to mitigation, Guinea-Bissau's Predicted and Determined National Contribution (INDC, 2015), which underpins the Paris Agreement, pointed out that, in order to meet the mitigation objective advocated in the AFOLU sector, a global investment of no less than $ 200 million by 2020 and $ 500 million between 2020 and 2030 in foreign aid.

The country should strongly focus on strengthening human capacities that have a direct effect on improving decision making and planning for integral management of low carbon development, focusing on the necessary techniques and technologies - reforestation and conservation of forests and power generation systems. from renewable energy (hydroelectric, photovoltaic, wind).

Promoting research and development research, regional and international exchanges to improve and better apply the knowledge acquired by stakeholders would also be a good way for the country to strengthen its resilience to the adverse effects of climate change in general.

Finally, with the implementation of the projects funded in the Guinea-Bissau Sustainable Energy Investment Plan 2015-2030, the country will be able to reach 61% of the target of renewable energy penetration in the established national energy matrix (39% hydro and 22% non-renewable). against the 52% target established by SE4ALL (39% hydro and 22% non-hydro renewable).

4.8 References and Footnotes

— Fonseca, Miguel (2017) - O sector da água na Guiné-Bissau/Pontes e Parcerias nos Países de Língua Portuguesa, Maio de 2017

— Gov. Da Guiné-Bissau/GEF/PNUD (2011) - Projecto de Reforço de Resiliência e da Capacidade de Adaptação dos Sectores Agrário e Hídrico as Mudanças Climáticas na Guiné-Bissau,

— Guinea-Bissau (2005) Initial National communication of Guinea-Bissau about climate change, Ministry of Environment http://secretariatunfccc.intl

— Guinea-Bissau (2007) National Programme of Action of Adaptation to Climate Change. http://unfccc.int/resource/./gnb01.

— Guinea-Bissau (2011) - Second National Communication on Climate Change in Guinea-Bissau.

— Guinea-Bissau (2015) Intended Nationally Determined Contributions – INDC.

— Guinea-Bissau (2017) - Third National Communication on Climate Change in Guinea-Bissau.

— MRN/DGA (2007) - Projeto CARBOVEG– Quantificação do Carbono Armazenado e da Capacidade de Sumidouro da Vegetação Florestal da Guiné-Bissau –.

— Overseas Development Institute (2012). Plano de Investimento para a Energias Sustentável da Guiné-Bissau 2015-2030, MEI-UNIDO-ECREEE-GEF (201

https://www.lugaresincertos.com/viagens/africa/guine-bissau/

Chapter 5:
Information on domestic MRV of Domestically supported NAMAs

Chapter 5
Information on domestic MRV of Domestically supported NAMAs

Pecixe Island – Guinea Bissau
https://kalmasoul.com/kalma-blog/pecixe-um-paraiso-remoto/

Chapter 5:
Information on domestic MRV of Domestically supported NAMAs

5.1 Introduction

The historic Paris Agreement brokered in December 2015 established universal and harmonized Measurement, Reporting, and Verification (MRV) provisions for climate change mitigation. A common system of transparency now applies to all countries. MRV is central to effectively implementing the Nationally Determined Contributions (NDCs) submitted under the Paris Agreement, which describe countries' mitigation goals and policies. Measurement is needed to identify emissions trends, determine where to focus greenhouse gas (GHG) reduction efforts, track mitigation-related support, assess whether mitigation actions planned under NDCs or otherwise are proving effective, evaluate the impact of support received, and monitor progress achieved in reducing emissions. Reporting and verification are important for ensuring transparency, good governance, accountability, and credibility of results, and for building confidence that resources are being utilized effectively.

5.2 MRV Concepts and Definitions

Many countries have engaged in MRV to serve a variety of domestic and international purposes. This term is widely used in the climate change field, but often without a clear reference to the type of MRV being discussed. This often leads to confusion because the underlying nature of MRV-related activities differs according to their context and application (Singh, N., J et al., 2016).

BOX 1 | Measurement, Reporting, and Verification of Nationally (MRV) Determined Contributions - Concept and Definitions

Effective mitigation of climate change requires a clear understanding of greenhouse gas (GHG) emissions and their sources, and regular monitoring of mitigation strategies and their impacts. The practice of "MRV," which integrates three independents, but related, processes of measurement or monitoring (M), reporting (R), and verification (V), is fundamental in this regard (Ninomiya 2012). MRV includes the following steps and procedures (Dagnet et al. 2014):

Measure or monitor **(M)** data and information on emissions, mitigation actions, and support. This may entail direct physical measurement of GHG emissions, estimating emissions or emissions reductions utilizing activity data and emission factors, calculating changes relevant to sustainable development, and collecting information about support for climate change mitigation.

Report (R) by compiling this information in inventories and other standardized formats to make it accessible to a range of users and facilitate public disclosure of information.

Verify (V) by periodically subjecting the reported information to some form of review or analysis or independent assessment to establish completeness and reliability. Verification helps to ensure accuracy and conformance with any established procedures and can provide meaningful feedback for future improvement.

The term MRV first appeared in the context of climate change mitigation policy as part of the Bali Action Plan (2007), which called for "measurable, reportable, and verifiable nationally appropriate mitigation commitments or actions" and stated that they should be "supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner" (UNFCCC 2007). Subsequently, efforts have been made to fill in the details and define what should be measured, reported, and verified, how, by whom, and for what purpose. Most recently, under the Paris Agreement, it was agreed that all countries will provide emissions data and track progress against their contributions. MRV systems will be a significant component in effectively tracking and improving the implementation of mitigation goals and policies articulated under countries' Nationally Determined Contributions (NDCs) (CDKN Global 2016).

5.2.1 MRV in Guinea-Bissau

Even before the term MRV emerged under the United Nations Framework Convention on Climate Change (UNFCCC), some form of monitoring and evaluation (M&E) was routinely been used by government institutions and other agencies to accurately and transparently assess their actions and goals within the government legislation framework. However, in the context of GHG the process of monitoring and evaluation (M&E) follows a given classification and depends on objective (emission, mitigation actions or support) so that the M&E for mitigation can be named MRV (see Box 1 for details) and categorized into three types (Pang et al. 2014) (Figure 1).

MRV of GHG emissions refers to estimating, reporting, and verifying actual emissions over a defined period of time. This type of MRV can be performed at national level, or by organizations and facilities. For example, national GHG inventories include an account of emissions from a country for a particular period, are reported to UNFCCC, and undergo some form of review.

MRV of mitigation actions involves assessing (ex-ante or ex-post) GHG emissions reductions and/or sustainable development (non-GHG) effects of policies, projects, and actions, as well as monitoring their implementation progress. It also involves assessing progress toward mitigation goals. An example would be a national government estimating the GHG and job growth-related impacts of its home insulation subsidy program. While MRV of GHG emissions measures actual emissions, MRV of mitigation actions estimates the change in emissions and other non-GHG variables that results from those actions.

MRV of support focuses on monitoring the provision and receipt of financial flows, technical

knowledge, and capacity building, and evaluating the results and impact of support. An example of this kind of MRV would be developing countries tracking climate- specific finance received through bilateral or multi- lateral channels.

The Government of Guinea-Bissau, through its various institutions and agencies, regularly conducts surveys and censuses to complement usual data collection, especially in areas covered by regular organizational activities. This type of monitoring and evaluation (M&E) is usually performed according to the resources and skills available to the government and its institutions, taking into account the financial, technical and technological aspects, including availability of funds, level of knowledge, appropriate staffing and technologies such as the necessary hardware and software. Unfortunately, data for compiling GHG inventories is not traditionally part of the government's M&E system and that is why such M&E processes, that is MRV have not yet been fully installed to establish systematic procedures for the periodic compilation of GHG inventories. However, despite these constraints, the country adhered to the international agenda and Guinea-Bissau signed and ratified the UNFCCC, thus becoming a contracting party

.

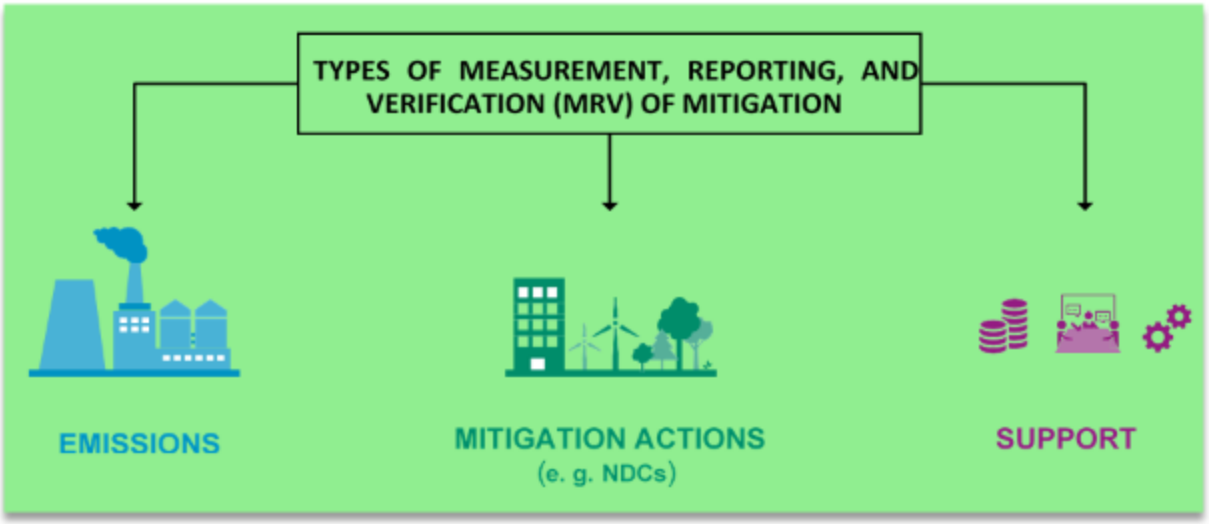


Figure 5.1 – The MRV categories of mitigation into three types. Adapted from: Singh, N., J et al., 2016

5.3 Information on Domestic MRV

5.3.1 Development of MRV in Guinea-Bissau

According to the past GHG inventories (2006), the main GHG emission sectors identified were: (i) Land Use Change and forest use; (ii) Energy and (iii) Waste. In order to adopt the country's emission reduction strategy, the UNDP financed in 2011 a consultation work aimed at identifying barriers, gaps and capacity needs at the level of Institutional, human and systemic for a successful formulation of development Strategy for Low Carbon Emission (LEDS), NAMAS and MRV system. The identified gaps and barriers regarding the implementation of the MRV, LEDS and NAMAS initiatives in the country were at five levels: human resources, material, technical, financial and institutionally in which a coordinate structure is required.

At the human resources level

The following points stand out:

- Poor development of climate change education, training and research, in particular as regards vulnerability, adaptation / mitigation and technology transfer;
- Lack of mastery of instruments and methodologies for inventorying GHG, adequately assessing vulnerability and adaptation and mitigation to climate change and its effects;
- Insufficient scientific training on certain aspects such as vulnerability, adaptation and mitigation of climate impact;
- Lack of ownership by national actors of climate change issues and challenges;
- Poor documentation and archive culture;
- Constant political instability;

- Lack of sensitivity on the part of politicians about issues related to climate change and its adverse effects;
- Lack of financial resources.

At a material and technical level

The following gaps and barriers are particularly evident:

- Lack of national research and systematic observation institutions in the field of weather and water sciences (meteorological, hydrological and oceanographic services);
- Lack of specialized staff on climate change;
- Lack of an accessible and structured national database (hydrological, hydrogeological, forest inventory) for better vulnerability assessment and adaptation;
- Lack of a documentation method and data files;
- Lack of long-term surveillance and monitoring units on climate parameters;
- Lack of coherent, specific and good resolution model for vulnerability assessment and adaptation applicable to all sectors;
- Absence of effective climate and hydrological forecasting systems;
- Absence of a national centre specializing in climate change research;
- Insufficient material for data collection, archiving, analysis and reporting (GIS, Remote Sensing, etc.) at national level.

At a financial level

The following difficulties are distinguished mainly:

- Poor financial capacity of state and research institutions to collect, archive and analyze climate data and renewable natural resources;
- Lack of financial resources to purchase and acquire certain data and software needed for vulnerability assessment and adaptation;
- Insufficient financial resources to build capacity and set up a regular vulnerability assessment and adaptation system;
- Poor resource mobilization to fund adaptation programs, projects and strategies.

At institutional level:

- Lack of institutional organization;
- Lack of coordination of actions.

5.3.2 Integration of M&E and MRV in Guinea-Bissau

The National Objective is to set up an MRV system integrated into the current M&E process at national, sectoral and probably district level whenever possible. The essence of the issue will be the definition of indicators for mitigation actions, which will allow the integration into the existing national M&E structure, backed by specific training, capacity development, provision of archiving systems and data base as well as computation infrastructure. The current annual reports sent periodically by the industry, water, energy, forests, agriculture and livestock sectors as well as other regulatory bodies will be used for monitoring purposes. MRV / M&A models will be developed in a sectoral approach and incorporated into the existing reporting model while safeguarding the specific objectives outlined by the UNFCCC. Practical training of monitoring agents should be regular and will be organized for data providers and data network owners.

On the other hand, the MRV system development approach will therefore be twofold, being oriented towards the national and project based NAMAs. Thus, whenever a project is within a data provider or data network owner (Ministry of Energy and Energy, Agriculture and Livestock, Forestry, Water, Waste, etc.,) this will be responsible for implementing, measuring and collecting data regarding implementation and monitoring over time with data being logged in specific format and scientific units outlined by the IPCC. This data will then be entered into the IPCC 2006 software for calculating emission reductions in databases specifically developed for MRV purposes.

Whenever there are difficulties in having direct and reliable measurements or data on impacts such as fuelwood consumption or penetration of energy efficient household appliances, efforts will be made to track emission reduction or absorption in the GHG inventory and make estimates for the emitting source. Further details on the MRV system, including institutions and their respective roles to a specific sector will be applied in the NAMA project. These individual MRV plans will be validated and approved when developing the project report on the NAMAs which will be the sole responsibility of the project implementing institutions.

5.3.3 M&E and MRV in Guinea-Bissau - Past and ongoing initiatives

The country has undertaken several initiatives in the field of mitigating the negative effects of GHG. Thus, with regard to monitoring, reporting and verification (MRV/M&E), there are several past and ongoing initiatives to emphasize:

1. Project of quantification of stored carbon and the capacity of sink of forest vegetation of Guinea-Bissau-CARBOVEG-GB (2007-2009) — monitoring and reporting, financed by the Portuguese Agency of the Environment – APA , with the overall objective of contributing to the support of the Guinea-Bissau forestry sector in the emerging carbon market, both within the framework of the Kyoto Protocol and in the framework of voluntary carbon markets. In any of these markets, high-quality information on two aspects is essential: (i) Land Use and Land Use Changes, with special attention to afforestation, reforestation and deforestation, and (ii) changes in biomass stocks, corresponding to the living forest component above the soil.

Photo credit: Joana Benzinho & Marta Rosa. 2015

2. Project Think Global and Local Action (2007-2009) — monitoring and reporting, funded by the University of Twente (Holland), through the FOCAL point of the UNFCCC, TOD/ITC Institute in collaboration with Enda Tiers Monde /Enda Energy program, aimed at quantifying living biomass above ground (bvas), Carbon stocked (CO2) and equivalent carbon (CO2 eq) in the community forest reserve of Djalicunda and Madina Djalocunda (north and east of the country, respectively).

3. Forest monitoring System of Guinea-Bissau (SiMoFlor-GB)/2nd phase of CARBOVEG-GB — monitoring and reporting, in Portfolio, has as main objective the design, development and commissioning of a system of Monitoring of forest vegetation, natural and planted, for the entire territory of Guinea-Bissau. This project intends to equip and empower the country with a knowledge base and a geographic information equipment that supports the development in the agroforestry strand of the national economy, framed in the logic of adaptation and mitigation of Climate change impacts. The project contributed to the promotion of clean development actions under bilateral and multilateral programmes (such as REDD and REDD +), also supporting investment in sustainable forest management and certification of products and Services provided by them.

4. National Initial communication on Climate Change (2004), 2nd and 3rd national communications on Climate Change (2011 and 2015), respectively) — report, inserted in the framework for the application of articles 4 and 12 Of the UNFCCC, signed at the earth/Rio de Janeiro Summit in 1992 and decisions 10/CP2 and 17/CP8: (i) reflect national circumstances, with a specific emphasis on the aspects of development policies linked to the main components of the process of Climate change; (ii) Report the national GHG emission inventories (year 2000, 2006 and 2010, as reference years respectively), according to the methodology recommended for this purpose by the Convention secretariat and the IPCC; (iii) point out the mitigation measures of GHG emissions and the capacities linked to the country's social and economic development policies; (iv) Report the study of vulnerability and adaptation to climate change; (v) point out measures to adapt to climate change, whereby contributions from external aid will be indispensable; (vi) Report the socio-economic analysis of the impacts of climate change in the country; (vii) point to the need for strengthening national capacities in the field of training, communication, awareness raising, climate change information in Guinea-Bissau and finally other relevant information has been presented and Constraints and gaps.

5.4 Information on National Appropriate Mitigation Actions - NAMAS

The proposals for National Appropriate Mitigation Actions (NAMAs) constitute one of the voluntary commitments of countries with the UNFCCC. The NAMAs concept emerged in the Bali COP (Paragraph 1.b ii)). The Bali action plan called for "a national easing of appropriate mitigation for developing countries in the context of sustainable development, supported and enabled by technology, financing and capacity-building strengthening" Measurable, Monitored and Verifiable-MRV ". The NAMAs proposition should serve as a bridge between developed countries and developing countries, following the principle of "common but differentiated responsibilities, of agreeing with the national circumstances of each country". Through international negotiations, NAMAs have been improved. NAMAs can be a simple project or a program and/or sectoral policies that can generate REDUCTIONS in GHG emissions.

The NAMAs concept is still in the evolution phase and can be implemented differently depending on the type of support expected by developing countries. There are three types of NAMAs: (i) Unilateral NAMAs: Actions to MITIGATE/reduce GHG emissions produced by developing countries with own resources; (ii) supported NAMAs: Actions to mitigate/reduce GHG emissions produced by developing countries with support from developed countries in terms of technology transfer, financing and training, and (iii) NAMAs credits: Actions to mitigate/reduce GHG emissions, resulting in a probability of carbon credits to be placed on the carbon market.

The Copenhagen Accord focuses essentially on four key areas: (i) medium-term emission reductions by industrialized countries; (ii) measures to be taken by developing countries to limit emissions; (iii) funds to carry out the necessary actions; and (iv) equitable governance of the regime adopted to combat climate change.

Guinea-Bissau has acceded to the Copenhagen Accord in the same way as the 55 countries that acceded to it (until 31 July 2011) and has thus made commitments to draft NAMA ideas with the UNFCCC, but as yet the country has not has your NAMAs Strategy and / or Policy. For the elaboration and implementation of NAMAs the country needs financial and technical support as well as individual, institutional and systemic capacity building.

The Cancun Conference also succeeded in restoring the content of the Copenhagen Accord under UNFCCC auspices. This means that the individual promises of GHG emission reductions submitted by countries under the Copenhagen Accord have already been recognized by the Convention. This was a remarkable milestone, because for the first time, both developed and developing countries have agreed on actions to reduce emissions. The financial commitments made by developed countries were also taken into account.

With the final decisions of the UNFCCC, Cancun laid the foundations for building appropriate institutions and the MRV funding frameworks for actions. NAMAs promise to become a primary mechanism for achieving "common but differentiated responsibilities" in the fight against climate change. The Cancún Agreement and the Durban COP brought significant milestones in relation to NAMAs. At the COP 18 in Doha, Qatar, the operationalization of the Green Climate Fund (GCF), a central register and guidelines for MRV reporting is expected to be created and implemented to increase the NAMA framework for carbon reduction actions in the developing countries.

5.4.1 Development of NAMAs

Guinea Bissau has developed legal and institutional arrangements for the implementation of NAMAS. The National Designated Authority for Kyoto Mechanisms (AND-GB) was established by Decree No. 11/2006 of the Council of Ministers of 11 August, published in Official Bulletin No. 34 of 22 August 2006 and has Competences include approving and following up on the implementation of projects under the Kyoto Flexibility Mechanism - Clean Development Mechanism. It is an inter-ministerial body composed of several ministries and is in the process of raising international financial resources for the elaboration of the operating regulations of its National Designated Authority for the Kyoto Mechanisms, in order to enable it to fulfil the purposes for which it was created.

Following this, a document titled "subsidy for development of proposals for national action for Appropriate mitigation (NAMA)" was prepared.

1. The 2011 African Development Bank (ADB) - funded National Appropriate Mitigation Action Plan (NAMAS) grant was part of the AfDB's support to help the 13 African countries that had not responded to UNFCCC on the development of its NAMA proposals before the 17th Conference of the Parties (COP 17) held in Durban from 28 November to 9 December 2011. As a result of this work, a portfolio list of projects that were submitted to the UNFCCC Secretariat prior to COP 17 was prepared and it was concluded that Guinea-Bissau needs supported NAMAs as the country needs foreign resources to support NAMAs.

Since then several initiatives were undertaken not exactly as NAMAs but in the context of Low Emissions and Development Strategies - LEDS initiatives.

5.5 Information on Low Emissions and Development Strategies - LEDS

Low Emissions and Development Strategies - LEDS initiatives provides a direct link between mitigation and achieving sustainable development, while climate change is a cross-cutting issue across all the sustainable development goals (SDGs) particularly the SDG 13 (climate action). The Strategy allows the country to decarbonize the economy without threatening the country's long-term development objectives or limiting achievement of the SDGs. The LEDS also provides the opportunity to integrate national sustainable development objectives into the context of "deep decarbonization" and vice versa, Regrettably, Guinea-Bissau has not yet developed and submitted its LEDS, but it has developed a number of initiatives which may be framed within the LEDS context.

5.5.1 Initiatives in the context of LEDS in Guinea-Bissau

As for the Low carbon Development Strategy (LEDS), several past and other initiatives have been undertaken which falls into the context, namely:

1. Project rational use of forest heritage - CARBONIZATION (1997-2000)- financed by the EU/FAO whose objective was to allow a rational use of forest heritage using new and improved techniques of wood processing and organize new forest stands.

2. PREDAS Project (2005) – Regional Project, aimed at ensuring the supply of residential or urban and rural households in domestic fuels, on the basis of participatory, integrated management and Lasting the natural resources of the territories of the "tabancas", accelerating and modernising the substitution of the trade in woody energies; Improve the living conditions of rural and urban populations, develop modern technologies and activities that generate jobs and incomes, strengthen the coherence, coordination and efficiency of actions and develop the capacity to intervene Private, local actors in the implementation of activities with a view to improving the sub of domestic energy.

3. Butanisation Project -This is an initiative launched in the years 90, which aimed to provide butane gas as an alternative energy source for rural, peri-urban and urban populations in order to reduce pressure in forests – the basis of Domestic energy (firewood and coal).

River Corubal (Saltinho) – Tombalí Region – Guiné-Bissau
Photo credit: José Valberto Teixeira Oliveira. 2009

4. Project Vulgarization of biogas production techniques and its durable use -was intended to ensure regular, durable and less costly supply to the consuming populations of biogas produced (domestic fuel). The project advocated the construction of 20 biodigesters, aiming on one side the fight against deforestation and desertification and on the other hand, the rationalization of the consumption of firewood and coal through the introduction and vulgarization of the techniques of biogas production for cooking, lighting and biofertilizer for horticulture in the rural world and in the peripheral and peri-urban areas, with key

populations (basic associations, livestock breeders, NGOs, etc.).

Photo credit:
Joana Benzinho & Marta Rosa. 2015

5. Solar Regional Program-PRS2, funded by The EU, had as its main objective to fight for poverty reduction within the scope of DENARP, to improve the living conditions of populations and to strengthen the national private photovoltaic sector.

6. Project Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) Methodology (WISDOM),
started in December 2009 and developed by FAO and the government of Guinea-Bissau in order to enable Rational management of woody energy, to support the planning of it by integrating and analysing the existing relationship between production-consumption and providing useful elements for the formulation of new strategies for the woody/domestic energy sector.

7. Under the National Authority designated for the Kyoto mechanisms the ECOPROFITABLETM Lighting Africa program was endorsed. The objective was to replace inefficient lighting in households in Africa (Algeria, Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Ivory Coast, Egypt, Gabon, Guinea, Guinea-Bissau, Equatorial Guinea, Liberia, Libya, Madagascar, Mali, Malawi, Morocco, Mauritania, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Chad, Tunisia) under a CDM project, through the distribution of 200 million low light bulbs Consumption (CFLs), at the same time reduces GHG emissions and will reduce the demand peak by 10,000 MW. It has as specific objectives Promotion of low energy lamps for residents of households in Africa, to reduce the peak of maximum demand for electricity.

8 Training for the development of resilient low carbon strategies - a project in the context of the Portuguese fast start in which will participate 4 African countries of Portuguese expression (Cape Verde, Guinea-Bissau, Mozambique and Sao Tome and Principe), with main objective of providing these countries with the necessary skills to develop, implement, measure, report and verify a strategy for the development of low-emission Gases with Greenhouse effect (GHG) adapted to the impacts of climate change and consistent with the Millennium Development Goals, in particular poverty reduction and the guarantee of environmental sustainability.

9. SOLAR - a solar project carried out by the IBAS project in 20 Tabancas of the country. In the framework of the energy facility of the EU 3 projects are underway:
- Solar electrification project of the village of Bambadinca with a potential of 412 KVA, which should be carried out by the NGO TESE;
- Solar electrification project of the city of Gabu that is being carried out by the NGO FRES;
- Solar electrification project of the city of Bissorã which is being held by ADPP NGO;
- In the framework of the ECOWAS Regional Centre for Renewable Energies and energy efficiency (ECREE), the country has benefited from financing for the electrification of five (5) Tabancas with the use of solar panels.

10. BIOMASS- In The city of Bissau is underway a project of cogeneration of biomass with the use of cashew nutshell with a potential of 80 KVA, and a central 40KVA in the sector of Safim.

11. HYDROELECTRICITY-OMVG _ project recommends the construction of:
•Sambangoló Dam with a potential of 120 MW;
•Caletá Dam with a potential of 240 MW;

•Transport line with 1700 km in 225 KW which passes in 4 countries (Guinea-Bissau, Guinea, Gambia and Senegal). Guinea-Bissau must enter 8% of the investment in order to benefit from 8% of the total potential (cost/benefit).

12. **Wind - VERGNET - France** - diagnostic study on the wind potential in the islands of Bubaque and Bolama (Bijagós Archipelago) with the aim of creating a wind farm whose ultimate purpose is to able to provide Electricity to these two sites, from wind turbines and solar generators, to: (i) water pumping and (ii) to ensure the illumination of public infrastructures;

5.6 MRV, NAMAs and LED - Supported received

Given the socio-economic situation of the country and the magnitude of the environmental problems that it faces, the Government of Guinea Bissau has frequently requested international and bilateral aid to overcome some of the barriers that limit progress in the management of the countries' resources and help to minimize the impacts of environmental problems. In this regard, Guinea Bissau has received a number of international aid over time, some of which are of assistance to the sectors involved in fight against the impacts of climate change, of which the most significant are presented in Table 5.1. The Government of Guinea Bissau takes this opportunity to thank all partners who have long supported the Adaptation and Mitigation of Climate Change in the country.

Table 5.1 – Support received in the context of MRV, NAMAs and LED activities.

Project/Programme	Amount	Activity	Source
CARBOVEG-GB (2007-2009)	€470,000	Project for Quantification of stored carbon and sink capacity of Guinea-Bissau forest vegetation - - Monitoring and Reporting, funded by the Portuguese Environment Agency - APA), with the overall objective of contributing to the support of Guinea-Bissau's forestry sector in the emerging carbon market, both under the Kyoto Protocol and under voluntary carbon markets.	Portuguese Environment Agency - APA),
Think Global and Local Action Project (2007-2009)	€37,000	The objective was the Quantification of Above-Ground Living Biomass (BVAS), Stock Carbon (CO2) and Equivalent Carbon (CO2 equiv) in the Community Forest Reserve of Djalicunda and Madina Djalocunda (North and East of the country, respectivel	Monitoring and Reporting, funded by the University of Twente (Netherlands) for through the UNFCCC Focal Point University of Twente (Netherlands)
Guinea-Bissau Forest Monitoring System (SiMoFlor-GB) / Phase 2 of CARBOVEG-GB	€938,063	This project aimed to equip and empower the country with a knowledge base and an instrument of geographic information that supports the development in the agro-forestry aspect of the national economy, framed in the logic of adaptation and mitigation of climate change. The project will contribute to the promotion of clean development actions under bilateral and multilateral programs (such as REDD and REDD +), while also supporting investment in sustainable forest management and certification of the products and services they provide	Portuguese Environment Agency - APA),
Rational Use of Forest Heritage Project - CARBONIZATION (1997-2000)	US$1,500,000	aimed at enabling rational use of forest heritage using new and improved wood and coal transformation techniques and organize ranks of them	funded by the EU / FAO
PREDAS regional Project (2005)	USD 35,000,000	general objective of ensuring the supply of urban fuels to residential and urban households on the basis of	

		participatory, integrated and sustainable resource management.	
The EU-funded Regional Solar Program - PRS2	€4 million	aimed primarily at fighting poverty reduction under the PRSP, improving people's living conditions and strengthening the national private photovoltaic sector.	
Wood fuel Integrated Supply / Demand Overview Mapping (WISDOM) Methodology (WISDOM) project	US$338,864	To enable rational management of wood energy, support its planning by integrating and analysing the relationship between production and consumption and provide useful elements for the formulation of new strategies for the energy sector. woody / domestic energy.	Developed by FAO and the Government of Guinea-Bissau
ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREE)	€250,000	In-country electrification of five (5) Councils using solar panels	ECOWAS

5.7 Capacity and Support needs

The main and urgent needs identified points to the availability of information for the realization of GHG inventories. Specific points transversal to all sectors are identified and summarized below.

1. Creation of a prototype (template) to represent all sectoral inventory information.
2. Make available a web tool (compactible with IPCC methodology and data required) to be shared amongst all relevant actors to input emissions information and follow up under uniform registration and systematization criteria.
3. Harmonise local and specific emission factors for each type of technology for all Inventory categories for local emission generation factors.
4. Harmonise compilation of statistical information from Government institutions such as the National Institute of Statistics and Forestry inventory information system to facilitate generation of local emission data.
5. Considering each of the GHG Inventory Sectors, different gaps have been identified according to: i) Human Resources ii) Technical & Technological aspects; iii) Financial Constraints and iv) Institutional Weaknesses.

The main gaps for support are summarized in the Table5.2 below:

Table 5.2 – Capacity and support needs in the context of MRV, NAMAs and LED activities.

Type of Support	Key Activities
Human resources development	• Develop climate change education, training and research, in particular as regards vulnerability, adaptation / mitigation and technology transfer amongst the key stakeholders; • Carry out training and capacity development on the use of instruments and methodologies for GHG, inventory and climate change projection techniques; • Develop skills for characterisation of sectoral vulnerability, adaptation and mitigation of climate impact; • Training and capacity development in inventory data archiving and data handling;
Technical & Technological support	• Support the technical & technological upgrade of national research institutions to carry out systematic observations in the weather and water sciences sectors (meteorological, hydrological and oceanographic services); • Promote and support national training for specialized staff on climate change; • Support the structuring of national database (hydrological, hydrogeological, forest inventory and soil erosion) for better vulnerability assessment and adaptation; • Support the establishment of Waste recycling Units (including Agriculture & Livestock sectors) across the country to reduce GHG emission (methane); • Establish national plan and targets for long-term surveillance and monitoring units on climate parameters to support periodically National Communication reporting; • Strengthen the technical capacity for effective climate and hydrological forecasting and early warning systems;

	• Create a national centre of excellence for specialized research in climate change with sufficient equipment, archiving systems, analysis tools such as GIS, Remote Sensing, etc.
Financial support	• Promote the systematic financial support as percentage (1%) of GDP from state budget for Education and Research institutions to collect, archive and analyse environmental and climate data as well as renewable natural resources; • Provision of financial resources to acquire data sets, hardware and software (models) required for vulnerability assessment and adaptation and climate change projections; • Establish a national task force for resource mobilization to fund adaptation programs, projects and strategies. • Financial support to strengthen the National Institute of Statistics to enhance their capacity and performance • Investment in basic sanitation infrastructures, waste collection and treatment equipment, water drainage
Institutional support	• Decentralise towards the Regions and districts the strengthening of institutional capacity and organisation to enhance the role and buy ownership of the rural communities; • Promote inter-institutional coordination for adaptation and mitigation actions. • Prioritise National Forest Inventory and GHG calculations

5.8 Stakeholders systematised support priorities

Individual needs for technical capacity building in program and project development and implementation are enormous and should constitute a priority in the process of applying and implementing NAMAs, LEDs for creating an MRV system. The implementation of these strategies assumes the development of national cadres in different specialties in order to learn the scientific knowledge that allows the implementation of UNFCCC directives leading to maximum allowable GHG reduction.

In this field priorities were identified by the national stakeholders including the creation of new and / or strengthening of related national institutions to facilitate the process of designing and implementing NAMAs and LEDS, as well as the establishment of a national MRV system; Improvement of institutional organization and coordination regarding overall climate change and GHG mitigation / mitigation issues. Some of these priorities have been systematised below in Table 5.3.

Table 5.3 – Stakeholders systematised support priorities in the context of MRV, NAMAs and LED activities.

Stakeholders systematised support priorities			Institution's role in capacity building
Short	Medium	Long term	
Greater disclosure about NAMAs, LEDS and MRV through seminars, training sessions and capacity development. Develop Training Needs Analysis and implement training of technicians on specific issues on climate change adaptation and mitigation. Definition and elaboration of GHG Mitigation / Mitigation Strategy and Action Plan. Definition of institutional needs for capacity building	Training of technicians in specific areas of climate change. Development of a strategy and action plan for medium term mitigation financing Develop National strategy and action plan for NAMA implementation. Strengthening national capacity on MRV and Respective NAMA. Creation of a decision support unit on GHG emissions mitigation.	Creation of permanent mechanism of communication with the communities. Development of National LEDs Strategy National Strategy and Action Plan for Carbon Market and use of certified emission reductions (CERS) concept Enhance the implementation of Kyoto Protocol-the	Promote, coordinate and monitor activities (The Secretariat of State of Environment and Biodiversity (SEAB) in partnership with MEP). Disseminate information to communities and economic operators (SEAB). Develop research programs on climate change (SEAB and Universities and National Research Center). Scientific support (Partnerships with Research Centers Abroad).

for GHG inventory and mitigation Prioritise training/capacity development in data collection and data base handling for Emission inventory.	Enhance activities of the REED programme in the context of the National System of Protected Areas (SNAP)	Clean development mechanism (CDM)	

5.9 References and Footnotes

— African Development Bank (2001a) Key issues in forestry sector to year 2020 in the West African subregion.Document de travail fosa est par Björdahl, G. & Van Hensbergen, African Development Bank, Abidjan.

— Cassama Viriato L, S (2011) proposal for a national action strategy for appropriate mitigation of greenhouse gases in Guinea-Bissau.

— CDKN Global (Climate and Development Knowledge Network Global). 2016. "News: CDKN and Ricardo Energy and Environment Team Up on NDC Guidance." Webpage. Available online at: http://cdkn.org/2016/06/news-cdkn-ricardo-energy-environment-team-ndc-guidance/?loclang=en_gb

— Dagnet, Y. et al. 2014. Improving Transparency and Accountability in the Post-2020 Climate Regime: A Fair Way Forward. Washington, D.C.: World Resources Institute. Available online at: www.wri.org/our-work/project/act-2015/publications

— Ninomiya, Y. 2012. Classification of MRV of Greenhouse Gas (GHG) Emissions/ Reductions: For the Discussions on NAMAs and MRV. Kanagawa, Japan: Institute for Global Environmental Strategies. Available online at: http://mitigationpartnership.net/sites/default/files/iges_pb_mrv.pdf

— Pang, Y. et al. 2014. MRV—Measurement, Reporting, Verification. How to Set Up National MRV Systems. Draft 4.2. Bonn and Eschborn, Germany: GIZ. Available online at: http://mitigationpartnership.net/mrv-tool-how-set-national-mrv-systems

— Singh, N., J. Finnegan, and K. Levin. 2016. "MRV 101: Understanding Measurement, Reporting, and Verification of Climate Change Mitigation." Working Paper. Washington DC: World Resources Institute. Available online at http://www.wri.org/mrv101.

Cacheu Fort – Slavery Route, Cacheu, Guinea-Bissau

Chapter 6:
Additional Information

Chapter 6
Additional Information

Traditional Bijago Fire Dance

https://kwekudee-tripdownmemorylane.blogspot.com/2012/12/bijago-people-guinea-bissau-african.html

6.1 Introduction

The implementation priorities of the TERRA RANKA Strategic and Operational Plan (2015-2025) are based on the broad axes that constitute the strategic orientations of the Document. The pillars show the emergence in 2025 of a diversified economy alongside traditional domestic sectors (construction, trade and distribution), and competitiveness-critical support sectors (energy and e-governance) and the four major drivers of growth. Thus, solid and concrete intermediate targets for each of the drivers of growth have been set for 2020: Rice self-sufficiency, double cashew revenues, tourism development in Bijagós (20,000 tourists in 2020), double revenues and value added of fishing and development of the phosphate building and mining sector in Farim at one of the sites. In order to fully develop the engines of growth, five (5) Axis were defined: (i) peace and governance; (ii) biodiversity and natural capital; (iii) infrastructure and urban development; (iv) human development and (v) business environment.

6.2 Climate Change in the framework of National strategic development

The PRSP II proposal TERRA RANKA Strategic and Operational Plan (2015-2025) takes a firm stance with regard to climate change by stating that: "Development strategies for different growth sectors should become low carbon and climate-resilient development strategies *to promote sustainable development".* One of the Guiding Principles is "promoting sustainable development that is more resilient to climate change" and permeates the various axes of the strategy. In particular, Axis 3 "Promoting sustainable economic development" and Axis 4 "Increasing the level of human capital development specify adaptive and mitigating actions to be undertaken", while Axis I include the "prevention and risk management of natural disasters". The following components can be listed as highlighted by DENARP II:

- Integration of climate change issues into national and sub-national development policies, strategies and plans;
- Adaptation of agricultural systems;
- Durable land and water management;
- Protection of coastal systems;
- Protection of biodiversity;
- Measures to reduce the risk of natural disasters (civil protection);
- Spatial planning (land registry, forestry, agricultural and urban planning);
- Energy efficiency (including domestic, transportation) and renewable energy;
- Climate proofing of infrastructure.

The priority areas identified in the PRSP II result from the findings of the country's work on climate change (eg. First, Second and Third National Communications, National Climate Change Adaptation Action Plan (NAPA), among others).

The Presidential Palace in Bissau - official residence of The President of Guinea Bissau

6.2.1 Key Sectors of the Strategic development

In the context of the TERRA RANKA Strategic Document 2015-2025 the Biodiversity and Natural Capital axis aims to preserve and value the country's natural resources in a sustainable way. This axis defined the rules governing human activities to limit anthropogenic pressures on the environment and increase the resilience of ecosystems to the threats of climate change. It revolves around two main fields of action: (i) institutional development, which aims above all to establish a regulatory and institutional framework of reference and to provide Guinea-Bissau with a legal body, an innovative governance and financing model that gives a status of an Africa country at the forefront of sustainable development; and (ii) sustainable management of ecosystems where our ecosystems and biodiversity should be better and better known with the

finances for improved safeguarding of vulnerable resources, implementing the National Protected Areas Strategy to enhance these 15% to 26%% of land, favouring the preservation of ecosystems across the territory, ensuring respect for biological balances and finally implementing a Climate Plan to increase the resilience of national ecosystems to climate change.

The Infrastructure and Urban Development Axis

This Axis aims to provide the country with the logistics, energy, digital and urban infrastructures necessary for its development. In order to achieve the above, the following interventions will be needed: (i) in the transport sector, blockages will be eliminated (rehabilitation of Bissau port and urban roads, priority inland waterways and inland waterways); (ii) in the energy and water sector, a major turnaround is needed by developing 90 MW by 2020 and significantly improving access to safe drinking water and sewerage / sanitation facilities; (iii) in the digital system, the digital system needs to be transformed into a true growth lever for the economy as a whole; and (iv) in land management and urban development, it is necessary to renovate and build urban centers in order to provide them with functional infrastructure and systems and establish them as epicentres of economic activity. In this context, the priorities are based on the development of the Bolama-Bijagós Archipelago and the five main urban centers.

The Human Development Axis

This Axis aims to enhance the potential of the Guinean population, to ensure that their basic needs are met, to implement a social safety net and to develop their skills, productivity and employability. This requires investing in: (i) education and employment; (ii) health; (iii) social protection for large-scale poverty reduction through the creation of both a safety net and real empowerment opportunities for the poor; and (iv) culture, youth and sports that will be especially bearers of a major cultural renewal.

The Simplification of Business Sector and Private Sector Development axis aims to implement an enabling environment for the private sector. It is about creating favourable conditions for the flourishing of the private sector, which is essential for the development of investments and the positioning of the engines of growth. Business scope simplification revolves around three programs: (i) development of a conducive and coherent national legal framework; (ii) business scope reform; and (iii) implementation of integrated economic platforms with the creation of a multisectoral Special Economic Zone in Bissau.

6.2.2 Climate Mitigation in the context of national sustainable development objectives and plans

The cost benefit of mitigation resulting from national sustainable development objectives and plans has not yet been estimated. The country is working on this. Even so it is expected that:

— By increasing the percentage of protected areas from 15 to 26%, according to the National Protected Areas Strategy the capacity of carbon sinks will increase and hence the national effort to tackle the damaging impacts of climate change. It will strengthen the country's existing capacity to participate in the REDD + mechanism in accordance with the Cancun and Warsaw framework as a way of receiving funding for efforts to reduce deforestation and forest degradation, forest conservation and management, and increase of carbon stock.

— In its most recent planning, the Government emerging from the last democratic elections of April 2014, has proposed for the energy sector a prominent role in its ten-year strategic and operational plan "Vision Guinea-Bissau 2025-Terra Ranka". In essence, the Administration envisages investments for the reinforcement and extension of the 90 MW power plant by 2020. These investments would be combined with others, such as those for the implementation of a national energy transmission grid. On the other hand, as part of its National Poverty Reduction Strategy, NPRSP II (2012), the country has programmed investments for the power system to increase its installed capacity by 60%. In both the first and the second case, the planned investments did not specify the typology of the energy sources to be used for the

strengthening of electricity production, and it is therefore understood that such investments are mainly concerned with fossil fuel power generation, ie diesel and fuel oil.

6.2.3 Climate adaptation in the context of national sustainable development objectives and plans

As with mitigation, the cost-benefit of adaptation at national level has not yet been estimated. Similarly, it is expected that by increasing the percentage of protected areas from 15 to 26%, the capacity of national ecosystems to adapt will certainly increase by enhancing soil protection against water and wind erosion and protecting the coast against sea level rise and other types of erosion. It should be noted that Guinea-Bissau has a considerable coastline (approximately 300 km) where the vast majority of the population lives, and much of the infrastructure, equipment and major economic activities are in place and practiced in this coastal area.

The Project on resilience and adaptability of the agricultural sectors to climate change in Guinea-Bissau did the cost-benefit analysis of adaptation in the Gabu region, (taking into account the development trend baseline) and it shows that the capacity of the Guinea-Bissau to adapt to climate change will be low. Any endeavours that may exist will most likely be through international initiatives and NGO efforts, both with scarce funding and inadequate management, with little deep government commitment due to lack of low finances and weak institutional capacity.

Alternatively, the country may have the capacity at national and local levels to plan and implement measures to increase resilience to climate change. This will be carried out within the framework of a climate change resilience program, integrated into multisectoral rural development and based on up-to-date and accurate data and forecasts.

At national level, government agencies should assume a coherent leadership role within a strong legislative and policy framework. The national government should effectively allocate human and financial resources to agricultural and water management for climate resilience. The national government should be able to use greater capacity to absorb and attract climate-related funding from the international realm. National administrative and technical agencies, in partnership with civil society organizations, can provide timely and accurate technical support to local governments and communities. This will be based on a sufficient understanding of climate change, climate variability and its implications through a prioritization process.

At local level, communities should identify and prioritize measures and undertake programs and projects that incorporate livelihoods activities that reduce their vulnerability, in particular with respect to climate change and climate variability. This will include developing infrastructures as well as protective measures such as good agricultural and water management practices, tree planting, ceasing environmentally harmful practices, and further diversification of environmentally and socially sustainable livelihood activities. Communities should also use their increased knowledge of climate change to clearly articulate their demands with local and national government, and to secure additional funding for appropriate and effective activities.

Lessons learned can be disseminated at local, national and international levels so that communities can share best practices with other local communities. National policy integration processes that have successfully incorporated climate change will be recorded so that they can be replicated in other sectoral policies when new funding becomes available.

6.2.4 Climate Mitigation in the context of existing strategies and policies

Guinea-Bissau has acceded to the UNFCCC Copenhagen Agreement with several dozen other countries. The agreement promotes measures by developing countries and industrialized countries to limit emissions in the medium term and the financing organization to take the necessary actions. As the process progresses, the commitments of all countries (developed and developing) to lower emissions, as well as the funding frameworks, are recognized. Guinea-Bissau is currently seeking funding to draw up its NAMA Strategy and REDD + Strategy.

Thus, the forest in Guinea-Bissau plays an important role in both adapting and mitigating climate change. However, the view that the forest is a balancing factor for the earth's ecosystems and processes and not just a natural resource to be exploited is not yet understood by policy makers and the population. In 2010 a diagnosis was made to lay the foundations for a new forest policy, but the process was halted. The vision is for sustainable management of forest resources - namely through the conservation and restoration of forest heritage - to foster a socio-economic balance of meeting the needs of communities and their accountability. Proposed guiding principles include: biodiversity conservation, sustainable land management, research and research and forest teaching, valorisation of forest and wildlife resources that favour economic development and environmental improvement, promotion of agro-forest-pastoral management, participation and communities' accountability in the design, implementation, monitoring and evaluation of forest activities through decentralized management. However, forests continue to be heavily pressurized either by traditional thinning practices for agriculture, slash & burn practice, charcoal production or by the latest rampant exploitation of forest resources and their large-scale commercialization (after the 2012 coup d'état).

Capacity building for the implementation of Trade Law, Governance and Regulation (FLEGT) is urgent. This involves the elaboration of the forest inventory and forest management instruments with reserve areas and exploration areas for various purposes, in anticipation of massive reforestation. It should be noted that the new government that came out of the 2014 elections introduced a 5-year moratorium that prohibits logging and timber exports. This will reduce pressure on forests and consequently natural regeneration and restoration of forest heritage.

6.2.5 Climate Adaptation in the context of existing strategies and policies

Governance in Guinea Bissau is based on articulation between the Central Government and Regional Governments. Regional governments have very limited means to meet their obligations. Some Ministries have delegations in different regions. Aware of the fragility of the ecosystems and vulnerabilities that characterize the country and as part of the UNFCCC implementation, the Government of Guinea-Bissau has developed basic instruments to prepare the country for possible adaptation measures. Thus, the Initial National Communication, the National Climate Change Adaptation Action Program (NAPA), the Second National Communication and the Third National Communication were prepared.

Awareness of climate change has progressively increased among policy makers and the wider community. Thus, the country through the National People's Assembly (ANP) ratified the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD) on October 27, 1995.

Palácio Colinas de Boé – Assembleia Nacional Popular

As part of its obligations, the country approved the National Climate Change Adaptation Action Plan (December 2006), the National Biodiversity Strategy and Action Plan (Decree 3/2004 of 19 May) and the National Action Program to Combat Drought and Desertification (2006 and a new PAN / LCD in 2011). The country ratified the Kyoto Protocol through Resolution No. 14 / PL / ANP / 2005 of 2 March, making a commitment to develop, update, publish and participate in the Conferences of the Parties (COP) national inventories of GHG emissions and removals. Greenhouse Effect (GHG). It has already prepared three National Communications on climate change and is preparing its BUR1.

There is absence of legislation related to land use planning and town planning, ie there is no urban planning. In the case of the General Regulations on Construction and Urban Housing, climate safeguards are not yet included. These gaps make climate change adaptation planning and climate risk management difficult, as many of the decisions that impact on the ability of the territory and society to adapt to the effects of climate change can be made in spatial planning.

The national (political, strategic, institutional and programmatic) framework for disaster risk reduction is under development. A National Civil Protection Service has been set up and a draft legal draft has been prepared for the creation of the National Platform for Disaster Risk Reduction (PNRRC) and a "National Strategy for Disaster Risk Reduction" - both are to be analysis of the Council of Ministers. The National Risk Reduction Strategy includes food insecurity, epidemics, extreme weather events, coastal erosion, fires but will have to first study vulnerabilities.

The Coastal Zone Master Plan, prepared in 1993 with the support of IUCN, was an important milestone in the sustainable development of the country. The plan was aimed at the development of the coastal zone, but also the conservation of natural resources, coastal ecosystems and biodiversity. Following this plan, important actions emerged, such as the creation of the Orango, João Vieira and Poilão, Cacheu, Cufada and Cantanhez nature parks and the Bijagos Biosphere Reserve project.

6.3 Presentation of current climate change adaptation initiatives and perspectives

The country's first exercise to pursue initiatives to promote the fight against climate change and long-term climate variability was carried out under NAPA (2006). According to NAPA (2006) it was possible to gauge the level of exposure of the sectors to climate risks based on the sensitivity matrix analysis which showed that the sector with the highest exposure was agriculture with 57%, followed by livestock and health both with 54%, followed by the fisheries with 51% and infrastructure with 46%.

Again as a result of the NAPA exercise, the identification of particularly vulnerable social groups was made possible on the basis of available socio-economic indicators, particularly those provided by the Light Poverty Assessment Survey (ILAP) and indications of the impact of climate change on the sectors of activity acknowledged in the process of preparation. Subsistence small farmers were found to be the 1st most vulnerable group (54%), followed by livestock farmers (49%), waged workers living in large cities (46%) and fishermen (34%).

Short-term objective

Thus, in the context of information of this BUR 1, the national short-term objective, was to implement the following actions with the financial, technological and capacity-building support from the international community:

— The already achieved increase in the percentage of protected areas from 15% to 26% and beyond ensuring their management,
— The effective implementation of the Forest Law and the moratorium on banning logging and exportation over the next five years;
— Conduct a national forest inventory;
—Develop agro-ecological zoning and forest management;
— Strengthen the existing capacity in order to participate in the REDD + mechanism and thereby increase the national effort to tackle the damaging impacts of climate change.
— Enhance the adaptability of national ecosystems by enhancing soil protection against water and wind erosion and protecting the coast from rising sea levels and other types of erosion.

Medium- and long-term objective

In the medium- and long-term Guinea-Bissau is conditionally committed, depending on financial, technological and capacity building support from the international community stemming from the new Climate and Green Fund Agreements to:
— Develop a national reforestation and sustainable management program for forest and agroforestry ecosystems by 2025;
— Develop scientific and technical research on adaptation of new productive varieties with broad spectrum tolerance to the harmful effect of climate by 2025;

— Reduce illegal and indiscriminate logging by 2030;
— Foster forestry / plantation of species resistant to drought and low rainfall by 2030;
— Develop an Integrated Coastal Zone Management Program by 2025;
— Implement 80% of renewable energy in the national energy matrix by 2030;
— Increase energy efficiency – by reducing energy losses up to 10% over time by 2030;
— Promote 80% of universal access to electricity by 2030;
— While a SIDS Member state, develop a Country Climate Change Vulnerability & Resilience Profile.

The long-term objectives

The long-term objectives are the introduction of climate proofing in business sectors through establishments / introduction of:
— Short cycle drought resistant seeds;
— Hydro-agricultural planning;
— Introduction of culture techniques resilient to the effects of climate change;
— Introduction of fast-growing fodder plants for animal feed;
— Preparation of contingency plans for the management of climate risks and natural disasters;
— Rainwater harvesting and storage (water retention basins and mini dams) for dry season water management;
— Construction of grain and seed banks;
— Infrastructures (roads, bridges, houses, etc.).

Currently and still taking into account the results of NAPA, the country is making efforts to implement a series of projects and initiatives some already underway or foreseen to be implemented in the near future on the theme of climate change adaptation. Some of these initiatives are presented below:

(i) **Climate Change and Coastline Adaptation Project**: Response to Coastal Change and Its Human Dimensions in West Africa under Integrated Coastal Zone Management (ACCC). Following studies carried out in the years 2000-2003 on the continent of Africa, during the African Process for the Development and Protection of the Coastal and Marine Environment, the ACCC project emerged. This process has chosen three priorities: coastal erosion, the impacts of climate change on coastal zones and the application of integrated coastal zone management.

The ACCC Project aimed to strengthen the adaptability of local communities and the resilience of the coastal ecosystems of the five West African countries (Mauritania, Cape Verde, Senegal, Gambia and Guinea-Bissau) to climate change. It had as components:
1. Implementation of pilot activities to enhance the adaptability and resilience of coastal ecosystems in areas vulnerable to the harmful effects of Climate Change;
2. Integration of climate change and adaptation issues into coastal zone management policies and programs.

(ii) **Adaptation and resilience building project for coastal areas and communities vulnerable to climate change in Guinea-Bissau (portfolio)**
In partnership with UNDP and submitted to the LDC Fund, the project aims to strengthen the resilience and adaptability of communities and coastal investments to the impacts of climate change. The project has three main components:

1. Enhanced policies, regulations, institutions and individuals mandated to manage coastal zones to reduce the risks of climate change;
2. Vulnerability of coastal investments to reduced climate risks through the design, construction and maintenance of coastal protection measures;
3. Rural livelihoods in the coastal zone reinforced and protected from climate change impacts

iii) **Stepping up smart agriculture in eastern Guinea-Bissau** - Scaling up climate-smart agriculture in East Guinea Bissau (in portfolio). In partnership with the West African Development Bank (BOAD) and submitted to the Adaptation Fund, the project aims to strengthen farmers' capacities for smart agriculture while enhancing adaptation and climate risk planning and management capacities at all levels of governance The project also aims to solidify and broaden the actions developed by the project "Strengthening resilience and adaptability of the agrarian and water sectors to changes in Guinea-Bissau", from the 14 intervention villages in the Gabu region to 26 in the

Gabu regions. and Bafata, with a total beneficiary population of 37,000. The project will address vulnerability in agriculture and water management, as well as contributing to the long-term development of resilience needs of extremely vulnerable farmers, with a particular focus on extremely vulnerable groups: women, the elderly and children. The project has three specific objectives:

1. Develop the technical and institutional capacity of government and civil society (private sector, local communities and NGOs) to address the growing climate risks in climate change adaptation planning;
2. Increase the resilience of existing agricultural production systems and contribute to the diversification of production, notably through the implementation of climate resistant actions such as water management to minimize the risks of severe droughts and floods;
3. Promote the dissemination of lessons learned on knowledge of smart agriculture and adaptation planning in other regions of the country, other West African countries, and international climate change negotiations and fora, including those of the UNFCCC.

Main square in Bafatá with Amílcar Cabral bust, Bafatá, Guinea-Bissau[8].

iv) Guinea-Bissau Resilience Project to Climate Change and Increasing Food Security (in portfolio)

In partnership with UNDP and FAO, it aims to develop and operationalize a National Agro-Ecological Zoning System (NAEZ) to support decision-making in land use management, increased agricultural productivity and reduced vulnerability to climate change. It is based on the fact that Guinea-Bissau's economy is largely dependent on land and climate productivity, and mainly on rainfall patterns, and given the predictions of climate change it is critical to prepare the country for adaptations in its agriculture to ensure the food security of the population and make farming increasingly profitable and sustainable.

Colonial old town of Bafatá, the capital of Bafatá Region[9]
Photo credit: jbdodane

The system to be operationalized is based on plant productivity models, data and maps already developed by FAO to a coarse scale, but its practical application in Guinea-Bissau requires: i) parameterization of the main suitable crops (including biofuels); ii) small software developments; iii) construction of fine resolution spatial databases including meteorological information; iv) data collection and soil mapping; v) training of technicians; vi) awareness raising and ownership of information by farmers and local associations.

As main results, it is expected to set up a NAEZ system that produces high resolution maps for agricultural management, providing decision support in the use of fertilizers and / or irrigation for present climate and future climate forecasts. The system and the information it produces (including maps) underlie field interventions by Agricultural Extension Services, local communities and other stakeholders. Interventions will be designed to increase the resilience of local populations to increases in rainfall variability and, at the same time, increase productivity and return on agricultural products. This will reduce human pressure on ecosystems and promote a reversal of environmental degradation phenomena.

6.4 References and Footnotes

- African Development Bank (2001a) Key issues in forestry sector to year 2020 in the West African
- Sustainable Agriculture in Guinea-Bissau Increasing Production. 2018. https://borgenproject.org/sustainable-agriculture-in-guinea-bissau/
- https://www.cia.gov/library/publications/the-world-factbook/geos/pu.html
- Projecto de Dinamização dos Sistemas de Produção Pecuários nos Sectores de Pitche e Gabu BALAL GAINAKO (contrato DCI-NSAPVD 2010 / 257–105). Accessed on 25th April 2016
- http://www.plataformaongd.pt/conteudos/File/Recrutamento/TdREstudo032011.pdf
- http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation
- http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-andbiosphere-programme/)
- http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T4615A11037468.en. Downloaded on 31 August 2019.
- Cassamá, V. L. S., Atewamba, C., and E. Kouame (2015). Country profile on climate change, agricultural trade and food security in ECOWAS: Guinea Bissau Report. Accra: United Nations University - Institute for Natural Resources in Africa
- Cassamá, V. L. S., Djassi, B., Sal, D. (2009) - Vulnerabilidade e adaptação as alterações climáticas - Sector agrário, 2009, Bissau p. 3.
- Guinea-Bissau National Adaptation Programme of Action (NAPA). http://www.adaptationundp.org/projects/guinea-bissau-national-adaptation-programme-action-napa. Accessed on 25th October 2019.

Footnotes and others

[1] https://commons.wikimedia.org/wiki/File:Main_square_in_Bafat%C3%A1_with_Am%C3%ADlcar_Cabral_bust,_Bafat%C3%A1,_Guinea-Bissau_1.jpg

[1] https://www.nationsonline.org/oneworld/guinea_bissau.htm

ANNEX 1. References and Footnotes

Executive Summary Error! Bookmark not defined.

— [1] Food and Agriculture Organization [FAO]. 2015. FAOSTAT. FAO, Rome, Italy. http://faostat3.fao.org/browse/Q/QC/E [Accessed Jan 5, 2015].

— [1] http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation

— [1] Food and Agriculture Organization [FAO]. 2015. FAOSTAT. FAO, Rome, Italy. http://faostat3.fao.org/browse/Q/QC/E [Accessed Jan 5, 2015].

— [1] Sustainable Agriculture in Guinea-Bissau Increasing Production. 2018. https://borgenproject.org/sustainable-agriculture-in-guinea-bissau/

— [1] Projecto de Dinamização dos Sistemas de Produção Pecuários nos Sectores de Pitche e Gabu BALAL GAINAKO (contrato DCI-NSAPVD 2010 / 257–105). Accessed on 25th April 2016 http://www.plataformaongd.pt/conteudos/File/Recrutamento/TdREstudo032011.pdf

— [1] http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation

— [1] Tree cover "threshold" is used for defining the tree cover area. 30% includes all areas with more than 30% tree cover.

— [1]https://commons.wikimedia.org/wiki/File:Main_square_in_Bafat%C3%A1_with_Am%C3%ADlcar_Cabral_bust,_Bafat%C3%A1,_Guinea-Bissau_1.jpg

— [1] https://www.nationsonline.org/oneworld/guinea_bissau.htm

Chapter 1: National Circumstances

— DGRH, 2016. Diagnóstico de Necessidades e Gaps de Capacidades nas Entidades Gestoras de Serviços de Águas. http://www.ppa.pt/wp-content/uploads/2016/10/GuineBissau-1.pdf.

— Eros.usgs.gov. 2013. https://eros.usgs.gov/westafrica/land-cover/land-use-land-cover-and-trends-guinea-bissau

— FAO. 2015. Global Forest Resources Assessment (FRA) 2015. http://www.fao.org/3/a-i4808e.pdf

— Ferreira, T C & Lona, J T. 2018. Componente 3 do Projeto BUR 1: "Políticas e medidas para mitigação/atenuação das alterações climáticas e seus efeitos" Projecto SB-001119.13 - Elaboração do Primeiro Relatório de Actualização Bienal da implementação da Convenção-Quadro das Nações Unidas sobre as Alterações Climáticas. Componente 3 do Projeto BUR 1. 60pp.

— GoGB. 2015. Estratégia e Plano Nacional da Diversidade Biologica. Secretaria de ESatdo do Ambiente. Bissau. 155p

— MRN/DGA. 2007. Projeto CARBOVEG-GB – Quantificação do Carbono Armazenado e da Capacidade de Sumidouro da Vegetação Florestal da Guiné-Bissau.

— Mongabay. 2018. "Deforestation statistics for [selected country name]". Accessed on 06.10.2019 from rainforests.mongabay.com.

— Nahada V., Sobrino I., Rodríguez S., 2012. Extraordinary Joint Scientific Committee Meeting Report Guinea-Bissau – EU. Bissau. Reunião do Comité Científico Conjunto entre a República da Guiné-Bissau e a União Europeia.

— Partenariat Régional pour la Conservation de la zone côtière et Marine en Afrique de l'Ouest. 2019. Guinea Bissau: protected areas coverage up from 15% to 26.3%. Accessed on 06.10.2019 from prcmarine.org/en/guinea-bissau-protected-areas-coverage-15-263. Acessed

— Sardinha, R. 1993. O papel da arvore nos sistemas agrarios da Guine-Bissau". Primeiras Jornadas sobre a agricultura na Guine-Bissau, Comunicações, Lisboa, Secretaria de Estado da Ciência e Tecnologia, 183-206.

— SEA. 2019. Proposed Forest Reference Emission Level for The National System of Protected Areas of Guinea-Bissau – Secretariat of State for the Environment. Reducing Emissions from Deforestation in the National System of Protected Areas- REDD+ Results-Based Payments under the UNFCCC - Bissau | January 2019

— Seminoff, J.A. (Southwest Fisheries Science Center, U.S.). 2004. Chelonia mydas. The IUCN Red List of Threatened Species 2004: e.T4615A11037468.

— STRATEGIC AND OPERATIONAL PLAN FOR 2015-2020 "Terra Ranka". Guinea-Bissau 2025. Executive Summary & Portfolio of Projects. Organisation for Economic Co-operation and Development. 03-Dec-2015. 31p

— The World Bank. 2015. http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation.

— The World Bank. 2018. IMPLEMENTATION COMPLETION AND RESULTS REPORT. Second APL (APL-B1) West Af. Reg. Fisheries Program (Guinea Bissau) (P119380). 83p

— The-world-factbook. 2018. https://www.cia.gov/library/publications/the-world-factbook/geos/print_pu.html. Accessed 31.08.2019.

— UNDP. 2018. Human Development Indices and Indicators: 2018 Statistical Update. Guinea-Bissau. https://www.populationof.net/guinea-bissau/. Accessed 31.08.2019.

— Unesco. Org. 2017. (http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-andbiosphere- programme/)

Footnotes and others

[1] Food and Agriculture Organization [FAO]. 2015. FAOSTAT. FAO, Rome, Italy. http://faostat3.fao.org/browse/Q/QC/E [Accessed Jan 5, 2015].

[2] Sustainable Agriculture in Guinea-Bissau Increasing Production. 2018. https://borgenproject.org/sustainable-agriculture-in-guinea-bissau/

[3] Projecto de Dinamização dos Sistemas de Produção Pecuários nos Sectores de Pitche e Gabu BALAL GAINAKO (contrato DCI-NSAPVD 2010 / 257–105). Accessed on 25th April 2016 http://www.plataformaongd.pt/conteudos/File/Recrutamento/TdREstudo032011.pdf

[4]http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation

Chapter 2: National Greenhouse Gas Inventory

— Manual IPCC Actualizado de 2006 para o cálculo do inventário dos gases, com efeito, de estufa.

— Guia de Boas Praticas para o sector de LULUCF-IPCC, (2003)

— Inventários das Emissões dos GEE na Guiné-Bissau. Anos de referência 2010.

— Anuário Estatístico de FAO. Produção de 2012 e 2013

— Dados da distribuição de fertilizantes do Projecto KR2 do MADR.

— Dados da evolução de superfície e de produção das diferentes culturas na Guiné-Bissau 2013 elaborado pela Divisão de Estatística Agrícola do MADR.

— Dados de evolução dos efectivos de animais fornecidos pela Direcção Geral de Pecuária do MADR 2009 extrapolado para 2013.

— IPCC, 2006: Guidelines for National Greenhouse Gas Inventories, prepared by the National Greenhouse Gas Inventories program. Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

— Study of the plan Director for the development of infrastructures for production and distribution of electricity, CAbira, 2013 – Database – Vol. I

— National action Plan in the Renewable energy Sector (PANER) of Guinea-Bissau, 2015.

— Energy action Agendafor all in guinea-Bissau (SE4All), 2015.

— National Initial Communication of Guinea-Bissau on climate change, UNFCCC, 2004.

— Second National Communication on climate change, UNFCCC, 2008.

Footnotes and others

5 Programa de Acção Nacional de Adaptação as Mudanças Climáticas

6 Documento de Estratégia Nacional de Redução da Pobreza

7 Relatório Plano de Acção da Estratégia Financeira Integrado 2012 (MADR – Direcção Geral das Florestas e Fauna)

8 Entrevistas

9 Rui Nene Djata Ex-Ministro de Agricultura, Director Geral da Engenharia Rural;

10 Lorenço Monteiro Carvalho de Abreu Director Nacional da Vulgarização Agrária.

Chapter 3: Mitigation Actions

— Ferreira, T C & Lona, J T. 2018. Componente 3 do Projeto BUR 1: "Políticas e medidas para mitigação/atenuação das alterações climáticas e seus efeitos" Projecto SB-001119.13 - Elaboração do Primeiro Relatório de Actualização Bienal da implementação da Convenção-Quadro das Nações Unidas sobre as Alterações Climáticas. Componente 3 do Projeto BUR 1. 60pp

— Project CARBOVEG-GB (2007) – Quantification of stored carbon and the capacity of Sumidouro forest vegetation of Guinea-Bissau-MRN/DGA.

— Republic of Guinea-Bissau. 2015. Intended Nationally Determined Contributions (INDC).

—https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Guinea%20Bissau%20First/GUINEA-BISSAU_INDC_Version%20to%20the%20UNFCCC%20(eng).pdf

— http://chimbo.org/wp-content/uploads/2016/06/Annual-Report-2015.pdf

— UNIDO, 2017. GUINEA-BISSAU SUSTAINABLE ENERGY INVESTMENT PLAN. Ministry of Industry and Energy. 2015-2030 Period. 131p

— [1] https://ibapgbissau.org/img/FotosAreasProtegidas/PNTC/PNT%20CACHEU-Bolol-17%20octobre%202012-enhaut-R0090247.jpg

— http://guineabissau.sodepaz.org/galery/o-carvao-vegetal-a-energia-de-guine-bissau/show

— https://www.dw.com/pt-002/fogareiro-melhorado-revoluciona-guin%C3%A9-bissau/a-16699318

—https://www.google.pt/imgres?imgurl=http%3A%2F%2Fguineabissau.sodepaz.org%2Fuploads%2Fgalery%2Fimages%2F52aee172642941.24315948.jpeg%3F1536278406201&imgrefurl=http%3A%2F%2Fguineabissau.sodepaz.org%2Fgalery%2Fo-carvao-vegetal-a-energia-de-guine-bissau%2Fshow&docid=sOCnbLFUzOhrMM&tbnid=2ntE8anZ3aHr8M%3A&vet=10ahUKEwiawJHftZjeAhXEIsAKHRZ1C4UQMwgnKAAwAA..i&w=960&h=640&itg=1&bih=505&biw=1282&q=52aee172642941_24315948&ved=0ahUKEwiawJHftZjeAhXEIsAKHRZ1C4UQMwgnKAAwAA&iact=mrc&uact=8

— http://suniaenergy.com/trabajos/central-solar-de-bambadinca-guinea-bissau/

— https://ibapgbissau.org/Home/Galeria?Length=4

Chapter 4: Financial, Technology, Capacity Needs and Support Received

— Fonseca, Miguel (2017) - O sector da água na Guiné-Bissau/Pontes e Parcerias nos Países de Língua Portuguesa, Maio de 2017

— Gov. Da Guiné-Bissau/GEF/PNUD (2011) - Projecto de Reforço de Resiliência e da Capacidade de Adaptação dos Sectores Agrário e Hídrico as Mudanças Climáticas na Guiné-Bissau,

— Guinea-Bissau (2005) Initial National communication of Guinea-Bissau about climate change, Ministry of Environment http://secretariatunfccc.intl

— Guinea-Bissau (2007) National Programme of Action of Adaptation to Climate Change. http://unfccc.int/resource/./gnb01.

— Guinea-Bissau (2011) - Second National Communication on Climate Change in Guinea-Bissau.

— Guinea-Bissau (2015) Intended Nationally Determined Contributions – INDC.

— Guinea-Bissau (2017) - Third National Communication on Climate Change in Guinea-Bissau.

— MRN/DGA (2007) - Projeto CARBOVEG– Quantificação do Carbono Armazenado e da Capacidade de Sumidouro da Vegetação Florestal da Guiné-Bissau –.

— Overseas Development Institute (2012). Plano de Investimento para a Energias Sustentável da Guiné-Bissau 2015-2030, MEI-UNIDO-ECREEE-GEF

Chapter 5: Information on domestic MRV of Domestically supported NAMAs

— African Development Bank (2001a) Key issues in forestry sector to year 2020 in the West African subregion.Document de travail fosa est par Björdahl, G. & Van Hensbergen, African Development Bank, Abidjan.

— Cassama Viriato L, S (2011) proposal for a national action strategy for appropriate mitigation of greenhouse gases in Guinea-Bissau.

— CDKN Global (Climate and Development Knowledge Network Global). 2016. "News: CDKN and Ricardo Energy and Environment Team Up on NDC Guidance." Webpage. Available online at: http://cdkn.org/2016/06/news-cdkn- ricardo-energy-environment-team-ndc-guidance/?loclang=en_gb

— Dagnet, Y. et al. 2014. Improving Transparency and Accountability in the Post-2020 Climate Regime: A Fair Way Forward. Washington, D.C.: World Resources Institute. Available online at: www.wri.org/our-work/project/act-2015/publications

— Ninomiya, Y. 2012. Classification of MRV of Greenhouse Gas (GHG) Emissions/ Reductions: For the Discussions on NAMAs and MRV. Kanagawa, Japan: Institute for Global Environmental Strategies. Available online at: http:// mitigationpartnership.net/sites/default/files/iges_pb_mrv.pdf

— Pang, Y. et al. 2014. MRV—Measurement, Reporting, Verification. How to Set Up National MRV Systems. Draft 4.2. Bonn and Eschborn, Germany: GIZ. Available online at: http://mitigationpartnership.net/mrv-tool-how-set-national-mrv-systems

— Singh, N., J. Finnegan, and K. Levin. 2016. "MRV 101: Understanding Measurement, Reporting, and Verification of Climate Change Mitigation." Working Paper. Washington DC: World Resources Institute. Available online at http://www.wri.org/mrv101

Chapter 6: Additional Information

— African Development Bank (2001a) Key issues in forestry sector to year 2020 in the West African

— Sustainable Agriculture in Guinea-Bissau Increasing Production. 2018. https://borgenproject.org/sustainable-agriculture-in-guinea-bissau/

— https://www.cia.gov/library/publications/the-world-factbook/geos/pu.html

— Projecto de Dinamização dos Sistemas de Produção Pecuários nos Sectores de Pitche e Gabu BALAL GAINAKO (contrato DCI-NSAPVD 2010 / 257–105). Accessed on 25th April 2016

— http://www.plataformaongd.pt/conteudos/File/Recrutamento/TdREstudo032011.pdf

— http://www.worldbank.org/en/news/feature/2015/11/30/guinea-bissaus-green-development-takes-root-starting-with-biodiversity-conservation

— http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-andbiosphere-programme/)

— http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T4615A11037468.en. Downloaded on 31 August 2019.

— Cassamá, V. L. S., Atewamba, C., and E. Kouame (2015). Country profile on climate change, agricultural trade and food security in ECOWAS: Guinea Bissau Report. Accra: United Nations University - Institute for Natural Resources in Africa

— Cassamá, V. L. S., Djassi, B., Sal, D. (2009) - Vulnerabilidade e adaptação as alterações climáticas - Sector agrário, 2009, Bissau p. 3.

— Guinea-Bissau National Adaptation Programme of Action (NAPA). http://www.adaptationundp.org/projects/guinea-bissau-national-adaptation-programme-action-napa. Accessed on 25th October 2019.

Footnotes and others

[1] https://commons.wikimedia.org/wiki/File:Main_square_in_Bafat%C3%A1_with_Am%C3%ADlcar_Cabral_bust,_Bafat%C3%A1,_Guinea-Bissau_1.jpg

[1] https://www.nationsonline.org/oneworld/guinea_bissau.htm

ANNEX 2. Institutional Arrangements