

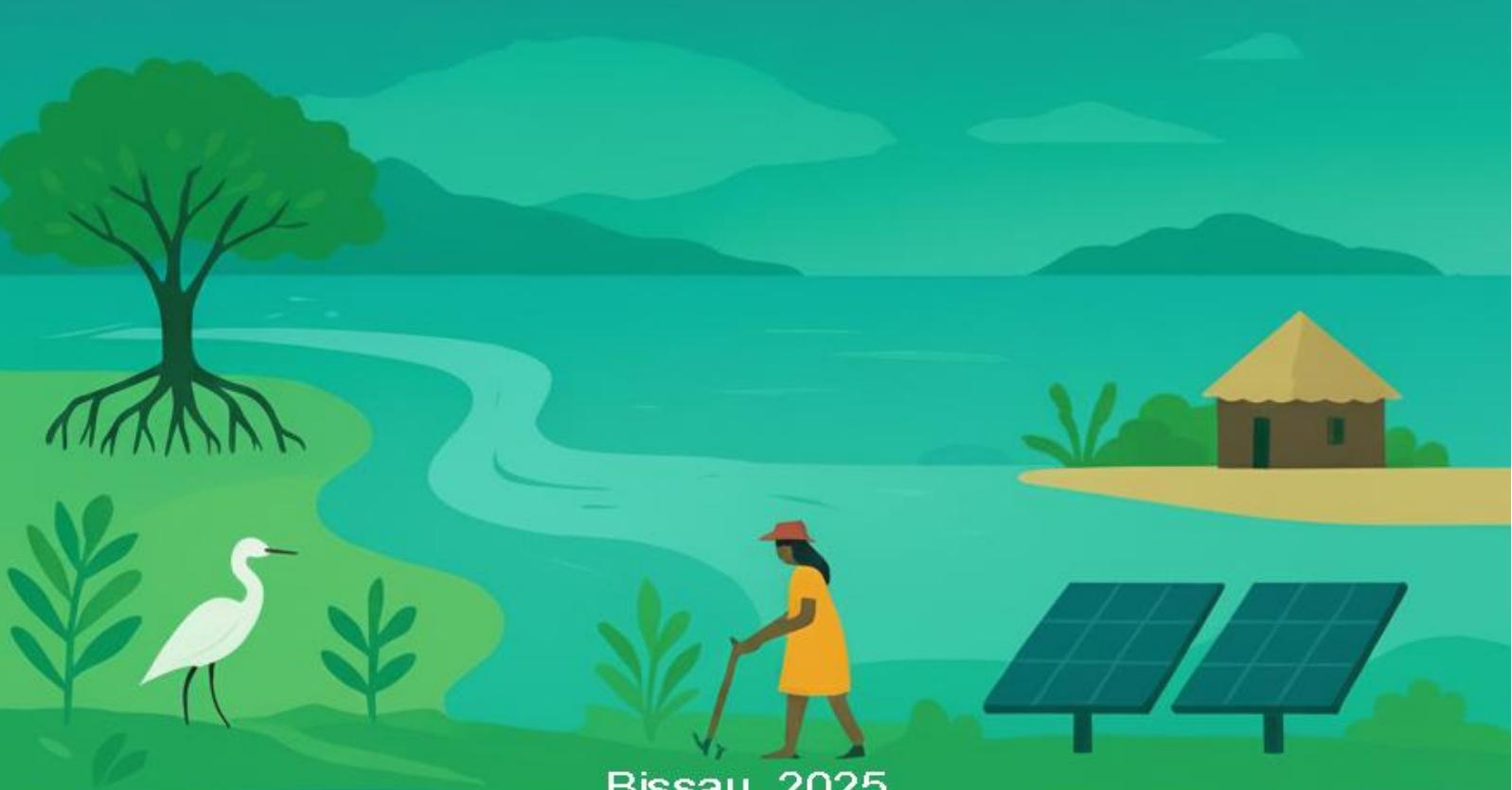


REPUBLIC OF GUINEA-BISSAU

MINISTRY OF THE ENVIRONMENT, BIODIVERSITY AND CLIMATE ACTION

Fourth National Communication (NC4)

to the United Nations Framework Convention on Climate Change



Bissau, 2025

With technical and financial support



REPUBLIC OF GUINEA-BISSAU

FOURTH NATIONAL COMMUNICATION REPORT (NC4) TO THE UNITED NATIONS
FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC)

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Lusophone Nucleus for Climate Transparency

EXECUTIVE SUMMARY

The Fourth National Communication (NC4) of the Republic of Guinea-Bissau to the United Nations Framework Convention on Climate Change (UNFCCC) is a strategic reference document that reflects the country's progress in implementing international policies, measures and commitments related to climate change. This report is the result of a participatory process involving government institutions, national experts, international partners and civil society, and was prepared under the coordination of the Ministry of Environment, Biodiversity and Climate Action (MABAC), with the technical and financial support of the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF).

Guinea-Bissau is one of the most vulnerable countries to the adverse effects of climate change, due to its geographical, socioeconomic and environmental characteristics. The territory faces growing threats such as floods, droughts, rising sea levels, coastal erosion, biodiversity loss and severe impacts on agriculture, fisheries, water resources and public health. These vulnerabilities are exacerbated by the population's high dependence on natural resources, widespread poverty, and institutional and infrastructural weaknesses.

The report initially presents an update of the National Greenhouse Gas Emissions Inventory (GHG), developed in accordance with the guidelines of the Intergovernmental Panel on Climate Change (IPCC2006, 2019). This inventory identifies the main sources of emissions in the country, highlighting the predominance of the agriculture, forestry and land use (AFOLU) sectors, as well as the energy sector, strongly dependent on biomass and petroleum products. Despite the low level of industrialisation, pressure on forest resources and inadequate waste management contribute significantly to national emissions.

With regard to adaptation, NC4 analyses the impacts already observed and future risks in sectors critical to the economy and the well-being of the population. Specific vulnerabilities are identified in coastal areas, particularly in the Bijagós Archipelago, inland agricultural areas and riverside communities. The document highlights the need to strengthen resilience through measures such as the promotion of climate-smart agriculture, the protection and sustainable management of forests and ecosystems, the improvement of water supply and sanitation systems, the strengthening of health services and the implementation of resilient infrastructure.

In the field of mitigation, NC4 presents programmes and policies aimed at reducing emissions and promoting sustainable and low-carbon development. Priority measures include expanding the use of renewable energies, in particular solar and hydroelectric; promoting energy efficiency; modernising the transport sector; and encouraging sustainable management practices in agriculture and forests. These initiatives are in line with Guinea-Bissau's Nationally Determined Contribution (NDC), which sets a 30% emissions reduction target by 2030 conditional on international support.

Another central aspect of NC4 is the identification of financial, technical and training needs. The report estimates that full implementation of mitigation and adaptation measures will require the mobilisation of about \$664 million between 2021 and 2030. However, private sector participation is still incipient due to institutional constraints and the absence of a specific regulatory framework for climate finance and technical knowledge constraints. In this sense, NC4 emphasises the importance of creating innovative

financing mechanisms, strengthening international cooperation and promoting synergies between environmental conventions.

The report also emphasises the crucial role of education, awareness-raising and public participation as pillars for strengthening the national response to climate change. The need to integrate climate issues into education programmes, support initiatives of civil society organisations and promote the participation of local communities, including women and young people, in the formulation and implementation of environmental policies is highlighted.

Finally, NC4 reaffirms Guinea-Bissau's commitment to move towards a path of sustainable and climate-resilient development, despite the constraints faced. The country recognises that achieving its climate goals depends on strong international support in terms of financing, technology transfer, capacity building, and strategic partnerships. Thus, NC4 is not limited to fulfilling an accountability obligation under the UNFCCC, but is a strategic planning tool to guide national public policies, attract green investments and strengthen regional and international cooperation on climate action.

FOREWORD

The Republic of Guinea-Bissau has the honour to present its Fourth National Communication (NC4) to the United Nations Framework Convention on Climate Change (UNFCCC). This report is not limited to fulfilling an international obligation, but reflects our country's firm and renewed commitment to global climate action and building a sustainable and resilient future for the Guinean people.



Minister of Environment,
Biodiversity and Climate Action

Since the ratification of the UNFCCC in 1995 and the Kyoto Protocol in 2005, Guinea-Bissau has maintained a consistent trajectory of reporting and transparency, presenting the First, Second and Third National Communications (2005, 2011 and 2018), the Paris Agreement (2015), the First Biennial Update Report (BUR, 2020) and its Nationally Determined Contribution (NDC, 2021) and its First Biennial Transparency Report (BTR1, 2024). NC4 continues this journey, reinforcing our determination to mainstream climate action as a cross-cutting priority in public development policies.

Our national reality is extremely vulnerable to climate change. Increasing the frequency and intensity of phenomena such as droughts, floods, coastal erosion and rising sea levels threaten fragile ecosystems, biodiversity, food security and the well-being of communities. This requires urgent and coordinated responses, combining adaptation, mitigation, and institutional and community capacity-building measures.

NC4 is therefore an essential tool for diagnosis and planning. The document updates the national greenhouse gas (GHG) emissions inventory, identifies the most emitting and vulnerable sectors, analyses climate risks and impacts, presents mitigation and adaptation strategies and programmes, and details the financial, technical and training needs to implement effective measures.

This collective effort was only possible thanks to the commitment of the Ministry of Environment, Biodiversity and Climate Action (MABAC), through the National Environment Institute (INA), the contribution of national experts and the technical and financial support of the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF). I would like to express my deep gratitude to all the national and international partners who have joined us in this process.

In presenting this National Communication, Guinea-Bissau reaffirms its call for international solidarity, resource mobilisation and enhanced multilateral cooperation, without which the most vulnerable countries, such as ours, will not be able to fully face the challenges posed by climate change.

I am convinced that NC4 will serve as a strategic basis to guide public policies, attract green investment, strengthen international cooperation and consolidate Guinea-Bissau's transition to a sustainable, inclusive and resilient development model.

Viriato Luís Soares Cassamá
Minister for the Environment, Biodiversity and Climate Action

A handwritten signature in blue ink, appearing to read "Viriato Luis Soares Cassamá".

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ACRONYMS AND ABBREVIATIONS

PA	Paris Agreement
AFOLU	Agriculture, Forestry and Other Land Uses
PAs	Protected Areas
BDUT	Land use database
BM	World Bank
RTB	Biennial Transparency Report
BUR1	First Biennial Update Report
CH4	Methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CMGB	Municipality of Guinea-Bissau
CO2	Carbon dioxide
CO2eq	Carbon dioxide equivalent
COP	Conference of the Parties
CRT	Common Reports Table
WFC	Common tabular format
AD	Activity data
DENARP	National Poverty Reduction Strategy Paper
DGE	Directorate General for Energy
FGD	Directorate-General for Forests
HRMD	Directorate-General for Water Resources
LCY	Guidelines
DSEA	Directorate of the Office for Agricultural Statistics

EAGB	Guinea-Bissau Electricity and Water Company
EE	Energy Efficiency
D	Renewable energy
ETF	Enhanced Transparency Framework
FE	Emission factor
FTT	Intertropical Front
FM radio	Methodological sheet
FREL	Baseline for forest emissions
GACMO	Cost Model for Reducing Greenhouse Gases
GHG	Greenhouse gas
GEF	Global Environment Facility
GTT	Technical Working Group
GWP	Power of Global Warming
HFC	Hydrofluorocarbon
IBAP	Institute of Biodiversity and Protected Areas
IGEE	Greenhouse Gas Inventory
INA	National Environment Institute
INEC	Instituto Nacional de Estatística e Censos
INITE	National Institute of Applied Research and Technology
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
ITMO	Internationally Transferred Mitigation Result
LD	Guidelines
LULUCF	Land Use, Land Use Change and Forests
MABAC	Ministry of Environment, Biodiversity and Climate Action
MADR	Ministry of Agriculture and Rural Development
MPGs	Modalities, Procedures and Guidelines for the Transparency Framework
MRV	Monitoring, Reporting and Verification System
N2O	Nitrous oxide
NC4	Fourth National Communication on Climate Change
NDC	Nationally Determined Contribution
NF3	Nitrogen trifluoride
NIR	National Inventory Report
ODA	Official Development Assistance
SDG	Sustainable Development Goals
OMVG	Gambia River Improvement Organisation
OTO	Other official transmissions
PANA	National Climate Change Adaptation Plan
PANEL	National Action Plan for Energy Efficiency
PANER	National Renewable Energy Action Plan
PCI	Lowest calorie value
PFC	Perfluorocarbon
PGRU-GB	Urban Waste Management Plan of Guinea-Bissau

GDP	Gross domestic product
PIES	Sustainable Energy Investment Plan
SNE	National Development Plan
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
QA/QC	Quality Assurance/Quality Control
REDD+	Reduce emissions from deforestation; reduce emissions from forest degradation; conserve forest carbon stocks; manage forests sustainably; and increase forest carbon stocks.
MSW	Municipal Solid Waste
SCN	Second National Communication on Climate Change
SF 6	Sulphur hexafluoride
TCN	Third National Communication on Climate Change
UNFCCC	United Nations Framework Convention on Climate Change

CHAPTER I - NATIONAL CIRCUMSTANCES AND INSTITUTIONAL ARRANGEMENTS

1.1. Introduction

Guinea-Bissau is extremely vulnerable to climate change, especially floods, droughts, rising sea levels and coastal erosion. These recurrent climate shocks negatively affect livelihoods and the economy.

Given these climate vulnerabilities, disaster risks in the country are increasing and tend to be national, mainly due to a combination of factors such as accelerated population growth, socioeconomic aspects characterised by increased poverty, disorderly urbanisation and environmental degradation.

The country after presenting the first 3 National Communications on Climate Change, namely the first communication in 2005, the second in 2011, the third in 2018, the first BUR in 2020 and its Nationally Determined Contribution (NDC) in 2021, the country received a new grant from the GEF (Global Environment Facility), this time, to prepare its Fourth National Communication (NC4), in accordance with Article 12 of the United Nations Framework Convention on Climate Change (UNFCCC), which stipulates that the communication on the climate situation of each member country must be made through a periodic national report entitled National Communication on Climate Change, within the framework of the United Nations Framework Convention on Climate Change Climate Change (UNFCCC).

The Fourth National Communication is a tool that will help the country to improve the compilation of the greenhouse gas (GHG) inventory and extend it to other sectors not covered by the previous communications, thus facilitating the deepening of the vulnerability analysis and the proposal of a national adaptation programme. It should also allow the resumption of the review exercise of strategies and programmes containing measures to mitigate emissions or increase GHG absorption sinks, as well as the development of strategies and measures to strengthen Guinea-Bissau's capacity to address climate change issues.

This chapter presents the National Circumstance of Guinea-Bissau, also includes information on the characteristics of its geography, demography, climate and economy, as well as the main characteristics of the main economic sectors: AFOLU (agriculture, livestock, forestry and land use); Water Resources; Coastal Zone; Public Health; Energy; Industry and Waste) to give an idea of the general national context in which the challenges of mitigation and adaptation to climate change are addressed, detailing the priorities, objectives and circumstances of national development that serve as the basis for addressing climate change issues.

1.2 Government Structure

The Republic of Guinea-Bissau adopts a political system of multiparty democracy, based on the separation and interdependence of the Executive, Legislative and Judicial powers. The institutional framework is defined in the Constitution of the Republic, which enshrines the rule of democratic law, popular sovereignty and the defence of fundamental rights.

1. *Executive branch:* It is headed by the President of the Republic, elected by direct universal suffrage, who exercises the functions of Head of State, guarantor of national unity and Supreme Commander of the Armed Forces. The Government, led by the Prime Minister, is responsible for

the conduct of the country's general policy and public administration, consisting of Ministers of State, Ministers of State and Secretaries of State.

2. *Legislative branch:* The National People's Assembly (NPA) is the supreme body of representative sovereignty, composed of directly elected deputies, with legislative powers, political oversight and approval of key governance guidelines and instruments of economic and budgetary planning.
3. *Judiciary:* It operates independently and is exercised by the courts, with the Supreme Court of Justice as the highest instance. Regional courts, sectoral courts and specialised courts are also part of this power. The Supreme Judicial Council ensures the management and discipline of the judiciary.

In addition to the three traditional powers, there are control and supervisory institutions such as the Court of Auditors and the Ombudsman, as well as autonomous administrative bodies, including local authorities, which have been gaining increasing importance in the context of administrative decentralisation.

Guinea-Bissau participates actively in regional and international cooperation mechanisms, being a member of ECOWAS, the African Union, the CPLP and the United Nations, which influences the design and implementation of its national policies.

The country ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 27 October 1995 and also ratified the Kyoto Protocol on 18 November 2005 (IGEE, 2008), thus becoming a contracting party to the Convention, committing itself to develop, update and publish the National Communications on Climate Change and other strategic documents on the same topic and to participate in the Conferences of the Parties (COP). In order to comply with its reporting obligations, Guinea-Bissau has already systematically prepared and presented: (i) The First Inventory and the National Initial Communication in 1996, reference year 1994; (ii) The Second Inventory and the subsequent second national communication in 2011, reference year 2000; and (iii) now the Third Inventory and, consequently, within this framework, the reporting guidelines, adopted at COP 8 for the preparation of the national communications of the Parties not included in Annex I to the Convention and contained in Decision 17/CP. 8, were adopted for the preparation of this Fourth National Communication (reference year is 2020), still guided by the Guidelines and/or Best Practices Guide of the Intergovernmental Panel on Climate Change (IPCC) 2019 for the preparation of national communications of Parties not included in Annex I to the Convention.

In the new organisational structure of the Government of the Republic of Guinea-Bissau, the Ministry of Environment, Biodiversity and Climate Action (MABAC) is the governmental entity with the overall responsibility for the development of environmental, biodiversity and climate action policies. The organisational structure for the implementation of the NC4 Project is presented in the scheme below.

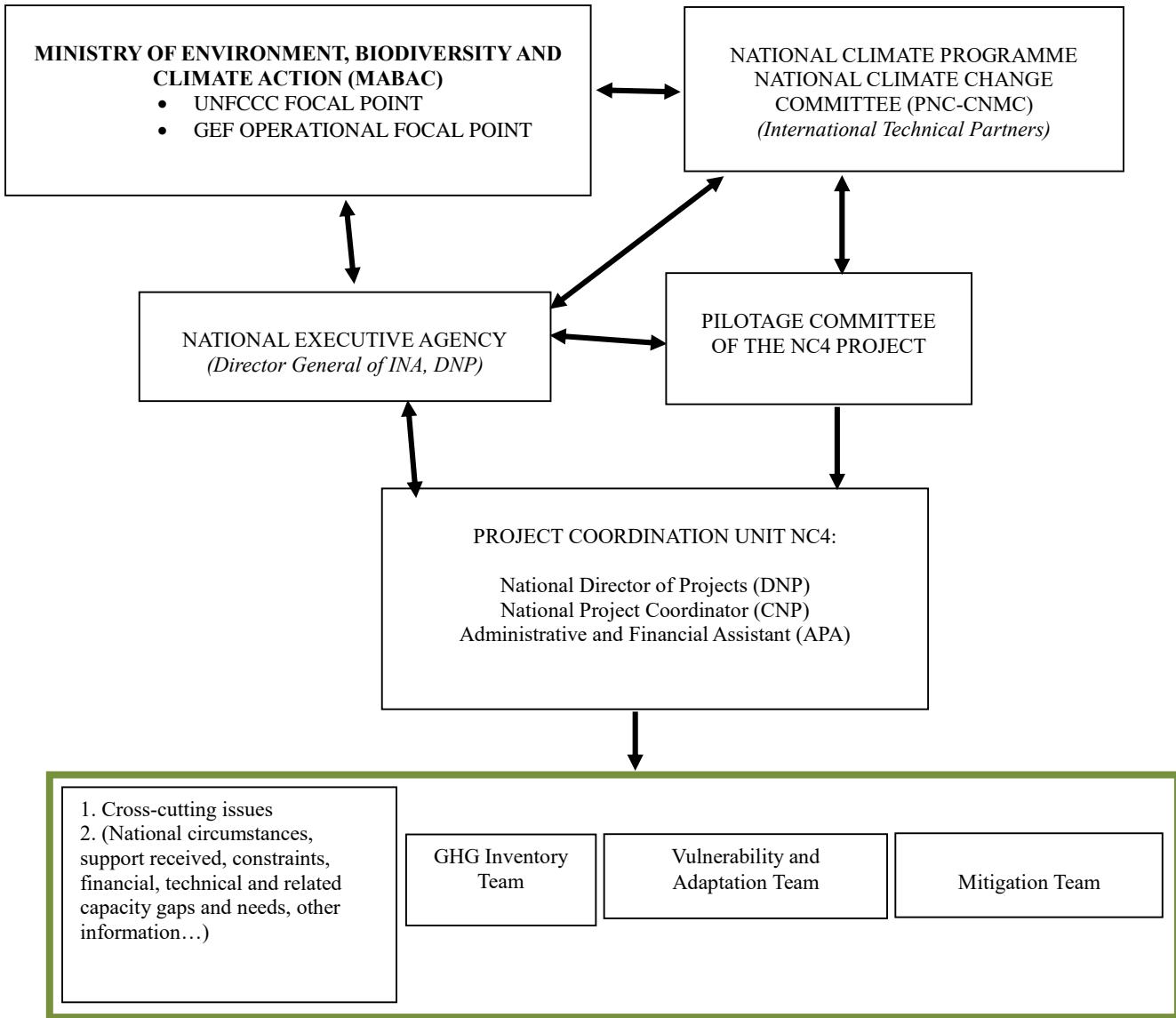


Figure1Subject: Scheme of the institutional arrangements of the NC4 project

The National Environment Institute (INA) is responsible for the overall coordination and implementation of environmental policy across departments, programmes and projects in a centralised system, as there are still no regional offices. Given the NSI's limited resource capacity (human, material and financial) for the effective implementation of its policy, it has received significant support from a number of national and international partners, including: UNEP/GEF, World Bank (WACA Project), EU, IUCN and occasionally Wetlands International, etc.

The National Committee on Climate Change (NCCC), chaired by MABAC and involving a broad representation of stakeholders, assumed the overall oversight and advisory role for the implementation of the NC4 project. The highest level of project structure is the Project Management Unit (PMU), which was the highest decision-making body of the National Communication and provided general guidance and oversight.

1.3 Population Profile

Guinea-Bissau is currently facing a challenging dynamic demographic landscape, which includes rapid and unbalanced urbanisation and rural-urban migration. The population tends to focus on large cities in search of better services and infrastructure.

According to demographic projections provided by the National Institute of Statistics (INS), in 2023, the population of Guinea-Bissau is 1,781,310 inhabitants; in 2030 it will be 2,053,620 inhabitants.

The average age in Guinea-Bissau decreased by 0.67 years between 2012 and 2023, from 18.97 to 18.30 years (median value).

About 45% of the country's population lives in large cities. This growing trend of urbanisation is increasing by 3.1% per year.

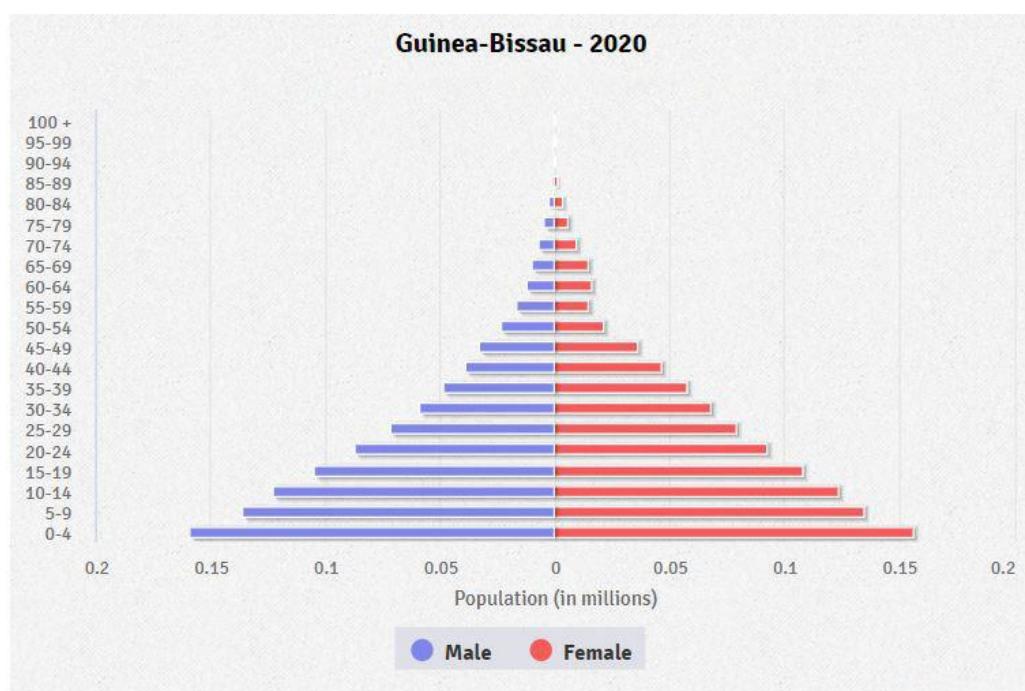


Figure 2: Guinea-Bissau population pyramid

Population growth is the result of birth rate, mortality rate and migration rate. Taking 2021 as an example in the chart: Guinea-Bissau's population increased by approximately 44,900. In the same year, the mortality rate was 8.7 per 1,000 inhabitants (~17,600 cases) and the birth rate was 31.1 per 1,000 inhabitants (~62,700 births). Thus, approximately 200 inhabitants emigrated to other countries.

On average, 16,837 people have died each year in Guinea-Bissau in the last 10 years. The number of births was 62,885 per year.

The following chart compares the trends of births and deaths. All figures refer to births or deaths per 1,000 inhabitants.

Population projections for 2014-2060 estimate that by 2020 the population will be 1,678,768, reaching 2,029,547 in 2030 (see table below).

Table 1-0-1 Subject: Population projections 2014-2060

Year	Optimistic hypothesis			Trend Hypothesis			Pessimistic hypothesis		
	TOTAL	Man	Woman	TOTAL	Man	Woman	TOTAL	Man	Woman
2020	1,678,768	800,620	878,148	1,682,149	802,343	879,807	1,687,834	805,237	882,596
2021	1,709,219	812,508	896,712	1,714,193	815,041	899,152	1,721,865	818,948	902,916
2022	1,741,002	825,168	915,833	1,747,193	828,322	918,871	1,757,251	833,446	923,805
2023	1,774,143	838,617	935,526	1,781,308	842,267	939,041	1,794,039	848,752	945,287
2024	1,807,358	852,199	955,160	1,816,449	856,830	959,620	1,832,303	864,905	967,398
2025	1,842,016	866,600	975,416	1,852,784	872,084	980,699	1,872,115	881,931	990,184

Source: INS, Nov-2022

The population of Guinea-Bissau consists of more than 20 ethnic groups, with different languages, social structures and customs. The majority of the population lives on agriculture and professes local traditional religions. About 45% practice Islam. The most widely spoken languages are Fulani and Mandinka, from populations concentrated in the north and northeast. Other important ethnic groups are the Balanta and Papuas on the south coast, and the Manjaco and Mancanha on the central and north coasts.

The population of Guinea-Bissau is currently predominantly rural; but this situation will be reversed from 2037 with an urbanisation rate of more than 50% (50.32%).

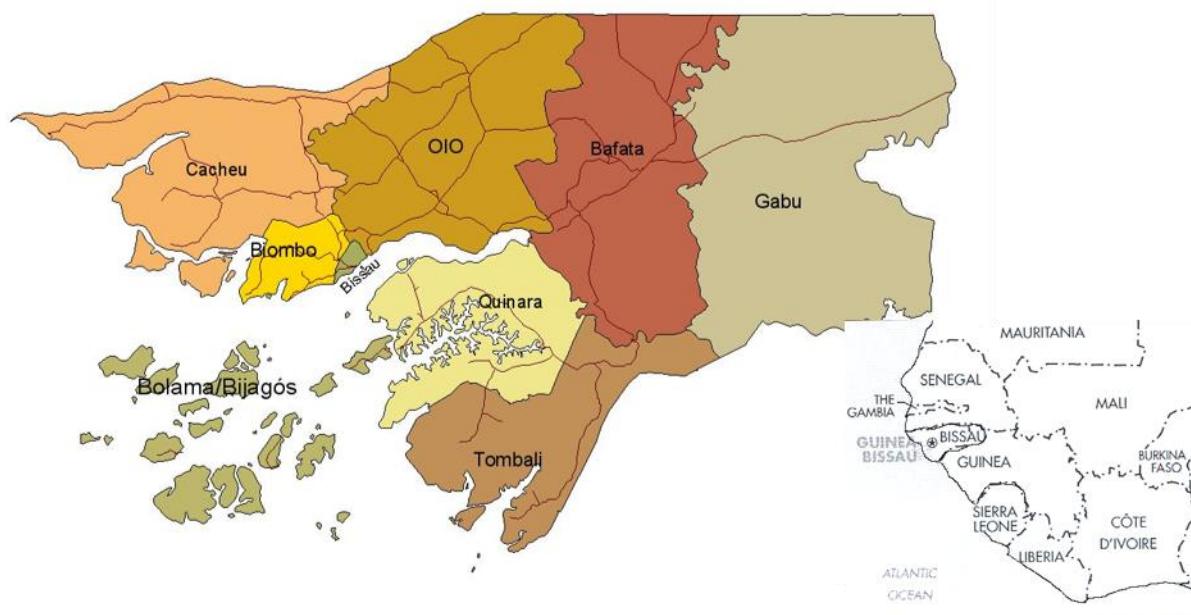
The population of Guinea-Bissau is predominantly rural. However, about 49.3% of the population of Guinea-Bissau lives in urban areas²⁸ and, according to data on the population size of Guinea-Bissau,

In Guinea-Bissau, the number of urban residents is approximately 743,402. The current population density is 51.7 inhabitants per square kilometre as of April 2016. The city alone, with Bissau, the capital, has more than 100,000 inhabitants, with an estimated population of 492,000 in 2015. Urban population concentration also occurs in other major cities, such as Gabú (43,556) and Bafatá (34,760). In fact, the population of Guinea-Bissau's urban areas has grown at a considerable pace, and recent data indicate that urbanisation is 4.13%. This means that a considerable number of people are migrating to urban areas, either due to poor economic conditions and lack of employment opportunities in villages; and/or poor agricultural conditions and increasing population pressure on land. These are the main factors driving the exodus of the rural population to urban areas, testing, on the one hand, the capacity of urban centres to absorb the incoming population and provide them with sufficient means of subsistence and, on the other hand, contributing to the steady decline in agricultural productivity.

1.4 Profile Geography

The Republic of Guinea-Bissau lies on the west coast of Africa, between latitudes 11°-13°N and longitudes 13°-17°W, bordering the Republic of Senegal to the north, the Republic of Guinea (also known as Guinea-Conakry) to the east and south, and the Atlantic Ocean to the west. Its area is 36,125 km², of which only 27,700 km² are of land surface, due to the country's low altitude relative to mean sea level.

Administratively, the country is divided into 8 regions and 1 autonomous sector: the Regions of Bafatá, Biombo, Bolama/Bijagós, Cacheu, Gabú, Oio, Quínara, Tombali and the Autonomous Sector of Bissau (SAB), which is the capital of the country. The regions are divided into sectors (36 in total) and these into sections, consisting of villages (tabancas).



Number3Map of the administrative division and geographical location of Guinea-Bissau

The country consists of a continental part and an island that covers the Bijagós archipelago, consisting of about 90 islands and islets, of which only 21 are inhabited. In terms of geomorphological characterisation, three main areas can be identified: the western coastal zone, the central zone, characterised by gently undulating plateaus, and the zone of plateaus and hills of the Gabú region, in Boé.

The topography favours the existence of two areas of high potential for water production: the areas influenced by the tides (whose area can reach up to 150 km²) and the areas corresponding to the large basins of the Geba and Corubal rivers, due to the great availability of surface water. Among the numerous rivers that cross the territory and the main accesses to the interior of the country, the Cacheu, the Mansoa, the Geba and the Corubal stand out.

These features make the country highly vulnerable, especially to rising sea levels, floods, and the saline intrusion associated with climate change.

1.5 Climate Profile

The climate throughout the year is mainly determined by the location of the territory in relation to the Intertropical Front (ITF) and by the subsidiaries of the semi-permanent high pressure cells, usually designated by Alto dos Açores, in the North Atlantic; Alto de Santa Helena, in the South Atlantic and also by the low summer thermal pressure that settles over the Sahara.

Guinea-Bissau's climate is humid tropical, characterised by an alternation between a monsoon-influenced rainy season and a Harmattan-ruled dry season. In the northeast, the climate is warmer, with low

humidity, while in the south the climate is characterised by intense rainfall and lower temperatures. Precipitation can reach levels in the order of 2,500 mm in the south, and in the north, the average precipitation was recorded in the order of 1,400 mm. Since the 1970s, there has been a gradual trend of declining precipitation.

The climate is naturally determined by factors such as the influence of geography and three major climatic phenomena, namely: i) the movements of the Intertropical Convergence Zone (ITCZ); ii) the subsidiary actions of semi-permanent high pressure cells, commonly referred to as Alta dos Açores in the North Atlantic and Alta de Santa Helena in the South Atlantic; and iii) the summer thermal depression that settles over the Sahara desert. The country is divided between the mainland and small islands.

1.5.1 Precipitation

The first rains normally occur in the second half of May, between 15 and 20 degrees Celsius. Currently, the rainy season clearly begins in June, with intensity and regularity in distribution throughout the month. October marks the end of the rainy season, preceding the transition month, which corresponds to November.

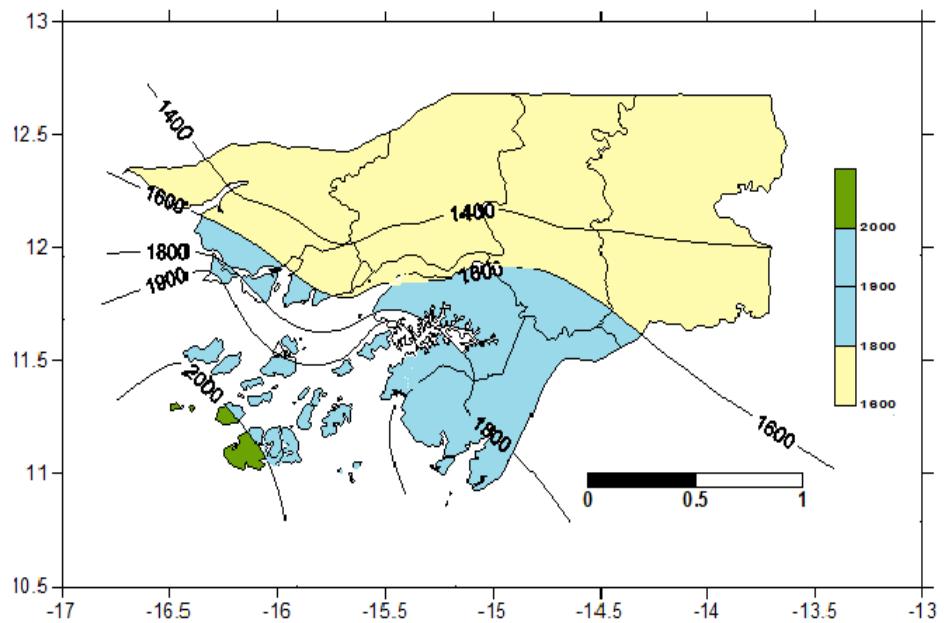
The year can be divided into two distinct seasons:

- Dry season: December to May (inclusive); and
- Rainy season: June to November (inclusive).

The southern region of Guinea-Bissau has the highest rainfall. These indices decrease with latitude, which means that in the north the average rainfall is lower.

The average annual precipitation in Guinea-Bissau presents a great spatial variability, with values observed between 830.0 mm and 1505.3 mm in the centre and north of the regions of Cacheu, Biombo and Oio. In the regions of Bafatá and Gabú, the observed values vary between 1289.7 mm and 1871.7 mm. The values vary between 1661.5 mm and 2005.2 mm in the regions of Quinará and Bolama/Bijagós.

On average, about 80% of annual precipitation occurs during the months of July, August and September. The maximum rainfall is reached in August, with a monthly average of more than 300 mm. The minimum, close to zero (0.0 mm), occurs during the months of December to April (dry season).

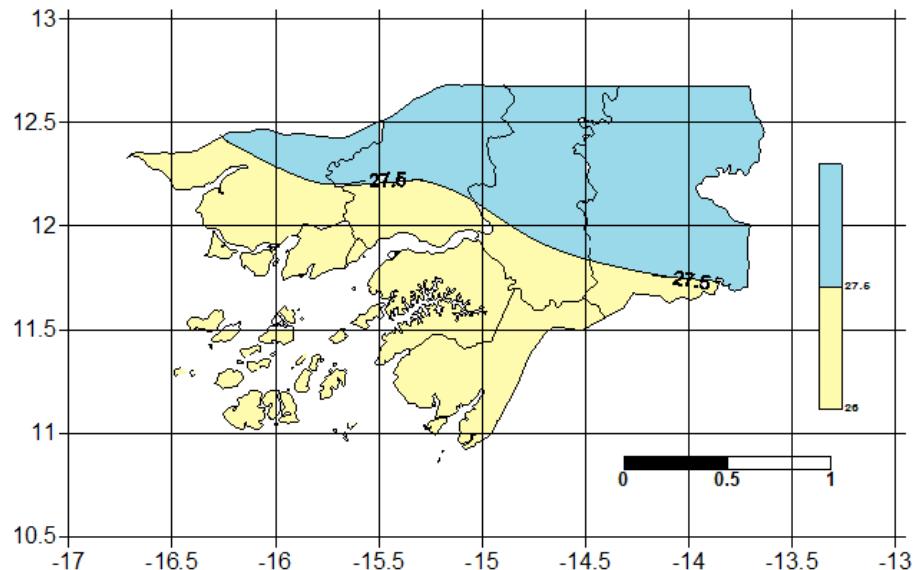


Number4Subject: Distribution of average normal annual rainfall values (1991-2020)

1.5.2 Temperatures

Temperatures vary between 20.6°C and 39.7°C (monthly average: 30.2°C) in April and May, just before the rainy season, between 21.7°C and 31.8°C (monthly average: 27.8°C) in August and September and between 16.4°C and 39.0°C (monthly average: 27.7°C) from December to March.

The average annual air temperature varies between a minimum of 25.4 °C in Bolama and 28.2 °C in Bissau, and a maximum of 30.8 °C in Bafatá. The monthly average temperature values vary regularly throughout the year, reaching a maximum in April and May and a minimum in December and January.



Number5: Distribution of normal values of mean temperature (°C) (1991-2020)

The average values of the maximum temperature range from 35.5 °C in Bafatá (31.3 °C to 39.7 °C); 32.8 °C in Bissau (30.5 °C to 35.0 °C) and 31.7 °C in Bolama (29.5 °C to 33.9 °C).

The average minimum air temperature varies between 19.7 °C in Bafatá (16.4 °C to 22.9 °C); 21.2 °C in Bissau (18.6 °C to 23.7 °C) and 20.4 °C in Bolama (and 18.6 °C to 22.2 °C).

From the point of view of temperature, the year can be clearly divided into four periods:

- 1- Cold season: December, January and February;
- 2- Hot period: March, April and May;
- 3- Rainy season: June, July, August and September; and
- 4- Second hot season: October and November.

1.5.3 Climate variability

Throughout the year, the climate of Guinea-Bissau is mainly conditioned by the situation of the movements and impacts of the Intertropical Convergence Zone (ITCZ) in relation to the territory; and by the subsidiary actions of the semi-permanent high pressure cells, commonly designated High of the Azores in the North Atlantic and High of Saint Helena in the South Atlantic, as well as by the low pressures of the austral summer, and also by the low summer temperatures that settle over the Sahara Desert. Changes in the behaviour of general air circulation systems, such as the anomalous ITCZ oscillation or the increase in sea surface temperature (SST) that occurs when there is cooling in the tropical North Atlantic, and slight warming in the South Atlantic, in the Sahel region, in the West African region and in the Southeast Asian region, in the Sahel region, where Guinea-Bissau tends to become drier with decreasing precipitation.

On the other hand, human action to reduce vegetation cover, increase atmospheric carbon dioxide and air pollution in the northern hemisphere has also been pointed out as a cause of climate change in the Sahel region and its surroundings, such as Guinea-Bissau. These changes are particularly noticeable in the variability of precipitation, with delays in the first rains, increase in extreme precipitation events, reduction in the total and number of rainy days, appearance of dry periods in the middle of the rainy season, strong winds, increase in temperature, increase in heat waves, decrease in the thermal amplitude with the increase in the minimum temperature and the number of warm nights (with values oscillating by about 10% in some cases).

1.5.3.1 Temperature variability

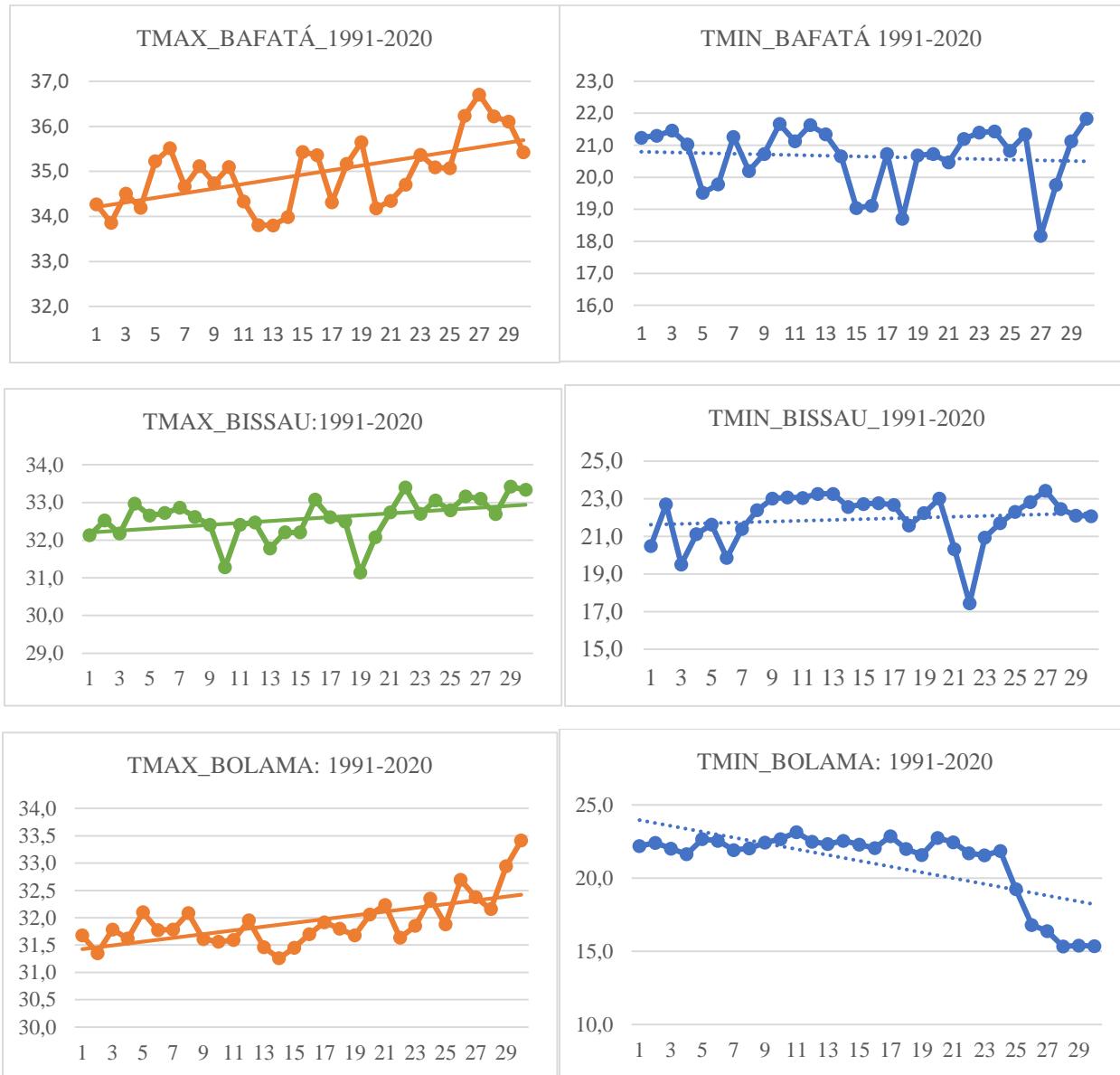
The highest temperature ranges are recorded in January and February, as well as in the first warm period (March and April), due not only to the fact that general winds alternate with warmer winds, but also to the existence of frequent calms.

To these two factors should be added the low degree of cloudiness that favours nocturnal irradiation and, consequently, the rapid decrease in temperature.

Even during the rainy season, when the amplitude of the diurnal variations is low, a few clear nights are enough to register an immediate drop in the temperature.

During the period of NORMAL CLIMATE 1991-2020, trends of maximum temperature increase are observed in all representative synoptic stations of the three zones of the country: Bissau (Central and North Zone); Bolama (South Zone and Islands) and Bafatá (Eastern Zone), and a trend of sharp decrease

of minimum temperatures in Bolama (South Zone and Islands). These trends confirm projections for future climate scenarios in Guinea-Bissau (see graphs below).



Number6: Maximum and Minimum Temperature Trends; 1991-2020 (Source: INM-GB Database)

1.5.3.2 Precipitation variability

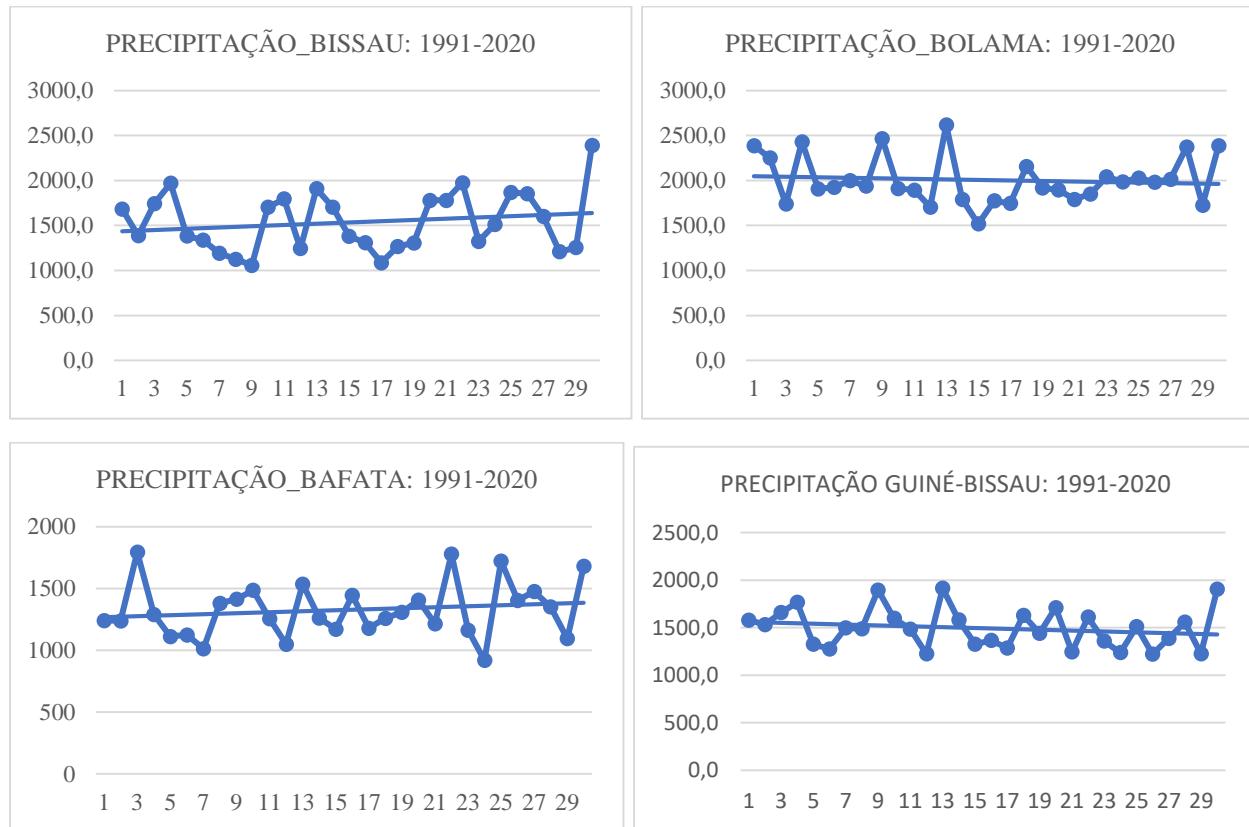
The average annual precipitation in Guinea-Bissau presents a great spatial variability, with values observed between 830.0 mm/year and 1505.3 mm/year, in the Centre and North of the Regions of Cacheu, Biombo and Oio. In the regions of Bafatá and Gabú, the observed values vary between 1289.7 mm/year and 1871.7 mm/year. In the regions of Quinará and Bolama/Bijagós, the values vary between 1661.5 mm/year and 2005.2 mm/year.

The southern region of Guinea-Bissau has the highest rainfall. These indices decrease with latitude, which means that in the north the average rainfall is lower.

On average, about 80% of annual precipitation occurs during the months of July, August and September. The maximum rainfall is reached in August, with a monthly average of more than 300 mm. The minimum, close to zero (0.0 mm), occurs during the months of December to April (dry season).

The three (3) Synoptic Stations of the country, namely: Bissau, represents the Central and Northern Zone; Bolama, represents the Southern Zone and Islands; and Bafatá, represents the Eastern Zone of the country.

For the period of NORMAL CLIMATE (1991-2020), the precipitation trends are: a slight increase in precipitation in Bissau and Bafatá and a decrease in Bolama. Overall, a decreasing trend in rainfall in Guinea-Bissau is notable, with strong inter-annual variability in precipitation (see graphs below).



Number7: Analysis of precipitation trends in the period from 1991 to 2020 (Source - INM-GB Database).

1.5.4 Water balance

The annual variations of the main climatic variables of Guinea-Bissau: (i) annual precipitation (mm); (ii) evapotranspiration (mm); (iii) average annual temperature ($^{\circ}\text{C}$) and (iv) intra-annual temperature variability; the country's water balance (Precipitation-Evapotranspiration, PE) shows a water surplus for four months in the year, between July and October and a water deficit for six months, from December to May.

The months of June and November are transitional periods, where there is almost a balance. The magnitude of water surpluses during the rainy season is higher in the southwest and coastal regions than in the north and east of the country. In contrast, the deficit during the dry season shows an opposite trend.

Thus, precipitation, and specifically water surplus during the rainy season, are the climatic factors that best differentiate the climatic regions of Guinea-Bissau.

1.6 Economic profile

With a population of approximately 2 million inhabitants and a GDP estimated at US\$1.7 billion in 2022, Guinea-Bissau has some of the lowest socioeconomic indicators in the world: it ranks 177th out of 191 countries, according to the latest ranking of the UNDP Human Development Index (HDI). The average life expectancy at birth in 2021 is only 59.7 years, per capita GDP is less than \$900, population growth is 2.4%, and the fertility rate is 4.3 children per woman. Moreover, an estimated 21.7% of the population has less than \$1.9 billion in PPP per day, and almost 7.4% of children die before the age of five.

The economy of Guinea-Bissau is extremely vulnerable to fluctuations in prices and production of cashew nuts (about 150,000 tons), which represents 80% of the country's exports mainly to India. The agricultural sector accounts for almost 35% of GDP, of which 10% is directly attributable to the cashew nut sector and represents 20% of budget revenue. In addition, the very significant fishing potential remains largely untapped. Guinea-Bissau also has the potential to extract bauxite and phosphate without any really active exploration project at this time. Thus, industry accounts for only about 15% of GDP. Services account for just over half of the country's GDP.

After reaching 1.5% in 2020, the GDP growth rate recovered significantly to 6.4% in 2021, according to IMF data, due to: (i) an increase in cashew nut production; (ii) public investments in essential infrastructure (externally financed); (iii) the gradual lifting of restrictions and the improvement of business confidence, which boosts private investment. In 2022, the growth rate slowed to 3.5%, affected by below-expected cashew nut exports and the consequences of the war in Ukraine (rising food and energy prices). In the medium term, Guinea-Bissau is expected to achieve growth 4.5% in 2023, then stabilising at an average of around 5% per year over the period 2024-2027.

The standard of living measured by gross national income (GNI) per capita is \$780 in 2022, with constant international dollars converted by purchasing power parity (PPP). Conversion rates have been steadily increasing from 1,335 in 1990 to 1,552 in 2017 (UNDP, 2018). However, Guinea-Bissau's GDP per capita, as an indicator of economic strength, reached 820 dollars in 2022 and went through a fairly stable period, from 614 dollars in 2010 to 620.21 dollars in 2016, which represents a GDP per capita equivalent to 3% of the world average.

The vulnerability of the economy is twofold. On the one hand, the strong dependence on agriculture (almost 60% of GNI), mainly on the cashew sector, the main source of export earnings, and on the other, the long period of political instability.

Table 1-0-2: Evolution of Guinea-Bissau HDI based on consistent data (Human Development Report, UNDP 2024)

Year	Life expectancy at birth	Estimated duration Education level	Average duration Education level	GNI per capita (2017 dollars in PPP)	HDI Value
1990	47.1	3.7	-	1,692	-
1995	48.7	5.2	-	1,713	-
2000	50.4	6.7	-	1,668	-

2005	52.3	8.5	2.3	1,644	0.403
2010	54.6	9.9	2.6	1,739	0.436
2015	57.0	10.5	3.2	1,848	0.464
2016	57.3	10.5	3.3	1,916	0.468
2017	57.7	10.5	3.3	1,929	0.470
2018	58.0	10.5	3.3	1,945	0.472
2019	58.3	10.6	3.6	1,996	0.480

PPA – Part of Purchasing Power

Real economic growth slowed to 3.5% in 2022, compared to 6.4% in 2021. This was due to disruptions in the supply chain and reduced demand and economic activity caused by measures and policies to contain the pandemic. Inflation increased from 3.3% to 7.8% in 2021. The general government deficit decreased from 5.5% of GDP in 2021 to 5.2% in 2022. Tax revenue was unchanged at 9.1%, equivalent to a ratio of wages to tax revenue of approximately 65.3%. On the expenditure side, total government expenditure decreased slightly from 24.5% of GDP in 2021 to 23.3% in 2022. As a result, the public debt reached 80.2%.

Table 1-0-3 Subject: Macroeconomic indicators

	2018	2019	2020	2021	2022	2023	2024 E ¹	2025 P ²
Real GDP growth rate (%)	4.80%	3.80%	5.60%	2.10%	5.20%	4.40%	4.60%	5.10%
Real GDP per capita growth rate (%)	2.30%	1.30%	-0.2%	2.90%	3.20%	2.10%	2.30%	—
Inflation (annual average, %)	-0.2%	0.40%	0.30%	1.50%	7.90%	7.20%	3.80%	—
Budget balance including grants (% of GDP)	-2.0%	-3.8%	-3.4%	-8.8%	-6.2%	-8.2%	-7.3%	-3.4%
Current account balance (% of GDP)	-3.5%	-3.5% (approx.)	-8.0%	-2.8%	-8.0%	-8.3%	-8.5%	-5.8%

¹ 2024 (Estimate) — According to the World Bank: growth of 4.6%, average inflation of 3.8%, budget deficit of 7.3% of GDP and current account deficit of 8.5% of [GDPworldbank.org](#).

² 2025 (Projections/Forecast) — According to the IMF: projected growth of 5.1%, average inflation of 2%, budget deficit of 3.4% and current account deficit of 5.8% of [GDP](#).

Sources:

- Indicators 2018–2024: [World Bank Selected Indicators Report thedocs.worldbank.org](#).
- Projections for 2025: IMF Report – Article IV Consultation, July 2025 [IMF](#).
- Economic update and additional data (2024): World Bank overview – Guinea-[Bissau worldbank.org](#).

1.6.1 Emerging economic sectors

The country's history of chronic political instability has led to a political discontinuity that poses a significant obstacle to reform. However, the reforms undertaken in the last three years have produced concrete results, notably in terms of macroeconomic stabilisation and improved public financial management. The newly established climate of peace allowed the economy to grow by 5.1% in 2015, compared to 2.9% in 2014.

The vulnerability of the country's economy is twofold. On the one hand, the vulnerability of Guinea-Bissau's economy is mainly due to its dependence on agriculture (almost 60% of GDP), in particular the cashew nut industry, which is the main source of export earnings and a significant share of government

revenues. On the other hand, Guinea-Bissau's economic depression is largely the result of a long period of political instability. Proof of this is that, due to the latest unrest in 2012, the country's GDP contracted by 1.5%, according to the African Development Bank Group. To diversify its economy and promote growth, Guinea-Bissau must prioritise economic diversification if it is to increase its resilience to external shocks.

In fact, agriculture, forestry, fisheries, and livestock accounted for 41.3% of GDP in 2023. This is followed by trade (19.3%), government services and manufacturing, each representing 10% of GDP.

Table 1-0-4: Real GDP by sector (in million CFA francs at 2015 prices)

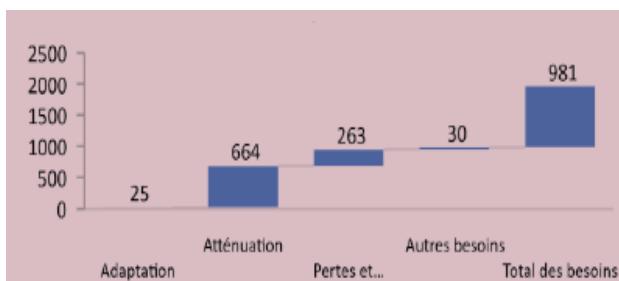
GDP/Sector	2020	2021	2022	2023	2024	2025
Primary sector	297,481.4	312,239.7	328,071.9	342,807.2	358,854.8	375,949.3
Agriculture	244,320.8	257,714.4	272,277.0	285,635.8	299,795.9	314,922.6
<i>Agriculture other than fruit and cashew nuts</i>	147,926.7	156,247.0	165,736.3	176,538.1	188,079.8	200,413.6
<i>Cashew nuts and fruits</i>	96,394.0	101,467.4	106,540.8	109,097.7	111,716.1	114,509.0
Breeding and hunting	27,254.7	27,926.1	28,472.8	29,105.8	29,757.1	30,427.2
Fishing	21,358.3	21,997.3	22,655.4	23,333.2	24,496.4	25,718.7
Forest	4,547.7	4,602.0	4,666.7	4,732.4	4,805.5	4,880.8
Real GDP growth rate (in %)	2020	2021	2022	2023	2024	2025
Primary sector	1.8%	5.0%	5.1%	4.5%	4.7%	4.8%
Subsistence farming	6.8%	5.6%	6.1%	6.5%	6.5%	6.6%
Cashew nut	-6.2%	5.3%	5.0%	2.4%	2.4%	2.5%
Breeding and hunting	2.5%	2.5%	2.0%	2.2%	2.2%	2.3%
Fishing	6.5%	3.0%	3.0%	3.0%	5.0%	5.0%
Forest	1.8%	1.2%	1.4%	1.4%	1.5%	1.6%

Source: National Institute of Statistics (INS) of Guinea-Bissau

Guinea-Bissau is among the countries most affected by climate change. The financing needs identified in the Nationally Determined Contribution (NDC) for climate change mitigation and adaptation are estimated at 664 million dollars in the period from 2021 to 2030, with the objective of reducing GHG emissions by 30%.

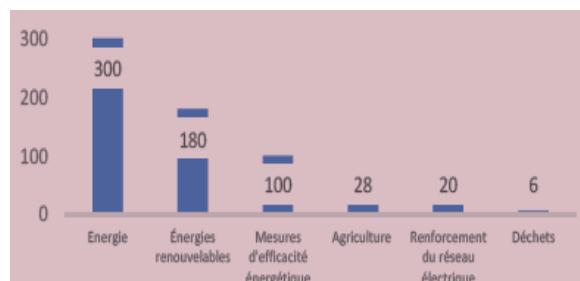
Already committed funding has been mobilised from development partners and climate funds. Involvement of the private sector, including the banking sector, is virtually non-existent, owing in particular to the lack of an adequate regulatory framework, the lack of expertise and experience, and the high cost of investment.

The NDC has highlighted sectors suitable for private investment, in particular renewable energy, energy efficiency, forestry and biodiversity. To attract private finance, the country needs to develop specific regulatory frameworks for climate finance, implement tax incentives, promote good governance, and build technical capacity.



Number8Subject: Cumulative climate financing needs of Guinea-Bissau, NDC 2020-2030

Source: Authors' calculations based on OECD data



Number9Subject: Financing needs for mitigation by sector (in millions of US dollars)

Source: CDN (2021) Guinea-Bissau

1.7 Energy

Guinea-Bissau has a wide range of potential energy sources, including biomass, hydrocarbons, hydropower, solar energy, wind energy, bioenergy and ocean energy. Currently, all of them are underdeveloped due to insufficient financial, regulatory and technical capacity. As a result, the country's current energy capacity is extremely limited. Energy consumption in Guinea-Bissau is mainly based on biomass (90%), petroleum products (8%) and electricity (2%). Biomass energy resources include wood, charcoal and agricultural/forestry products. At the subsistence level, the collection and use of wood/charcoal for heating and cooking consumes huge biomass resources and labour.

The hydroelectric potential of Guinea-Bissau is high, but only 33.84 MW of hydroelectric capacity have been identified so far (including Saltinho (14 MW) and Cusselintra (13 MW)) in studies conducted in the 1980s. Thus, the generation of electricity in Guinea-Bissau is excessively dependent on imported diesel. This strong dependence of a non-oil producing country on energy imports (mainly petroleum products) is a significant factor with negative impacts on the economy. The first step to reduce the excessive dependence on fossil fuels with high import costs is the total replacement of diesel in the generation of electricity by other cleaner sources.

The production system in Guinea-Bissau, both at regional and national level, are the OMVG energy project dams and the Cusselintra and Saltinho dams in Guinea-Bissau. A 15 MW BOAD power plant and TAGs, wind turbines and solar power are also included in the project.

Energy Project of OMVG (Organisation for the Development of the Gambia River). Cusselintra and Saltinho hydroelectric power plants.

At the national level, the hydroelectric potential of Guinea-Bissau is estimated at a minimum of 300.91 GWh, with a minimum power of 33.84 MW. This potential is necessary for the construction of two (2) hydraulic dams in Cusselintra and Saltinho, as well as transformed hydroelectric microdams. Thus, an investment of approximately 116,8 million GFCF is required for the construction of all these hydroelectric works. As regards the infrastructure development strategy, the hydroelectric (HA) projects of Cusselintra and Saltinho will be taken into account.



Number10Subject: Target structure of the 225/63 kV transmission network in Guinea-Bissau (in 2025) – option 63 kV.

The Government of Guinea-Bissau intends to implement programmes aimed at implementing an energy model based on economic rationality and sustainability, through, on the one hand, the combination of energy efficiency measures and the use of energy from endogenous and renewable sources and, on the other, the reduction of additional costs affecting energy prices. At the same time, it is intended to reduce the country's energy dependence and ensure security of supply, promoting a balanced energy mix.

In this sense, and in the implementation of the Government Programme and the Great Options of the 2020-2030 Plan, "It is a challenge for the future - The development of priority sectoral measures and objectives", in the part relating to the "National Plan" "Action Plans for energy and energy policy", the Government of Guinea-Bissau intends to pursue, among others, the following objectives:

- Ensure the continuity of measures that ensure the development of a rational energy and economic model, that ensures the protection of sustainable energy and that does not compromise the competitiveness of companies in the quality of life of cities;
- Ensure a substantial improvement of the country's energy efficiency through the implementation of the National Energy Efficiency Action Plan (NEEAP) and the National Renewable Energy Action Plan(PANER). After the completion of its preparation, the government intends to strengthen the coordination of programmes to support energy efficiency and renewable energy, as well as support innovation and technology transfer.

Guinea-Bissau is currently facing the challenge of improving access and energy security for its population while mitigating climate change. The unstable political and economic environment in Guinea-Bissau has affected the development of several sectors of the economy, including the energy sector. The country is currently trying to recover from its long period of instability.

The Government of Guinea-Bissau, through the Ministry of Energy, Industry and Natural Resources (MEIRN), remains committed to the process of sectoral reorganisation and, at the same time, to the

implementation of the policy for the energy sector, with a special focus on the energy sector. One of the constraints that hinder the development of the energy sector is the difficult national/international financial situation, marked by the scarcity of resources, thus imposing the need to adopt new strategies in the energy subsector.

Regarding energy resources, the country has the following potential:

- **Biomass energy:** The amount of biomass mobilised from various agricultural waste for the production of solid fuels in Guinea-Bissau is estimated at 239,760 tons. There is a clear predominance of rice (35.4%) and cassava (34.8%) residues, followed by groundnut (12.4%) and sorghum (7%) residues. The cultural residues present low values <5%. The resulting energy production corresponds to a thermal energy of 2,220,950 TJ (terajoules). With an average growth rate of 5%, the country's cashew nut production is expected to increase from 171,000 tons in 2011 to 333,000 tons in 2025. Unfortunately, almost all of this significant production is exported without processing – the country is the world's largest exporter of fresh cashew nuts. If Guinea-Bissau were to process all its domestic cashew nut production, the amount of cashew nut shell extracted would be 119,609 tons in 2011 (since the shell corresponds to 70% of the cashew nut), which could have corresponded to 2.7 TJ of thermal energy if used as solid fuel for energy production. At the same time, the country produces approximately 683,480 tons of cashew pulp, of which only 30% is processed into fruit juice and brandy. The rest is discarded. If this percentage could be transformed into ethanol, approximately 13,353 m³ of ethanol (CABIRA) would be generated.
- **Fossil fuels (oil, coal, natural gas):** these resources have not been identified in the country despite the results of research carried out so far, which give rise to some hope for the existence of oil in offshore areas;
- **Hydropower:** The country has a very large river basin which, if properly exploited for energy purposes, could contribute to closing the electricity deficit. In the study of the Energy Master Plan carried out by the company CABIRA, using the SIMAHPP Professional software version 4.8, which was used to analyse the sites selected by PAGIRE for the construction of dams for agricultural purposes, 19 microdams were identified that can be used for the production of electricity, whose potential was estimated at 2.94 MW, with an expected annual production of 25.91 GWH. In addition to these, the study also identifies: the production of electricity through the Tide-Motive and wave energy, whose potential is about 4 MW, and an annual production of 35 GWH; and the dams of Saltinho, Cussilinta and Surire (fast), with an estimated power of 27 MW, which totals 33.94 MW and an annual production of 300.91 GWH;
- **Solar and wind energy:** As a tropical country, it benefits from a strong solar irradiation estimated at 5.5 kW/m²/day and an average wind speed between 2.5 and 5.3 m/s. If these renewable energy potentials are exploited, Guinea-Bissau could reduce its greenhouse gas (GHG) emissions and take advantage of clean development mechanisms (CDMs).

In the energy sector, the country should align its industrial policies with current trends and opportunities in the energy transition, exploiting its renewable energy potential (solar, hydroelectric, etc.) to address its significant energy deficit. Opportunities exist for the private sector, thanks to ongoing initiatives by

development partners, including the World Bank, which plans to install a 40-megawatt solar plant to cover the entire country. The contribution of the private sector is expected for the construction of production infrastructure. Likewise, BOAD established a credit line for SMEs operating in the renewable-energy sector and installed two 1-megawatt hybrid mini-grid systems in Gabu and Cahungo. A 22-megawatt solar plant originally planned was suspended due to lack of funding, but could be the subject of a public-private partnership once the country's structure is well established. A regional approach to their exploitation can also help maximise their contribution to sustainable growth.

Table 1-0-5 Subject: Estimated final energy consumption (ktoe) in Guinea-Bissau. APP: other petroleum products

Products/ Sectors	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential sector															
Wood or firewood	309	317	325	333	341	349	358	367	376	386	395	404	415	426	436
Coal	66	68	69	71	73	75	77	78	80	82	84	87	89	91	93
Gasoline	16,958	17,399	17,852	18,316	18,792	19,281	19,782	20,296	20,824	21,365	21,921	22,491	23,076	23,676	24,291
Lighting oil	0.358	0.370	0.384	0.397	0.411	0.426	0.441	0.456	0.473	0.489	0.507	0.525	0.543	0.562	0.582
Diesel/diesel	8,800	9,029	9,263	9,504	9,751	10,005	10,265	10,532	10,806	11,087	11,375	11,671	11,974	12,286	12,605
LPG	0.503	0.562	0.628	0.702	0.784	0.876	0.978	1,092	1,220	1,363	1,522	1,701	1,899	2,122	2,370
Other petroleum products	0.061	0.066	0.072	0.079	0.086	0.094	0.102	0.111	0.121	0.132	0.144	0.157	0.171	0.187	0.204
Road Transport Sector															
Gasoline	5,176	6	6	7	8	9	9	10	12	13	14	16	17	19	21
Diesel oil	28	30	32	34	37	39	42	45	48	51	55	59	63	67	72
Inland waterway															
Gasoline	0.862	0.962	1,073	1,197	1,335	1,489	1,661	1,853	2,067	2,305	2,572	2,869	3,200	3,570	3,982
Air transport sector															
Kerosene	2,312	2,603	2,930	3,298	3,713	4,179	4,705	5,296	5,962	6,711	7,555	8,504	9,573	10,777	12,131
Specified name (transport)															
APP/Mixture	1,140	1,243	1,355	1,478	1,611	1,756	1,915	2,088	2,277	2,482	2,706	2,951	3,217	3,508	3,824
Industrial Sector															
APP/Construction	0.617	0.673	0.733	0.800	0.872	0.951	1,036	1,130	1,232	1,343	1,465	1,597	1,742	1,898	2,070
Other sectors	0.489	0.533	0.581	0.634	0.691	0.753	0.821	0.896	0.977	1,065	1,161	1,266	1,380	1,505	1,640
Electrical energy	13	14	15	17	18	20	22	24	26	28	31	34	37	40	43
Final consumption	453	468	483	498	515	532	550	569	588	609	631	654	678	703	730

Source: CABIRA – Synthesis of the development strategy (Study of the Energy Master Plan and an Infrastructure Development Plan for the production and distribution of electricity); 2020.

1.8 Transport

The transport sector in Guinea-Bissau plays a key role in the mobility of people and goods, territorial integration and national and international trade. However, it faces significant structural limitations that affect its efficiency, safety and environmental sustainability.

- Road transport:** They are the main means of transport in the country, accounting for more than 90% of passenger and cargo transport. The road network is extensive, but much of it is in poor condition, with unpaved roads, vulnerable to erosion and torrential rains, which compromises the connection between the regions, especially during the rainy season.
- Maritime and fluvial transport:** They have great strategic importance, given the archipelagic and coastal configuration of the territory. The port of Bissau is the main infrastructure for foreign trade, but it needs modernisation and expansion to increase operational capacity. River navigation

remains an essential means for riverine communities, although limited by the lack of adequate vessels and local port infrastructure.

3. *Air transport:* Bissau's Osvaldo Vieira International Airport is the only airport infrastructure of significant size, serving as a gateway for international air traffic. Secondary aerodromes exist in some regions, but are underused and poorly maintained.
4. *Rail transport:* The country does not have a rail system, which limits the alternatives for large-scale freight transport.

From an environmental point of view, the transport sector is one of the main sources of greenhouse gas (GHG) emissions, due to the almost exclusive dependence on imported fossil fuels and the predominance of old and low energy efficiency vehicles.

National priorities include:

- Modernisation and maintenance of the road network;
- Improve maritime and port connectivity, including inter-island transport;
- Improving the safety and efficiency of air services;
- Promote sustainable transport and encourage the use of cleaner vehicles;
- Development of policies to reduce dependence on fossil fuels through the progressive introduction of clean and efficient technologies.

Strengthening the transport sector is therefore essential not only for the socio-economic integration and competitiveness of the country, but also for achieving environmental and climate commitments in the field of emissions mitigation.

1.9 Industry

Guinea-Bissau's industrial sector is still incipient and characterised by a low diversified production base and low technological capacity. Industrial activity is concentrated mainly in small and medium-sized units, linked to the processing of agricultural and fishery products, the extraction of natural resources and artisanal production.

Key industry features include:

1. *Agribusiness:* Cashew nuts represent the main export product of the country, but most of them are exported in nature, with low national processing capacity. The modernisation and expansion of the cashew husking and processing industry are seen as strategic priorities to add value and create jobs.
2. *Fishing and fish processing:* Despite the high potential, the fish processing industry is limited, with few conservation and processing infrastructure, restricting the export of value-added products.
3. *Extractive industries:* There are artisanal activities of extraction of sand, clay and other non-metallic minerals, especially for the construction sector. The bauxite and phosphate farms are

identified, but they are still in the preliminary stage of evaluation and do not represent a structuring activity.

4. *Basic industries and manufacturing:* The country has few manufacturing facilities, limited to small industries of beverages, soap, furniture, building materials, and local consumer products.

From an environmental and climate point of view, the industrial sector contributes to greenhouse gas emissions mainly through fossil fuel-based energy consumption, the use of inefficient biomass and inadequate waste management.

The main national priorities for the industrial sector are:

- Promote the local processing of agricultural production, in particular cashew nuts and other agroforestry products;
- Encourage investments in sustainable, low-carbon and clean-tech industries;
- Improve energy and transport infrastructure affecting industrial competitiveness;
- Strengthen the regulatory framework and institutional capacity-building to attract investment and public-private partnerships;
- Develop industrial areas and supporting infrastructure to promote entrepreneurship and innovation.

Strengthening the industrial sector is seen as crucial to diversify the economy, create jobs and reduce external vulnerability, and should be aligned with the country's sustainable development goals and climate commitments.

1.10 Waste

In the last thirty years, the city of Bissau has registered a strong population growth, which consequently led to rapid changes in both the magnitude and the formation of capital (for example, names, numbers, neighbourhood boundaries). The demographic composition and economic level of the population contribute to determining the amount and type of waste produced in a given city. In the city of Bissau, as in most African cities, there has been a very high population growth rate, due, on the one hand, to the increase in the birth rate and, on the other, to the phenomenon of urbanisation. This leads us to assume that the amount of waste produced in the city of Bissau will increase in the same proportion as the population increases.

Currently, the amount of municipal solid waste (MSW) produced in Bissau is 316 tons per day and, considering the population growth and the maintenance of constant production levels, by 2025, the production of 395 tons of MSW per day will be reached. The estimated daily waste production per person is 0.6 kg/inhabitant/day.

Today, we face obvious hygiene problems and the dispersion of large amounts of solid waste that the municipality has difficulty managing. Less than 30 per cent of the waste produced by the capital's population ends up in the city's landfills every day.



Number11 Subject: Problems with municipal solid waste in Guinea-Bissau

Municipal solid waste management (MSW) is the responsibility of the Municipality of Guinea-Bissau (CMGB), but the garbage collection service is limited only to the main blocks, or neighbourhoods, of the city centre. In the neighbourhoods surrounding the city and in the regions that make up the country, cleaning, collection, treatment and final disposal depend almost exclusively on the voluntary action of youth associations in each neighbourhood and the residents themselves. The absence or absence of urban cleaning services is the cause of several illegal landfills that have spread throughout the country. There is only one legal landfill declared by the CMGB for the disposal of any type of waste, and it is located in a rural area near the capital.

The area where the CMGB dumps the waste has been carefully chosen. There's a large rural community around that lives off agriculture and fishing. It should also be noted the existence of a river around the legal deposit. At this point, fishing in the area is already difficult, because all the manure (Figure 2A) that leaves the deposit was thrown into the river, causing the death or escape of the fish (Figure 2B).



Number12: (A) Leachate from the CMGB legal landfill outside Safim. (2B)

Open disposal of waste can contribute to soil, air and water contamination and the spread of disease vectors.

The CMGB itself faces challenges in the collection and disposal of waste. In addition to the lack of transport for collection (Figure 3), there is a huge difficulty in finding people willing to work in the municipal waste collection service, since the company itself has created labels to honour different services (those that collect waste are not considered "someone" in Guinean society). Often, it is foreigners

who provide the collection service or families (the pickers) whose income depends, in part, on the materials collected in the dumps.



Number13Transport: used for waste collection

However, the adequate disposal of municipal solid waste remains the main challenge of the country, given that its careless disposal on land remains the most common, simple and economically "viable" option. All regions and communities of the country tend to use this simpler and more economical option, which is easily evidenced by the existence of illegal dumps and landfills that have spread everywhere (Figures 12 and 13).



Number14Market: Snail



Number15Subject: River water channel blocked by garbage in the Military District

According to the International Association of Lay Volunteers (LVIA, 2016), in Bissau alone, 316 tons of Municipal Solid Waste (MSW) are generated daily, with a per capita production of 0.6 kg of MSW / inhabitant / day. Although this production is far from the approximately 1.2 kg/inhabitant/day of Europe, its management is more complex due to the lack of infrastructure for waste treatment already mentioned. This volume of waste is expected to increase to 394 tons per day by 2025. Of the amount of waste generated, less than 30% is collected and the remainder has an uncertain destination.

In rural areas, per capita production is lower due to social inequality and lower purchasing power, with waste generated often being reused.

Therefore, it is very important that the country bets on strategies and structures that help regulate the destination of the waste produced to minimise the negative impacts currently observed.

According to LVIA (2016), in Bissau, organic waste represents the largest percentage (about 37%), of which about 7% is associated with pruning waste. These types of residues, together with the organic residues of the sieves, present a greater potential for the composting process, as can be seen in Table 3.

In rural areas, although there are no studies on the quantification of municipal waste, there are also organic waste produced in large quantities, compared to other waste produced in the country.

Table 1-0-6: Quantification of Municipal Solid Waste in the city of Bissau

Type of waste	Quantity (in %)
Organic waste	30%
The sieve remains	26%
Glass	9%
Paper/Cardboard	8%
Size	7%
Plastic	4%
Metals	4%
Inert	2%
Dangerous	1%

Source: LVIA, 2016

At present, the government of Guinea-Bissau is not taking any significant steps in relation to waste management. This has resulted in widespread environmental degradation, a situation that urgently needs to be reversed.

The reversal of the environmental situation in Guinea-Bissau should involve not only the creation of specific legislation in the area of waste management, but also the formal creation of effective control entities.

Current waste recycling/reuse practices should continue to be encouraged, if possible with cleaner and more up-to-date techniques, thus contributing to the implementation of the circular economy concept.

Composting seems to be a suitable process to recover the organic fraction of organic waste, since it is relatively simple to implement and ultimately produces a plant production factor, a compound that can be used as a fertiliser due to its high nutrient content and its very low content of heavy metals. However, it will be necessary to encourage changes in the environmental attitudes of the population. The government should also invest in environmental education, starting with primary schools.

1.11 Real Estate Park and Urban Structure

The urban structure of Guinea-Bissau is characterised by a strong population concentration in the capital, Bissau, and by a poorly planned pattern of urbanisation, marked by the spontaneous growth of peripheral neighbourhoods and the absence of adequate infrastructure. Urbanisation is advancing at an accelerated pace, driven by rural-urban migration, but not accompanied by sufficient investments in basic services, housing and sanitation.

1. Real estate park:

The housing deficit is estimated at more than 30% of national needs, with most informal and self-constructed housing. About 65% of households use precarious materials (adobe, zinc, straw), especially in peri-urban and rural areas, increasing vulnerability to climate disasters such as floods, cyclones and strong winds. The formal real estate sector remains small, with little supply of public or social housing for low-income families.

2. Urban structure:

The country's urbanisation rate is estimated at about 45% (ONU-Habitat, 2022), with more than a third of the urban population living in Greater Bissau. Other secondary cities, such as Gabú, Bafatá, Cacheu and Bolama, show slow growth and low economic attractiveness. The disorderly growth of urban areas results in the occupation of risk areas (river banks, low-lying areas and mangroves), putting pressure on ecosystems and aggravating climate vulnerability.

3. Urban infrastructure:

Only 38% of the urban population has access to clean water and less than 20% to adequate sanitation systems. The electricity supply is irregular and affects about 30% of the urban population, with great dependence on diesel generators. Solid waste management is poor: more than 60% of municipal waste is not collected, resulting in open deposition, with risks to public health and the environment.

4. Environmental and climate impacts:

The construction sector and the building stock contribute to greenhouse gas emissions due to the use of conventional materials (cement, uncertified wood, aluminium) and inefficient energy consumption. The lack of adequate urban planning and sustainable construction standards increases the population's exposure to climate risks, including seasonal flooding and coastal erosion.

National priorities in this sector include:

- Strengthen spatial planning and urban management to promote more resilient and sustainable cities;
- Reducing the housing gap by promoting social housing and affordable finance programmes;
- Integrate criteria for sustainable construction, energy efficiency and use of low impact local materials;
- Improve urban access to water, sanitation, electricity and waste management;
- Develop effective urban drainage systems to reduce flood risks;
- Support the development of secondary cities, to diversify the growth poles and promote territorial balance.

Sustainable and inclusive urban development is an essential condition for improving the quality of life of the population, reducing climate vulnerability and ensuring the resilience of communities to the impacts of global change.

Table 1-0-7: Main indicators of the Real Estate Park and Urban Structure

Indicator	Current situation (estimate)	Source>Note
Urbanisation rate	~45%	UN-Habitat (2022)
Urban population in Greater Bissau	>33% of the urban population	National estimate
Housing deficit	>30% of needs	Ministry of Housing / technical estimates
Housing in precarious materials	~65%	Informal sector and self-construction
Urban access to safe drinking water	~38%	UNICEF/WHO (JMP 2022)
Urban access to adequate sanitation	<20%	UNICEF/WHO (JMP 2022)
Urban access to electricity	~30%	Directorate General for Energy
Municipal waste not collected	>60%	Municipal estimate
Existence of sustainable construction standards	Very limited	Not applied systematically

1.12 Agriculture

The agricultural sector is the backbone of Guinea-Bissau's economy, providing 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 the macroeconomic stability of Guinea-Bissau. Agricultural exports account for more than 98% of total exports of goods. The production and export of cashew nuts and rice cultivation are the main activities associated with extensive livestock farming. In 2012, the area cultivated with cashew was 223,000 ha, with a production of 130,000 tons of raw cashew nuts (FAO, 2015). In 2013, cashew nut accounted for 87.7% of the country's total exports. The sector has grown since the late 1990s, and now 85% of people living in rural areas depend on these orchards in some way for their livelihood. This has led to a major economic improvement, but the lack of diversity involved in this monoculture practice leaves citizens extremely vulnerable. If crops fail or are affected by disease, hundreds of thousands of citizens will be adversely affected.

Most of the country's population is employed in low-productivity agriculture, focused on the production of cashew nuts, which has replaced rice production. Economic growth has stagnated since 2000 and poverty has worsened in the following years. In fact, poverty has increased in the last decade, in contrast to the regional situation. The social gap between Guinea-Bissau and its peers has widened more and more, as social progress has stagnated over the past decade. Poverty is more prevalent in rural areas than in urban areas. The latest recorded estimate indicates that approximately 64.7% live in poverty on less than \$2 a day. The agricultural sector underpins the Guinean 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 the macroeconomic stability of Guinea-Bissau. Agricultural exports account for more than 98% of total exports of goods. The production and export of cashew nuts and rice cultivation are the main activities associated with extensive livestock farming.

The country's climate and soil allow for the cultivation of a wide variety of commercial crops, fruits, vegetables, and tubers; however, cashew nuts generate on average more than 80% of export earnings and are the main source of income for many rural communities.

The impacts of climate change, such as increased droughts and floods in the future, will significantly affect the country's key assets. The agricultural sector, which is less diversified and depends mainly on rainfall, will suffer greatly from the increased tensions resulting from uneven rainfall, rising temperatures and rising sea levels. The livestock sector will also be significantly affected by droughts.

Future climate conditions will have potential impacts, such as:

- Loss of soil suitable for agriculture (continental and marine hydromorphic soils) due to salinisation and acidification (due to lack of rainfall) and intrusion of salt water (due to rising sea levels);
- Reduction of crop yields by about 20-30%, mainly of vegetables, cereals (rice and basil maize), peanuts and cashew nuts, due to drought, high temperatures, poor distribution of rainfall and/or floods from lowlands for prolonged periods; one third (33%) of the population will be mired in food insecurity.

Cashew nuts are the main exported product. It undoubtedly accounts for more than 90% of total exports and about 17% of government revenues, making the economy vulnerable to cyclical fluctuations in the market price of cashew nuts.

In Guinea-Bissau, factors contributing to soil degradation include soil salinisation, forest fires, agricultural deforestation associated with itinerant agriculture, overgrazing, excessive use of firewood, water erosion, and irregular and poorly distributed rainfall.

To realise its commitment to climate action, Guinea-Bissau has developed a series of policies to combat the effects of climate change that have highlighted the need for a transition to green growth.

Table 1-0-8: Policies and strategies for green growth in Guinea-Bissau

Policy/Strategy	Green growth priorities and objectives
Strategic and operational plan 2015-2020 "Terra Ranka"	Axis III; Ensuring sustainable management of natural capital and preserving biodiversity
Strategic and Operational Plan 2020-2023 "Chiga Time"	Strategic objective 6: Preserving biodiversity, combating climate change and enhancing natural capital
PNIA2 Agricultural Investment Plan (2017) Sub-programme 7: Adapting the agricultural sector to climate change	Objective: To promote food security and resilience in the agricultural sector and gender equality, in particular through the development of climate-friendly seed varieties, agricultural insurance products that protect farmers and the exploitation of locally adapted agroforestry systems.
Nationally Determined Contribution NDC 2021	Target: Reduce greenhouse gas emissions by 30% by 2030. Guinea-Bissau's unconditional contribution corresponds to 10% or 1.8 million tons of CO ₂ emissions compared to the baseline scenario of 18.2 million tons of CO ₂ in 2020.

Source: Official documents – authors compilation / Country Report, Guinea-Bissau 2023 (BOAD)

The country needs to move beyond subsistence farming to modern, large-scale agriculture, adapting to the vagaries of climate change. To this end, the country must focus on the transfer of technology and the mechanisation of the production system, in order to guarantee food and nutritional security and sovereignty. Developing sustainable agriculture (short-cycle seeds and drought-resistant varieties) and using climate-smart techniques, such as solar irrigation systems, would increase agricultural productivity

while preserving the environment. The private sector could also invest in the development of hydraulic works, the construction of micro-dams and small water retention gates.

Abstract: Agroecological zoning is one of the most important instruments to support agricultural activity, based on knowledge of the potential and environmental vulnerabilities of a given region, especially the behaviour and characteristics of climate, soil, vegetation, geomorphology, and with emphasis on the suitability of the land for agricultural use. Although it is a priority of the Ministry of Agriculture, unfortunately the country has not yet managed to carry out its agroecological zoning at national level, what has helped so far have been specific actions, carried out more within projects such as the ACTIVA project, in which the agroecological zoning was carried out in the regions of Bafatá, Quinará and Tombali, also under PADES this activity is planned for some places in the regions of Quinará, Tombali and Bolama, etc. Therefore, it can be considered that the measure taken was partially effective, due to its punctual implementation in some regions. The main obstacle to the effective implementation of this measure is the lack of internal capacity for its implementation. The implementation of this measure will contribute significantly not only to agronomic gains, but also to put an end to the anarchic occupation of land intended mainly for cashew cultivation, where agronomic skills are not respected, and to reduce the frequent conflicts between pastoralists and farmers, mainly in the Oio, Bafatá and Gabu regions.

Livestock farming

Livestock represents 4.8% of GDP, with an estimated value of \$51.389 billion in 2023, and constitutes 32% of agricultural income. It is a fragile sector, exposed to infectious and parasitic diseases. The estimated average meat consumption is 7.7 kg/inhabitant/year, including 2.6 kg of beef and 3.4 kg of pork. For milk, the estimated average consumption is 6 kg/person/year. Regarding livestock, the country is divided into 3 regions:

- The eastern part of the country, in the Gabu and Bafatá regions, concentrates most of the livestock activity, with 74% of the national bovine herd, 54% of the sheep herd and 63% of the national goat herd. The Fula (Peul), a Muslim people, constitute the main ethnic group, with the presence of a Mandinka minority in the Bafatá region. Their cattle-raising techniques are quite similar, and the ownership and management of the herd are familiar.
- The Bissau region and its surroundings concentrate the vast majority of the population, while livestock is limited to some more or less modernised poultry producers. This is the main marketing area.
- The rest of the country, whose ethnic groups are predominantly animist (especially the Balanta), has no livestock tradition, with a limited number of animals and meat rarely marketed, being used in ritual ceremonies (20 cows can be slaughtered during a funeral ceremony), with frequent practices of consuming dead animals. Herd management is collective (at village level). Pig farming is predominant in this region. The northern region alone has significant percentages: 13% of cattle, 10% of sheep, 19% of goats and 46% of pigs.

In Guinea-Bissau, the agricultural system still dominates the practice of extensive cattle raising and livestock. The livestock sector contributes 17% to the national GDP and 32% to the GDP of the agricultural sector. According to the livestock census carried out in 2009 by the Directorate-General for

Livestock (DGE) under the PRESAR / BAD, the cattle herd is estimated at 1,325,412, distributed mainly in the eastern and northern regions.

Table 1-0-9 Subject: Domestic livestock population by species and region, including the Bissau Autonomous Sector

Species	Region								Grand total	
	Grave	Quina	Oio	Biomb	Bolam	Bafatá people	Gabú	Ccheus		
Cattle	11010	19778	223943	25042	9065	294070	654543	87240	721	1,325,413
Sheep	4555	472	61510	341	225	77348	153349	6304	641	304,745
Goats	34645	23626	173731	26305	15654	98052	193445	80726	2900	649,083
Horses	110	91	950	0	...	658	2503	44	0	4,355
Donkeys	164	0	4450	0	...	8875	20890	0	0	34,770
Pigs	6825	18075	196029	21462	31930	15295	1484	13089	13591	343,680
Birds	63034	131180	422289	69244	57948	211099	318209	166510	43129	1,482,641

The Eastern region concentrates the highest concentration of cattle, where the regions of Gabu and Les Bafatá arise with 71% of cattle herds (49% and 22%); 75% of sheep (50% and 25%); 45% goats (30% and 15%); equidae 72.55% (57.45 and 15.10%); donkeys 85.60% (60.08% and 25.52%).

To maximise the positive impacts, it is urgent to organise the transhumance chain to promote exploitation and high livestock productivity as a contribution to poverty reduction. The total area of pastures is estimated at 1,268 million hectares, or about 35% of the country's total area, with approximately 300,000 hectares in the north, 800,000 hectares in the east and 168 hectares in the south. The biggest limitation of the sector is the lack of sufficient technical resources to support shepherds, the lack of infrastructure for water supply and poor animal health control.

1.13 Forests

Forest capital makes up the bulk of Guinea-Bissau's natural capital, accounting for about 65% of the country's total natural resources. The total forest cover was estimated at 1.98 million hectares in 2020, corresponding to approximately 55% of the national territory area, consisting mainly of primary forests.

The southern part of the country has dense tuff forests, while the northern and central regions are characterised by wooded savanna and mangrove forests in coastal areas, making Guinea-Bissau one of the densest forest areas in West Africa.

Despite the high ecological and economic value of forests, there was a tendency for forest cover to decline. Between 2001 and 2021, forest area decreased by approximately 5,075 hectares (World Bank, 2022). Official annual estimates indicate an average loss of 625,000 m³, distributed as follows:

- A 30% reduction in Tombali's dense rainforests;
- A 57% reduction in savanna forests in the Bafatá, Oio and Gabú regions;
- A 19% reduction in mangrove forests.

This decline is mainly explained by anthropogenic pressures, including:

- Expansion of agriculture and livestock;
- Use of timber for construction and trade;

- Production of firewood and charcoal for domestic energy.

The social and gender impact associated with forest use is significant: household chores related to obtaining firewood for cooking fall predominantly on women, reinforcing gender inequalities and work overload.

The protection, sustainable management and monitoring of forests are therefore national priorities, both for biodiversity conservation and climate change mitigation, considering the role of forests as carbon sinks.

Table 1-0-10 Subject: Key indicators for the forestry sector

Indicator	Value/Estimate	Remarks/Source
Total forest cover	1.98 million hectares	55% of the country area (2020)
Proportion of natural capital represented by forests	65%	National assessment
Average annual loss of forest area	625,000 m ³ /year	World Bank, 2022
Variation in dense humid forest cover (Tombali)	-30%	2001–2021
Variation in the cover of savanna forests (Bafatá, Oio, Gabú)	-57%	2001–2021
Variation in mangrove forest cover	-19%	2001–2021
Total forest cover loss (2001–2021)	5,075 hectares	World Bank, 2022
Main causes of forest loss	Agriculture, construction, firewood/coal	Anthropogenic pressures
Gender impact	High	Women responsible for collecting firewood and related household chores
Predominant forest types	Primary forests, cluster forests, savanna forests, mangroves	Geographical distribution north, centre and south

1.14 Public Health

The public health sector in Guinea-Bissau remains fragile, strongly affected by socio-political instability, poor sanitation and the limited capacity of the health system to deal with health crises. These conditions contribute to the spread of various infectious diseases, including malaria, respiratory diseases, diarrhoea and cholera.

Prevalent diseases:

- Malaria is the leading cause of hospital mortality, being caused mainly by Plasmodium falciparum in more than 90% of cases. It represents about 50% of national hospitalisations, with a higher incidence among children, which constitute approximately 65% of paediatric cases.
- Other important diseases include tuberculosis, sexually transmitted diseases, measles, malnutrition, neonatal tetanus, leprosy, hookworm disease and onchocerciasis.

Health system infrastructure and capacity:

- The country faces severe limitations in testing capacity, underfunded hospitals and a shortage of qualified personnel, making the system vulnerable to outbreaks, including the COVID-19 pandemic.
- Dependence on a highly informal economy aggravates the vulnerability of the population, as demonstrated by the delay in the annual harvesting of cashew nuts due to lockdowns, affecting 80% of the economically active population.

Water, sanitation and hygiene (WASH):

- Only 10% of the population has access to piped water, 28% use protected wells and 18% use pumps or makeshift sources.
- About 13% of the population walks 30 minutes or more to reach drinking water, and 6% have access to inadequate sources.
- Poor water and sanitation quality is responsible for a large number of infectious diseases (diarrhoea, dysentery, enteric fever).
- The rate of access to improved water sources is 65%, 84% in urban areas and 53% in rural areas (MICS4, 2011).

Nutrition:

- Chronic malnutrition affects more than 25% of children in the country (MICS5, 2014) due to food insecurity, inadequate health services, poor water and sanitation, inadequate child feeding practices and high illiteracy rates among women.

Influence of climate change:

- The variability of the rains and the increase in the temperature affect the distribution of disease vectors, such as the mosquitoes that transmit malaria, dengue and schistosomiasis, increasing the incidence of diseases during the rainy season.
- Heavy rains favour the proliferation of mosquitoes and contaminate water sources, resulting in a higher frequency of diarrhoea and other infectious diseases.

Institutional responses and national programmes:

- The National Climate Change Adaptation Plan (NAP) aims to improve public health, including:
 - a) Health education;
 - b) Ensure minimum sanitation conditions;
 - c) Increase in the number of latrines and sanitation centres;
 - d) Improve the quality of drinking water, especially in the capital.

Strengthening public health is therefore a national priority, integrating measures to adapt to climate change, promoting gender equity and reducing the vulnerability of the most exposed communities.

Table 1-0-11 Subject: Key indicators of the public health sector

Indicator	Value/Estimate	Remarks/Source
Malaria hospitalisations	~50% of total	MINSAP, 1998
Paediatric malaria cases	~65% of paediatric admissions	MINSAP, 1998
Major Public Health Illnesses	Malaria, diarrheal diseases, respiratory diseases, tuberculosis, sexually transmitted diseases, measles, malnutrition, tetanus neonatal, leprosy, hookworm, onchocerciasis	National assessment
Access to piped drinking water	10%	MICS4, 2011
Access to water from protected wells	28%	MICS4, 2011
Access to water by pump or improvised fountain	18%	MICS4, 2011
Access to a suitable water source (improved)	65% (urban 84%, rural 53%)	MICS4, 2011
Travel time to the source of drinking water	13% walk ≥30 minutes	MICS4, 2011
Access to adequate sanitation	<20%	National estimate
Prevalence of chronic malnutrition in childhood	>25%	MICS5, 2014
Socio-economic impact of outbreaks (COVID-19, malaria, etc.)	High, affecting yield and productivity	National assessment

1.15 Development Priorities

Guinea-Bissau's development priorities are directly linked to the need to promote inclusive and sustainable economic growth, capable of responding to the country's social, environmental and institutional challenges. The Government has been aligning its national policies with the United Nations 2030 Agenda and the African Union 2063 Agenda, ensuring greater coherence between national objectives and international commitments.

Priority areas include:

- a) Reducing poverty and promoting social inclusion, with a focus on creating decent employment opportunities, strengthening social protection and combating gender and regional inequalities.
- b) Consolidation of good governance, peace and institutional stability, through the strengthening of democratic institutions, the rule of law and citizen participation.
- c) Promotion of human capital, with strategic investments in education, health, technical and professional training and youth empowerment.
- d) Diversification and modernisation of the economy, with special attention to agriculture, fisheries, tourism and emerging sectors, promoting food security and sustainable income generation.
- e) Sustainable management of natural resources and environmental protection, giving priority to climate resilience, biodiversity conservation and sustainable use of coastal and forest areas.

- f) Infrastructure and renewable energy, through expanding access to basic services, rural electrification with clean energy and the development of transport and communication infrastructure.
- g) Regional integration and international cooperation, strengthening Guinea-Bissau's participation in the mechanisms of ECOWAS, the African Union and the CPLP, as well as in global development partnerships.

These priorities reflect the country's strategic vision of achieving resilient, environmentally sustainable and socially inclusive economic development, in line with the National Development Plan and international commitments.

1.16 Climate Change Mitigation and Adaptation Priorities

National and Regional Context

Guinea-Bissau is located in the coastal zone of West Africa, presenting a high vulnerability to climate change due to its geographical exposure, strong dependence on natural resources and structural limitations in terms of institutional, technical and financial capacity. With about 80% of the population dependent on agriculture, fishing and forestry for their livelihoods, the country faces increasing challenges associated with coastal erosion, soil salinisation, irregular rainfall variations, prolonged droughts and recurrent floods.

In the regional context, Guinea-Bissau integrates several sub-regional climate response initiatives, including:

- African Island States Climate Commission (AISCC);
- West Africa Coastal Areas (WACA) initiative;
- and ECOWAS programmes on renewable energy and integrated coastal management.

These platforms strengthen technical and political cooperation among West African countries, enabling the sharing of good practices and joint access to climate finance.

Developmental Circumstances

The national approach to climate change is anchored in the priorities defined in the Strategic and Operational Plan "Terra Ranka II" (2025–2030), which guides the country's sustainable development around three complementary axes:

1. Green and inclusive economic growth;
2. Sustainable management of natural resources and biodiversity;
3. Strengthening environmental and climate governance.

Guinea-Bissau recognises that economic growth and climate resilience are mutually dependent objectives, which is why mitigation and adaptation policies are designed in an integrated manner, based on national strategic instruments, including:

- Nationally Determined Contribution (NDC, 2021);
- National Adaptation Plan (PAN, 2022);
- National Biodiversity Strategy and Action Plan (ENBPA);
- and the National Renewable Energy Plan (PNER, 2023).

Adaptation Priorities

Adaptation is recognised as an absolute priority for sustainable development and the protection of vulnerable communities. Key strategic goals and actions include:

- 1. Strengthening the resilience of coastal and rural communities*
 - Implement coastal protection infrastructure and nature-based measures to curb salt erosion and intrusion;
 - Promote ecological restoration of mangroves and wetlands.
- 2. Promoting climate-smart agriculture*
 - Introduction of drought and salinity resistant varieties;
 - Adoption of agroecology and integrated soil management practices;
 - Creation of local seed banks and rehabilitation of degraded agricultural perimeters.
- 3. Protection and sustainable management of forest ecosystems, mangroves and river basins*
 - Strengthening the role of IBAP and local communities in conservation;
 - Implementation of reforestation programmes and payment for environmental services (PES).
- 4. Development of early warning systems and climate observation networks*
 - Expansion of the national hydro-meteorological network and technical training of the Directorate-General for Water Resources (DGRH);
 - Creation of community communication mechanisms for early warnings on floods and high tides.
- 5. Strengthening institutional and Community capacity*
 - Integration of adaptation into regional and sectoral development plans;
 - Ongoing training of national technicians and local leaders in participatory climate planning.

Mitigation Priorities

Although Guinea-Bissau contributes marginally to global greenhouse gas emissions, the country recognises the potential of mitigation to promote environmental and socioeconomic co-benefits. The priorities are:

- 1. Promotion of renewable energies*
 - Expansion of solar mini-grids in isolated rural communities;
 - Progressive replacement of diesel generators by clean sources.
- 2. Improving energy efficiency*
 - Implementation of efficiency programmes in public buildings and urban lighting;
 - Promoting cleaner transport and improving urban logistics.
- 3. Valorisation and conservation of forest and mangrove ecosystems*
 - Strengthening the carbon sink role of national forests;
 - Monitoring and combating deforestation and illegal logging.
- 4. Sustainable use of biomass and clean technologies*
 - Introduction of improved stoves and biogas in rural areas;
 - Incentives to replace firewood and coal with sustainable alternatives.
- 5. Integration of low carbon technologies in the productive sectors*
 - Promotion of low-impact fishing and farming practices;
 - Modernisation of small industries and agri-food processing.

Integrated Approach and Strategic Alignment

The priorities presented are fully aligned with the revised 2021 NDC, the National Adaptation Plan (NAP) and the 2030 Sustainable Development Strategy, ensuring a synergistic approach between mitigation and adaptation.

Its implementation is based on a combination of:

- International climate finance (GEF, GCF, UNDP, World Bank);
- National institutional strengthening (via CNMC, INA and IBAP);
- and regional partnerships with West African and CPLP countries, in particular within the framework of the AISCC.

☞ Nationally Determined Contribution – NDC 2021, Guinea-Bissau

☞ National Adaptation Plan – NAP Central

☞ National Biodiversity Strategy and Action Plan – CBD

☞ Strategic and Operational Plan "Terra Ranka II" (2025–2030)

1.17 Other conditions

In addition to the socio-economic, institutional and climate factors already mentioned, there are other conditions that significantly influence sustainable development and the implementation of environmental and climate policies in Guinea-Bissau.

These conditions include:

1. *Geographical and environmental conditions*: The country has a vast coastline, islands and archipelagos, extensive mangrove areas and forest resources, whose conservation is essential for both global biodiversity and the livelihood of local communities. However, these areas are highly vulnerable to rising sea levels, soil salinisation and ecosystem degradation.
2. *Socio-economic factors*: High poverty, dependence on subsistence farming and fragile basic infrastructure pose additional challenges to climate resilience and reducing vulnerabilities.
3. *Political and institutional conditions*: Despite progress, challenges related to political instability, limited qualified human resources and weak inter-institutional coordination persist, affecting the effectiveness of the implementation of national strategies.
4. *International support*: The capacity to mobilise climate finance, technology transfers and capacity building programmes remains essential to enable the country to meet its commitments under the UNFCCC and the Paris Agreement.
5. *Knowledge and awareness-raising*: Limiting access to environmental information and education at Community level influences the adoption of good adaptation and mitigation practices, requiring greater investment in awareness-raising and training programmes.

These conditions should be considered as transversal factors that shape the definition of priorities and strategies, conditioning both the results achieved and the future needs of the country in the context of climate change and sustainable development.

1.18 Data or information gaps

The availability, quality and timeliness of data are one of Guinea-Bissau's greatest challenges in public policy development, development planning and communication of international obligations under the United Nations Framework Convention on Climate Change (UNFCCC).

The main weaknesses identified include:

1. *Climatic and hydrometeorological data*: Insufficient observation network, with short time series, gaps in the measurement of precipitation, temperature, evaporation, flow and oceanographic parameters, hindering robust analysis of climate trends.
2. *Greenhouse gas (GHG) inventory*: limited and dispersed data on key sectors (energy, waste, agriculture, land use, land use change and forests), which limits the accuracy of national emission and removal estimates.
3. *Natural resources and ecosystems*: lack of up-to-date information on forest cover, deforestation rates, mangrove degradation, marine and coastal biodiversity, making it difficult to monitor and plan conservation measures.

4. *Socio-economic sectors*: incomplete statistics on agriculture, fisheries, energy, transport and waste, limiting the integration of climate variables into sectoral development plans.
5. *Socio-economic and vulnerability data*: lack of detailed studies on climate vulnerability at EU level, including gender, youth and most exposed groups, needed to guide inclusive adaptation policies.
6. *Technical and institutional capacities*: the absence of consolidated data collection, processing and management systems, as well as inter-institutional sharing mechanisms, leads to duplications, inconsistencies and loss of relevant information.

These weaknesses hamper the ability to plan, monitor and evaluate mitigation and adaptation actions effectively and limit the preparation of technical reports such as National Communications, Biennial Transparency Reports (BTRs) and National Adaptation Plans.

Strengthening national capacities for data collection, management and sharing is therefore a priority need, including the modernisation of observation networks, the development of integrated information systems and technical training of human resources.

1.19 Suggestions and improvements needed

Based on the analysis of national circumstances and institutional arrangements, a number of areas are identified where reinforcement measures and improvements are needed to strengthen governance, socio-economic resilience and climate change response capacity:

Institutional strengthening and intersectoral coordination:

- Strengthen government bodies responsible for planning, monitoring and implementing climate, environmental and urban development policies;
- Improve integration between ministries and institutions by promoting shared information systems and consistent data flows.

Technical training and human resources:

- Develop continuous training programmes for technicians and managers in critical areas such as GHG inventory, urban planning, water resources management, public health and forest management;
- Encourage training in clean and sustainable technologies, adapted to national realities.

Data Systems and Monitoring:

- Modernise and expand climate, hydrological and environmental observation networks;
- Establish centralised and accessible databases, ensuring quality, up-to-date and reliable information for international decision-making and reporting.

Critical Infrastructure and Basic Services:

- Improve the transport network, ports and aerodromes;
- Increasing access to clean water, sanitation and clean energy, especially in peri-urban and rural areas;

- Strengthen the housing stock by promoting social housing and sustainable construction.

Environmental sustainability and climate mitigation:

- Promote sustainable forest management practices, mangrove protection and biodiversity conservation;
- Encourage the transition to renewable energy sources and low-carbon technologies in the industrial, transport and residential sectors;
- Integrate gender considerations and social inclusion into mitigation and adaptation policies.

Resilience and public health:

- Strengthen the public health system and the capacity to respond to outbreaks and epidemics;
- Implement health education programmes, disease prevention and access to adequate sanitation;
- Adapting health policies to climate change, considering seasonal and geographical vulnerabilities.

In summary, the implementation of these suggestions aims to increase national resilience, improve governance, reduce vulnerabilities and prepare the country to face the challenges arising from climate change, ensuring sustainable and inclusive development.

CHAPTER II: NATIONAL GREENHOUSE GAS INVENTORY

2.1 Introduction

This chapter presents a summary of the inventory of greenhouse gas (GHG) emissions carried out in Guinea-Bissau for the period between 2010 and 2022. The inventory was carried out for anthropogenic GHG emissions from four sectors: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Land Use (AFOLU) and Waste. GHG emissions have been estimated in accordance with the UNFCCC Guidelines for National Reports (NCS) of Parties not included in Annex I to the Convention and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The GHG report was also produced following the Paris Agreement's Methodologies, Procedures, and Guidelines as a recent guidance for countries to prepare National Inventory Reports for Biennial Upgrade Reports.

Due to capacity limitations of national experts, data availability and methodological issues, only estimates of direct greenhouse gases, i.e. CO₂, CH₄ and N₂O, were considered in this inventory. It is interesting to note that, although the disclosure of precursors and indirect emissions is not mandatory for non-Annexe I countries, these gases need to be considered in future Biennial Update reports, as they are linked to the national management of air pollution, which is a priority for Guinea-Bissau.

2.2 Brief description of the institutional arrangement

In Guinea-Bissau, the national GHG inventory system is based on several categories of stakeholders:

* The national entity responsible for coordinating actions related to climate change and GHG inventories is the Ministry of Environment, Biodiversity and Climate Action (MABAC) / National Environment Institute (INA).

* The National Focal Point for the United Nations Framework Convention on Climate Change (UNFCCC) is MABAC, an entity designated by the Government to coordinate and report on the country's commitments under the UNFCCC and the Paris Agreement. This focal point is responsible for climate reports – including National Communications; Biennial Reports (BUR and BTR) and NDC, which present GHG inventories and mitigation and adaptation measures.

* MABAC is responsible for: i) leading the data collection, analysis and reporting process; ensuring that the inventory is in line with the IPCC and UNFCCC guidelines; mobilising financial and technical resources for the inventory development.

In addition to the coordinating body, there are entities and technical institutions that play key roles in the inventory process:

* The National Technical Coordinator: its mission is to organise the national coordination of the inventory, validate the priorities according to the available resources, approve the methods implemented by the Unit, inventory and validate the report before transmission to the UNFCCC. This function is not necessarily technical, but involves the general and transversal management and approval of the various results.

* The inventory team, consisting of a Technical Coordinator and Sector Inventory Consultants, has the mission to define the methods to be applied, organise data collection, perform emissions calculations at sector level in collaboration with focal points, compile the inventory and write reports. This function is highly technical and requires significant stakeholder involvement.

* Data Providers and Consultants are responsible for transmitting the information at their disposal to the inventory team in case of direct request.

* Other experts from industry, civil society, researchers, etc.: monitor and occasionally participate in industry working groups at the request of the inventory team.

The national GHG inventory is a process of continuous improvement, in which the data collection phase is an essential link for its success. The preparation of the national GHG inventory is an inclusive and participatory process, which establishes the division of specific responsibilities between the institutions participating in the inventory, in order to ensure that the collection of sufficient data on activities, the selection and development of methods, emission factors and other parameters are in line with the IPCC guidelines and GMPs.

2.2.1. Information archiving

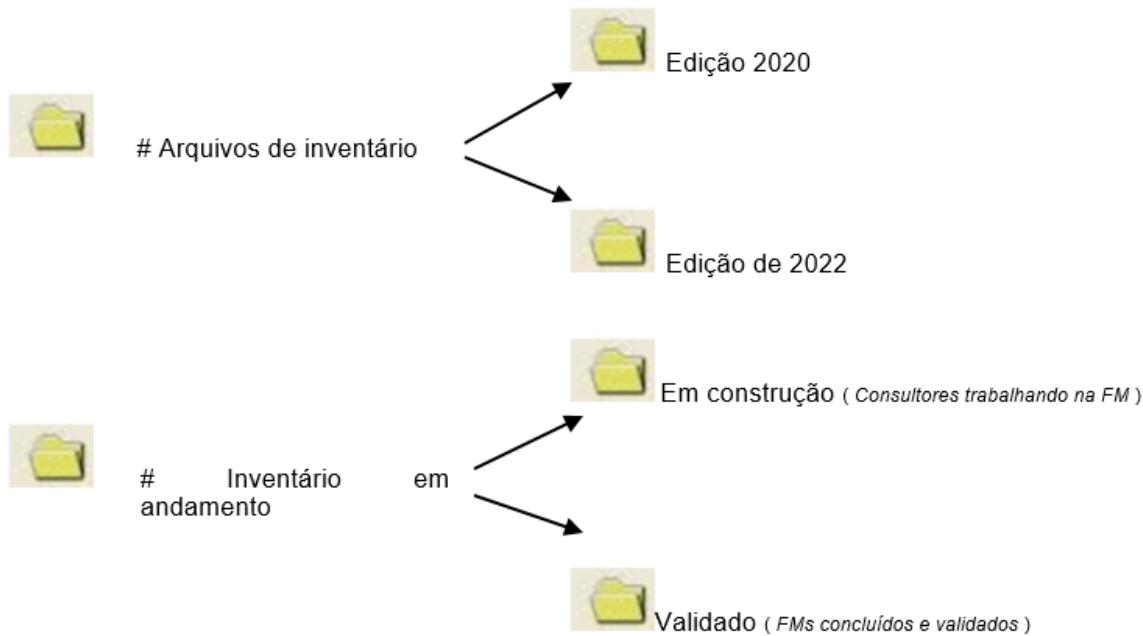
The inventory archiving process consists of the following: After the publication of the original inventory report, the methodological chips (MPs) used to compile the national inventory are archived to track the versions used in the production of the inventory, the purpose of which is to ensure inventory traceability. The National GHG Inventory Coordinator shall be responsible for all reported time series information, including all disaggregated emission factors and activity data, all documentation on data generation and aggregation, review results and planned inventory improvements. Each National Sectorial Consultant will execute its own archive.

The archive is carried out in electronic means and facilities that guarantee the integrity of the Information (especially losses over time, accidental risks, etc.) and, therefore, is stored safely (internal and remote backups, paper, read only and dates).

After the publication of the inventory master report, the methodological chips (MCs) that were used to compile the national inventory will be archived to track the versions that were used to produce the inventory of an edition, the purpose of which is to ensure the traceability of the inventory.

The coordinator is responsible for the inventory file. Each National Sector Adviser will run its own file.

To facilitate this work, you will all need industry experts to work on a common file architecture. Below is a working tree and a proposal:



Number16: GHG inventory storage system

A source directory is created and the name of that directory matches the name of the methodological record.

This directory also contains a subdirectory "references", which allows you to store the references used to create the worksheets. All other items of interest relating to this edition of the inventory should also be kept there. The results files are also stored.

All responsible inventory edits will be retained.

The archive must be made on media and installations that guarantee the integrity of the information (especially losses over time, accidental risks, etc.) and, therefore, must be stored safely (internal and remote backups, IT and paper, read only and dates).

2.2.2. Procedures for official examination and inventory approval

After the collection, processing and analysis of GHG emissions data, the national coordination of the inventory shall draw up a draft chapter on the inventory. This document is submitted to Quality Control (QC) by the team of specialists and Quality Assurance (QA) by the National Technical Coordination in a workshop. This document shall be submitted for evaluation by the heads of the working groups of national experts and the National Technical Coordinator.

The process of evaluating and officially approving a GHG inventory involves several important steps to ensure accuracy, transparency and compliance with international standards.

The steps are:

- i) Preparation of the inventory.
- ii) Internal verification and validation.
- iii) Public consultations.

- iv) Submission to review/validation bodies, such as: the United Nations Environment Programme (UNEP) and the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC);
- v) Official approval.
- vi) International publication and submission.

2.3. Overview of the methodology

The Guinea-Bissau GHG inventory report has been developed and structured in accordance with the United Nations Framework Convention on Climate Change (UNFCCC) and the 2006 IPCC guidelines. GHG emissions and their uncertainties were estimated for a period between 2010 and 2022 for the energy, AFOLU and Waste sectors, and their respective categories. The IPPU sector was not considered due to very high data uncertainty. In general, the Level 1 methodology was applied to estimate direct greenhouse gas emissions (CO₂, CH₄, N₂O) for all sectors, and country-specific data were considered when available.

The activity data used for the Guinea-Bissau GHG inventory between 2010 and 2022 were obtained mainly from various stakeholders, as summarised in table 2.1 below.

Table 2-0-1: Institutions contributing to the GHG inventory

Institutions	Responsibilities/data collected
Ministry of Energy (ME)	MEI is responsible for defining the policies, legislation and regulation of the energy sector. It also promotes renewable energy and regulates the oil sector. The ministry is responsible for issuing import and export licences for energy products and setting electricity tariffs.
Directorate-General for Energy (DGE):	EGO implements energy policies, promotes renewable energy and renewable energy (RE) and renewable energy (EE) projects, and oversees electricity generation and distribution. It is also responsible for approving tariffs and customs exemptions for renewable energy projects.
Support Institutions:	Electricity and Water of Guinea-Bissau (EAGB) has the technical responsibility to implement electricity related programmes
National Institute of Applied Research and Technology (INITA):	Under the tutelage of the Ministry of Natural Resources, INITA develops studies on biomass and other renewable energy sources.
Ministry of Environment, Biodiversity and Climate Action:	Responsible for environmental management and environmental impact assessment of energy projects.
Ministry of Agriculture	Involved in the management of forest resources and in the implementation of projects that integrate energy and agriculture.
Ministry of Economy and Finance	It maintains a priority relationship with all development projects. It also acts as an intermediary in relations with donors and donors.

The year 2015 was chosen as the reference year according to Decisions 1/CP. 16 and 2.º/CP. 17 and considering the availability of data according to national circumstances.

Emissions are calculated simply by multiplying the activity data (AD) of the categories and subcategories and the emission factors (EFs) established in accordance with the IPCC 2006 Guidelines and the IPCC

recommendations on good practices and uncertainty management for national GHG inventories of 2003 ("GHG for LULUCF").

$$\text{Emission} = \text{AD} \times \text{EF}$$

Where:

AD: human activity resulting in GHG emissions or removals, occurring over a given period and in a specific area

EF: Emission factor, i.e. coefficient quantifying emissions or absorptions of a gas per unit of activity data.

Using the IPCC 2006 Inventory Software, emissions are calculated by considering the integrity and level of uncertainty in the collected activity data and the emission factors for each category and subcategory.

2.4 Summary of aggregate emissions/removals and trends

2.4.1. Analysis of total emissions

Calculations were based on the following formulae:

- a) Total Growth Rate (%) = $(\text{Ending Value} - \text{Initial Value}) / \text{Initial Value} \times 100$
- b) Annual Growth Rate (%) = $(\text{Final Value}/\text{Initial Value})^{(1/n)} - 1$; where n = number of years
- c) Growth Projection:

Ending Value = Baseline x $(1 + r)^n$; where r = Annual Growth Rate; n = number of years in the projection period

The total national emissions of Guinea-Bissau in 2010, in Gg of CO₂eq, without LULUCF, were 2,075.3 GgCO₂eq; 2,425.7 GgCO₂eq in 2015 and 2848.5 GgCO₂eq in 2022. The progressive emission rate from 2010 to 2022 is 37.3%. If this trend continues, by 2030 total national emissions will be 3 506.5 GgCO₂eq and reach 5 789.3 GgCO₂eq in 2050.

The total national emissions of GgCO₂eq in Guinea-Bissau with LULUCF in 2010 are -25,142.5 GgCO₂eq; in 2015, they are -19,309.6 GgCO₂eq and, in 2022, they are -19,696.2 GgCO₂eq. If this trend continues, by 2030 the country will emit -16779.8 GgCO₂eq and reach -11398.7 GgCO₂eq by 2050. As such, Guinea-Bissau will remain a carbon sink until 2050.

For total gas emissions:

In 2010, CO₂ emissions were -27090 GgCO₂-Eq, including LULUCF; CH₄ emissions were 1884.2 GgCO₂eq; N₂O emissions were 63 GgCO₂eq; and HFCs were 17.28 GgCO₂eq.

In 2015, CO₂ emissions were -21554 GgCO₂-Eq, including LULUCF; CH₄ emissions were 2164.7 GgCO₂eq; N₂O emissions were 73 GgCO₂eq; and HFCs were 14.26 GgCO₂eq.

In 2022, CO₂ emissions are -22,211 GgCO₂-Eq, including LULUCF; CH₄ emissions are 2,448.8 GgCO₂eq; N₂O is 66 GgCO₂eq; and HFCs are 600.7 GgCO₂eq.

Here is the organised table with the total emissions data by gas and by year:

Table: Summary of Total Gas Emissions by Gas

Year	CO2 (GgCO ₂ eq, incl. LULUCF)	CH4 (GgCO ₂ eq)	N2O (GgCO ₂ eq)	HFCs (GgCO ₂ eq)
2010	-27,090	1 884.2	63	17.28
2015	-21,554	2 164.7	73	14.26
2022	-22,211	2,448.8	66	600.7

The summaries of emissions of these gases are presented in Table 3, by Sector.

Table 2-0-2: Summary of emissions - Decision 17/CP.8 for 2010-2022

Year	Energy	Agriculture	FOLU-LULUCF	Waste	Total - without LULUCF	Total - with LULUCF
2010	233	1717.5	-27217.8	124.8	2075.3	-25142.5
2011	256.9	1358.8	-29148	158.8	1774.5	-27373.5
2012	273	1871.5	-27866.8	183.9	2328.4	-25538.4
2013	271.4	1882.7	-16753.8	202.9	2,357	-14396.8
2014	283.9	1548.5	-21075.4	217.7	2050.1	-19025.3
2015	309.2	1,887	-21735.3	229.5	2425.7	-19309.6
2016	328.5	1590.9	-18261.1	239.7	2159.1	-16102
2017	356.3	1882.4	-17278.5	248.5	2487.2	-14791.3
2018	372	1858.4	-17852.6	256.6	2,487	-15365.6
2019	436.6	1999	-17697.7	264.2	2699.8	-14997.9
2020	417.4	2030.2	-16606	273.9	2721.5	-13884.5
2021	449.3	2035.1	-20147.8	281	2765.4	-17382.4
2022	458.2	2102.2	-22544.7	288.1	2848.5	-19696.2

Note: The Agriculture Sector includes the sub-sectors or categories: savanna burning, urea application, direct and indirect N2O emission in soil management and rice cultivation.

2.4.2 Analysis of national GHG emission trends in CO₂ equivalent

For the purposes of analysis, the emissions of all direct gases were expressed as CO₂ equivalent and cumulative for each time horizon considered.

According to the IPCC, "The equivalent emission of CO₂ is the amount of carbon dioxide (CO₂) emitted that would cause, within a given time horizon, the same integrated radiative forcing as the amount of one or more emitted greenhouse gases (GHGs). The equivalent emission of CO₂ will be obtained by

multiplying the emission of a GHG by its global warming potential (GWP) from the IPCC's fifth assessment report for the time horizon considered."

Between 2010 and 2022, national GHG emissions show an increasing trend. In fact, emissions increased from 2,075.3 GgCO₂eq in 2010 to 2,848.5 GgCO₂eq in 2022, an increase of 37.26% without LULUCF. If this trend continues, by 2030 national GHG emissions will be 3,518.09 GgCO₂eq and, by 2050, will reach 5,963.92 GgCO₂eq.

In the Energy sector, emissions increased from 233.0 Gg in 2010 to 309.2 Gg in 2015, representing a growth of 32.6%. Between 2015 and 2022, emissions continued to rise from 309.2 Gg to 458.2 Gg, which corresponds to an increase of 48.2%. In the total period from 2010 to 2022, emissions nearly doubled, with cumulative growth of 96.6 per cent.

In the LULUCF sector, CO₂eq removals decreased from -27,217.8 Gg in 2010 to -22,544.7 GgCO₂eq in 2022, corresponding to a 17.18% loss in emission removal capacity.

In the waste sector, emissions increased from 124.8 GgCO₂eq in 2010 to 229.5 GgCO₂eq in 2015, reaching 288.1 GgCO₂eq in 2022. In the 2010-2022 period, the sector's emissions more than doubled, representing an increase of approximately 130%.

National CO₂eq emissions have a general trend of increasing between 2010 and 2022 and increase by 8% per year.

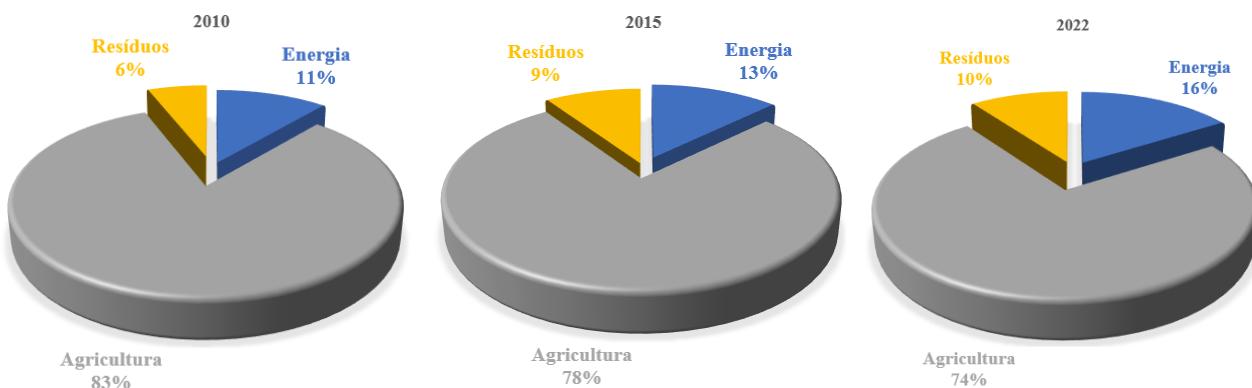
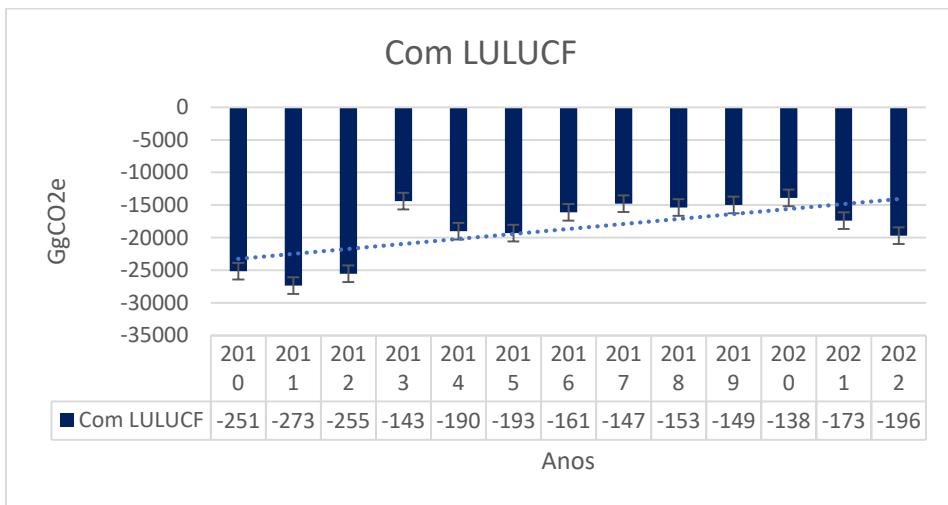
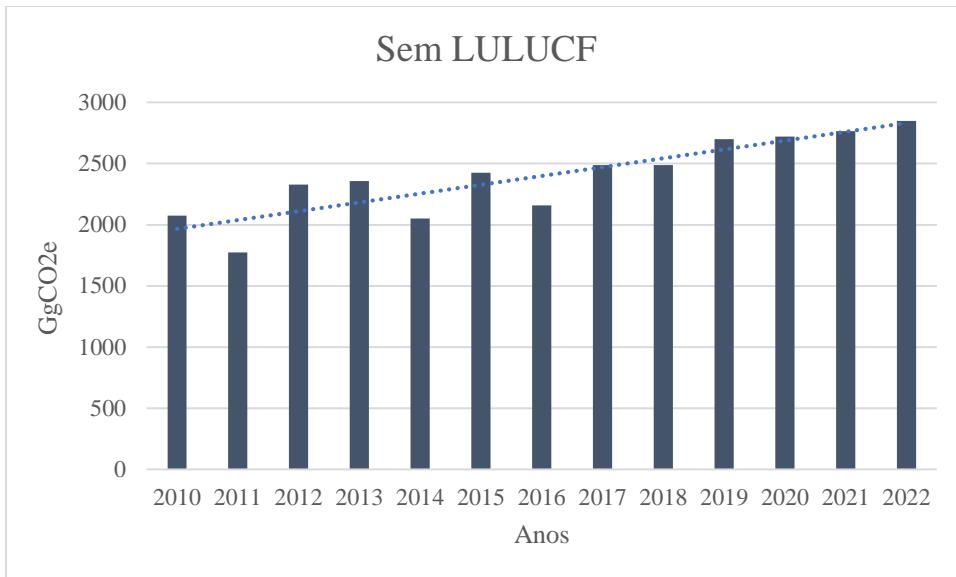


Figure 17: Total GHG emissions (in%); Distribution by sector; 2010 - 2015 - 2022



2.5 Analysis of the main categories

2.5.1. Results of the analysis without LULUCF

The analysis of the main categories without LULUCF in 2022 revealed ten (10) main categories covering 95% of total GHG emissions.

1. Enteric fermentation (CTR 3. A): Enteric fermentation is the main source of CH₄ emissions, with 51.95% of total emissions (2848.5GgCO₂eq), or 1479.8 GgCO₂eq. This demonstrates the importance of agriculture, and more specifically livestock, in the country's GHG balance.
2. Solid waste tank (CTR 5. A): This is the second main category, with CH₄ emissions accounting for 14.29% of total emissions, i.e. 407 GgCO₂eq.
3. Road transport (CTR 1.A.3.b): CO₂ emissions from liquid fuels contribute 7.37% of total cumulative emissions, or 209.93 GgCO₂eq.

4. Rice cultivation (RTC 3. C): CH₄ emissions from rice cultivation represent 5.24% of total emissions, or 110.8 GgCO₂eq.
5. Industrial energy (CTR 1.A.1): Liquid fuel (heavy oil, petrol and diesel) from industrial energy accounts for 3.95% of total CO₂ emissions, or 99 GgCO₂eq.
6. Other sectors - Solid biomass (CTR 1.A.4): CH₄ emissions from solid biomass account for 3.89% of total emissions, or 110.8 GgCO₂eq.
7. Manure management (CTR 3.B): CH₄ emissions from manure management represent 2.24 % of total emissions, or 63.8 GgCO₂eq.
8. Discharge and treatment of waste water (CTR 5. D): CH₄ emissions from waste water discharge and treatment account for 2.12% of total emissions, or 60.4 GgCO₂eq.
9. Incineration and open burning of waste (CTR 5. C): CH₄ emissions from the incineration and burning of waste in the open air account for 1.78% of total emissions, or 50.7 GgCO₂eq.

2.5.2. Results of the LULUCF analysis

By including emissions and removals from the Land Use, Land Use Change and Forests (LULUCF) sector, the national GHG emissions profile in 2022 shows significant differences.

- The LULUCF sector plays a crucial role as a net carbon sink, absorbing a significant share of emissions from other sectors.
- Net CO₂ removals associated with forests and other land uses partially offset emissions, reducing the national total GHG.
- Thus, while agriculture, waste, and energy remain the major emitting sectors, the country's overall GHG balance is strongly influenced by land-use dynamics, in particular forest conservation and biomass burning practices.

According to the analysis:

1. Enteric fermentation (CTR 3. A) remains the main source of emissions, but its relative contribution to the national total decreases when considering the effect of LULUCF removals.
2. Solid waste tank (CTR 5. A) and road transport (CTR 1.A.3.b) remain among the most relevant categories, but also with lower percentages in total.
3. The LULUCF sector presents a net balance of CO₂ absorption, highlighting the strategic role of Guinea-Bissau forest cover in climate change mitigation.

In quantitative terms, the inclusion of LULUCF results in:

- Significant reduction in total net emissions, with the absorption of CO₂ by forests offsetting a significant fraction of gross emissions.
- Change in the percentage shares of the main emitting categories as LULUCF removals reduce the relative weight of each sector.

2.5.3. Results of trend analysis with LULUCF

In terms of Level I trend analysis, three (3) categories cover 96.2% of total emissions.

Table 2-0-3:Trend of the main categories from 2010 to 2022

IPCC category code	IPCC Category	Greenhouse gas	2010 estimate Ex0Gg (CO2 Eq)	2022 estimate ExtGg (CO2 Eq)	Trend Assessment (TXT)	% Contribution to trend	Cumulative total for column G
3.B.1.a	Forest remnant land	CARBON DIOXIDE (CO2)	-30818.7	-29644.1	0.153132	0.618289	0.618289
3.B.2.b	Land converted into cropland	CARBON DIOXIDE (CO2)	3600.87	7099.42	0.075376	0.304341	0.92263
4A	Disposal of Solid Waste	METHANE (CH4)	0	358,1944	0.009939	0.04013	0.96276

CO2 emissions from the category "Forest land remaining as forest land" appear first, with a contribution to the trend of about 61.82%, followed by CO2 emissions from "Forest land converted to agricultural land", which represent 30.4% of the contribution to the trend, or 92.22% of the total accumulated. The disposal of solid waste, which contributes to CH4 emissions, accounts for 4% of the contribution.

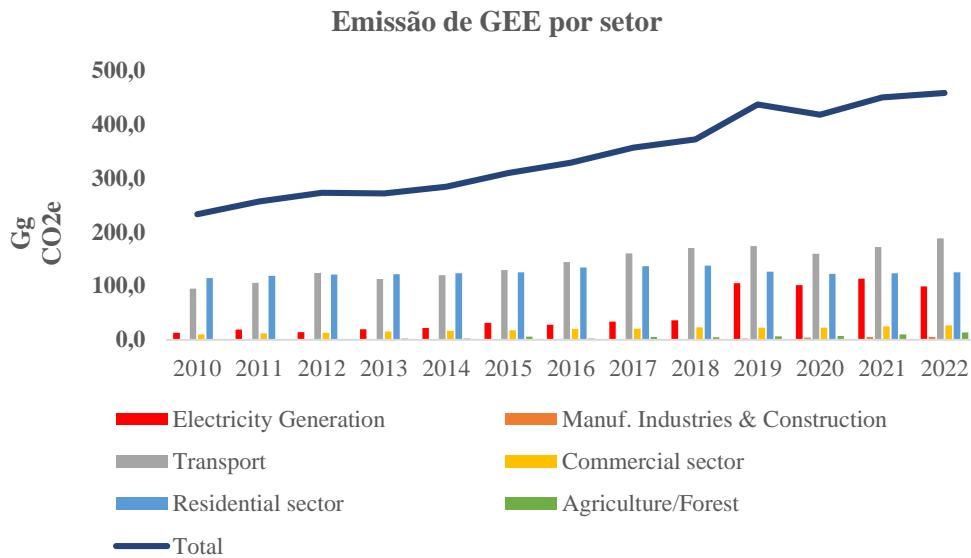
2.6 Comparison of GHG emissions from reference and sectoral approaches

Comparison of GHG emissions from reference and sectoral approaches has not been conducted due to lack of reliable data. This will be conducted in the GHG inventory of upcoming BTR2 report.

2.7 Trend in emissions by sector

2.7.1. Energy Sector

The predominant energy emissions come from the transport and residential categories. From 2019 to 2022, electricity generation has also become the source of GHG emissions. Other energy categories are not significant from 2010 to 2022. Therefore, we can conclude that energy emissions are dominated by transport, residential and electricity generation.



Number18: Trend in CO₂-Eq emissions 2010-2022

Trend in gas emissions in CO₂ equivalent

Between 2010 and 2022, Guinea-Bissau's energy sector emitted a total of 4445.2 Gg of CO₂eq, with most emissions originating from the Transport sector (1.A.3), followed by the Other Sectors (1.A.4), Energy Industry (1.A.1) and Manufacturing and Construction Industry (1.A.2), with inventoried data from 2019 to 2022 (see Figure 19). During this period, CO₂ emissions increased from 46% to 67% of the total, while CH₄ emissions decreased from 48% to 29%, and N₂O emissions remained insignificant, showing a slight reduction from 6% to 4%. Carbon dioxide therefore remains the main emitter in the energy sector (see Figure 20).

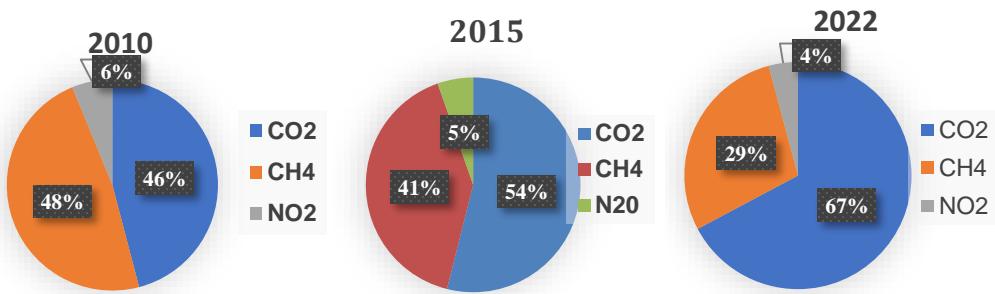


Figure 19Subject: Distribution of equivalent CO₂ emissions by type of gas for the years 2010-2015-022

2.7.2. Industrial Processes and Product Use (CRT sector 2)

Data and information were collected to estimate the emissions of this sector and a draft report was prepared for the IPPU Sector.

However, this sector is considered negligible because it only concerns emissions related to the non-energy uses of fuels (lubricants, paraffins, solvents) and the use of fluorinated gases in air conditioning and refrigeration systems in Guinea-Bissau.

Given the inconsistencies observed during the compilation of the GHG inventory, for the data and information in this sector, flexibility was used in accordance with paragraph 7(c) of the BMP. 7(c) of the MPG.

The Sector of Industry, Industrial Processes and Product Use (IPPU) will be subject to further analysis in future improvements.

Use of Lubricants, Paraffin and Solvents

Guinea-Bissau has industrial activities that may involve the use of lubricants, paraffins and solvents. For example, the production of paraffin wax, which is derived from petroleum, is used in various industrial applications such as lubricants, packaging, textiles and candles. However, the production and use of these products in the country are limited and not widely documented.

Use of Fluorinated Gases in Air Conditioning and Cooling

The use of fluorinated gases, such as hydrofluorocarbons (HFCs), in air conditioning and refrigeration systems is a common practice in many countries. In Guinea-Bissau, import data indicate stability between 2010 and 2018, with a slight reduction of 1.05%, from 17.34 Gg to 17.16 Gg. However, in 2019, an extremely high variation was recorded, with imports rising from 17.16 Gg to 17,160 Gg, indicating a significant increase in the use of these gases.

Conclusion

Although the IPPU sector in Guinea-Bissau is considered insignificant due to limited industrialisation, some industrial activities in the country involve the use of products such as lubricants, paraffins and solvents, as well as fluorinated gases in air conditioning and refrigeration systems. It is important to monitor and regulate these activities to mitigate their emissions and environmental impacts.

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

Sub-sectors of Agriculture

1. Trend in emissions

Table 2-0-4Contribution of emissions from the agricultural sub-sector in GgCO₂eq

Ano	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
subsetor Agricultura	286,4	187,9	376,3	312,6	285,8	304,1	273,3	236,1	191,5	280,3	276,6	244,4	274,0

Source: IPCC2006 Calculation Software

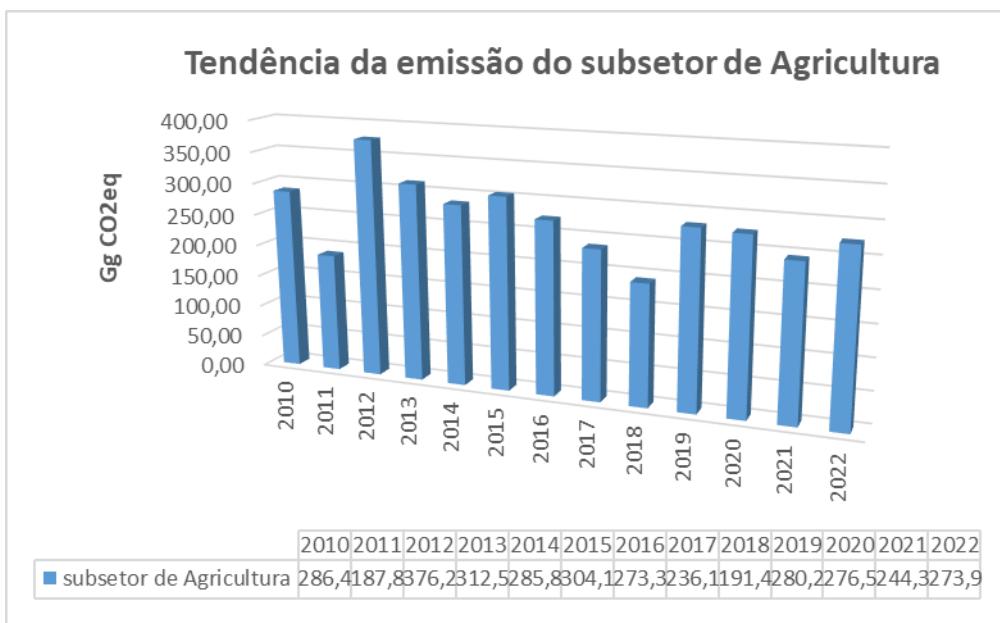


Figure 20 Subject: Emission trends in the agricultural sector

In this sub-sector, the Figure indicates a trend of reduction of CO₂eq greenhouse gas emissions, considering the most recent starting year (2010-2022), taking into account the implementation of the climate-smart agriculture system through projects and assistance to farmers associations. However, in 2011, there was a drop in productivity due to the significant reduction of mineral fertilisers, consequently in farmers' income, which motivated, in the following year, 2012, the abundant reuse of mineral fertilisers. Thanks to the promotion of MADR, in the following years farmers were trained, sensitised and monitored in the area of the rational use of this product (mineral fertiliser) and the health benefits of the gradual transition to organic farming.

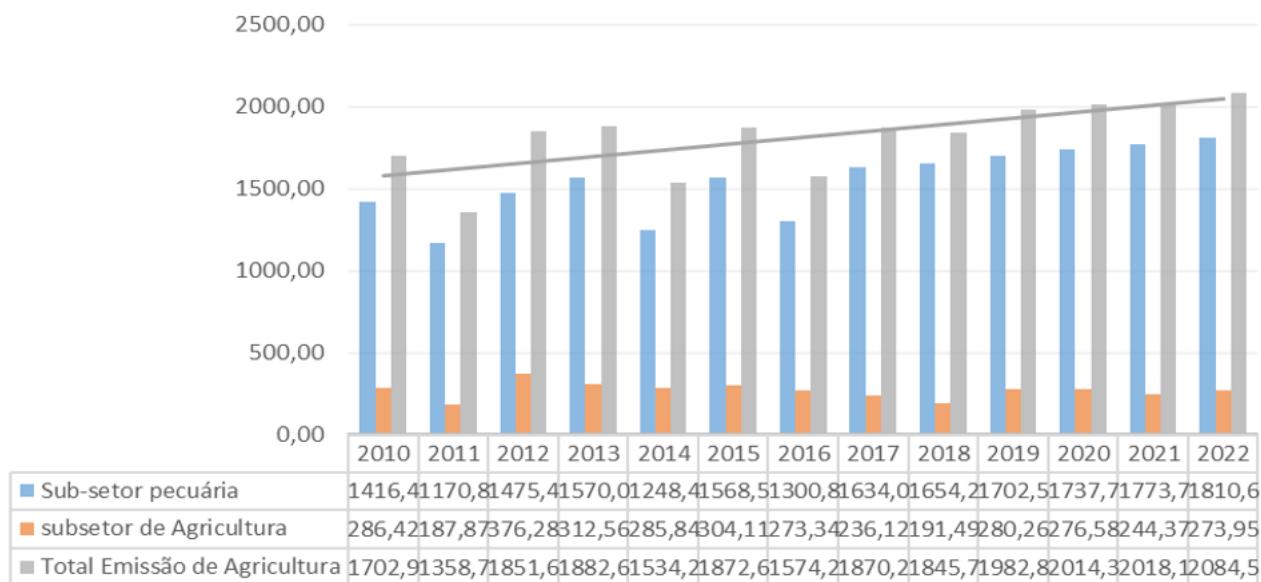
The Agricultural sector in the lateral direction (agriculture and livestock) has its GHG emissions that tend to grow, according to the estimated results, see table below.

Table 2-0-5 Subject: Total contribution of the agricultural sector to GHG emissions

Year	Categories		Total Emissions Agriculture
	Livestock sub-sector	Subsector Agriculture	
2010	1416.48	286.42	1702.9
2011	1170.88	187.87	1358.75
2012	1475.4	376.28	1,851.68
2013	1570.08	312.56	1882.64
2014	1248.4	285.84	1534.24
2015	1,568.59	304.11	1,872.69
2016	1300.88	273.34	1574.22
2017	1634.09	236.12	1870.21
2018	1654.21	191.49	1845.7
2019	1,702.57	280.26	1982.83

2020	1737.74	276.58	2014.32
2021	1773.77	244.37	2018.15
2022	1810.61	273.95	2084.57

Trends in the Subsector AGRICULTURE



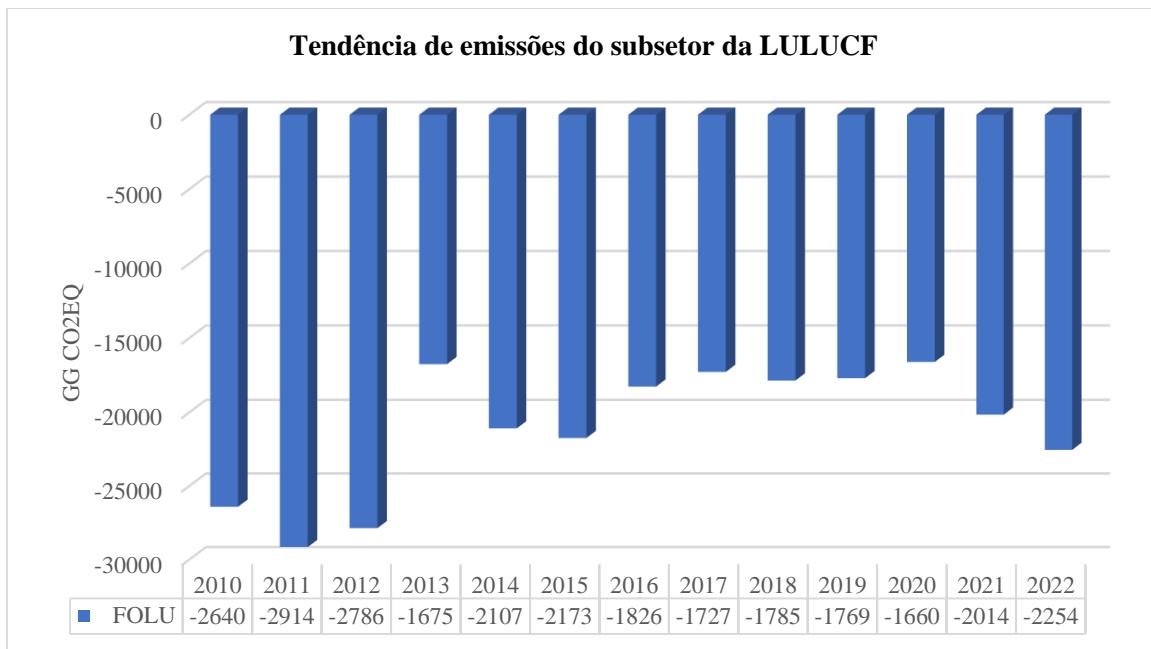
Number21Subject: Emissions trends in the agricultural sector

Forests and other land uses

Forests and Other Land Uses, at the level of GHG inventory, assume the role of sequestrators of these gases in the atmosphere. However, small-scale emission and large-scale removal of gases emitted by other sub-sectors at the national level are well known. It should also be noted that this sub-sector (Forests and Other Land Uses) includes the following sources: Forests and Cultivated Land, Pastures, Wetlands and Building Land.

Table 2-0-6Subject: Contribution of emissions from the sub-sector Forests and Other Land Use (GgCO₂-Eq)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
LULUCF	-27218	-29148	-27867	-16754	-21075	-	21735	-	18261	-	17279	-	17853



Number 22 Subject: Trend in emissions from the LULUCF sub-sector

Summary of GHG emissions from AFOLU sector by sources

The AFOLU sector is one of the largest contributors to the emission and removal of greenhouse gases. Thus, the amount of gases emitted and sequestered into the atmosphere can be observed in Table 4 below, according to their emission sources.

Table 2-0-7: Contribution from AFOLU emission sources

Year	Categories			CO2e	
	Livestock farming	Agriculture	FOLU	Non-FOLU emissions	Emissions with FOLU
2010	1416.48	286.42	-26409.12	1673.52	-24735.60
2011	1170.88	187.87	-29147.97	1388.28	-27759.69
2012	1475.40	376.28	-27866.83	1813.08	-26053.75
2013	1570.08	312.56	-16753.84	1858.83	-14895.01
2014	1248.40	285.84	-21075.42	1503.02	-19572.40
2015	1568.59	304.11	-21735.79	1836.76	-19898.54
2016	1300.88	273.34	-18261.07	1541.68	-16719.39
2017	1634.09	236.12	-17278.53	1843.99	-15434.54
2018	1654.21	191.49	-17852.61	1815.86	-16036.75
2019	1702.57	280.26	-17697.71	1955.38	-15742.32
2020	1737.74	276.58	-16605.98	1987.72	-14618.26
2021	1773.77	244.37	-20147.8	2001.09	-18146.71
2022	1810.61	273.95	-22544.7	2061.95	-20482.75

Source: Calculation software (IPCC2006)

Contribuição de fontes de emissão do sector AFOLU

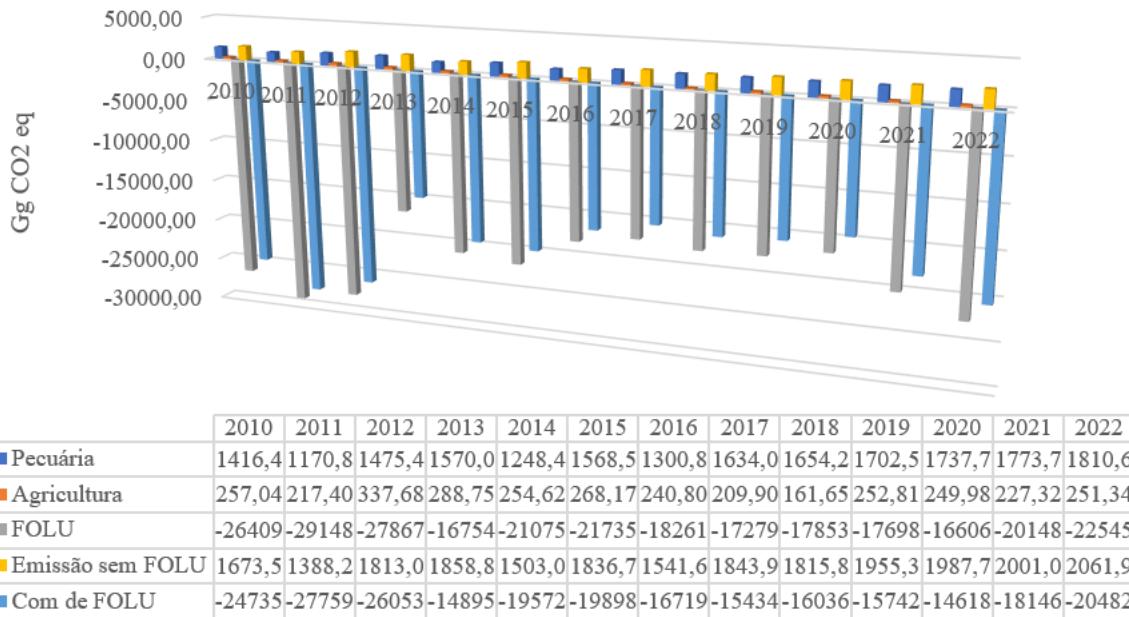


Figure 23 Subject: Total GHG emissions by sector category AFOLU

Comparative Analysis of GHG Emissions by Sources

Table 06 allows the comparison of emissions from the main sources of the AFOLU sector and Figure that allows the analysis of the contributions of the different sources mentioned, according to the three years of GHG inventory (2010, 2015 and 2022).

Table 2-0-8: AFOLU emissions, 2010-2015-2022

Year	Livestock farming	Aggregate sources - non-CO ₂	Forests and other land uses (FOLU)
2010	1416.48	286.42	-26409.12
2015	1,568.59	304.11	-21735.3
2022	1810.61	273.95	-22544.70

Source: Calculation software (IPCC - 2006)

2.7.4. Waste

Times series of emissions development in the waste sector:

Total annual emissions from the waste sector gradually increased in 2010 from 2015 to 2022, with an annual rate of increase commensurate with population growth.

Figure 1 summarises the trend in greenhouse gas emissions by category code in the waste sector (CO₂=4C, CH₄=4, CH₄=4D, CH₄=4C, N₂O=4D, N₂O=4C).

Table 2-0-9 Subject: Total emissions per year

Year	Total (Gg CO ₂ Eq)
2010	124.84
2011	158.86
2012	183.98
2013	202.98
2014	217.77
2015	229.58
2016	239.71
2017	248.59
2018	256.65
2019	264.18
2020	273.92
2021	281.01
2022	288.12

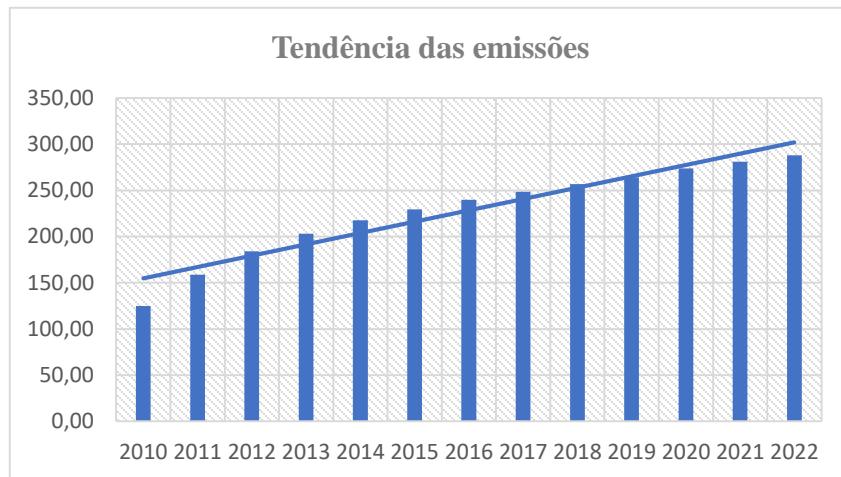


Figure 24 Subject: Trends in CO₂ emissions from the waste sector

Although waste water was the main contributor to CH₄ emissions from the waste sector, the higher rate of increase in emissions from solid waste disposal shows that solid waste disposal is also gradually becoming an important contributor to CH₄ emissions from the solid waste category (4A).

Overview of the evolution of gaseous emissions by waste sub-categories:

- i) CH₄ from the natural decomposition of solid waste going to landfills/landfills, biological treatment of solid waste, waste water treatment and disposal and incineration of solid waste;
- ii) CO₂ emissions from the incineration and open burning of solid waste;
- iii) N₂O emissions from waste water treatment and disposal, biological treatment of solid waste and waste incineration.

Between 2010, 2015 and 2022, total direct GHG emissions from the waste sector grew steadily. This increase is due to all subsectors due to:

- a) Population growth,
- b) The increase in the amount of waste generated in the country,
- c) Installation of autonomous wastewater treatment systems.

Overall, the contribution of CH₄, N₂O and CO₂ emissions to all sub-categories of the waste sector in Guinea-Bissau gradually increased, taking into account the periods 2010, 2015 and 2022, according to IPCC Software 2006 calculations.

CH₄ emissions from the waste sector increased by 100.15 GgCO₂eq in 2010, 202.34 Gg CO₂eq in 2015 and 256.65 GgCO₂eq in 2022, according to the table below.

Table 2-0-10: GgCO₂eq time series summary

YEAR	CH4	N2O	CO2	TOTAL

2010	100.15	18.80	5.89	124.84
2015	202.34	20.84	6.40	229.58
2022	256.65	24.07	7.41	288.12

Source: IPCC 2006 (Software)

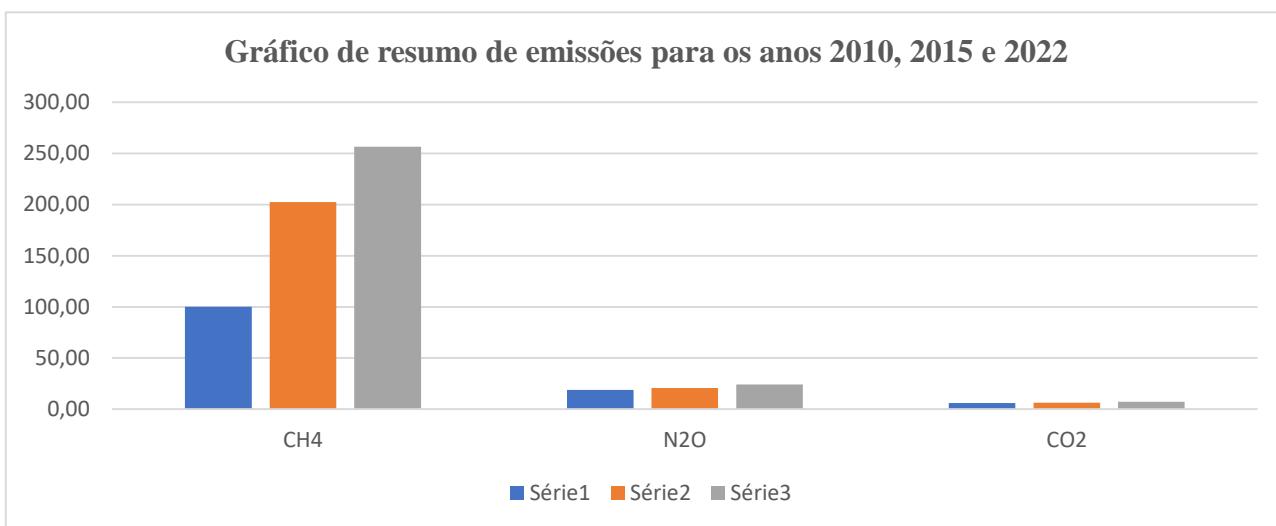


Figure 25: GHG emissions (CH4, N2O and CO2); 2010, 2015 and 2022; in GgCO2-Eq

2.7.5. Summary of the sectoral contribution to national emissions (No LULUCF)

In Guinea-Bissau, the GHG emitting sectors, in order of importance, are agriculture, energy, waste and industrial processes.

In 2010, the main GHG emitting sectors were agriculture (82%), energy (11%), waste (5.95%) and industrial processes (1.4%).

In 2015, the main GHG emitting sectors were agriculture with (77.3%), waste with (9.4%), energy (12.6%) and industrial processes with (0.6%).

In 2022, the main GHG emitting sectors were the agricultural sector (76%), the waste sector (10%) and the energy sector (14%) of total emissions, as can be seen in Figure 1.

2.8 Quality Assurance and Control Procedures (QA/QC)

Quality Control (QC) was observed from the collection, compilation and validation of data, to the verification of the methodology, among the elements of the inventory working group. The collected data were compiled and compared before being introduced in the software. In the introductory phase, one element informs, the other verifies and the third introduces, avoiding as much as possible the margin of error. After obtaining the results of the question, the team leader analysed the results obtained, observing the logic and consistency of the values in relation to the year.

As regards quality assurance (QA), there is no established structure at national level that can verify non-compliance of the inventory group to verify quantitative and qualitative emission procedures and results. However, the report is shared with UNEP for review and comment before being submitted to the UNFCCC.

2.9 Overall assessment of uncertainty

The uncertainty in CO₂ estimates for the residential category is 7.92% for liquid fuels. For methane (CH₄), the uncertainty is 200.06%, while for nitrous oxide (N₂O), this uncertainty is 236.42%. As for the estimates of CO₂ for solid biomass in the same category, the uncertainties are 19.35% for CO₂, 227.33% for CH₄ and 297.77% for N₂O.

Regarding the commercial and institutional category, the uncertainty in the CO₂ estimates for liquid fuels remains at 7.92%. For methane (CH₄), the uncertainty is 200.06%, and for nitrous oxide (N₂O), the uncertainty of the estimates is also 236.42%. For solid biomass in this category, the uncertainties are 19.35% for CO₂, 227.33% for CH₄ and 297.77% for N₂O.

For Agriculture, Forestry and Other Land Uses, evaluations were conducted using the Level 1 methodology in accordance with the 2006 IPCC Guidelines and the good practices set out therein and also following Chapter 2, paragraph 29 of the MPGs. The uncertainties of the activity data were estimated using expert judgement according to the level of data collection, i.e. the level of reliability of the data collected in different national and international institutions. The IPCC Excel uncertainty calculation table was used, where the results of GHG emissions and removals, percentage uncertainty of activity data, standard emission factor, start year and most recent inventory (2010 and 2022) were introduced. The combined uncertainty is the calculation of the two uncertainties (activity data and emission factor) plus the GHG emission results equivalent to CO₂, see table below.

Table 2-0-11: Subcategory uncertainty estimation

Period	Categories	Indicator		
		Uncertainty of activity data	Issuance factor uncertainty	Combined uncertainty
2010 and 2022	Forest land remaining in forest land	± 5%	± 7%	± 8.6%
	Enteric fermentation	± 6%	± 7%	± 9.2%
	Land converted to agricultural land	± 6%	± 7%	± 9.2%

Source: IPCC Excel uncertainty calculation table

According to this table, the uncertainties of the different categories were calculated together with the results of their GHG emissions, see more details in the attached uncertainty calculation table.

Table 2-0-12: Estimation of quantitative inventory uncertainties at national level

Sector	Indicator	
	Total stock uncertainty (%)	Uncertainty trend (%)
AFOLU	12.7	2.2

The main source of uncertainties are the standard emission factors, for which the country does not yet have its own data, some missing data that have been extrapolated and the reliability of data from different national and international institutions. In this way, the AFOLU Industry Expert Group will do its utmost to ensure the highest level of data collection and compilation of information, with the aim of reducing the level of uncertainty of inventory data at national level.

2.10 Overall assessment of completeness

Within this inventory, the scope assessment covers the sectors of activity concerned. The method of analysis is in accordance with the guidelines in paragraphs 30, 31 and 33 of Decision 18/CMA.1. Standard notifications are used to notify the emission/absorption categories and sources for which emissions have been estimated and those for which emissions have not been estimated, either because of a lack of data or because the category is not available at national level.

Undeclared categories and subcategories are recorded in the Tables: Energy; Agriculture; LULUCF and Waste. In fact, these are categories for which, on the one hand, activities are non-existent at national level and, on the other hand, data and information relating to the inventory period are not available.

The general table of completeness for 2022 is presented below and the categories of sectoral emissions not occurring with explanations are presented in the next 2 tables for energy and AFOLU.

Inventory year: 2022

Categories	Emissions (Gg)		
	Net CO2 (1)(2)	CH4	N2O
Total National Emissions and Removals	-22 210 900	99,998	0.251
1 - Energy	307,989	4,684	0.072
1.A - Fuel Combustion Activities	307,989	4,684	0.072
1.A.1 - Energy Industries	99,014	0.004	0.001
1.A.2 - Manufacturing and Construction	5,130	0,000	0,000
1.A.3 - Transport	184,734	0.029	0.009
1.A.4 - Other Sectors	19,111	4,651	0.061
1.A.5 - Unspecified	NOS	NOS	NOS
1.B - Fuel fugitive emissions	NOS	NOS	NOS
1.B.1 - Solid Fuels	NOS	NOS	NOS
1.B.2 - Oil and Natural Gas	NOS	NOS	NOS
1.B.3 - Other emissions from Energy Production	NOS	NOS	NOS
1.C - Carbon Dioxide Transport and Storage	NOS		
1.C.1 - Transport of CO2	NOS		
1.C.2 - Injection and Storage	NOS		
1.C.3 - Other	NOS		
2 - Industrial Processes and Product Use	0.514	NOS	NOS
2.A - Mineral Industry	NOS	NOS	NOS

2.A.1 - Cement production	NOS		
2.A.2 - Production of lime	NOS		
2.A.3 - Glass Production	NOS		
2.A.4 - Other uses of carbonates in processes	NOS		
2.A.5 - Other (specify)	NOS	NOS	NOS
2.B - Chemical Industry	NOS	NOS	NOS
2.B.1 - Ammonia Production	NOS		
2.B.2 - Nitric Acid Production			NOS
2.B.3 - Production of Adipic Acid			NOS
2.B.4 - Production of Caprolactam, glyoxal and glyoxylic acid			NOS
2.B.5 - Production of Carbides	NOS	NOS	
2.B.6 - Production of Titanium Dioxide	NOS		
2.B.7 - Production of Sodium Carbonate	NOS		
2.B.8 - Petrochemical and Carbon Black Production	NOS	NOS	
2.B.9 - Fluorchemical Production			
2.B.10 - Production of Hydrogen	NOS	NOS	NOS
2.B.11 - Other (specify)	NOS	NOS	NOS
2.C - Metallurgical Industry	NOS	NOS	NOS
2.C.1 - Iron and Steel Production	NOS	NOS	
2.C.2 - Production of Ferroalloys	NOS	NOS	
2.C.3 - Aluminium production	NOS		
2.C.4 - Magnesium production	NOS		
2.C.5 - Lead Production	NOS		
2.C.6 - Zinc Production	NOS		
2.C.7 - Rare Earth Production	NOS		
2.C.8 - Other (specify)	NOS	NOS	NOS
2.D - Non-energy products from the use of fuels and solvents	0.514	NOS	NOS
2.D.1 - Use of Lubricants	0.514		
2.D.2 - Use of paraffin wax	NOS		
2.D.3 - Solvent Use			
2.D.4 - Other (specify)	NOS	NOS	NOS
2.E - Electronic Industry	NOS	NOS	NOS
2.E.1 - Integrated Circuit or Semiconductor			NOS
2.E.2 - TFT flat panel			NOS
2.E.3 - Photovoltaics			
2.E.4 - Heat Transfer Fluid			
2.E.5 - Other (specify)	NOS	NOS	NOS
2.F - Use of products as substitutes for ozone-depleting substances			
2.F.1 - Refrigeration and Air Conditioning			
2.F.2 - Foam expansion agents			
2.F.3 - Fire protection			
2.F.4 - Aerosols			
2.F.5 - Solvents			

2.F.6 - Other Applications (specify)			
2.G - Manufacture and use of other products	NOS	NOS	NOS
2.G.1 - Electrical Equipment			
2.G.2 - SF6 and PFCs of other product uses			
2.G.3 - N2O from product uses			NOS
2.G.4 - Other (specify)	NOS	NOS	NOS
2.H - Other	NOS	NOS	NOS
2.H.1 - Pulp and Paper Industry	NOS	NOS	NOS
2.H.2 - Food and Beverage Industry	NOS	NOS	NOS
2.H.3 - Other (specify)	NOS	NOS	NOS
3 - Agriculture, Forestry and Other Land Use	-22,526,813	73,607	0.088
3.A - Livestock		64,665	NOS
3.A.1 Enteric Fermentation		61,995	
3.A.2 - Manure Management		2,670	NOS
3.B - Earth	-22,527,033		
3.B.1 - Forest land	-29,644,127		
3.B.2 - Farmland	7 117 094		
3.B.3 - Pasture	NOS		
3.B.4 - Wetlands	NOS		
3.B.5 - Settlements	NOS		
3.B.6 - Other Land	NOS		
3.C - Aggregate sources and sources of non-CO2 emissions on land	0.220	8,942	0.088
3.C.1 - Burning	NOS	2,687	0.083
3.C.2 - Liming	NOS		
3.C.3 - Application of urea	0.220		
3.C.4 - Direct N2O emissions from managed soils			0.003
3.C.5 - Indirect N2O emissions from managed soils			0.002
3.C.6 - Indirect N2O emissions from waste management			NOS
3.C.7 - Rice cultivation		6,255	
3.C.8 - CH4 of drained organic soils		NOS	
3.C.9 - CH4 of drainage ditches in organic soils		NOS	
3.C.10 - CH4 of Organic Soil Rehumidification		NOS	
3.C.11 - CH4 emissions from rewetting of mangroves and tidal marshes		NOS	
3.C.12 - Aquaculture N2O emissions			NOS
3.C.13 - CH4 emissions from rewetted wetlands and reared on mineral soils of inland wetlands		NOS	
3.C.14 - Other (specify)	NOS	NOS	NOS
3.D - Other	NOS	NOS	NOS
3.D.1 - Harvested Wood Products	NOS		
3.D.2 - Other (specify)	NOS	NOS	NOS
4 - Waste	7,408	21,707	0.091
4.A - Disposal of Solid Waste		17,057	
4.B - Biological Treatment of Solid Waste		NOS	NOS

4.C - Incineration and Open Burning of Waste	7,408	2,126	0.035
4.D - Treatment and Disposal of Wastewater		2,524	0.056
4.E - Other (specify)	NOS	NOS	NOS
5 - Other	NOS	NOS	NOS
5.A - Indirect N2O emissions from atmospheric nitrogen deposition in NOx and NH3			NOS
5.B - Indirect CO2 emissions from atmospheric oxidation of CH4, CO and NMVOC	NOS		
5.C - Other	NOS	NOS	NOS
Memo Items (5)			
International Bunkers	1 280 969	0.121	0.035
1.A.3.ai - International Aviation (International Bunkers)	NOS	NOS	NOS
1.A.3.ai - Indirect N2O emissions from atmospheric nitrogen deposition in NOX and NH3			NOS
1.A.3.ai - Indirect CO2 emissions from atmospheric oxidation of CH4, CO and NMVOC	NOS		
1.A.3.di - International deep-water navigation (International Bunkers)	1 280 969	0.121	0.035
1.A.3.di - Indirect N2O emissions from atmospheric nitrogen deposition in NOX and NH3			NOS
1.A.3.di - Indirect CO2 emissions from atmospheric oxidation of CH4, CO and NMVOC	NOS		
1.A.5.c - Multilateral Operations	NOS	NOS	NOS
1.A.5.c - Indirect N2O emissions from atmospheric nitrogen deposition in NOX and NH3			NOS
1.A.5.c - Indirect CO2 emissions from atmospheric oxidation of CH4, CO and NMVOC	NOS		

Table 2-0-13: Completeness analysis for the energy sector

Categories Sources and sinks of GHG	(Gg) Emissions			Notes
	CO2	CH 4	N2O	
ENERGY				
1.A.1. Energy industries				
1.A.1.b. Petroleum refining	NO	NO	NO	This activity does not exist in the national territory
1.A.1.c. Manufacture of solid fuels and other energy industries	NO	NO		This activity does not exist in the national territory
1.A.2. Manufacturing and construction industries				
1.A.2.a. Iron and steel	NO	NO	NO	This activity does not exist in the national territory
1.A.2.b. Non-ferrous metals	NO	NO	NO	This activity does not exist in the national territory
1.A.2.c. Chemicals	NO	NO	NO	This activity does not exist in the national territory
1.A.2.d. Cellulose, paper and printing	NO	NO	NO	This activity does not exist in the national territory
1.A.2.e. Processing of food, beverages and tobacco	NOS	NOS	NOS	This activity exists at national level, but data and information are inaccessible
1.A.2.g. Others	NO	NO	NO	This activity does not exist in the national territory

Categories Sources and sinks of GHG	(Gg) Emissions			Notes
	CO2	CH 4	N2O	
1.A.3. Transportation				
1.A.3.a. Domestic aviation	NOS	NOS	NOS	The activity exists at national level, but data and information are inaccessible
1.A.3.c. Railways	NO	NO	NO	This activity does not exist in the national territory
1.A.3.d. Initial Navigation	NOS	NOS	NOS	This activity exists at national level, but data and information are inaccessible
1.A.3.e. Other transport	NO	NO	NO	This activity does not exist in the national territory
1.A.5. Others				
1.A.5.a. Stationary	NO	NO	NO	This activity does not exist in the national territory
1.A.5.b. Mobile	NO	NO	NO	This activity does not exist in the national territory
1.B.1. Solid fuels				
1.B.1.a. Coal mining and handling	NO	NO		This activity does not exist in the national territory
1.B.1.b. Fuel transformation	NO	NO	NO	This activity does not exist in the national territory
1.B.1.c. Others	NO	NO	NO	This activity does not exist in the national territory
1.B.2. Oil and natural gas and other emissions from energy production				
1.B.2.a. Oil	NO	NO	NO	This activity does not exist in the national territory
1.B.2.b. Natural gas	NO	NO	NO	This activity does not exist in the national territory
1.B.2.c. Ventilation and burning	NO	NO	NO	This activity does not exist in the national territory
1.B.2.d. Others	NO	NO	NO	This activity does not exist in the national territory
1.C. Carriage and storage of CO2				
1.C.1. Carriage of CO 2	NO			This activity does not exist in the national territory
1.C.2. Injection and storage	NO			This activity does not exist in the national territory
1.C.3. Others	NO			This activity does not exist in the national territory
1.D.1. International bunkers				
1.D.1.a. Aviation	NOS	NOS	NOS	This activity exists at national level, but data and information are inaccessible
1.D.2. Multilateral operations	NOS	NOS	NOS	
Captured CO2	NO	NO	NO	This activity does not exist in the national territory
1.D.4.a. For home storage	NO	NO	NO	This activity does not exist in the national territory
1.D.4.b. For storage in other countries	NO	NO	NO	This activity does not exist in the national territory

Table 2-0-14:Completeness analysis for Agriculture and LULUCF

Code	Category	Subcategories	(Gg) Emissions			Notes
			CO2	CH 4	N2O	
3	Agriculture					
3A.		- Enteric fermentation			NOS	
3.B		- Manure management			NOS	NE because the country does not have an advanced process of waste management.
Note:	Other conversions are not observed in the country		NO	NO	NO	There are no other forms of conversion in the country.
3.E		Burning in the savannas	NO	E	NO	Software anomalies
3.F		Waste burning	NO	E	E	Software anomalies
3.E.2		Burning in pastures	NO	NS	NS	No data available
3.C.1.d		Burning in other lands	NS	NS	NS	No data available
3.G		Liming	NO			Practices not observed in the country.
3.H		Urea application	E			Emissions are estimated
3.D.1		Direct emission of N2O from soil management			E	They're calculated, but they're tiny.
3.D.2		Indirect N2O emission from soil management			E	They're calculated, but they're tiny.
3.D.1.b		Indirect N2O emission from manure management			NOS	Software anomalies
3.C		Cultivable rice		E		Calculated emissions
Note:	Subsequently, the remaining subcategories of 3.C.8,9,10,11,12,13,14,		NO	NO	NO	These practices are not observed in the country.

The national greenhouse gas inventory for the agricultural sector, drawn up between 2010 and 2022, is incomplete for direct gases CH₄ and N₂O. In this inventory, we seek to estimate all direct greenhouse gas emissions for all categories of sources in agriculture. Estimated and non-estimated emission schedules for the categories considered are detailed in the respective sections. Despite the efforts, greenhouse gas emissions for some categories and subcategories were not included in this inventory, mainly due to the lack of reference data.

2.12 Planned improvements

Planned improvement in the energy sector

While we have obtained a consistent time series on GHG emissions from the energy sector, there are data gaps related to the reporting system. Areas of improvement related to biomass include the following:

In the transport sector, there are still some gaps in the data, especially at the level of aggregation. The following improvement can help solve this problem and contribute to a better estimation of GHG emissions:

- Conduct research on biomass fuel consumption in households,
- Collection of data on the age of vehicles
- Data collection on fuel consumption by categories and characteristics of vehicles and aircraft
- Collection of data on kilometres travelled by vehicles
- Breakdown between the fuel consumption of transport vehicles and other sectors using petroleum products, such as households, industries and commercial institutions/activities.

Further improvements in the collection of data on various fuels (such as diesel, kerosene, LPG) used in domestic and institutional/commercial activities should also receive special attention, as these activities are the main contributors to Rwanda's total GHG emissions.

Planned improvement in the IPPU industry

Data collection and quality assurance in:

- non-energy uses of fuels (lubricants, paraffins, solvents)
- use of fluorinated gases in air conditioning and refrigeration in Guinea-Bissau.

Improvements planned by AFOLU Sector

The agricultural sector, as one of the important sectors in this context, deserves special attention due to its specificities. Research institutions and universities should be encouraged or facilitated to conduct research on existing gaps to develop local emission factors that allow the calculation of Level 2 greenhouse gas emissions.

In the meantime, in order to reduce uncertainties and significantly improve estimates of GHG emissions in the AFOLU sector, favourable conditions for sustainable improvement should be created, which is mainly based on the discussion of the amended software version of the IPCC 2006 as regards category 3B - Land and category 3C - aggregated sources and sources of non-CO₂ emissions on land, notably in burned field (see C. 14).

Livestock sub-sector

Given the difficulties faced by this AFOLU sub-sector in terms of updated data, i.e. the last animal census of 2009, without others, the data used were calculated on the basis of the animal growth rate of the MSAR statistical institute. It is therefore appropriate to take the following measures:

- Fund a project for the general national animal census.
- Categorise the animals according to their characteristics and areas.
- Improve and adopt the modern waste management system to allow the estimation of gases (N₂O, NOx and NMVOC);
- Develop national emission factors to minimise uncertainties in the GHG inventory results of this sector;
- Estimate in the future all sub-sector related gases with a time series starting from the year 1990 as recommended by the MPG guidelines.

Agricultural subsector

- Improve source calculation and collection of reliable activity data, including: fertiliser use, arable land, crop residues.

Forestry and land use sub-sector

- Improve data collection to monitor the time series from 1990 to 2025, respecting the MPG guidelines;
- Use of the Geographic Information System (GIS) to calculate degraded forest areas and changes in land use.
- Forest mapping with high resolution images for updating forest cover data in different ecological zones and forest types;
- Calculate the emissions of the categories that, due to lack of data, have not had their emissions estimated.

Planned improvements in the Waste Sector

The creation of an accessible and efficient solid waste management system and the introduction of sustainable practices such as selective collection, recycling, composting and biogas-based energy generation would reduce large amounts of methane emissions in this category.

Establish community recycling cooperatives, employ local labour and reduce waste accumulation in hazardous areas.

CHAPTER III: PROGRAMMES CONTAINING MEASURES TO MITIGATE CLIMATE CHANGE

3.1. Introduction

The mitigation assessment presented in this chapter is an updated action plan of Guinea-Bissau's mitigation actions, based on Guinea-Bissau's NDC, updated in 2021,¹ and the monitoring of Guinea-Bissau's NDC, according to Guinea-Bissau's BTR1²Report. The proposed mitigation options are activities directed to the energy, forestry and land use sectors, selected based on the analysis of key categories of the GHG inventory, taking into account mainly that the selected mitigation options can lead to carbon market projects. In fact, energy and forestry projects are easy to implement and have a significant contribution to GHG emissions.³

Climate change mitigation is a strategic priority for Guinea-Bissau, with the main objective of reducing greenhouse gas (GHG) emissions, thus contributing to the commitments made in the Paris Agreement and to the achievement of the Sustainable Development Goals (SDGs). To guide decision-making and inform international partners, several mitigation assessment options have been developed, based on the elaboration of different emissions scenarios.

Despite being one of the countries with the lowest global emissions, Guinea-Bissau has adopted a proactive approach in combating climate change, focussing on key sectors with mitigation potential. The mitigation programmes were designed taking into account national institutional capacity, resource availability and coherence with sustainable development plans. Mitigation scenarios are presented, explaining the underlying assumptions and the methodology used to develop mitigation options.

3.2. Description of the sectoral approaches used for the mitigation assessment

According to the Revised Nationally Determined Contribution (NDC, 2021), access to energy is a social, economic and environmental issue of great importance for Guinea-Bissau. The country's electrification rate is still low, at no more than 45 percent in 2020, and the government plans to increase it to 80 percent by 2030.

Primary energy consumption is still dominated by biomass, which represents more than 80% of the country's primary energy demand. This is one of the main drivers of deforestation in Guinea-Bissau, along with itinerant agriculture based on slash and burn techniques. This is an important issue for the country in terms of its energy matrix and energy production costs, noting that Guinea-Bissau imports fossil fuels to meet its needs and access to modern energy, for which there is a large and repressed demand.

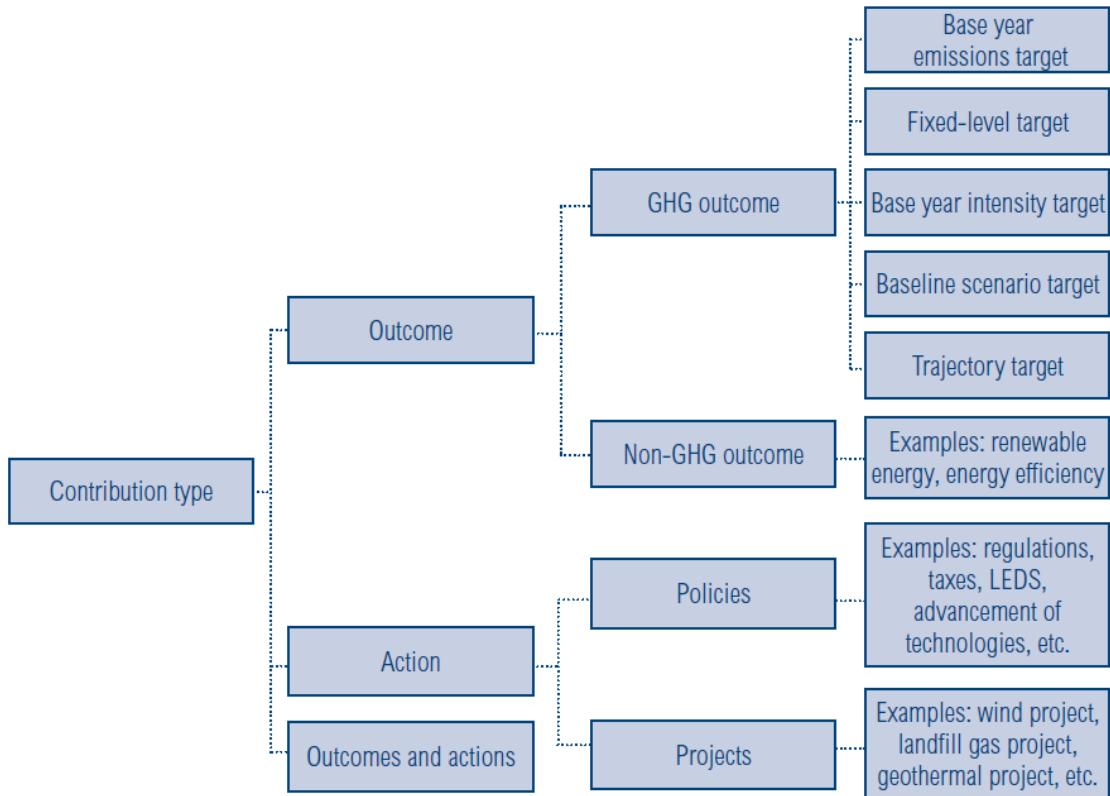
In addition to emission reductions, mitigation measures based on clean energy and reforestation/afforestation will reduce the cost of energy production (reduce oil-based energy imports), reduce pressure on existing forests, ensure environmental protection and improve socio-economic development.

¹<https://unfccc.int/NDCREG>

²<https://unfccc.int/documents/645093>

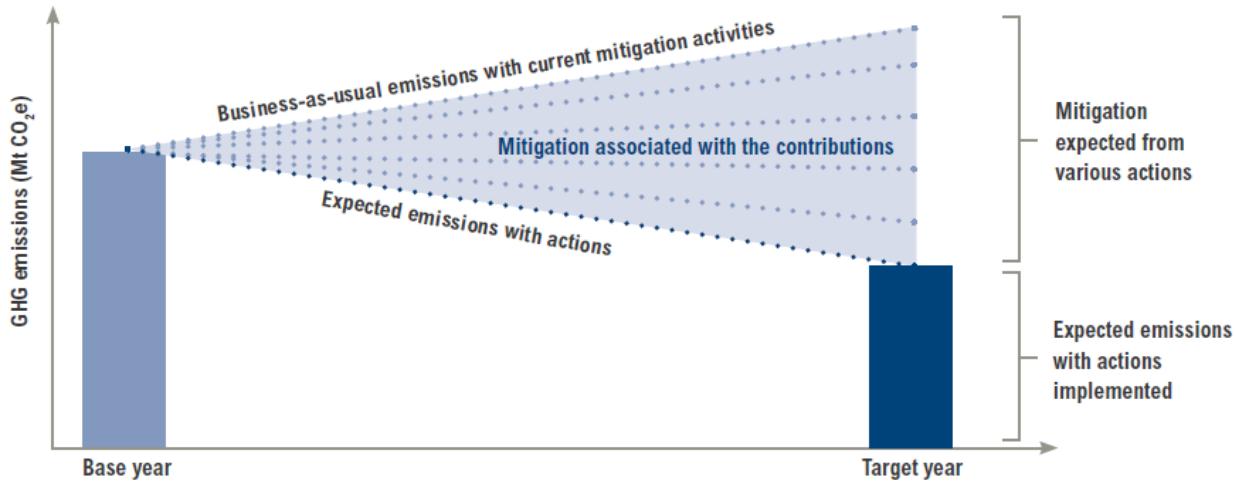
³Guinea-Bissau National Inventory Report 2024: <https://unfccc.int/documents/645094>

The mitigation assessments were based on a combination of three alternative approaches, namely: (i) activity-based approach, (ii) results-based approach or (iii) a combination of the two approaches (WRI&UNDP, 2015). These types of mitigation activities (types of contribution) are illustrated in Figure 3.1.



Number26: Types of mitigation contributions (WRI and UNDP, 2015)

Total GHG emission reductions or removals were calculated through the development of sectoral scenarios and alternative scenarios, based on several policy implementation assumptions. The tool used is the IPCC 2006 software, which uses data from 2025 to 2050 to model base and mitigation scenarios. The use of base scenarios to calculate the emission reduction resulting from mitigation actions is illustrated in WRI and UNDP (2015), as can be seen in Figure 3.2.



Number27: Determination of expected emissions in a future year if mitigation actions are implemented (WRI and UNDP, 2015).

3. 3. Energy

3.3.1. Overview of energy

Guinea-Bissau has for decades been facing a structural crisis in the electricity sector, marked by low installed capacity, limited territorial coverage, obsolete infrastructure, high operating costs and a strong dependence on fossil fuels, especially in rural areas where access rates remain extremely low. The situation has worsened over time, reflecting the lack of sustainable investments and an effective national strategy for the development of the energy sector.

In response to this critical situation, the Government of Guinea-Bissau initiated in 2018 a strategic partnership with the Turkish company KARPOWER, through a contract for the supply of electricity through a floating thermoelectric power plant powered by Heavy Fuel Oil (HFO). This unit currently represents the main source of electricity generation in the country, with an installed capacity of 24 MW in 2024, intended exclusively for the supply of the capital and adjacent areas. This partially stabilised power supply in the city of Bissau, an advance in the face of electricity shortages.

In addition to the floating plant, Guinea-Bissau's power generation system has three small-scale thermoelectric power plants located in Gabu, Bafatá and Canchungo, each with an installed capacity of approximately 1 MW. These plants operate in isolation, facing technical and financial limitations, as well as high operating costs due to the use of diesel. In total, the country's installed capacity is around 27 MW, insufficient to meet domestic demand, representing a significant obstacle to the country's economic and social progress.

3.3.2. Energy reference/baseline assumptions (2025-2050)

a) Thermal power generation

Currently, the cities of Gabu, Bafatá and Canchungo operate small isolated power plants, each with a capacity of 1 MW and powered by diesel. The electricity generated is used for residential, commercial,

institutional and other purposes in these three locations. In the baseline scenario, no changes are expected between 2025 and 2050. The current configuration will be maintained, with the three thermoelectric generators remaining in operation and consuming approximately 6,183,529 litres of diesel per year.

b) KARPOWER plant

The baseline scenario assumes the maintenance of the current electricity supply model during the period 2025-2050 without introducing structural reforms in the sector. The floating power plant KARPOWER continues to be the main source of generation, with a progressive increase in its capacity at an average rate of approximately 2% per year, with the objective of partially responding to the growth of demand in the city of Bissau. The three existing thermal power plants in Gabu, Bafatá and Canchungo continue to operate on a limited basis, without expansion or modernisation, each maintaining 1 MW of installed capacity. The energy matrix remains heavily dependent on imported fossil fuels, in particular HFO and diesel, without the relevant incorporation of large-scale renewable sources. These assumptions were based on EAGB data and the judgement of the national expert. The reference fuel consumption ranges from 25.259.333 litres to 41.447.124 litres.

3.3.3. Impact of the baseline energy scenario (2025-2050)

a) Economic impact

From an economic point of view, although the installed capacity of floating power plants is progressively increasing at a rate of 2% per year, operational and generation costs remain high due to dependence on imported heavy fuel oil (HFO). This reality tends to keep electricity out of reach of a large part of the population and limits the growth of productive sectors that depend on reliable and affordable energy. By not developing a national energy production base, the country remains vulnerable to external shocks and loses some strategic autonomy. On the other hand, the expansion of installed capacity may not effectively accompany the continuous increase in demand, which feeds the risk of supply deficits and recurrent losses in the electricity system.

(b) Social impact

At the social level, the centralisation of energy supply in the city of Bissau contributes to the dynamics of urban growth, but accentuates the inequalities between the capital and the rest of the territory. In inland regions, the lack of regular access to electricity hampers the proper functioning of essential services such as health centres, schools and security infrastructure, and limits the emergence of sustainable economic activities. Most rural people will continue to rely on one-off and unstable solutions, such as small generators or low-power solar kits, which reinforces energy exclusion and limits the possibilities for improving living conditions.

c) Environmental impact

In environmental terms, the continuity of generation from heavy fuels implies the maintenance of high levels of pollutant emissions, with direct impacts on air quality, population health and coastal ecosystems. The absence of a clear commitment to renewable sources undermines Guinea-Bissau's alignment with global energy transition goals and hinders the country's integration into regional climate mitigation strategies. Without a change of course, the current model is unsustainable in the medium and long term, both ecologically and financially.

3.3.4. Assumptions of energy mitigation scenarios (2025-2050)

The mitigation scenario considers the progressive implementation of strategic investments in the electricity sector of Guinea-Bissau, with a view to diversifying the energy matrix, reducing dependence on fossil fuels and expanding access to electricity in a more sustainable and balanced way in the national territory. This scenario contemplates two main axes of intervention: (i) the installation of hybrid solar mini-grids replacing thermal generators in the regions of Gabu, Bafatá and Canchungo; and (ii) the entry into operation of the OMVG (Organisation for the Mise en Valeur du fleuve Gambie) Interconnection Project, with access to renewable energy (hydroelectric) and lower operating cost.

a) Hybrid solar mini-grids

Today, the cities of Gabu, Bafatá, and Canchungo operate with small, isolated thermal power plants, each with a capacity of 1 MW, powered by diesel. In the mitigation scenario, this infrastructure will be progressively replaced by solar mini-grids with the same capacity (1 MW each). The planned timetable is as follows: in 2025 the current model is maintained, with the three thermal generators still in operation. In 2030, two of these generators, those from Bafatá and Gabu, will be replaced by solar mini-grids. In 2035, the third mini-solar grid will be installed in Canchungo, completing the planned transition. As of 2035, no further changes are expected in this segment, assuming the continuous operation and maintenance of the solar infrastructure until 2050. Even so, it is estimated that about 5% of the electricity continues to be generated by diesel generators, for reserve purposes, support in consumption peaks or situations of low solar radiation.

b) Replacement of the KARPOWER plant with the OMVG interconnector

In the same mitigation scenario, it is considered that, from 2025, the supply of the city of Bissau will no longer depend on the floating power plant KARPOWER, being replaced by electricity from the OMVG regional network, interconnected to neighbouring countries through an infrastructure already in the process of completion. OMVG's interconnected system supplies Guinea-Bissau with an initial capacity of 26 MW. The installed capacity of this system will increase at a rate of 2% per year by 2050.

3.3.5. Impact of energy mitigation scenarios (2025-2050)

a) Economic impact

Replacing the KARPOWER floating plant with supplies from OMVG and small generators with solar mini-grids will help the country spend less on imported fuels such as diesel. This means less risk with changes in the price of oil. With cheaper and more stable energy, small companies will have better conditions for growth, above all in the interior of the country. It will also be possible to attract new investments in productive activities such as processing agricultural products and providing services. Installing and maintaining solar mini-grids will create jobs and could help develop new technical skills in the country. In addition, the use of renewable sources improves energy security, as the country ceases to rely so much on external and costly solutions. In the long run, the model is more sustainable and can strengthen the national economy in a more balanced way.

b) Social impact

Although the project does not foresee the expansion of the power grid to new areas, replacing diesel generators with solar mini-grids will bring a significant improvement in the quality of power supply in the localities of Gabu, Bafatá and Canchungo. With more stable electricity, less subject to frequent failures and cuts, existing public services, such as schools, health centres, and administrative posts, can function more regularly and efficiently. Continuity of supply also facilitates the use of critical equipment, such as refrigeration systems for medicines or computers to support education. This energy reliability brings more comfort and safety to families and small businesses, reducing dependence on individual generators or poor solutions. In addition, the installation and operation of the mini-grids creates local employment opportunities and can stimulate the development of technical skills among young people in the beneficiary communities.

c) Environmental impact

The use of clean sources, such as solar energy and hydroelectric energy from OMVG, has a very positive effect on the environment. The replacement of diesel generators and the KARPOWER plant significantly reduces the emission of polluting gases, such as carbon dioxide (CO₂), which contribute to global warming. It also reduces air pollution and the risk of soil and water contamination, which are common when using fossil fuels. In coastal areas, removing the floating plant helps protect the marine environment and prevents oil spills. This new energy model is more in line with Guinea-Bissau's international environmental commitments and shows that the country is moving towards a greener future. With this change, the country also improves its international image and can attract support and financing related to environmental protection. In the long run, it's a healthier, cleaner and safer system for everyone.

3.3.6. Emission analysis for baseline and mitigation scenarios for the energy sector

The simple results for the baseline and mitigation scenarios for both selected energy options (hybrid solar mini-grid and replacement of the KARPOWER plant by the OMVG interconnector) of the IPCC 2006 software are presented in the figure below.

Fuel Consumption Data		Fuel Combustion Emissions							
Worksheet						2030			
Sector:	Energy	Category:	Fuel Combustion Activities	Subcategory:	1.A.1.a.i - Electricity Generation				
Sheet:	Fuel Consumption Data	Data							
Fuel Type (All fuels)									
Equation 2.1, 2.2, 2.3, 2.4, 2.5									
Subdivision		Fuel		Consumption Unit		Conversion Factor (TJ/Unit) (NCV)			
S	Δ	F	Δ	U	Δ	C	CF		
						$TC = C * CF$			
► Baseline Scenario 1		Gas/Diesel Oil		Gg (Auto CF)		5.256			
Baseline Scenario 2		Residual Fuel Oil		Gg (Auto CF)		27.63			
Mitigation Scenario 1		Gas/Diesel Oil		Gg (Auto CF)		1.927			
Mitigation Scenario 2		Residual Fuel Oil		Gg (Auto CF)		19.36			

Fuel Consumption Data	Fuel Combustion Emissions				
Worksheet		2030			
Sector:	Energy				
Category:	Fuel Combustion Activities				
Subcategory:	1.A.1.a.i - Electricity Generation				
Sheet:	Fuel Combustion Emissions				
Data					
Fuel Type	(All fuels)				
Equation 2.1, 2.2, 2.3, 2.4, 2.5					
Subdivision	Fuel	Total consumption (TJ)	CO2 Emissions (Gg CO2)	CH4 Emissions (Gg CH4)	N2O Emissions (Gg N2O)
S	Δ	T	CO2	CH4	N2O
Baseline Scenario 1	Gas/Diesel Oil	226.008	16.74719	0.00068	0.00014
Baseline Scenario 2	Residual Fuel Oil	1,116.252	86.3979	0.00335	0.00067
Mitigation Scenario 1	Gas/Diesel Oil	82.861	6.14	0.00025	0.00005
Mitigation Scenario 2	Residual Fuel Oil	782.144	60.53795	0.00235	0.00047

Number28: Visualisation of 2030 energy and emissions data in the 2006 IPCC software for thermal power generation/hybrid solar mini-grids (Scenario 1) and replacement of the KARPOWER plant (Scenario 2).

a) Replacement of thermal power generation by hybrid solar mini-grids

In the base scenario, there are no changes to the existing infrastructure. Diesel generators will continue to run at full capacity in all three cities until 2050, resulting in constant annual emissions of 16.8 kilotons of CO₂ equivalent. In the period 2025 to 2050, this equates to cumulative emissions of 436.8 kilotons of CO₂ equivalent.

In the mitigation scenario, diesel systems are progressively replaced by hybrid solar mini-grids, maintaining the same capacity of 1 MW at each site. The transition follows the following schedule:

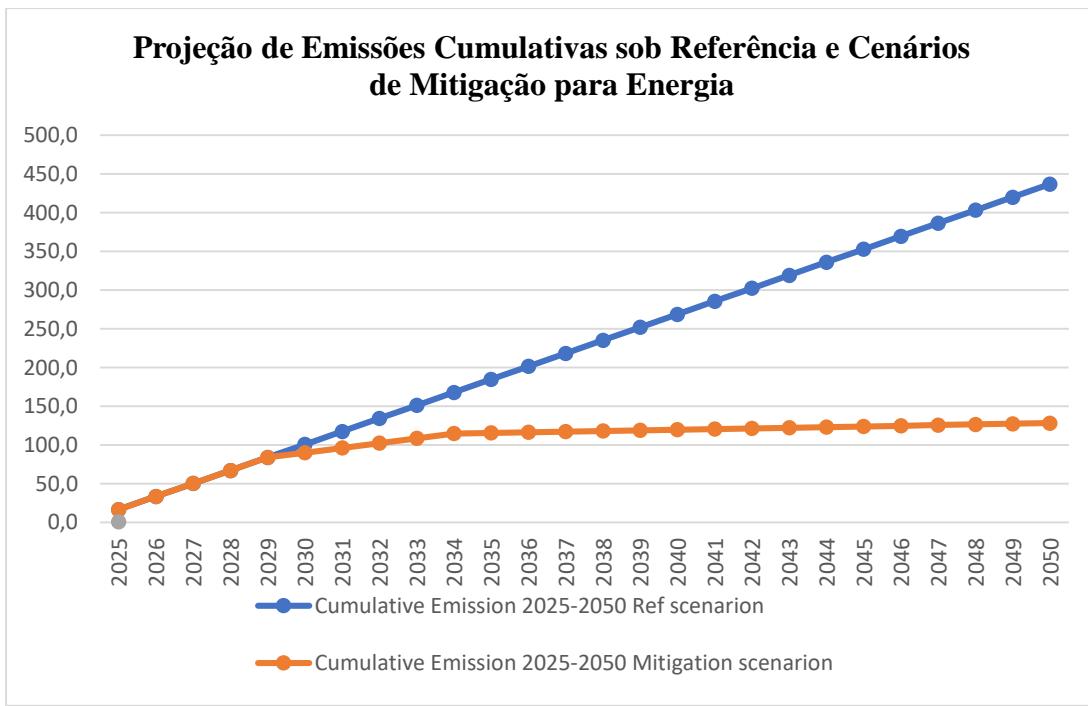
- 2025-2029: All three cities continue to use diesel, with emissions of 16.8 ktCO₂ per year.
- 2030-2034: Bafatá and Gabu are solarized, reducing annual emissions to 6.16 ktCO₂e.
- 2035-2050: Canchungo also transitions to solar energy. At this point, 95% of electricity is generated from solar and 5% from backup diesel, keeping emissions stable at 0.84 ktCO₂e per year.

By 2050, cumulative emissions in the mitigation scenario will total 128.2 kilotons of CO₂ equivalent, leading to an overall reduction of 308.6 kilotons of CO₂ equivalent compared to the initial value.

Table 2-0-1: Baseline and mitigation for the replacement of thermoelectric power in hospitals by hybrid solar mini-grids

Years	Annual emissions reference scenario 2025-2050	Cumulative emissions reference scenario 2025-2050	Annual Emissions Mitigation Scenario 2025-2050	Cumulative emissions mitigation scenario 2025-2050
2025	16.8	16.8	16.8	16.8
2026	16.8	33.6	16.8	33.6
2027	16.8	50.4	16.8	50.4
2028	16.8	67.2	16.8	67.2
2029	16.8	84.0	16.8	84.0
2030	16.8	100.8	6.16	90.2
2031	16.8	117.6	6.16	96.3
2032	16.8	134.4	6.16	102.5
2033	16.8	151.2	6.16	108.6
2034	16.8	168.0	6.16	114.8

2035	16.8	184.8	0.84	115.6
2036	16.8	201.6	0.84	116.5
2037	16.8	218.4	0.84	117.3
2038	16.8	235.2	0.84	118.2
2039	16.8	252.0	0.84	119.0
2040	16.8	268.8	0.84	119.8
2041	16.8	285.6	0.84	120.7
2042	16.8	302.4	0.84	121.5
2043	16.8	319.2	0.84	122.4
2044	16.8	336.0	0.84	123.2
2045	16.8	352.8	0.84	124.0
2046	16.8	369.6	0.84	124.9
2047	16.8	386.4	0.84	125.7
2048	16.8	403.2	0.84	126.6
2049	16.8	420.0	0.84	127.4
2050	16.8	436.8	0.84	128.2



Number29:Cumulative emissions projection in reference and mitigation scenarios for replacement

b) Replacement of the KARPOWER plant with the OMVG interconnector

For the period 2025-2050, emissions in the baseline scenario are expected to increase from 78.3 kilotonnes of CO₂e in 2025 to 128.8 kilotonnes of CO₂e in 2050. This increase is due to an annual growth of 2% in installed capacity, while the continued dependence on the KARPOWER plant fuelled by fossil fuels remains. In the same period, cumulative emissions in the reference scenario are estimated at 2,642.3 kilotonnes of CO₂e.

With the implementation of the mitigation measure, the replacement of the KARPOWER plant by the OMVG interconnector, which provides cleaner and more sustainable electricity, emissions are expected to increase more moderately, from 29.6 kilotons of CO₂ equivalent in 2025 to 48.6 kilotons of CO₂ equivalent in 2050. Cumulative emissions under this mitigation scenario are projected at 997.9 kilotons of CO₂ equivalent.

Therefore, replacing the KARPOWER plant with the OMVG interconnector will result in a total reduction of 1,644.4 kilotons of CO₂ by 2050 compared to the baseline scenario.

Table 3-0-2: Baseline and mitigation for the replacement of the KARPOWER plant by the interconnector

Years	Annual emissions reference scenario 2025-2050	Cumulative emissions reference scenario 2025-2050	Annual Emissions Mitigation Scenario 2025-2050	Cumulative emissions mitigation scenario 2025- 2050
2025	78.5	78.5	29.6	29.6
2026	80.1	158.6	30.2	59.8
2027	81.7	240.3	30.8	90.6
2028	83.3	323.6	31.4	122.0
2029	85.0	408.6	32.0	154.0
2030	86.7	495.3	32.7	186.7
2031	88.4	583.7	33.3	220.0
2032	90.2	673.8	34.0	254.1
2033	92.0	765.8	34.7	288.8
2034	93.8	859.6	35.4	324.1
2035	95.7	955.3	36.1	360.2
2036	97.6	1053.0	36.8	397.0
2037	99.6	1152.5	37.5	434.6
2038	101.6	1254.1	38.3	472.9
2039	103.6	1357.7	39.1	511.9
2040	105.4	1463.1	40.1	552.0
2041	107.5	1570.7	40.9	592.8
2042	109.7	1680.4	41.7	634.5
2043	111.9	1792.3	42.5	677.0
2044	114.1	1906.4	43.4	720.4
2045	116.7	2023	44.0	764.4
2046	119.0	2142.0	44.9	809.3
2047	121.4	2263.4	45.8	855.0
2048	123.8	2387.2	46.7	901.7
2049	126.3	2513.5	47.6	949.3
2050	128.8	2642.3	48.6	997.9

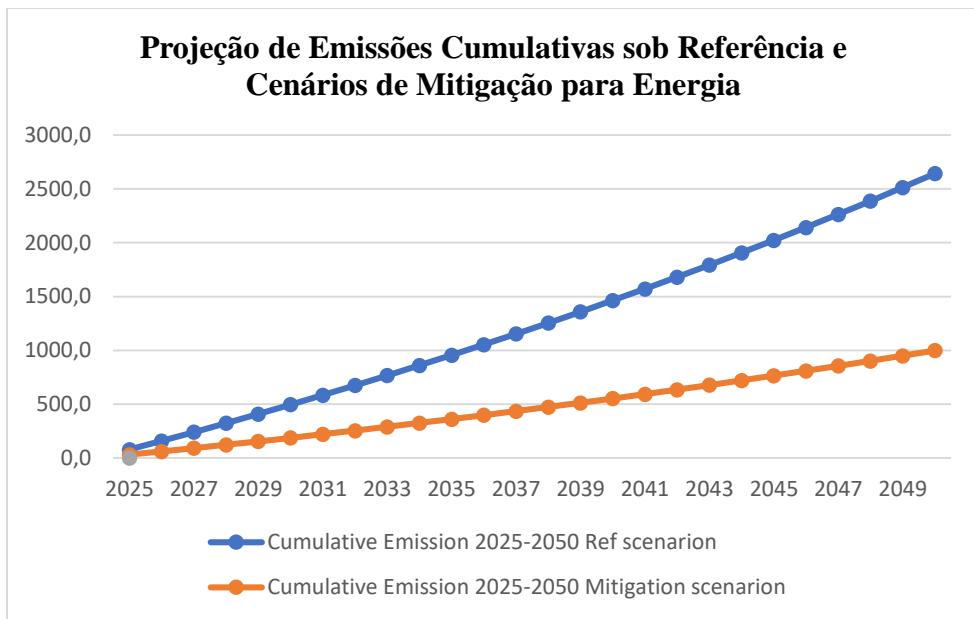


Figure 3.4: Projection of cumulative emissions in reference and mitigation scenarios for the replacement of the KARPOWER plant by the OMVG interconnector

3.4. Agriculture and Land Use

Guinea-Bissau, situated in West Africa, is characterised by a wide coastline, wetlands and tropical forests, including important mangrove ecosystems. These natural environments have historically played an essential role in carbon sequestration, climate regulation and protection against coastal erosion.

However, in the absence of effective climate change mitigation and adaptation policies, particularly in the forest sector, the country continues to lose significant areas of vegetation cover, including mangroves, due to agricultural expansion, logging, disorderly urbanisation and coastal erosion caused by rising sea levels.

In the absence of reforestation, projects or policies (trees and mangroves), lack of environmental oversight, population growth without territorial planning, and energy poverty, the following consequences may occur:

3.4.1. Baseline scenario for the agricultural sector and related impacts

- *Average rate of deforestation:* 1.5% per year in dry and wet forests.
- *Estimated mangrove loss:* 30% by 2050, due to soil salinisation, rising sea levels and farm use and firewood.

a) Impact on GHG emissions:

- *Increased net CO₂ emissions:* Forests and mangroves, which acted as carbon sinks, become net sources of emissions.
- Estimated additional emissions (2025–2050):

- Degraded forests corresponding to the loss of sequestration capacity: -4,097 kilotons of CO₂e (2022 to 2030) Projections for (2030 to 2050) point to an absorption of -15,903 GgCO₂eq, which could reach -10,068 GgCO₂eq by 2050. Therefore, the loss of sequestration capacity: - 5.835 GgCO₂eq (2030 to 2050).

b) Environmental and social impacts:

- Increased frequency and intensity of coastal flooding.
- Reduction of marine and terrestrial biodiversity.
- Food insecurity, due to decreased agricultural productivity caused by soil impoverishment and climate instability.
- Environmental internal migration (climate migrants).
- Increased reliance on international aid to deal with natural disasters.

Without strategic actions aimed at reforestation (of trees and mangroves), environmental conservation, especially in the protection of forest and coastal ecosystems such as mangroves, Guinea-Bissau will face a significant increase in its greenhouse gas emissions, in addition to multiple socioeconomic and ecological consequences.

This baseline scenario is essential as a basis for assessing the potential benefits of alternative scenarios with proactive mitigation interventions such as reforestation, sustainable land management and mangrove conservation.

3.4.2. Mitigation scenario for the agricultural and land use sector

The overall objective of the Mitigation Scenario is to significantly reduce net greenhouse gas emissions and increase Guinea-Bissau's climate resilience by restoring vegetation cover, with special attention to reforestation (trees and mangroves) of degraded areas and their conservation, especially of coastal mangroves.

With the implementation of the project and the policies of reforestation (trees and mangroves), environmental inspection and demographic growth with territorial planning, one can expect:

a) Reforestation and Agroforestry

Objective: To reforest 2000 hectares every five years, starting from degraded areas by 2050, i.e. this quantity of hectares may even double (4000 ha), if conditions are right for its implementation.

Method: planting native species combined with sustainable agricultural crops (agroforestry).

Co-benefits: increasing agricultural productivity, restoring soil, creating green jobs.

b) Rehabilitation and Conservation of Mangroves

Objective: Restore 14,241 hectares of mangroves by 2050.

Method: mapping of degraded areas, community mobilisation, use of assisted natural regeneration techniques.

Co-benefits: coastal protection, increased artisanal fishing, carbon sequestration.

c) Creation of Conservation Units and Environmental Surveillance

New protected areas: 3 nature parks and 5 community reserves.

Institutional strengthening: training of forest guards, use of drones and satellites for monitoring.

e) Environmental Education and Community Empowerment

Awareness campaigns: on the importance of mangroves and forests.

School and community programmes: involving young people and local leaders in sustainable management.

3.4.3. Expected impacts on emissions (GHG mitigation)

Table 3-0-3: Estimated sequestered emissions (2025 to 2050)

Emission source / hijacking	Estimated reduction/sequestration by 2050
Reforestation (2000 ha)	-16.19 GgCO2
Mangrove reclamation	-1295.09GgCO2
Estimated total	-1311.29GgCO2

Economic: generating about 1,000 direct green jobs (nurseries, reforestation, ecotourism, monitoring).

Social: improvement of food and water security; valorisation of local products.

Ecological: restoration of biodiversity, improvement of soil and water quality.

Adaptation: better protection against coastal storms and prolonged droughts.

Conditions of Success

International climate finance: through mechanisms such as the Green Climate Fund (FCV).

Technical partnerships: with NGOs, universities and multilateral organisations.

Community involvement: focussing on rural and coastal populations.

Robust public policies: integrating climate mitigation into national development plans.

This alternative mitigation scenario offers Guinea-Bissau the opportunity to lead a sustainable development model adapted to its ecological and social reality. Investing in reforestation of trees and mangroves not only reduces GHG emissions, but also strengthens food sovereignty, the local economy and the country's ability to address future climate challenges.

3.4.4. Emission analysis for baseline/reference and mitigation scenarios for the Agriculture and Land Use sector

For the reference situation, that is, the absence of the reforestation project (trees and mangroves) and other public policies and government strategies in the country, the results of the calculation of the IPCC 2006 software, report that the removal of carbon dioxide (CO2) is zero (0) between the years (2025 to 2050), this implies the non-occurrence of any type of sequestration of carbon dioxide (CO2) in the atmosphere.

It should also be noted that, in this situation (reference), given the non-implementation of the project and other public policies and strategies, the capacity to sequester greenhouse gases is zero, from the perspective of values or results of calculations of the IPCC 2006 software. But, in accordance with the needs of the population, activities to cut and use forest resources irrationally thus continue to increase greenhouse gas emissions, while sink capacity gradually decreases.

Regarding the mitigation situation, with the implementation of the project and other public policies and government strategies between the years (2025 to 2050), the results of the IPCC 2006 software demonstrate a large gradual capacity of carbon dioxide (CO₂) sequestration in the atmosphere.

Table 3-0-4: GgCO₂eq removal trend in the mitigation situation (2025 – 2050)

Year	Mitigation Situation	
	Tree	Mangroves
2025	0.00	0.00
2030	-1.08	-82.19
2035	-2.16	-231.03
2040	-3.24	-277.74
2045	-4.32	-328.75
2050	-5.40	-375.38

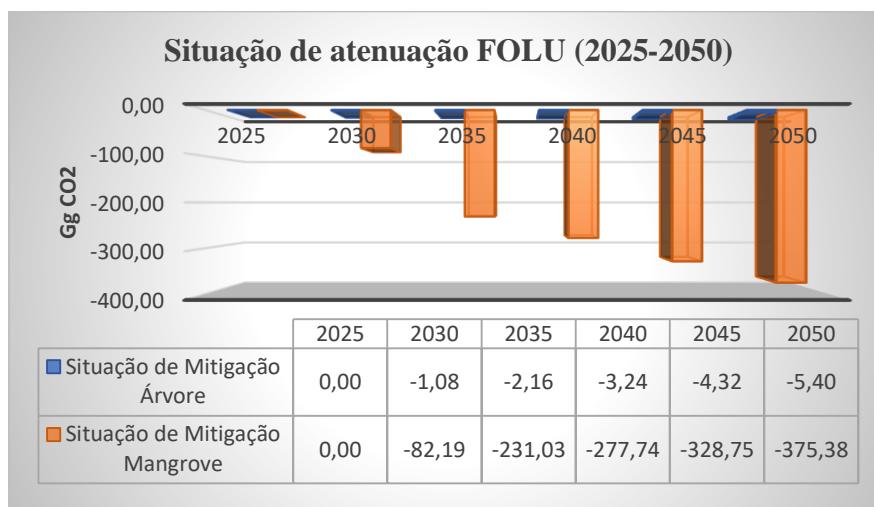


Figure 3.5.Removal trend in the mitigation situation (2025-2050)

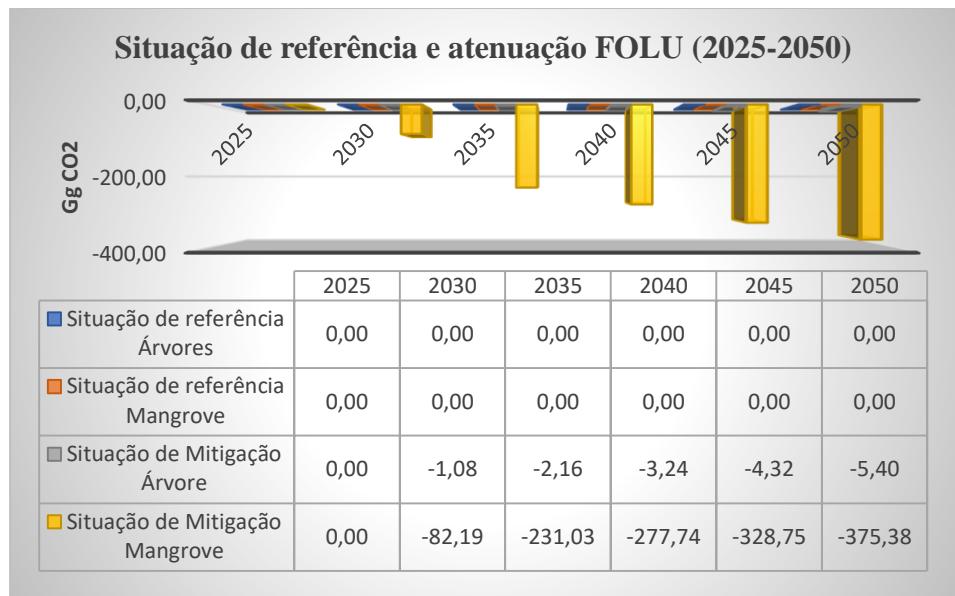


Figure 3.6: Trend of CO₂ removal in the reference and mitigation situation (2025-2050)

3.5. Analysis of total reduced emissions

The replacement of the KARPOWER plant by the OMVG interconnector represents the main contribution to the total emission reduction (1,644.4 ktCO₂eq in 2050), followed by mangrove planting and the hybrid mini-grid. If all the proposed mitigation options are implemented simultaneously, the total emission reduction will reach 2,357.18 ktCO₂eq in 2050. Reforestation and planting of mangroves will at some point contribute to adaptation to climate change.

Table 3-0-5: Total emissions reduced ktCO₂eq

Years	Hybrid solar mini-grids	Replacement of the KARPOWER plant with the OMVG interconnector	Reforestation	Mangrove plantation	To reduce emissions completely
2025	-	48.90	-	-	48.90
2030	10.60	308.60	1.08	82.19	415.27
2035	69.20	595.10	2.16	231.03	1,220.89
2040	149.00	911.10	3.24	277.74	1,364.48
2045	228.80	1,258.60	4.32	328.75	1,843.87
2050	308.60	1,644.40	5.40	375.38	2,357.18

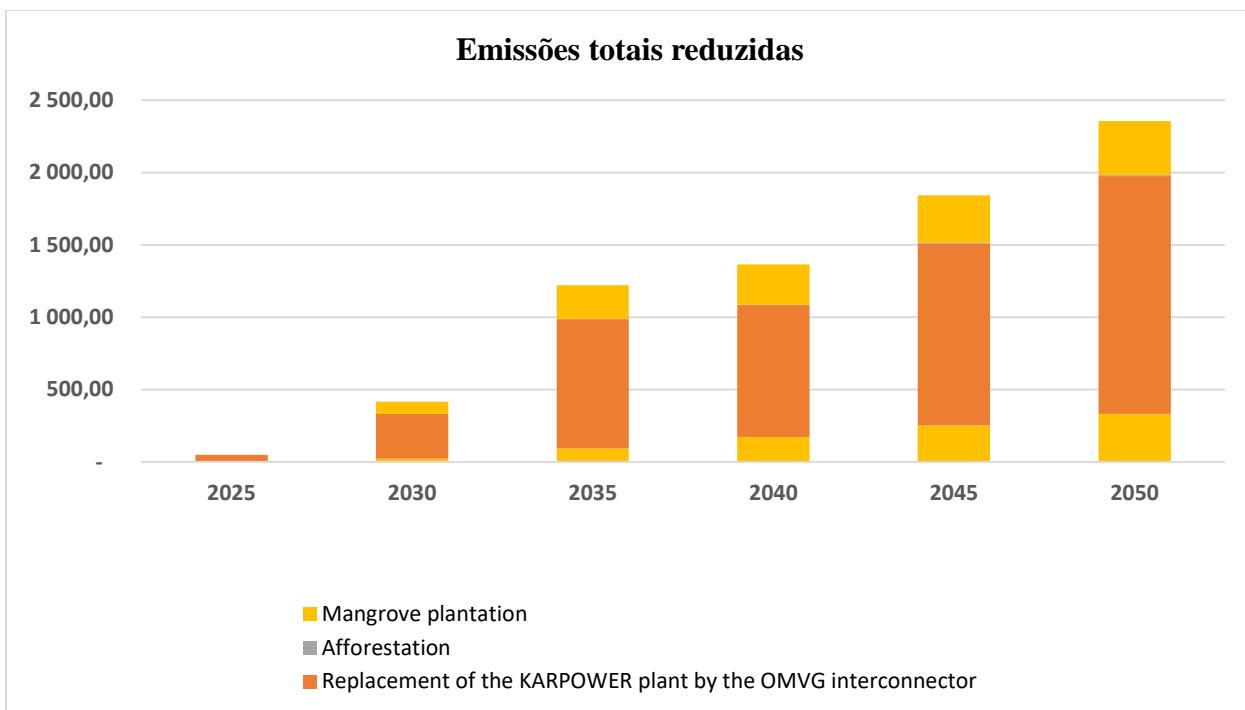


Figure 30: Total emissions reduced from 2025 to 2050

3.5. Details and justification of selected mitigation options

Table number 3-0-6 provides details and justifications of the mitigation options selected by subsector. Contains activities (quantity or scope), expected results, reduced emissions, specific recommended actions, estimated budget, and stakeholders/participants. With this information, the proposed mitigation option can be easily implemented as country-specific projects.

Table 3-0-6: Presentation of the details of the implementation of mitigation options for agriculture, forestry and land use

Subsector/ Subsector	Activities (Quantity/Scope)	Expected results	Reduced emissions	Actions	Budget Million FCA	Participants and role
AFOLU/Fo restry - Trees	Survey and mapping of priority areas for restoration.	Survey and mapping of priority areas.	0	Displacement to the terrain for survey and mapping.	59 000 000	Local population and NGOs recruited
	Establishment of nurseries and production of native plants.	Produced seedlings and nurseries	0	Creation of nurseries and plants in adequate space	10,000,000	Local youth recruited
	Planting trees (different species) in an area of	2000 ha of planted areas	5.40 ktCO2e	- Contact with the local population;		Local populatio

	2000 ha between 2025 and 2025	with different tree species		- Act of planting in the available areas.	285 000 000	n and NGOs recruited
	Training / Training of local agents, and environmental guards, in monitoring via drones and satellites.	Local agents and environmental guards trained in drone and satellite monitoring	0	- Training activities; - Practices of use of drones on land;	59 000 000	
	Environmental education in schools and communities.	The community at large is empowered and educated environmentally	0	- Implementation of environmental education programmes; - Radio programmes and disk displays for communities	59 000 000	
	Partnerships with NGOs, universities and local cooperatives.	Partnerships with NGOs, cooperatives and universities	0	- Signing partnerships with environmental protection bodies		
AFOLU/Forest - Mangrove	Mangrove restoration/plantation	14,241 hectares of mangroves restored	-375.38KtCO2	- Contact with the local population; - Act of planting in the available areas.	472 000 000	xxxx
Electricity production	Hybrid solar mini-grids installation in Bafatá, Gabú and Canchungo (1 MW each)	Replacement of diesel generators, stable electricity supply, local job creation	308.60 GgCO2eq (by 2050)	<ul style="list-style-type: none"> · Technical, economic, social and environmental studies · Acquisition and installation of equipment · Local training · Operation and maintenance 	Estimate (~7,872-9,840)	<ul style="list-style-type: none"> · Government (coordination and supervision) · Private sector (installation and operation) · Communities (beneficiaries)

						ries and local maintenance)
Electricity production	Replacement of the floating thermoelectric power plant KARPOWER with the electric power of OMVG (26 MW)	Reduced HFO dependency, lower operating cost, more stable access to electricity	~1,644.40 kt CO2eq (by 2050)	<ul style="list-style-type: none"> · Connection to the OMVG network · Stabilisation of supply . Decommissioning of the floating plant 	Already funded	<ul style="list-style-type: none"> · Government (negotiation and integration) · OMVG (fuelling) . International partners (financial support)

CHAPTER IV. PROGRAMMES CONTAINING MEASURES TO ADAPTAT ON CLIMATE CHANGE

4.1. National Circumstances, Institutional Arrangements and Legal Framework

4.1.1. National circumstances

Guinea-Bissau has signed and ratified the main agreements of the United Nations Framework Convention on Climate Change (UNFCCC). In 1995, it ratified the UNFCCC; in 2005, it ratified the Kyoto Protocol (RGB, 2011), and in 2016, it signed the Paris Agreement. Guinea-Bissau has made significant progress: in 2001, it published its First National Communication on Climate Change, which formed the basis for the most concise document of the National Action Plan on Adapting to Climate Change (PANA), published in December 2006.

PANA is a set of diagnoses on the socio-environmental context of the country, as well as proposals for technical solutions to climate challenges. The PANA identified the rural regions and the productive activities developed in them, such as agriculture, fishing, livestock and forest extraction, as the most susceptible to changes in rainfall patterns and the occurrence of extreme events (RGB, 2006).

The document on Strengthening the Resilience and Adaptation Capacity of the Agricultural and Water Sectors to Climate Change in Guinea-Bissau (PRCASAHMC-GB) (RGB, 2011) underlines that rising sea levels, as well as building coastal stands, can contribute to the loss of coastal floodplains and mangroves, causing crop losses due to the salinisation of rice paddies. Possible changes in rainfall patterns can impact current food security strategies, increase child malnutrition and cause an increase in cases of heat wave-related diseases and deaths, floods, storms and similar events.

4.1.2. Institutional arrangements

The Ministry of Environment and Biodiversity (MABAC) is the main body providing guidance on policies, legal issues and other documents related to the environment and biodiversity, including climate change. The National Environment Institute (INA) plays a key technical role in the National Committee on Climate Change (NCCC). The INA is responsible for providing technical and scientific support, coordinating activities related to environmental impact assessment, contributing to the development of adaptation policies and strategies and assisting in the practical implementation of adaptation measures, in collaboration with other institutions involved.

The National Committee on Climate Change (CNAC) of Guinea-Bissau is composed of several government institutions and relevant organisations that collaborate in the formulation and implementation of policies related to climate change. The main entities that make up the CNAC include:

- *Ministry of Environment, Biodiversity and Climate Action (MABAC)*: Body responsible for the overall coordination of the country's environmental and biodiversity policies.

- *National Environment Institute (INA)*: Provides technical and scientific support, coordinating activities related to environmental impact assessment and contributing to the development of adaptation strategies.

In addition to these institutions, the NCCC may include representatives of other relevant ministries and entities, such as the Ministries of Agriculture, Fisheries, Water Resources, Health and Energy, as well as

non-governmental organisations (NGOs), research centres and institutes, civil society and international partners involved in climate issues. This multidisciplinary approach allows an integrated and effective response to the challenges posed by climate change in Guinea-Bissau.

Below is an organisation chart that clearly illustrates how the various institutions and institutional arrangements are linked to key policies and processes related to adaptation, such as NAPA, NDC, the NAP process and interactions with the Green Climate Fund (GCF) and the Global Environment Facility (GEF).

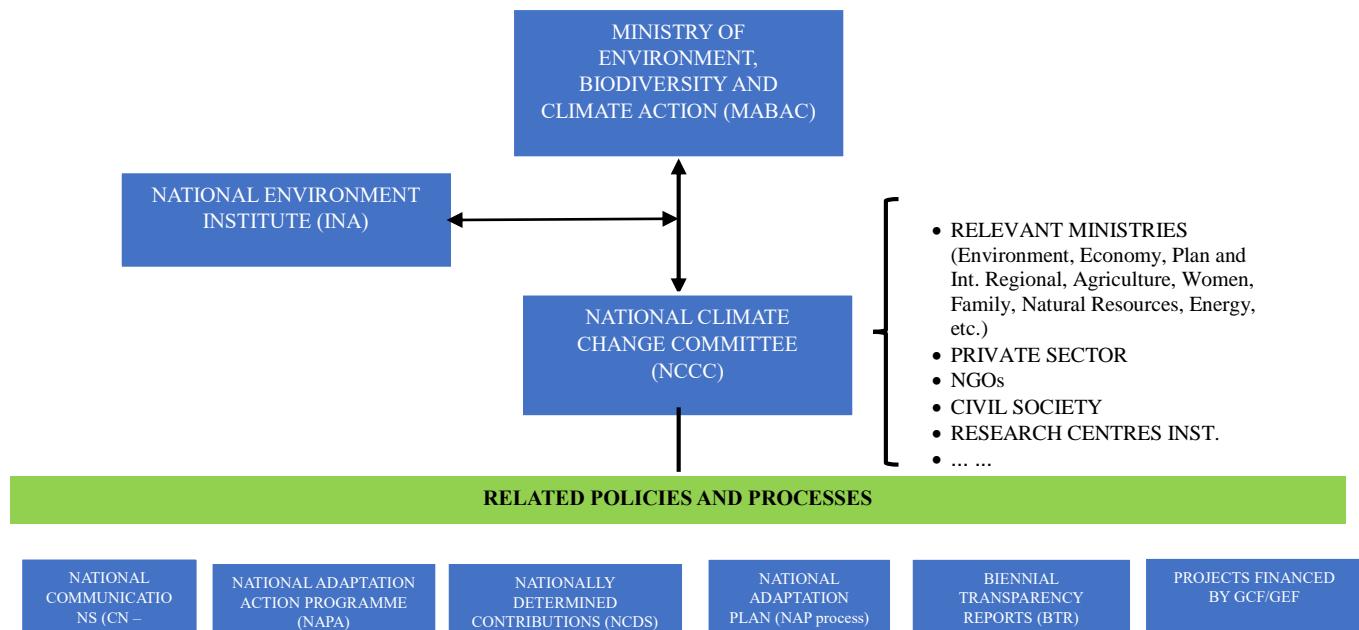


Figure 31: Organisation chart of institutional arrangements related to climate change adaptation issues.

Current institutional arrangements have been instrumental in facilitating coordinated adaptation actions. The National Committee on Climate Change (NCCC) plays a central role in coordination between the relevant government institutions. Despite these efforts, there are still challenges related to limited institutional capacity and the need for a more robust integration of adaptation actions into the regular operations of public institutions. Strengthening institutional capacity and improving inter-institutional communication are priority areas for ensuring the effectiveness of adaptation actions.

The effectiveness of existing institutional arrangements is also related to the technical and administrative capacity of the government institutions involved, especially in terms of specialised human resources, adequate infrastructure and access to the necessary technologies. Continuous improvement of these capabilities is essential to ensure that institutions are able to effectively implement adaptation actions and integrate them into their day-to-day operations.

4.1.3. Legal framework related to climate change

Considerations and planning for adaptation to climate change in Guinea-Bissau are at an early stage of development. Although some climate change integration activities have been carried out in the framework of the implementation of the project "Strengthening Climate Change Resilience and Adaptive Capacity in Guinea-Bissau's Agricultural and Water Sectors", the country faces major challenges, mainly

due to the absence of a National Climate Change Policy Table and an established national adaptation planning process. It is therefore necessary to create an enabling environment to facilitate the integration of adaptation measures into national development objectives and to strengthen the capacity of the Ministry of Environment, Biodiversity and Climate Action, which is responsible for the development of environmental and climate change adaptation policies.

The table below presents some policies and plans on climate change:

Table 4-0-1: Climate Change Policies and Plans

Policies/Plans	Description
Paris Agreement.	Guinea-Bissau is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and ratified the Paris Agreement in April 2016.
National Determined Contribution (NDC).	Guinea-Bissau submitted its National Contribution (Expected) in September 2015. The document includes mitigation and adaptation components. The NDC was inspired by the National Poverty Reduction Strategy (DENARP II) and is aligned with the Strategic and Operational Plan - Terra Ranka 2015-2025. Guinea-Bissau's contribution to mitigation includes the implementation of policies and actions planned in the forestry and energy sectors. Their contribution to adaptation broadly identifies agriculture, the coastal zone, cross-cutting areas, disaster risk management, education, energy, environment, health and tourism as areas requiring adaptation actions. It also identifies gaps and needs, as well as high-level adaptation objectives. One of these shortcomings is the need to carry out a cost-benefit analysis of adaptation measures. According to the updated 2021 NDC, the implementation of adaptation and mitigation measures depends on external partners that provide financial resources, technology, and training. Although the impacts and vulnerabilities of climate change are presented, they are based on NAPA (2006) and, therefore, are considered outdated.
National Action Plan for Adaptation (NAPA, 2006).	PANA has identified several priority strategic actions to address the risks and impacts of climate change in Guinea-Bissau. These actions aim to increase the food security of rural populations in order to increase their resilience, reduce pressure on forest and fishing resources and improve access to drinking water. PANA prioritises agriculture and tourism, as well as water resources, coastal erosion and biodiversity.
Third National Communication (TNC).	The 2018 TCN presents, among other aspects, the climate-induced impacts and suggested adaptation needs for the main sectors of agriculture and livestock, energy, forestry, biodiversity, fisheries and water resources. The TCN proposes a series of adaptation measures. For the water sector, it proposes: Establishing a coherent and consistent strategy, using an integrated approach to water resources management and increasing rainwater harvesting and storage capacity to increase surface and groundwater reserves. For the agricultural sector, it proposes a range of adaptation measures that vary across ecosystems. These ecosystems are those of mangroves, the Bas-Fonds (freshwater), those of the plateau and those of backyard agriculture.
Hyogo Table/Sendai Table.	Under the Hyogo Framework/Sendai Framework, Guinea-Bissau has been making efforts since 2010 to develop its capacity in Disaster Risk Reduction/Disaster Risk Management (DRR/DRM), which led to the adoption of

	the National Strategy for Disaster Risk Reduction and the creation and operationalisation of the National Civil Protection Service (SNPC).
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4.2. Impacts, risks and vulnerabilities

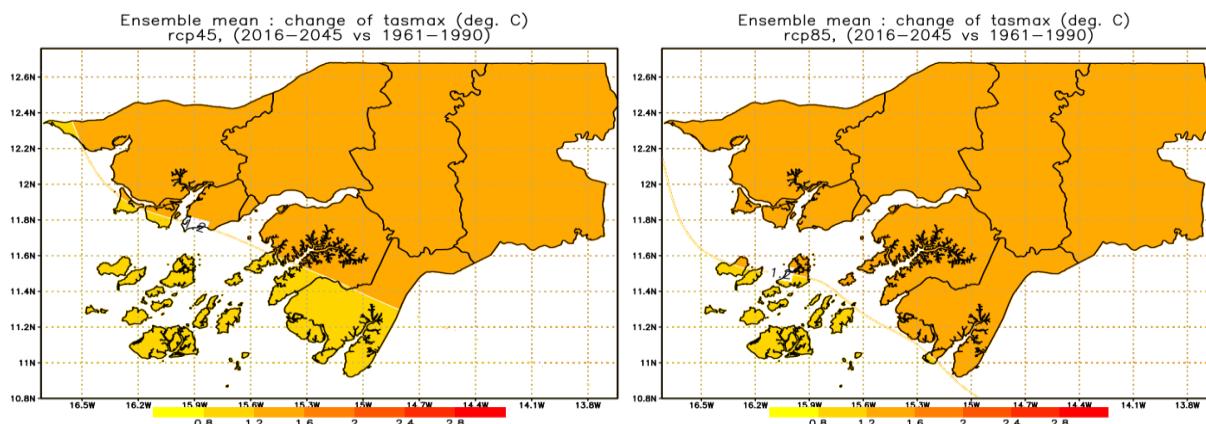
4.2.1. Analysis of past and future climate change projections

Available information on past climate change indicates general trends, such as the increase in average annual temperature and changes in precipitation patterns, reported mainly by the Intergovernmental Panel on Climate Change (IPCC) in its global and regional assessment reports (IPCC, 2014; IPCC, 2021) and the new climate scenarios for Guinea-Bissau 2016 - 2045, provided by the National Institute of Meteorology (INM), there is a gradual increase in temperatures, accompanied by variability in precipitation regimes and a higher frequency of extreme events, such as droughts and intense rainfall.

Looking ahead, climate projections indicate that these trends will continue, with further increases in average temperatures, intensification of extreme weather events, and changes in precipitation patterns. Specifically, the IPCC climate models suggest that Guinea-Bissau could face significant increases in average annual temperature, ranging from 1.5 °C to 3 °C by 2100, depending on the emissions scenario considered (IPCC, 2021).

The new climate scenarios project significant changes in the climate of Guinea-Bissau. Systematic increases in average daily temperature are expected to reach +1.4 °C in the period 2016-2045 and +2.2 °C in the period 2046-2075, according to Scenario CRP4.5 (low emissions); and from +1.6 °C to +3.1 °C in the period 2046-2075, according to Scenario RCP8.5 (high emissions).

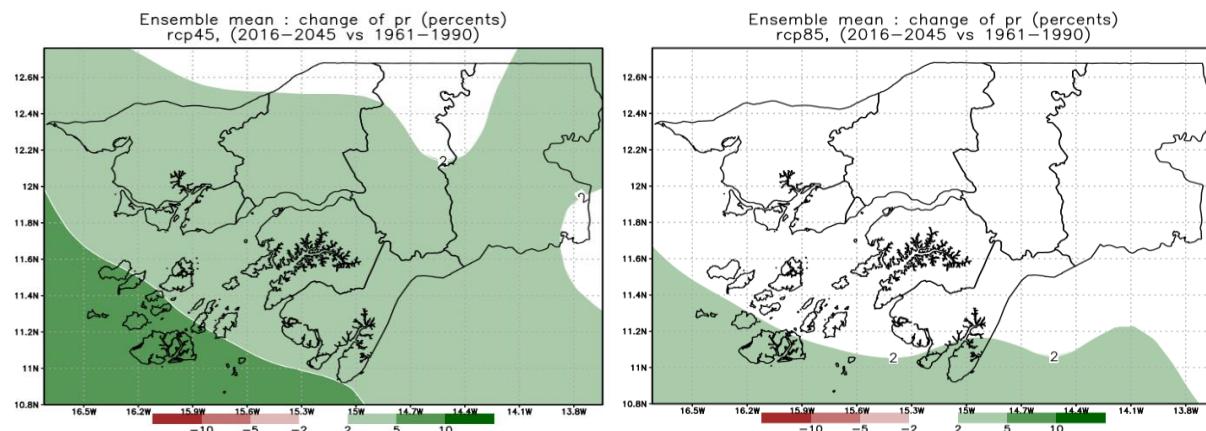
For the maximum daily temperature, the average of the regional climate models used indicates an increase in the order of +1.2 °C [+0.8 °C to +1.7 °C] on the coast (Bissau and Bolama) to +1.4 °C [+1.0 °C to +1.6 °C] in the interior and east, according to Scenario RCP4.5 (low emissions), for the period 2016-2045 compared to Normal 1961-1990. An increase from +1.3 °C [+0.9 °C to 2.0 °C] on the coast to +1.5 °C [+1.2 °C to 2.1 °C] inland according to Scenario RCP8.5 (high emissions) for the period 2016-2045 compared to Normal 1961-1990 (see Figure 33).



Number32: Projections of maximum daily temperature (°C) changes for the period (2016-2045): a) scenario RCP4.5 (low emissions) and b) scenario RCP8.5 (high emissions).

Regarding precipitation, the average of the fourteen models used in the simulations indicates a slight increase in average daily precipitation of +10% for the period 2016-2045, according to Scenario RCP4.5 (Low emissions). For Scenario RCP8.5 ("High Emissions"), a climatologically identical situation to Normal is expected (without significant variations from the reference period: 1961-1990), with the exception of the southwestern part of the Bijagós Archipelago and the southern part of the Tombali Region (Cacine Sector), where an increase of +5% is expected.

Average Daily Precipitation (in %) 2016-2045; Scenario RCP4.5 ("low emissions"), the average of the set of models used in the simulations projects a slight increase in average daily precipitation, in the order of +3% [+2% to +5%] in almost all the national territory, except for the southwestern part of the Bijagós Archipelago, where an increase between +5% and +10% is expected. For Scenario RCP8.5 ("high emissions"), a climatologically identical situation to Normal is expected (without significant variations from the reference period: 1961-1990), with the exception of the southwestern part of the Bijagós Archipelago and the southern part of the Tombali Region (Canine Sector) where a slight increase of about +2% to +5% is expected.



Number33: Projections of average daily precipitation changes (in %) for the period (2016-2045): (a) scenario RCP4.5 (low emissions) and (b) scenario RCP8.5 (high emissions)

However, it is important to highlight the significant uncertainties associated with these projections, especially due to the scarcity of detailed historical data and the limited spatial resolution of climate models available for the region. In addition, the absence of specific national studies contributes to additional uncertainty regarding the exact magnitude of the projected changes and their detailed impacts on the territory and communities of Guinea-Bissau (UNDP, 2020; GEF, 2021).

For the scenarios of average sea level rise, according to the MAGICC SCENGEN Model, version 5.1, an increase of approximately 1.5 million is expected by 2020, 6.5 cm, and will reach 1.5 million by 2050, 20 cm. These sea level rises, combined with coastal erosion, can have drastic consequences for low-lying countries and small islands such as Guinea-Bissau, particularly affecting the country's economy, especially populations living in coastal areas and their livelihoods.

4.2.2. Impacts, risks and vulnerabilities in important socio-economic sectors

Available assessments, including reports produced by the Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) and other international organisations, highlight significant impacts on Guinea-Bissau's main socio-economic sectors resulting from current and future climate risks.

According to historical data (Directorate-General for Water Services/MRN), coastal flooding caused by high tides or torrential rains (such as those observed in 2003, 2004 and 2005) affected the eastern regions of the country (Bafatá and Gabú). This has caused damage to infrastructure (bridges and substandard housing), the loss of 63 hectares of food crops and the interruption of the work of hundreds of people, who have been forced to leave their villages temporarily or permanently.

The floods would come mainly from the tributaries of the Geba rivers and the shared tributaries of the Koliba (Guinea-Conakry) and Corubal (Guinea-Bissau) rivers.

In the eastern zone, dust waves from the Sahara Desert, drought, and rising temperatures can increase the allocation of cereals, mainly staple corn, horse corn, and sorghum.

The main risks of climate change already felt in the country are:

- Temperature increase;
- Change in precipitation;
- Sea level rise;
- Ocean warming and acidification.

Agricultural sector

The agricultural sector is particularly vulnerable to climate change, with prolonged droughts, irregular rainfall and frequent flooding reducing productivity and affecting food security. Small farmers in rural areas are most affected because of their direct dependence on climatic conditions for subsistence and commercial cultivation.



Number34Subject: Horticulture for adapting agriculture to climate change

Fishing Sector

The fisheries sector, which is crucial for the national economy and food security of coastal communities, faces significant risks due to rising sea levels, rising ocean temperatures and extreme weather events. These changes directly threaten marine and coastal ecosystems, essential for the reproduction and maintenance of fish species.



Number35:Subject: Market supply/artisanal fishermen

Urban area

Urban areas, particularly the capital, Bissau, are increasingly vulnerable frequent flooding and flooding, impacting critical infrastructure, housing and public health services. Vulnerable urban populations, including women, children and marginalised communities, face increased risks due to lack of adequate infrastructure and limited capacity to respond to climate emergencies.



Number36:Subject: Urban flooding in Guinea-Bissau

Water and Coastal Zone

Irregular rainfall and rising temperatures would lead to a decrease in river flow and a reduction in the abstraction of groundwater to supply the population. Groundwater quality would also be negatively impacted. Groundwater salinity is also expected to increase, compounded by rising sea levels.

The coastal zone will be affected by rising sea levels in the form of tropical storms, coastal erosion and floods in low-lying areas. The oceans will become more acidic, which at some point will have an impact on marine productivity, marine food chains and, consequently, on the availability of fisheries resources.

Impacts on rural populations and vulnerable social groups

Rural populations and vulnerable social groups, especially women and children, face additional challenges due to direct exposure to extreme events and limited adaptability. Women, responsible for much of family farming and natural-resource management, are disproportionately affected by climate change.

These analyses emphasise the urgent need for integrated policies and concrete actions for adaptation and resilience, considering the socio-economic and cultural particularities of Guinea-Bissau, to protect and strengthen the sectors and communities most vulnerable to the adverse effects of climate change.

4.3. Priorities and barriers to adaptation to climate change in Guinea-Bissau

Guinea-Bissau has made progress in implementing climate change adaptation strategies despite structural and financial challenges. National priorities reflect the need to protect ecosystems, ensure food security, strengthen infrastructure and promote sustainable development.

4.3.1. National priorities for climate adaptation

Guinea-Bissau's national priorities for adaptation to climate change are outlined in a series of policy and strategic documents that reflect the country's commitment to addressing the challenges posed by climate change. The main document setting out these priorities is the National Action Plan for Adapting to Climate Change (PANA), drawn up in 2006. This plan identified three sectors as the most vulnerable — agriculture, water and coastal areas — that remain central to the latest policies and strategies, including the Nationally Determined Contribution (NDC) updated in 2021.

- *Agricultural Sector:*

Agriculture is highly dependent on climatic conditions and forms the basis of the livelihood of a large part of the rural population. The sector faces significant risks due to rainfall variability, rising average temperatures, prolonged droughts and soil degradation. These factors reduce agricultural productivity, undermine food security, and exacerbate poverty in rural communities.

The national priority is therefore to develop the adaptability of agro-pastoral and forestry production systems, by promoting climate-resilient agricultural practices, crop diversification and strengthening the sustainable management of natural resources.

These actions are aligned with the commitments of NDC 2021, which highlight agriculture as a key sector for strengthening community resilience and food security, directly contributing to SDG 2 (Zero Hunger), SDG 13 (Climate Action) and SDG 15 (Terrestrial Life).

- *Water Resources:*

Water availability and quality are under increasing pressure due to reduced precipitation, salinisation of surface and groundwater in coastal regions and watershed degradation. These risks undermine the supply of drinking water, agricultural irrigation and the ecological balance of aquatic ecosystems.

Thus, one of the main priorities is to promote the integrated management of water resources, ensuring better hydro-meteorological monitoring, planning of water use and protection of recharge areas and water sources.

NDC 2021 reinforces this priority by proposing actions for sustainable and integrated management of surface and groundwater, and institutional strengthening for water governance. These measures contribute to the fulfilment of SDG 6 (Drinking Water and Sanitation) and SDG 13 (Climate Action).

- *Coastal Zone:*

The coastal zone of Guinea-Bissau, characterised by extensive mangroves and low-lying islands, is particularly vulnerable to sea level rise, coastal erosion, saline intrusion and loss of coastal ecosystems. These phenomena affect infrastructure, riverine communities, and livelihoods based on fishing and floodplain farming.

Priorities for adaptation focus on protecting and restoring coastal ecosystems, coastal spatial planning, and reducing risks of flooding and erosion through green infrastructure and nature-based solutions.

These actions are reaffirmed in NDC 2021, which proposes interventions to increase the resilience of coastal and marine ecosystems and protect vulnerable communities. These measures are aligned with SDG 14 (Life on Water), SDG 15 (Life on Land) and SDG 13 (Climate Action).

Together, these priorities form the basis for existing adaptation policies and guide the integration of climate resilience into national and local development plans. NDC 2021 reinforces this commitment by proposing an integrated approach to adaptation and mitigation that directly contributes to the implementation of the 2030 Agenda for Sustainable Development, consolidating Guinea-Bissau's role as a country committed to environmental sustainability, reducing vulnerability and strengthening the adaptability of its communities and ecosystems.

4.3.2. Barriers to adaptation

Guinea-Bissau faces several barriers that hamper its ability to effectively adapt to climate change. The main limitations include a lack of specialised technical capacity, insufficient financial resources and institutional challenges. These limitations make it difficult to implement the adaptation strategies needed to deal with adverse climate impacts.

To overcome these barriers, the country needs specific support in several areas:

- Institutional Strengthening and Technical Training: It is crucial to develop and improve the technical capacities of national institutions to plan and implement adaptation actions. This includes continuing training for professionals and strengthening government structures responsible for environmental and climate management.

- Access to International Climate Finance: Getting financial resources from international funds is essential to enable adaptation projects. Guinea-Bissau needs assistance to prepare competitive bids and meet the criteria required by global funders.

- Transfer of Appropriate Technologies: The introduction of sustainable and locally adapted technologies can increase the resilience of vulnerable sectors such as agriculture and water management. This includes climate-resilient farming practices and efficient water-use systems.

- Community Involvement and Public Awareness: The involvement of local communities in the adaptation process is essential. Education and awareness programmes can empower populations to adopt adaptive practices and actively participate in the implementation of solutions.

Addressing these specific needs will allow Guinea-Bissau to strengthen its resilience to climate change and promote sustainable and inclusive development.

4.4. Adaptation strategies, policies, plans, targets and actions to integrate adaptation to climate change in Guinea-Bissau

Ongoing national adaptation policy processes often include strategic initiatives coordinated by different instruments and approaches, such as National Adaptation Plans (NAPs), Nationally Determined Contributions (NDCs), National Action Programmes for Adaptation (NAPs) and the integration of adaptation into national development plans. Here is a detailed description of each of these processes:

4.4.1. National Climate Change Adaptation Plan (NAP)

The NAP is currently under development in Guinea-Bissau with the support of international partners such as the United Nations Development Programme (UNDP) and the Green Climate Fund (GCF). The central objective of the NAP is to strengthen the national capacity to identify, prioritise and implement effective adaptation measures in key sectors. This process involves:

(a) *the diagnosis and assessment of climate vulnerabilities*, especially in priority sectors such as agriculture, water, forestry, the coastal zone, health and infrastructure;

(b) *national and regional multi-stakeholder consultations* to ensure social inclusion, gender equity and community participation in adaptation decisions;

(c) *develop sector-specific adaptation strategies*, including detailed programmes and actions, with clear timelines and budget estimates;

(d) *identification of financing and capacity building needs*, including the development of technical, institutional and human capacities for the effective implementation of the NAP;

(e) Integrate the NAP into sectoral and regional policies and plans, increase coherence with sustainable development policies, poverty reduction strategies and local territorial plans.

4.4.2. Nationally Determined Contributions (NDCs)

The NDCs represent a strategic commitment of Guinea-Bissau under the Paris Agreement (UNFCCC). The country submitted its first NDC in 2015, recently updated in 2021. As regards adaptation, the NDC sets out priority actions to increase national resilience to climate impacts, involving:

- (a) restoration and protection of coastal and marine ecosystems*, with particular attention to mangroves, which are essential for natural flood protection and coastal erosion;
- (b) promote resilience and climate-friendly farming practices*, including drought-resistant varieties, sustainable water management and agro-ecological techniques;
- (c) Strengthen national early warning and climate risk management systems* by increasing institutional capacity for a rapid and effective response to climate emergencies;
- (d) Strengthen technical and scientific capacity* through investment in applied climate research, environmental education and specialised technical training;
- (e) Mobilising international climate finance* to complement national resources for the effective implementation of the proposed measures.

The updated NDC of Guinea-Bissau (2021) reaffirms and consolidates the priority actions of adaptation previously identified in the National Adaptation Action Plan (NAPA, 2006) and other national strategic documents, such as the Second National Communication (SCN) and the National Plan for Economic and Social Development (PNDES).

In particular, NDC 2021:

- Reconfirms the most vulnerable sectors — agriculture, water, coastal areas, forests/ecosystems, fisheries and health — as priorities for adaptation.
- It resumes and updates the structural measures proposed in NAPA, but with a greater focus on integrating adaptation actions into development policies and on strengthening institutional and community climate resilience.
- It is linked to the PANA-GB (National Environmental Action Plan) and the National Investment Plan for Adaptation (NAP) in preparation, aiming at coherence between planning instruments.

In summary:

Yes, Guinea-Bissau's NDC 2021 reconfirms the priority actions for adaptation outlined in NAPA and other national documents, keeping the same vulnerable sectors as the central focus of the national adaptation strategy.

4.4.3. National Action Programmes for Adaptation (NSAPs)

Guinea-Bissau's National Climate Action Plan (PANA), developed in 2006, was the first strategic approach to address climate change challenges in the country, serving as an emergency plan for

immediate priority actions. PANA initially identified the most vulnerable sectors and areas and proposed concrete actions to reduce climate vulnerability. Key actions highlighted include:

- a) *Integrated management of water resources* to ensure safe and sustainable access to water, especially in periods of prolonged drought;
- (b) *promoting food security* through crop diversification, the introduction of climate-resilient farming techniques and the improvement of traditional farming practices;
- c) *Protect and restore forests* and mangroves, recognising the importance of these ecosystems for local and regional climate stability;
- d) *improving public health systems*, especially in the management of climate-sensitive diseases such as malaria and diarrheal diseases;
- e) *Raising awareness and empowering the community* for the participatory management of natural resources and adaptation to climate change.

Currently, many actions initiated by PANA continue to be developed and deepened in the PNA and the NDC, creating continuity and strategic complementarity.

4.4.4. Integrating Adaptation into National and Sectoral Development Plans

Guinea-Bissau has adopted an integrated approach to adaptation, aligning climate objectives with national policies and sectoral development plans, such as:

- a) *Strategic and Operational Plan "Terra Ranka" (2015–2025)*: This document includes adaptation as one of the pillars to promote sustainable development and economic and environmental resilience;
- b) *National Strategy for Poverty Reduction and Growth*: Highlights actions to reduce social, environmental and economic vulnerabilities to climate change;
- c) *Agricultural and Rural Sector Master Plan*: explicitly provides for integrated climate actions to increase agricultural productivity and food security, reducing the negative impacts of extreme weather events;
- d) *National Plan for Integrated Water Resources Management*: Aims to ensure the availability and quality of water, especially in the face of climate variability;
- e) *Strategic Coastal Management Plan*: Incorporates adaptation strategies, including coastal protection and ecological restoration, to mitigate erosion and flooding.

4.4.5. Institutional Strengthening and Intersectoral Coordination

To effectively implement climate adaptation and mitigation processes, Guinea-Bissau has significantly strengthened its institutional mechanisms for climate governance and intersectoral coordination, through an articulated set of structural, legal and operational measures:

- a) *Creation and consolidation of the National Committee on Climate Change (CNMC)*

The CNMC, coordinated by the Ministry of Environment, Biodiversity and Climate Action (MABAC),

was reactivated and institutionalised by ministerial order, with representation of all strategic sectors (energy, agriculture, water resources, fisheries, health, infrastructure, economy and finance).

- As has been reinforced:
 - Clear definition of mandate and competences, including planning, validation and monitoring of climate policies;
 - Creation of Sectoral Technical Groups to support the updating of the NDC and elaboration of the Fourth National Communication (NC4);
 - Improving horizontal coordination between ministries and vertical coordination with regional governments and local authorities.

b) Institutional and technical strengthening of executive bodies

The capacities of the National Institute of the Environment (INA) and the Institute of Biodiversity and Protected Areas (IBAP), responsible for implementing and monitoring environmental and climate policies, were strengthened.

- As has been reinforced:
 - Conducting technical training in environmental assessment, adaptation, GHG inventories and resilience planning;
 - Modernisation of infrastructure and equipment for collecting and managing environmental data;
 - Integration of specialised personnel and creation of permanent thematic units on climate change and biodiversity;
 - Development of cooperation protocols with universities, research centres and international partners (UNDP, GEF, World Bank).

c) Implementation of Climate Project Management Units

Project Management Units (PMUs) were created and institutionalised within MABAC to ensure the coordinated implementation of climate initiatives, such as the *Coastal Project*, the *Rapid Alert Project* and the *Mini-Energy Networks Project*.

- How they have been strengthened:
 - Adoption of manuals of standardised administrative and financial procedures;
 - Establishment of reporting and supervision mechanisms directly linked to the CNMC;
 - Training of technical teams in project management and results monitoring;
 - Harmonisation of planning, monitoring and evaluation (M&A) instruments between different projects.

d) Adoption of legal and normative instruments

The institutional strengthening process was accompanied by the approval and updating of legal instruments that consolidate the climate governance framework:

- Revision of the Basic Environmental Law (Law No. 10/2010);
- Preparation of the Decree of Creation and Functioning of the CNMC;
- Integration of the Climate Component in the *National Sustainable Development Plan* and sectoral planning plans;
- Consolidation of the National Climate Finance Coordination Mechanism, in operationalisation phase with the support of UNDP and GCF.

4.4.5. Adaptation Targets

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Guinea-Bissau's national adaptation targets are clearly defined at three strategic and complementary levels:

1. International Commitments – Nationally Determined Contributions (NDCs)

The *Nationally Determined Contribution 2021 (NDC, 2021)* sets priority adaptation targets in key sectors, including:

- Water resources: enhanced hydro-meteorological monitoring and integrated river basin management;
- Agriculture and food security: promoting drought and salinisation resilient agricultural practices;
- Coastal areas: implementation of protection measures against coastal erosion and sea level rise;
- Biodiversity and ecosystems: conservation and restoration of mangroves, forests and protected areas as natural barriers to adaptation;
- Health: strengthening epidemiological surveillance for climate-sensitive diseases.

⇒ Nationally Determined Contribution (NDC 2021) – Guinea-Bissau;

(<https://unfccc.int/NDCREG>)

2. National Adaptation Plan (NAP)

The *National Adaptation Plan (NAP)*, currently being implemented, sets operational goals for the medium term (2025–2030), including:

- Reducing the vulnerability of coastal and agricultural communities through resilient infrastructure and diversification of livelihoods;
- Integrate climate adaptation into spatial planning and local planning instruments;
- Strengthen early warning systems and institutional capacity to respond to climate disasters;
- Promote technical and scientific training in adaptation and climate risk management.

- - ⇒ National Adaptation Plan (NAP) – Guinea-Bissau; (<https://napcentral.org/naps/guinea-bissau/>)
3. National and Sectoral Sustainable Development Plans and Strategies

These instruments translate the adaptation goals into concrete and integrated actions, articulating with the *Strategic and Operational Plan Terra Ranka II* (2025–2030), the *National Biodiversity Strategy and Action Plan (ENBPA)*, the *National Coastal Management Plan* and the *National Renewable Energy Plan*.

Examples of sectoral targets include:

- Energy: expanding the use of renewable energy to reduce dependence on fossil fuels;
- Fisheries: adoption of sustainable practices and improvement of fish conservation infrastructure;
- Infrastructure: road construction and public works adapted to extreme events;
- Education and gender: promoting the inclusion of women and young people in climate adaptation and awareness actions.

⇒ Strategic Plan "Terra Ranka II" (2025–2030); (<https://www.planification.gw/>)

⇒ National Biodiversity Strategy and Action Plan (ENBPA);
<https://www.cbd.int/nbsap/about/latest>)

4.5. Progress in implementing adaptation and Adaptation Progress Indicators

4.5.1. Progress in the implementation of adaptation

Guinea-Bissau has taken significant steps to consolidate adaptation to climate change as a national priority. The Nationally Determined Contribution (NDC), presented in 2021, sets clear adaptation targets in key sectors such as water, agriculture, forestry, health and coastal areas. These commitments are in line with the Paris Agreement in its Article 7.

At the same time, the country began formulating its National Adaptation Plan (NAP), with technical and financial support from the United Nations Development Programme (UNDP) and the Green Climate Fund (GCF). Activities undertaken to date include climate vulnerability assessments, cross-sectoral consultation workshops and the definition of criteria to prioritise adaptive measures.

Adaptation has also been gradually integrated into the main national and sectoral planning instruments, including the Strategic Development Plan "Terra Ranka II", the Agricultural and Rural Sector Master Plan (PDSAR) and the Integrated National Water Resources Management Plan (NIWRM).

The table below shows the progress of the Adaptation Policy and the Strategic Table.

Table 4-0-2: Adaptation Policy and Strategy

Instrument	Progress
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NDC (Nationally Determined Contribution)	The 2021 NDC integrates adaptation commitments in the areas of water, agriculture, forests, coastal areas and health. Preparations for the submission of the second (updated NDC) version are ongoing.
CASSEROLE (National Adaptation Plan)	In the formulation phase, with the support of UNDP/UNEP under the Green Climate Fund (GCF) preparation programme, vulnerability diagnostics and sector prioritisation workshops were conducted.
Sector Adaptation Plans	Among them are the Master Plan of the Agricultural and Rural Sector (PDSAR), the National Plan for Integrated Water Resources Management (PNGIRH) and the National REDD+ Strategy. These documents incorporate adaptive goals and actions.
Policy Integration Developer's Guide	Integration of adaptation into national plans (Strategic and Operational Plan – Terra RANKA II) is ongoing, especially in the areas of resilient agriculture, renewable energy and coastal management.

During the period under review, Guinea-Bissau has implemented a number of adaptation measures in priority sectors such as agriculture, water, coastal areas, biodiversity, health and gender. Interventions were carried out at both Community and institutional level, with the aim of reducing climate vulnerability and increasing the resilience of human and ecological systems.

In addition to the description of the actions, measurable progress has been made, with emphasis on the following indicators:

Resilient

Agriculture:

+1,600 farmers trained in agroecological practices and sustainable water use; Implementation of 12 solar irrigation systems in arid areas of Oio, Cacheu and Gabú.

Water Management:

Rehabilitation of 23 holes and construction of 10 new community water points;

Coastal Protection and Ecosystems:

Rehabilitation of 981 ha of wetlands and mangroves (Coastal Project); Awareness of 54 coastal communities on climate risks and nature-based solutions.

Education and Gender:

Inclusion of climate change issues in the curriculum of 32 pilot primary schools; Support for 135 women in climate cooperatives with access to microfinance for resilient activities.

These figures demonstrate not only the scope of the actions, but also the concrete positive impacts on people's lives and ecosystems. One of the main lessons observed is the importance of community participation and the integration of adaptation to local and sectoral policies. The continuity and expansion of these actions depends, however, on the mobilisation of additional funding and the consolidation of institutional capacity.

4.5.2. Adaptation Progress Indicators

Below is the table of Sector Adaptation Progress Indicators.

Table 4-0-3. Adaptation Progress Indicators

Sector	Action Implemented	Indicator	Value	Period	Source/Project
Agriculture	Training farmers in drought and salinisation resilient practices	Number of beneficiaries (trained farmers)	1,600	2021–2024	Coastal Project, FAO
Water Resources	Rehabilitation of supply infrastructure and catchment points	Number of water points rehabilitated	23	2022–2025	HRMD / UNDP
Coasts and Mangroves	Ecological rehabilitation and reforestation of coastal areas and mangroves	Restored area (hectares)	981 ha	2023–2025	Coastal Project (GEF/UNDP)
Education and Gender	Integrating climate content into curricula and programmes to support rural women	No. of schools / No. of supported women	32/135	2022–2024	MABAC / local NGOs

Process for Defining and Monitoring Adaptation Indicators

The adaptation indicators presented were officially defined and harmonised within the scope of the NDC (2021) and the National Adaptation Plan (NAP), with technical support from UNDP, FAO, World Bank and GEF, under the coordination of the Ministry of Environment, Biodiversity and Climate Action (MABAC).

1. Determination procedure

Step 1 – Identification of priority sectors: carried out through national and regional consultations conducted by the *National Committee on Climate Change (CNMC)*.

Step 2 – Definition of indicators:

- It was based on the criteria of the *UNFCCC Adaptation Committee* and the *NAP Technical Guidelines* (UNDP/UNEP);
- Each indicator was associated with an operational objective of the NAP and a target of NDC 2021;
- Quantitative (number, area, percentage) and qualitative (level of training, political integration) indicators were used.

Step 3 – Technical validation: the indicators were approved by the CNMC and integrated into the Adaptation Monitoring, Reporting and Verification (MRV) system, currently under development.

2. Measuring progress

Progress is measured through half-yearly project reports and field missions, consolidated by MABAC.

- The baselines were determined between 2018–2020, prior to the implementation of the main adaptation projects (Coastal, WACA, Early Warning).

Metrics are measured according to:

- Agriculture: number of farmers participating in training or direct beneficiaries;
- Water resources: number of infrastructure rehabilitated or new sources of supply installed;
- Coasts and mangroves: restored hectares, validated by satellite imagery and field checks (IBAP);
- Education and gender: number of institutions with adapted curriculum and number of women supported in resilience programmes.

3. Reporting and integration

The results were partially reported in the Third National Communication (NC3, 2018) and updated in the sectoral reports submitted to the UNFCCC in 2021–2023.

In BTR2, these indicators will be consolidated in the Adaptation Monitoring Approach (AMA), in alignment with the *Guidelines for BTR Adaptation Reporting* (CMA Decision 18/CMA.1).

Detailed information and calculation methodologies can be found in the following documents:

- ⇒ NDC 2021 – Republic of Guinea-Bissau (<https://unfccc.int/NDCREG>);
- ⇒ National Adaptation Plan (NAP) – NAP Central (<https://napcentral.org/naps/guinea-bissau/>);
- ⇒ Third National Communication (NC3) – UNFCCC (<https://unfccc.int/documents>).

4.5.3. Implementation of Projects and Actions on the Ground

At the operational level, Guinea-Bissau implements a number of projects that directly contribute to climate adaptation. One of the most emblematic is the Coastal Project, which aims to protect coastal areas and subsistence agriculture. This project promotes actions such as the rehabilitation of protection dykes, reforestation of mangroves, installation of irrigation systems and formation of communities in climate resilient agricultural practices.

Another strategic project is the Early Warning Project, which aims to strengthen national climate information and early warning systems. With funding from the Green Climate Fund (GCF), the installation of new weather stations, the strengthening of the National Directorate of Meteorology, and technical training of national experts in climate modelling and forecasting are underway.

Other initiatives include the Functional Literacy Programme focussing on climate resilience, targeting women and youth in the most vulnerable areas, and the WACA Project, with interventions focused on integrated coastal zone management and erosion reduction.

In the energy sector, the country is betting on the promotion of solar energy as an adaptation strategy, guaranteeing the supply of energy in remote communities and reducing vulnerability to climate shocks.

The table below shows the status of the Implementation of Adaptation Projects and Concrete Actions.

Table 4-0-3: Implementation of Projects and Concrete Actions of Adaptation.

Project/Programme	Sector	Actions in progress	Financiers
Costal Project	Coastal areas and agriculture	Dam rehabilitation, mangrove reforestation, support for resilient agriculture and water security	GEF, UNDP
Quick Alert Project	Meteorology and resilience	Strengthening of climate information systems, installation of weather stations, early warning training	Green Climate Fund, UNDP
Functional Literacy Project	Gender and local resilience	Functional education for women and youth, focussing on sustainable agriculture and adaptation to climate change	Coastal
WACA Project	Coastal management	Strengthening the resilience of coastal communities and protecting them from erosion	World Bank, UEMOA
Solar Programme for Resilience	Energy	Promotion of solar panels in rural areas as an energy resilience strategy	UNDP, Ministry of Energy

4.5.4. Advances in Governance, Monitoring and Evaluation

Guinea-Bissau created and operationalised the National Committee on Climate Change (CNCM), responsible for coordinating the implementation of climate policies, including adaptation actions under the NDC and the future NAP. This committee is inter-ministerial and also includes representatives of civil society, the private sector, universities and technical partners.

The Monitoring, Reporting and Verification System (MRV) for Adaptation is under development, with methodological proposals for data collection, definition of indicators and institutional coordination arrangements. This system will be essential to measure progress and report to UNFCCC international mechanisms.

In addition, efforts are being made to integrate climate data from various institutions, to improve the technical capacity of the National Environment Institute (INA) and the National Institute of Meteorology (INM) and to digitise the databases of historical series and projections.

The table below presents the governance, monitoring and evaluation structure.

Table 4-0-4 Subject: Governance, Monitoring and Evaluation Framework

Component	Current Situation
Establishment of the NCCC (National Committee on Climate Change)	It works with inter-ministerial representatives, NGOs, civil society and the private sector. Coordinates NDC/NAP actions.
MRV Adaptation System	In the development phase. Methodological proposals and indicators already exist in priority sectors (water, agriculture, health).

Climate data integration	Advances in the installation of meteorological infrastructure. Digitisation of hydro-meteorological data begins.
Community participation	Strengthened with local workshops, involvement of traditional leaders and grassroots associations in pilot projects.

4.6. Monitoring and evaluation of adaptation measures and processes in Guinea-Bissau

Guinea-Bissau is currently in a process of structuring and gradually operationalising its national MRV system, focussing on both mitigation (actions to reduce GHG emissions) and adaptation (actions, impacts and results). This process is driven by the commitments made under the Nationally Determined Contribution (NDC) of the National Adaptation Plan (PAN) and the preparation of the Second Biennial Transparency Report (RBT2).

The table below shows the progress made so far in the adaptation process.

Table 4-0-5: Progress so far in the adaptation process

Component	Current Situation
Institutional Structure	✓The National Committee on Climate Change (NCCC) has been established, leading the coordination of MRV actions. ✓Established a technical working group for MRV under BTR2.
Legal and Regulatory Table	△ In development. It is expected that national regulations on climate MRV will be adopted, integrating the UNFCCC guidelines.
Technical Training	✓Technical training on GHG emission inventories, REDD+ MRV and adaptation was carried out with the support of FAO, UNDP and GEF. △ need for continuous training and the creation of a permanent base of national experts.
MRV Mitigation System	✓National GHG Inventory (1990–2019) completed in the TCN (Third National Communication). △ In the process of updating to integrate data by 2022 in BTR2. △ There is still no national integrated system of MRV digital emissions, but there is a proposal for its creation.
MRV Adaptation System	△In development. Preliminary indicators of sectoral adaptation were defined in BTR1. △ Lack of a standardised and systematic methodology to measure the progress and impact of actions. ✓Some projects (Coastal, Early Warning, REDD+) have their own M&E systems that power the national MRV.
MRV for Climate Finance	△ Not yet working. The traceability of climate resources is done by project, without a unified database. △ A financial module for the MRV is being prepared in the context of BTR2.

4.7. Prevention, Minimisation and Management of Losses and Damage Associated with Climate Change Impacts in Guinea-Bissau

Guinea-Bissau, as a small island developing state and West African country with low adaptation capacity, is among the most vulnerable nations to the impacts of climate change. The main threats include rising sea levels, coastal erosion, flooding, prolonged droughts, and changes in precipitation patterns, which significantly affect agriculture, fisheries, food security, public health, and basic infrastructure.

To prevent and minimise these impacts, the Government adopted several strategies. The updated Nationally Determined Contribution (NDC) incorporates explicit commitments related to loss and damage management. Initiatives are underway, such as the Coastal Project (focused on community resilience and vulnerable coastal zones) and the WACA Project, which aims to protect against erosion and restore coastal ecosystems. These projects integrate preventive actions such as mangrove rehabilitation, community awareness, building resilient infrastructure and improving early warning systems.

Despite these efforts, losses and damages are already being felt in several regions. Coastal communities face forced displacement due to loss of land and housing; farmers suffer from unpredictable rainfall and crop failure; and unique ecosystems such as the Bijagós Archipelago are threatened. The institutional response still faces structural challenges, including weak cross-sectoral coordination, insufficient data, lack of adequate climate finance, and lack of compensation or insurance mechanisms for loss and damage.

Against this background, the country recognises the urgent need to move forward with a national mechanism for loss and damage that integrates risk identification, quantification of impacts, and resource mobilisation. Strengthening technical and institutional capacities, implementing robust monitoring and early warning systems and access to international funding, including the new Loss and Damage Fund established under the UNFCCC, are also priorities.

With a focus on vulnerable communities and nature-based solutions, Guinea-Bissau is determined to protect lives, livelihoods and ecosystems by strengthening national climate resilience and contributing to a just and sustainable transition.

4.8. Cooperation, good practices, experience and lessons learned on climate resilience in Guinea-Bissau

4.8.1. Cooperation

Guinea-Bissau has strengthened its response to climate change through strategic partnerships, implementation of good practices and continuous learning from local and international experiences. Cooperation with multilateral organisations, partner countries, and local communities has been essential to drive adaptation and mitigation actions.

The following table presents the list of National and International Cooperation

Table 4-0-6:List of National and International Cooperation

Type of Cooperation	Institutions/Partners	Main contributions
Multilateral Cooperation	UNDP, FAO, GEF, GCF, World Bank	Technical and financial support for adaptation, resilience and strategic planning projects
Regional Technical Cooperation	OMM, CILSS/AGRHYMET	Weather data, early warning systems, technical training
Bilateral Cooperation	EU, German Cooperation	Financing of water infrastructure and institutional support
Conservation Partnerships	MCRP, IUCN	Coastal protection, ecosystem-based management
Regional Mechanisms	ECOWAS, WACA, CPLP	Integration into regional climate response networks and sharing of best practices

Guinea-Bissau has accumulated relevant and promising experiences in climate adaptation, especially through pilot projects implemented in vulnerable areas with strong community participation. These good practices demonstrate local solutions with a tangible impact on improving the resilience of livelihoods, infrastructure and ecosystems, and can serve as a model for national and regional scale expansion and replication.

The following table presents the Best Practices Implemented.

Table 4-0-7: Best Practices Implemented

Intersection Domain	Good Practices
Agriculture and Food Security	Introduction of resistant crops, agroecological practices, consortia and agroforestry systems
Water resources	Tanks, small reservoirs, National Plan for Integrated Water Resources Management
Coastal areas	Reforestation of mangroves, construction of adapted ramps, management of community resources
Education and Awareness	Climate-focused functional literacy for women and youth in vulnerable areas
Monitoring and Prevention	Strengthening the early warning system, environmental databases, SGIs in the INA and IBAP

4.8.2. Experiences and lessons learned

During the implementation process of climate actions in Guinea-Bissau, especially in the field of adaptation, several relevant experiences were accumulated. These experiences have generated practical lessons that may be useful for other developing countries, in particular small island states and West African countries with similar socioeconomic and ecological characteristics.

1. Integrating Adaptation into Local and Sectoral Policies

Lesson learned: Adaptation is most effective when integrated with local and sectoral planning tools.

Experience has shown that the adaptation pilot projects with the greatest impact were those linked to Local Development Plans (LDPs) and Protected Area Management Plans. This increased local acceptance, facilitated the mobilisation of resources and reinforced sustainability after the completion of projects.

2. Community participation from the diagnostic phase

Lesson learned: Involving communities in the design and monitoring of adaptation actions significantly improves their effectiveness and acceptance.

During the Coastal Project, coastal communities were involved in identifying climate risks and nature-based solutions. This increased the relevance of interventions and reduced resistance. It also facilitated the appropriation and maintenance of results, such as mangrove plantations and drainage infrastructure.

3. The importance of developing technical and institutional capacities

Lesson learned: Investing in the continuous training of national technicians and community actors is essential to ensure the continuity and replicability of adaptation actions.

It was found that local technicians trained during the projects (e.g. water management, resilient agricultural practices, use of climate tools) became multipliers in their regions. However, in some cases, the high turnover in the public sector has compromised knowledge retention.

4. Monitoring and Evaluation: Gaps and Opportunities

Lesson learned: the absence of robust systems to monitor the impacts of adaptation actions makes it difficult to assess progress and mobilise climate finance.

Despite the implementation of several actions, such as mangrove rehabilitation or the promotion of resilient agriculture, the lack of harmonised impact indicators and real-time data has compromised the ability to report results to technical and financial partners.

5. Fragmented and short-term financing

Lesson learned: The fragmentation of financial resources and the short duration of projects limit sustainable impacts.

Many adaptation projects in Guinea-Bissau operate with short funding (2 to 3 years), making it difficult to consolidate results. The dispersion of funding sources and the complexity of communication requirements also overwhelm local capacities.

4.9. Any other information related to climate change impacts and adaptation under Article 7 of the Paris Agreement.

Article 7 of the Paris Agreement recognises adaptation as a global challenge with local, sub-national, national and international dimensions, and is essential for the protection of populations, livelihoods and ecosystems. Guinea-Bissau, as a highly vulnerable country with low capacity for adaptation, has sought to develop consistent actions to integrate adaptation into the core of its national development planning.

Guinea-Bissau recognises that adaptation is a national priority and requires a strategic, participatory and coordinated approach.

The following table provides information related to the adaptation under Article 7 of the Paris Agreement in Guinea-Bissau.

Table 4-0-8:Information on adaptation under Article 7 of the Paris Agreement in Guinea-Bissau

Category	Detailed description
Observed impacts	- Increase in frequency and intensity of seasonal floods (e.g. floods in Bafatá, Gabú and Bissau in 2022-2024) - Increased salinisation of coastal soils and mangrove degradation - Reduction of agricultural productivity - Decreased access to drinking water in rural areas
Vulnerable Sectors	- Agriculture and food security - Water resources - Coastal infrastructure - Public health - Biodiversity and fragile ecosystems (mangroves, estuaries, wetlands)
Limited adaptive capabilities	- Poor institutional and technical capacity to respond - Low availability of hydro-meteorological data - Insufficient financial resources - Poor integration of adaptation into sectoral and local policies
National Adaptation Priorities	1. Strengthening the resilience of rural communities and farming systems 2nd Strengthening Integrated Water Management

	<p>3. Protect coastal areas and fragile ecosystems.</p> <p>4. Improve climate information and early warning systems.</p>
Policy instruments	<ul style="list-style-type: none"> - Updated NDC (2021): includes adaptation commitments in agriculture, water, forests and coastal areas -National Adaptation Plan (NAP) – in development -PDSAR and PNGIRH as sectoral plans with adaptation components
Ongoing projects	<ul style="list-style-type: none"> -Coastal Project (GEF/UNDP)- Coastal Protection and Community Adaptation -Draft Early Warning (UNDP/WMO) – strengthening of forecasting and warning systems - Ecosystem-Based Adaptation (EbA) Project -FAO projects for food resilience
Territorial Integration	Adaptation is gradually being integrated into municipal and local development plans, with technical support from MABAC and partners.
Gender-based approach	Adaptation actions include specific initiatives for women's empowerment, such as climate education, access to resilient seeds, and representation on local water and land management committees.
Support and future needs	<ul style="list-style-type: none"> - Need for additional climate finance, including direct access to the Green Climate Fund - Strengthening the institutional capacity of MABAC, INA, IBAP, DGRH - Technical support to finalise the NAP - Development of MRV screening and adaptation systems
Contributions to the Global Adaptation Goal (GGA)	Guinea-Bissau contributes to AMG by strengthening systemic resilience, reducing the vulnerability of coastal and agricultural populations, and improving climate alert and response systems.

CHAPTER 5: ANY OTHER INFORMATION RELEVANT TO THE IMPLEMENTATION OF THE OBJECTIVE OF THE CONVENTION, INCLUDING INFORMATION ON GENDER AND CLIMATE CHANGE

5.1. Introduction

In accordance with Decision 17/CP.8 adopted at the Eighth Conference of the Parties (COP8), Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are encouraged to include in their National Communications additional information deemed relevant to the achievement of the objectives of the Convention. This provision aims to enable countries to share, in addition to mandatory reporting, experiences, initiatives, policies and innovative measures that can contribute to enhancing transparency, cooperation and the effectiveness of climate action at the global level.

Decision 17/CP. 8 also recognises the diversity of national contexts and highlights the added value of additional information, in particular as regards environmental governance, gender mainstreaming, education, public awareness, technology transfer and the involvement of non-state actors.

At the national level, Guinea-Bissau, as a developing country particularly vulnerable to the impacts of climate change, has made significant efforts to align its policies, strategies and initiatives with the objectives of the UNFCCC and the Paris Agreement. The country continues to strengthen its institutional and technical capacities, prioritising resilience, adaptation and sustainable development.

In this context, Guinea-Bissau has developed and implemented several projects and programmes related to biodiversity conservation, coastal protection, promotion of renewable energies and sustainable management of natural resources. Social inclusion, women's empowerment, youth mobilisation and community awareness are also key aspects for strengthening the national response to climate change.

Thus, this chapter of the Fourth National Communication of Guinea-Bissau presents a set of complementary information that contributes to a better understanding of the national efforts, the challenges faced and the future perspectives for action under the Convention.

From this introduction, this chapter contains the following subchapters:

- Development, transfer and access to environmentally sound technologies and knowledge
- Capacity building and regional/international cooperation
- Education, awareness raising and public participation
- Cooperation with non-governmental organisations, the private sector and civil society
- Systematic research and observation
- Gender equality and female empowerment
- Synergies with other environmental conventions
- Other relevant initiatives and information

5.2. Development, Transfer and Access to Environmentally Sound Technologies and Knowledge

The transfer and development of environmentally friendly technologies (ETs) are key elements to support developing countries in the implementation of the United Nations Framework Convention on Climate Change (UNFCCC). Decision 17/CP.8 emphasises that the identification of technological needs, the creation of favourable conditions and the promotion of international cooperation mechanisms are essential measures to accelerate the adoption of technologies that contribute to climate change mitigation and adaptation.

In Guinea-Bissau, a country characterised by high climate vulnerability and significant structural limitations, technology transfer represents a strategic opportunity to strengthen community resilience, improve basic services and support sustainable development. The country has made increasing efforts to mobilise partnerships, integrate appropriate technologies and promote local capacity development, although significant technical, financial and institutional barriers still exist.

5.2.1. National Situation and Priority Areas

The national priorities for technology transfer fall within the following sectors:

a) Energy

The national energy matrix depends largely on diesel generators and traditional biomass (firewood and charcoal). Progress has been made in recent years with the introduction of hybrid solar mini-grids, decentralised photovoltaic systems and residential solar kits, especially in rural communities with no connection to the national power grid.

Projects supported by the Global Environment Facility (GEF), UNDP and bilateral cooperation have enabled pilot infrastructure to be set up in several regions (e.g. Bafatá, Gabú and Oio), demonstrating the potential of renewable energy to reduce emissions and improve access to clean energy.

The challenge now is to scale up these solutions, ensure system maintenance, and create sustainable financial models that engage the private sector and local communities.

b) Agriculture and food security

The subsistence and highly rain-dependent agricultural sector faces increasing risks due to droughts, climate variability and soil degradation.

Conservation agriculture technologies, agroforestry systems, solar-powered drip irrigation, and more climate-resilient crop varieties are being progressively introduced. The country also benefits from low-impact traditional practices, which can be combined with modern technologies to increase productivity without compromising ecosystems.

However, the dissemination of these techniques is still limited by the lack of technical assistance, accessible equipment and adequate agricultural extension mechanisms.

c) Coastal and wetland management

Coastal areas, which account for more than 50% of the national territory, are increasingly exposed to erosion, salt intrusion and flooding.

To address these risks, hydro-meteorological monitoring technologies (automatic stations, remote sensors), early warning systems and digital mapping using drones and Geographic Information Systems (GIS) were introduced.

Projects such as WACA (West Africa Coastal Areas) supported the introduction of these tools, allowing better planning and faster response to extreme events.

Despite this, coverage is still limited and there is an urgent need to train national technicians to operate and maintain these technologies.

d) Water resources

The water resources sector represents a priority area for technology transfer and adoption in Guinea-Bissau, given its cross-cutting importance for public health, food security, energy and the resilience of communities to climate change. Water availability and quality are crucial factors for public health, agriculture and the resilience of communities.

Among the initiatives already implemented, the following stand out:

- *Stormwater collection and storage systems*, designed to reduce dependence on surface and groundwater sources, ensuring reserves during the dry season.

- *Holes equipped with solar pumps*, which allow the extraction of groundwater in a sustainable way, reducing operational costs and emissions associated with the use of fossil fuels.

- *Low-cost filtration technologies*, promoted mainly in rural communities, to ensure access to drinking water and reduce the risk of waterborne diseases.

The Directorate-General for Water Resources, in cooperation with international partners, has promoted the modernisation of the hydrological observation network, although financial and technical challenges remain.

e) Solid waste and urban management

The solid waste and urban management sector represents one of the biggest environmental and public health challenges in Guinea-Bissau, due to population growth, rapid urbanisation and the lack of structured waste collection, sorting and treatment systems. Inadequate waste management results in open dumps, proliferation of disease vectors, contamination of soil and waterways, and emissions of greenhouse gases (mainly methane from organic decomposition).

Despite the challenges, pilot experiments and initiatives with high potential are starting to emerge:

- **Waste recovery:** experimental projects aimed at sorting and reusing recyclable materials (plastics, metals, glass), still on a small scale.

Community composting: initial deployment of composting plants, using organic urban and agricultural waste to produce natural fertilisers.

- **Biogas production:** pilot projects in institutions (schools, hospitals and community centres) to transform organic waste into renewable energy, contributing to the replacement of firewood and charcoal.

These initiatives are still at an early stage, but represent areas of great potential for emission mitigation and clean energy generation.

Recent advances

In recent years, Guinea-Bissau has made significant progress in mobilising resources and implementing initiatives that promote the introduction of sustainable and adapted environmental technologies to the national context. These advances reflect not only enhanced international cooperation, but also the country's commitment to promoting innovative solutions to address the challenges of climate change, natural-resource management, and sustainable development.

- Establishment of strategic partnerships

Guinea-Bissau has sought to consolidate strategic partnerships with international reference organisations, including the Global Environment Facility (GEF), the United Nations Development Programme (UNDP), the World Bank, the European Union and the West African Economic and Monetary Union (WAEMU/WAEMU). These partnerships have played a central role in advancing climate action in the country, enabling not only the financing of climate change adaptation and mitigation projects, but also the introduction of locally appropriate technologies such as renewable energy systems, resilient agricultural practices, and environmental monitoring equipment.

In addition, these partnerships have contributed to institution building, promoting technical assistance and the sharing of international best practices, which are essential to increase national capacity for planning, implementing and monitoring environmental policies and projects. Thus, international cooperation has proved to be a strategic tool for building sustainable and resilient development, aligned with global climate goals.

- Modernisation of climate and hydrological observation

Guinea-Bissau is significantly strengthening its climate and hydrological monitoring capacity by forecasting and installing automatic hydro-meteorological stations as part of the Early Warning Project. These stations will enable real-time data collection on climate variability, precipitation, and water resources, providing a solid basis for informed decisions.

With the deployment of this equipment, the country will be able to improve its national early warning systems against floods and droughts, strengthening its capacity to respond to extreme events. Moreover, the use of reliable scientific data will support more effective policies and interventions, promoting evidence-based environmental management. At the same time, this modernisation will facilitate the integration of Guinea-Bissau into West Africa's regional climate monitoring networks, fostering cooperation, information exchange and alignment with international best practices.

- Expansion of renewable energies

Guinea-Bissau has promoted the implementation and expansion of community solar mini-grids in rural areas, providing sustainable access to electricity in areas not yet covered by the national power grid. This initiative has generated significant positive impacts: it contributes to reducing energy poverty, benefiting families and small businesses; improves quality of life by electrifying schools, health centres, and community spaces; and reduces pressure on forest ecosystems by partially replacing the use of firewood and charcoal as energy sources.

The expansion of renewable energy thus represents a strategic step towards more sustainable, resilient and environmentally balanced rural development, while promoting social inclusion, energy efficiency and conservation of natural resources.

- Training of national technicians

Guinea-Bissau has consistently strengthened its technical capabilities through training programmes and knowledge transfer in strategic areas for sustainable development. These efforts aim to train professionals to operate renewable energy systems efficiently, ensuring the maintenance and sustainability of the installed solar infrastructure in several regions of the country.

At the same time, the programmes promote and climate-smart sustainable agricultural practices, including soil conservation techniques, efficient water use and productive diversification, contributing to increasing the resilience of the agricultural sector to climate change. In coastal management, technical training allows a more effective response to erosion, sea level rise and degradation of coastal ecosystems, enhancing environmental protection and the resilience of coastal communities.

Thus, human resources training becomes an essential pillar for the sustainable development of Guinea-Bissau, promoting knowledge, innovation and evidence-based practices to address the country's environmental and climate challenges.

5.2.2. Identified Challenges

Despite significant progress in implementing sustainable development and climate change adaptation projects, Guinea-Bissau faces a number of challenges that limit the full effectiveness of these initiatives. The main one is the still limited technical capacity for the operation and maintenance of modern equipment, which limits the ideal use of the technologies introduced.

High technology acquisition and import costs, often compounded by customs barriers and logistical challenges, are another significant obstacle. Excessive dependence on external donors is also problematic, putting at risk the financial sustainability of essential projects for the country.

Moreover, there is weak institutional coordination and the absence of an integrated national strategy for technology transfer, factors that hinder coordination between different sectors and stakeholders. Finally, private sector involvement remains weak, despite its potential central role in spreading innovative solutions and promoting local investments in sustainable technologies.

These challenges highlight the need to strengthen national capacities, promote integrated policies and foster strategic partnerships that ensure the continuity and lasting impact of climate action and sustainable development in the country.

5.2.3. Future perspectives and priority measures

The Government of Guinea-Bissau recognises that the country's sustainable progress and climate resilience depend on strategic and coordinated actions. Therefore, it considers as a priority the development of a National Technology Transfer Strategy, aligned with Nationally Determined Contributions (NDCs) and the Sustainable Development Goals (SDGs), to guide the introduction and dissemination of technological solutions appropriate to the national context.

To ensure the financial viability of these initiatives, the government aims to create accessible climate finance mechanisms that encourage both the private sector and communities to invest in sustainable technologies. At the same time, cooperation will be strengthened through regional and international partnerships, leveraging networks such as ECOWAS and the African Union, promoting the exchange of experiences and access to technologies tailored to local needs.

Strengthening national capacities is also a priority, through continuing training programmes and the creation of technology demonstration centres to serve as practical reference points for technicians, managers and communities. Finally, the government is committed to local innovation, encouraging universities, research centres, and small businesses to develop solutions that meet the country's socioeconomic and environmental conditions, contributing to resilient, inclusive, and sustainable development.

5.3. Capacity Building and Regional/International Cooperation

Capacity building is a key pillar for the effective implementation of the United Nations Framework Convention on Climate Change (UNFCCC) in Guinea-Bissau, given the limited institutional and technical capacity at the national level. The country recognises that progress in climate change mitigation, adaptation, monitoring and reporting strongly depends on human resource training, institutional consolidation, and regional and international cooperation.

5.3.1. Strengthening National Capabilities

In recent years, Guinea-Bissau has promoted a set of initiatives aimed at strengthening the technical and institutional capacity of government entities, civil society and academia. Initiatives include training national technicians in strategic areas, including greenhouse gas (GHG) inventories, measurement, reporting and verification (MRV) systems, ecosystem-based adaptation, and climate planning.

Specialised training in climate modelling, the use of remote sensing tools, environmental database management and national reporting was also offered under the United Nations Framework Convention on Climate Change (UNFCCC), ensuring the production of accurate and consistent technical information.

Gender mainstreaming in training programmes has ensured greater participation of women in technical areas and decision-making on climate change, promoting inclusion and equity. At the same time, the creation of sectoral technical focal points has facilitated the collection and harmonisation of data, enhancing the production of national transparency reports, such as National Communications (NC), Biennial Update Reports (BAR) and Biennial Transparency Reports (BTR).

These actions have contributed significantly to strengthening the country's institutions, increasing its capacity for evidence-based climate policy planning, monitoring, and implementation and international best practices.

Despite progress in capacity-building and institution-building, Guinea-Bissau continues to face significant gaps that limit the consolidation and sustainability of progress. Among the main challenges are the high turnover of qualified personnel, which compromises the continuity and retention of accumulated technical knowledge; the weak institutionalisation of acquired knowledge, which makes it difficult to systematise and apply the skills developed in practice; and the absence of national training centres specialised in climate change, which restricts access to continuing education and technical development of professionals in the sector.

These gaps highlight the need for more robust strategies to ensure the maintenance and expansion of national capabilities, ensuring that technical knowledge and best practices are fully incorporated into the country's institutions and projects.

5.3.2. Regional cooperation

Guinea-Bissau is progressively strengthening its integration into regional cooperation mechanisms, recognising the importance of sharing experiences, good practices and technical expertise to address climate and environmental challenges. Active participation in the Economic Community of West African States (ECOWAS) has enabled the country to participate in regional adaptation and mitigation programmes, including initiatives focused on promoting renewable energy and climate-resilient food security.

Within the framework of the West African Economic and Monetary Union (WAEMU), Guinea-Bissau collaborates in projects for the sustainable management of natural resources and harmonisation of environmental policies, contributing to a more integrated and coherent approach to environmental management in the region.

Participation in the West African Mangrove Commission (WACC) provided an exchange of experience and knowledge on integrated coastal management, mangrove restoration and the protection of marine biodiversity, enhancing the resilience of the country's coastal ecosystems.

In addition, cooperation with regional university and research networks has fostered strategic partnerships with universities in the sub-region, enabling joint studies on biodiversity, climate variability and community resilience, as well as contributing to the training of specialised technical personnel and the production of scientific knowledge relevant to national policies and projects.

5.3.3. International Cooperation

Guinea-Bissau benefits from significant international cooperation, covering the technical, scientific and financial spheres, which has been essential for the advancement of the country's climate and environmental policies and projects. Active participation in multilateral environmental conventions, such as the UNFCCC, the Convention on Biological Diversity (CBD), and the United Nations Convention to Combat Desertification (UNCCD), provides a strong institutional framework and ensures access to climate finance mechanisms.

The support of UN organisations, including UNDP, FAO, UNEP, UNESCO and WHO, has been crucial in implementing projects involving agricultural adaptation, environmental monitoring, institutional strengthening, and gender mainstreaming in climate policies, promoting more inclusive and sustainable solutions.

International financial institutions, such as the Global Environment Facility (GEF), the World Bank, the African Development Bank, and the Green Climate Fund, contribute significantly to financing strategic projects in the areas of clean energy, coastal adaptation, and sustainable management of natural resources, strengthening the country's capacity to implement long-term actions.

At the same time, cooperation with NGOs and international research centres has facilitated the transfer of environmentally friendly technologies, promoted applied studies and supported the training of local actors, allowing the incorporation of international best practices and innovative solutions adapted to the national context.

5.3.4. Future prospects and needs

In order to consolidate the progress achieved and to respond effectively to emerging challenges, Guinea-Bissau has set out a number of strategic priorities. Among them is the creation of a national centre of excellence on climate change, in close collaboration with regional and international institutions, with the objective of strengthening research, training and technological innovation in the country.

Strengthening the national MRV and Transparency system is another priority, ensuring higher quality, consistency and regularity in the production of climate data and reports, which are essential for evidence-based decision-making and compliance with international obligations.

Mobilising international climate finance, in particular from the Green Climate Fund (GCF) and the Global Environment Facility (GEF), is essential to sustain strategic environmental adaptation, mitigation, and resilience projects. At the same time, Guinea-Bissau is committed to promoting South-South cooperation by facilitating the exchange of experiences with other African countries facing similar realities and strengthening local capacities and best practices.

Finally, it is considered vital to integrate the gender and youth dimensions in all capacity building and cooperation initiatives, recognising the essential role of these groups in climate action and sustainable development in the country. These priorities reflect Guinea-Bissau's commitment to consolidate an inclusive, scientific and sustainable approach to addressing the environmental and climate challenges of the present and the future.

5.4. Education, Awareness-Raising and Public Participation

Education, awareness-raising and public participation are key pillars for the effective implementation of the United Nations Framework Convention on Climate Change (UNFCCC). Decision 17/CP.8 reinforces that public awareness and the inclusion of different social groups in decision-making processes are essential conditions to promote a collective and sustainable response to climate change.

In Guinea-Bissau, the integration of environmental and climate issues in formal and informal education has been gaining relevance, although with structural limitations. Promoting climate literacy, community awareness and the involvement of civil society are considered key factors to increase community resilience and foster active citizenship in environmental protection.

5.4.1. Formal education

In Guinea-Bissau, formal education has taken the first steps to incorporate environmental and climate issues into the curriculum, although significant challenges remain. The Ministry of Education, Higher Education, Youth, Culture and Sport has sought to integrate content on climate change and the environment, particularly in primary and secondary education, recognising early on the importance of raising awareness among younger generations of the country's and the world's environmental challenges.

In higher education, the Amílcar Cabral University (UAC), together with other institutions, offers courses in biology, geography, environmental management and social sciences, covering topics such as climate change, biodiversity and sustainability. These initiatives contribute to the training of professionals with deep knowledge in environmental issues and to the production of relevant scientific knowledge.

However, there is still no integrated national curriculum on climate education. The environmental content is presented in a fragmented way, with a lack of adequate didactic materials, which limits the consistency and depth of learning. This challenge is aggravated by the scarcity of teachers with specific training in environmental areas, which makes it difficult to disseminate specialised knowledge and consolidate a solid and comprehensive environmental education.

The actual scenario thus shows initial progress and good policy intentions, but highlights the need for a more structured and systematic approach that can ensure that all pupils acquire sound skills in climate change, biodiversity conservation and sustainable development.

5.4.2. Non-formal education and Community awareness

Non-formal education and community outreach initiatives have been crucial to complement formal environmental education and strengthen community resilience to climate change. Civil society organisations, both national and international, have played a central role in this process, acting mainly in rural and coastal areas, where the effects of climate change are felt more intensely and populations are more vulnerable.

Several awareness campaigns have been implemented, addressing issues such as mangrove reforestation, sustainable use of fisheries resources, solid waste management and energy conservation. These initiatives aim not only to inform but also to involve communities in adopting more sustainable practices and preserving local ecosystems.

Strategic projects, such as WACA (West Africa Coastal Areas) and Coastal Project, have promoted community environmental education initiatives based on participatory methodologies that combine scientific knowledge with traditional wisdom, recognising the value of local experiences in developing adaptive solutions.

In addition, community radio and social media play a significant role in disseminating information on climate risks and good adaptation and mitigation practices. These channels broaden the reach of the messages, contributing to a greater public awareness and strengthening a culture of sustainability throughout the country.

These actions demonstrate an integrated approach combining education, community participation and media to promote environmental awareness and resilience to climate change.

5.4.3. Public Participation

Public participation in decision-making processes on environmental and climate issues has grown, although it is still at an early stage. In recent years, government authorities and institutions have made efforts to involve citizens by organising community forums and meetings to share information, listen to local concerns, and discuss environmental management measures.

The Institute of Biodiversity and Protected Areas (IBAP), together with other government entities, promotes the participation of local communities in the management of protected areas through co-management committees. These initiatives strengthen participatory governance and encourage the direct involvement of local communities in the conservation of biodiversity and the sustainable use of natural resources.

Women and young people have played an increasingly important role in community mobilisation and local projects. However, they continue to face structural barriers, such as limited access to financial resources, technical training and decision-making spaces, which restrict their full involvement in environmental governance processes.

In addition, public consultations on major development projects and environmental impact assessments are becoming more frequent, reflecting a positive trend towards greater transparency. Despite this, there are still significant gaps, in particular the lack of regular and systematic mechanisms to ensure the continuous participation of citizens and effective monitoring of decisions.

In short, while progress has been made in including the public in decision-making processes, structures and practices that promote broader, continuous and effective participation of citizens, especially among historically marginalised groups, need to be consolidated.

5.4.4. Future perspectives and priority measures

In order to strengthen education, awareness-raising and public participation in the response to climate change, Guinea-Bissau considers as a priority:

1. *National Strategy on Climate Education and Awareness*, aligned with the NDC, the National Adaptation Strategy and the SDGs.
2. *Integrate the content on climate change in school curricula* at all levels of education, with the production of teaching materials appropriate to national languages and cultural contexts.
3. *Strengthen the training of teachers and technicians* in the environment, climate and sustainable development.
4. *Expand community awareness campaigns*, in collaboration with NGOs, community radios and local leaders.
5. *Effective community participation* in natural resource planning and management processes, through inclusive governance mechanisms.
6. *Enhancing the role of women and young people* as agents of change, ensuring their access to resources, training and decision-making spaces.
7. *Using digital platforms and social networks* as innovative ways to engage urban youth in climate mobilisation.

Table 5-0-1: Education, Awareness Raising and Public Participation in Guinea-Bissau

Dimension	Current Situation	Gaps	Priority measures	Potential Partners
Formal education	The inclusion of environmental and climate content in school curricula is still limited; some pilot initiatives in secondary schools.	Outdated curricula; lack of adapted teaching materials; teachers without specific training.	Integrate the environment and climate at all levels of education; develop materials adapted to the national context; train teachers.	Ministry of Education, MABAC, UNESCO, UNICEF, UNDP.
Non-formal and community education	Some NGOs and projects (IBAP, Coastal, WACA) develop awareness in coastal and rural communities.	Scattered activities; lack of permanent programmes; low geographical coverage.	Create continuous community education programmes; train local animators; use community radio stations and social networks.	Local NGOs, IBAP, IUCN, FAO, community radio, civil society.
Public awareness	Campaigns carried out mainly on commemorative dates (Environment Day, Earth Day).	Lack of regular campaigns; weak national mobilisation; materials poorly adapted to national languages and local contexts.	Promote regular national campaigns; produce multilingual materials; diversify the media (radio, TV, digital).	Ministry of Media, national press, UNICEF, UNDP, youth associations.
Public participation	Some dialogue spaces created	Participation still limited; low	Strengthen the mechanisms of	MABAC, IBAP, IGA, AAAC, civil

	(public consultations in EIA, environmental forums).	representation of women and young people; lack of permanent institutional mechanisms.	community participation; ensure gender and youth inclusion; institutionalise environmental advisory councils.	society, youth and women networks.
Training and continuing education	Specific training projects carried out by international partners.	Lack of a national continuing education plan; absence of specialised centres.	Create a national environmental and climate training programme; establish university and technical partnerships.	National universities, regional institutes (e.g. CILSS, AGRHYMET), UNDP, UNEP.

5.5. Cooperation with non-governmental organisations, the private sector and civil society

Cooperation between the Government of Guinea-Bissau, non-governmental organisations (NGOs), the private sector and civil society has assumed an increasingly important role in the national response to climate change and in promoting environmental sustainability. In a context of limited institutional and financial resources, these actors have provided technical support, community mobilisation, project implementation and advocacy, complementing government actions and strengthening the resilience of the most vulnerable communities.

Both national and international NGOs are among the main drivers of the implementation of adaptation and mitigation projects in the country. Organisations such as the Institute for Biodiversity and Protected Areas (IBAP), in close collaboration with international partners (IICN, Wetlands International, WWF, Tiniguena, etc.), have promoted ecosystem conservation, mangrove restoration and biodiversity protection. These actions not only contribute to the mitigation of greenhouse gas emissions, but also strengthen the livelihoods of local people who depend on natural resources.

Organised civil society, through community associations, networks of women, young people and farmers, plays a key role in raising awareness, monitoring public policies and implementing local solutions. Initiatives by community radio, youth movements, and grassroots organisations have extended the reach of environmental education messages, ensuring that they reach the population in national languages and accessible formats. The involvement of civil society has also contributed to greater social inclusion and gender equity in decision-making processes related to climate change.

The private sector, although still incipient in this area, has started to assume a more important role in the financing and adoption of clean technologies, particularly in renewable energies and waste management. Local businesses and international operators have invested in decentralised solar solutions, community mini-grids and energy efficiency initiatives, demonstrating the potential of public-private partnerships to accelerate Guinea-Bissau's energy transition. In addition, small and medium-sized enterprises have been active in sustainable agriculture and ecotourism, aligning economic interests with environmental objectives.

However, cooperation between government, NGOs, the private sector and civil society faces significant challenges. Among them, the lack of formal coordination mechanisms, the dispersion of initiatives without full alignment with national priorities and the scarcity of qualified financial and human resources stand out. To overcome these limitations, it is essential to strengthen the mechanisms of multi-sectoral

dialogue, institutionalise consultation platforms and create incentives that promote innovation and private sector involvement.

Overall, Guinea-Bissau recognises that building an effective and sustainable climate response depends on the collective mobilisation of all social actors. The consolidation of inclusive and collaborative partnerships will not only increase the effectiveness of ongoing actions, but will also pave the way for attracting new funding, the development of local technologies and the valorisation of traditional knowledge of communities. Thus, cooperation with NGOs, the private sector and civil society is an indispensable pillar for achieving the objectives of the Convention and ensuring a more resilient and sustainable future for the country.

Table0-2Subject: Cooperation with NGOs, the private sector and civil society in Guinea-Bissau

Actors	Current contributions	Gaps	Priority measures	Strategic Partners
National and international NGOs	Implementation of conservation, adaptation and mitigation projects; mangrove restoration; biodiversity monitoring; community environmental education.	Scattered initiatives; lack of coordination with national policies; dependence on external financing.	Strengthen coordination with the government; integrate actions into national strategies; train local technicians; create financial sustainability plans.	IBAP, Wetlands International, Tiniguena, WWF, UNDP, GEF, FAO.
Civil society and community associations	Community mobilisation; awareness raising and environmental education; participation in local forums and committees; integration of women and young people.	Limited participation in formal decision-making processes; uneven geographical coverage; poor coordination with public institutions.	Establish permanent mechanisms for community participation; strengthen the representation of women and young people; institutionalise advisory councils.	Local associations of women and youth, community radio, NGO, IBAP, MABAC.
Private sector	Investments in renewable energy (solar mini-grids, photovoltaic systems); sustainable agriculture; ecotourism; energy efficiency; clean technology supply.	Low systemic participation; lack of incentives; weak integration in national climate strategies.	Develop public-private partnerships; create fiscal and financial incentives; foster local technological innovation; and increase investment in climate solutions.	Local and international companies, MABAC, Ministries of Energy and Environment, financial institutions, GEF, UNDP.
Multi-stakeholder platforms	Occasional national fora and dialogues; limited coordination of actions.	Lack of formal and permanent platforms; weak inter-institutional and multi-sectoral coordination.	Establish national coordination platforms; institutionalise regular dialogue and monitoring fora; align initiatives with NDCs	

5.6. Systematic Research and Observation

Scientific research and systematic observation are fundamental tools to understand the dynamics of climate change, assess its impacts and support the definition of appropriate mitigation and adaptation policies and measures. The United Nations Framework Convention on Climate Change (UNFCCC) recognises that reliable data collection, continuous monitoring, and multidisciplinary research are essential conditions for improving countries' ability to respond to climate challenges, reduce uncertainty, and promote informed decision-making.

In Guinea-Bissau, research and climate observation systems face several historical limitations, mainly related to institutional fragility, lack of financial resources, scarcity of modern equipment and low critical mass of specialised researchers. However, significant progress has been made in recent years through international cooperation, the implementation of climate projects and the strengthening of national technical capacities.

5.6.1. Scientific research in Guinea-Bissau

Scientific research on climate change in Guinea-Bissau is still at an early stage, reflecting structural, financial and institutional limitations that limit the country's ability to produce scientific knowledge.

Universities and research centres, especially the Amílcar Cabral University (UAC), play a central role in fostering research, although their contributions remain limited. The main obstacles include:

- *financial constraints*, which prevent the continued funding of research projects;
- *shortage of laboratories and appropriate scientific equipment*, which compromises the conduct of more in-depth and experimental studies;
- insufficient *advanced training* of teachers and researchers, which limits the ability to guide specialised research and publish in international scientific journals.

Despite these limitations, some positive initiatives have been observed, often carried out in partnership with international organisations and NGOs, which have allowed the development of studies applied in priority areas for the country, namely:

- *agricultural adaptation* to drought and precipitation variations, including climate-smart farming practices;
- *sustainable management* of mangroves and coastal ecosystems, with a focus on protection against erosion and the preservation of biodiversity;
- *impacts of climate variability on rural communities*, in particular on food security and livelihoods;
- *local resilience practices*, which value traditional knowledge and community adaptation to climate risks.

Interdisciplinary research, which combines the natural, social and economic sciences, is still at an early stage, but is beginning to gain prominence and relevance. This progress is due in part to the integration of Guinea-Bissau into regional networks such as ECOWAS, WAEMU and African Union programmes, which promote:

- the exchange of scientific experience between the countries of the sub-region;

- access to scholarships and academic mobility programmes;
- sharing data and research methodologies, strengthening international scientific cooperation.

In summary, the actual state of scientific research in Guinea-Bissau can be characterised as a process under construction, which combines significant internal limitations with growing external opportunities. Strengthening this area depends on investing in advanced training of researchers, creating adequate scientific infrastructure and integrating more strongly into international networks for the production and dissemination of knowledge.

5.6.2. Systematic Observation - Meteorological and Climatological

The systematic observation of climate and meteorology in Guinea-Bissau is largely ensured by the National Institute of Meteorology of Guinea-Bissau (INM-GB), an entity that plays a central role in the collection, management and dissemination of atmospheric and climatological data. INM-GB's work is essential not only to support daily weather forecasts, but also to provide key scientific information for agriculture, water management, civil aviation, public health, and, more recently, for early warning systems and climate change adaptation.

Currently, the country's weather observation network remains limited. The country has a limited number of stations, both automatic and manual, whose distribution is uneven, leaving several regions without adequate coverage. This gap undermines the collection of nationally representative data and makes it difficult to monitor climate variability in detail, especially in areas most vulnerable to droughts, floods, and extreme events.

Another significant challenge is the obsolescence and maintenance of equipment. Many existing stations use outdated technology, which often faces calibration and repair difficulties due to scarcity of replacement parts and limited national technical capacity to ensure continuous maintenance. This directly impacts the quality and continuity of time series, which are essential for long-term climate analysis, future scenario modelling and sector planning.

Despite these structural limitations, recent projects have brought about significant improvements. With the support of the United Nations Development Programme (UNDP) and the World Bank, actions are under way within the framework of the Rapid Alert Project, which includes the installation of new automatic weather stations at strategic points in the country. This new equipment represents a significant advance, allowing the collection of data in real time and automatic transmission to centralised analysis systems, increasing the reliability and punctuality of the available meteorological information.

The partial modernisation of the network, combined with training programmes for national technicians, provides a promising basis for strengthening systematic observation. However, the system still requires additional investments to meet regional and international quality standards, including:

- the expansion of the territorial coverage of the observation network;
- reinforcement of preventive and corrective maintenance of equipment;
- the consolidation of accessible and interoperable digital databases;
- and the continuous training of technicians in meteorological and climatological monitoring technologies.

Thus, the actual state of meteorological and climatological observation in Guinea-Bissau is characterised by recent but still insufficient progress, revealing a sector in transition: from a limited and vulnerable network to a more modern and reliable structure, supported by international partnerships and the national commitment to improve climate forecasting and adaptation systems.

Currently, the basic surface meteorological observation network in Guinea-Bissau consists of:

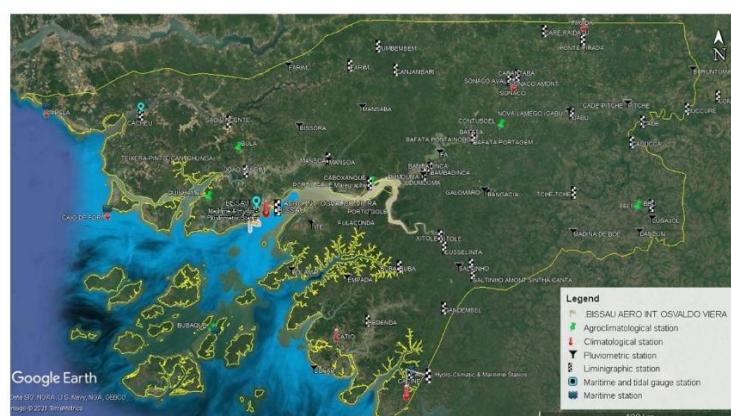
- *synoptic stations*, of which 03 are partially operational (Bissau, Bolama and Bafatá). These stations do not measure wind and 01 of them (Bolama) has no barometer to measure atmospheric pressure.
- *04 main weather stations* (Bissau, Bolama, Bafatá and Gabú), also partially operational.
- *12 auxiliary weather stations*, inoperative.
- *07 agro-meteorological stations*, inoperative.
- *rainy seasons*, of which 22 are in operation.

Both in the main weather stations and rainfall stations, local observers face significant difficulties in transmitting data to the INM-GB in Bissau. They depend on state-owned landlines – whose network is being rapidly deactivated – or mobile phones, often needing to use their own resources to purchase credits and send data/information to headquarters. In other words, the entire network, as well as the systems and protocols that support it, is quite precarious.

According to INM-GB, the main causes of the limitations in data collection by the surface meteorological observation network in Guinea-Bissau are:

- The political-military conflict of 1998/1999, which practically destroyed the network existing at the time.
- The lack of adequate training in the country - careers in meteorology and related fields should be sought abroad.
- The lack of financial resources in the INM-GB, insufficient for the acquisition of technical equipment (necessary for the replacement, expansion and updating of hardware and software), maintenance of the building, furniture, consumables, payment of public services, security, among others.

In addition, the INM-GB has a low level of technological incorporation, for example, still relying on fixed lines and regular visual observations of the team to collect meteorological data.



Number37Subject: Location of meteorological, rainfall and hydrological stations

5.6.3. Systematic Observation - Hydrology and Water Resources

The Directorate-General for Water Resources (DGRH), through its Hydrology Services, is the main entity responsible for monitoring rivers, aquifers and river basins in Guinea-Bissau. The role of HRD is crucial to ensure up-to-date knowledge on water availability and quality, an essential element for food security, public health, energy production and adaptation to climate change.

In recent years, the national hydrological network has been revitalised after a long period of fragility and lack of regular maintenance. Efforts are underway to install new hydrometric and rainfall stations, located at strategic points in major river basins. This equipment allows the collection of essential data on river flow, groundwater levels and precipitation, thus strengthening the analysis and planning capabilities in various sectors.

The data produced by the hydrological network are of great importance for:

- sustainable management of water resources, including planning their use in different economic sectors;
- flood prevention and forecasting, reducing risks to vulnerable communities;
- agricultural planning, allowing anticipating periods of drought or excessive rainfall;
- and support for the formulation of public policies based on reliable scientific information.

Despite these advances, there are still significant challenges that limit the full operability and effectiveness of the system:

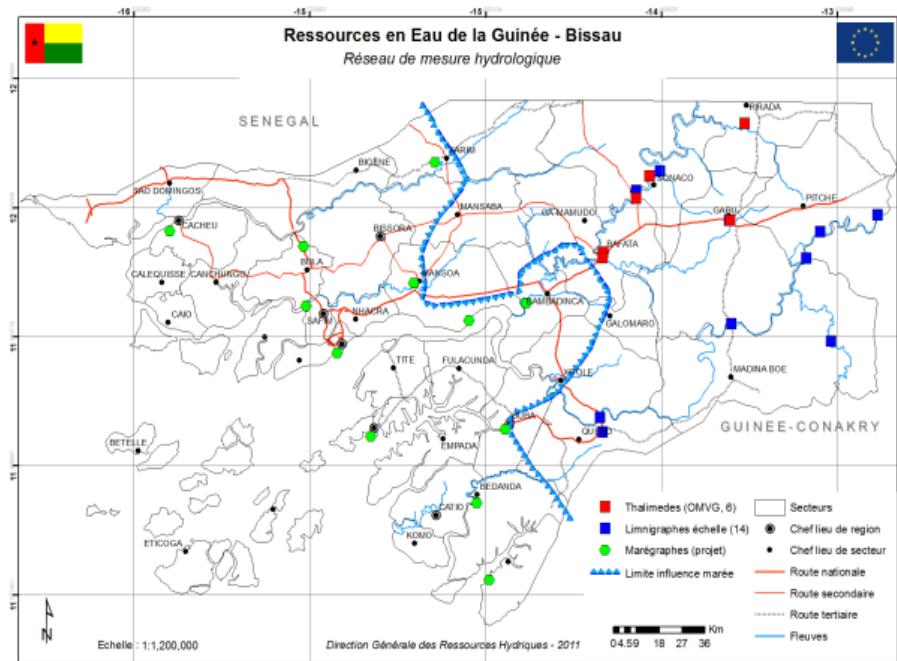
- *Insufficient equipment:* the installed network still does not cover the entire national territory, leaving several areas without systematic monitoring.
- *Maintenance difficulties:* Recurrent problems with failures, lack of replacement parts and shortage of specialised technicians compromise the continuity of data collection.
- *Lack of an integrated digital system:* Currently, there is no modern national database that allows to centralise, store, process and make available in an accessible way the hydrological information collected.

In short, the actual state of hydrological observation in Guinea-Bissau is characterised by a transition process, marked by significant progress, particularly in the context of international cooperation projects, but still with structural and institutional gaps. The strengthening of the hydrological network, coupled with the development of an integrated digital system and the continuous training of national technicians, will be crucial to consolidate a more efficient, preventive and sustainable management of the country's water resources.

The monitoring of water resources is carried out by the Directorate-General for Water Resources (DGRH), through the Hydrology Services, which maintain a network of hydrometric and rainfall stations distributed across the main river basins of the country.

- *Hydrometric stations:* Equipped to measure water levels and flows in large rivers and streams, they are essential for flood monitoring, drought forecasting and water resources management.
- *Precipitation seasons:* record precipitation at different points of the territory, allowing to evaluate the spatial and temporal distribution of rainfall.

- *Integration with alerts:* Data from these stations feed early warning systems, used especially in regions vulnerable to floods, such as Bafatá, Gabú and the Geba estuary.
 - *Technical challenges:* Many stations still lack proper maintenance, regular calibration and real-time data communication, limiting their effectiveness for hydrological modelling and extreme event prediction.



Number38Subject: Hydrological observation network

The installation and operation of the hydrological observation network in Guinea-Bissau has been almost entirely carried out by development partners, who have funded almost all the hydrological projects carried out to date. The country's cooperation with these partners began in the 1950s, during the colonial period, through Portugal. Other bilateral, multilateral and sub-regional organisations have also contributed to the development of hydrological services in Guinea-Bissau. Among them, we highlight: the Portuguese Institute of the Environment, the French Development Agency (AFD), the UNDP, the World Meteorological Organisation (WMO), the AGRHYMET / CILSS Regional Centres, OMVG, among others.

These partners have contributed in various ways, providing financing and technical assistance through projects, as well as ensuring the physical installation and maintenance of hydrological monitoring equipment. Training and development were also offered to technicians from national institutions and in some cases salaries were guaranteed to observers and service technicians. This reflects the chronic difficulties of the government of Guinea-Bissau in properly maintaining the state apparatus and providing sufficient services to the population.

The monitoring of the hydrological observation network is an important segment within the different types of water services provided by the State. It generates public goods and global benefits, as well as direct benefits for adaptation to climate change. Together with the meteorological, observation and monitoring services of the hydrological network are essential for the consolidation of climate services in Guinea-Bissau.

In terms of staffing, public institutions responsible for the water sector — whether Human Resource Development in general or specific technical hydrology services — face long-standing problems of understaffing, insufficient equipment and insufficient funding. There is a widespread shortage of qualified, tertiary-educated professionals, as well as specialised staff in areas such as climate change and hydrological forecasting.

5.6.4. Systematic Observation - Coastal and Marine Areas

Guinea-Bissau's coastal areas are strategically important for the country, not only because of their ecological value – which is home to ecosystems such as mangroves, estuaries and islands – but also because of their economic and social importance, as they are home to fishing communities, agricultural activities and urban infrastructure. However, these areas are highly vulnerable to the impacts of climate change, in particular rising sea levels, coastal erosion and saline intrusion, which threaten both ecosystems and the livelihoods of coastal populations.

In recent years, with the support of international partners, Guinea-Bissau has made important progress in introducing modern technologies for coastal observation and monitoring. The WACA Project (West African Coastal Areas) has played a central role in this process, promoting the use of:

- Remote sensors for large-scale data collection and difficult to access;
- Drones, which capture high-resolution images and monitor coastal development;
- Geographic Information Systems (GIS), which facilitate spatial analysis, modelling of erosion scenarios and identification of risk areas.

These tools have helped to map vulnerable areas, support land-use planning, and provide the scientific basis for coastal adaptation measures, including projects to restore mangrove ecosystems and define protection strategies for exposed communities.

Despite these advances, the country still lacks an integrated national coastal monitoring system. Existing initiatives operate mainly under specific projects of limited duration and are not fully coordinated between national institutions such as the National Institute for the Environment (INA), the Institute for Biodiversity and Protected Areas (IBAP), the Directorate-General for Water Resources and other relevant entities. This fragmentation compromises the continuity and sustainability of data collection and management, making it difficult to create consistent time series and implement evidence-based public policies.

Thus, the actual state of systematic observation in Guinea-Bissau's coastal and marine areas can be described as a scenario of isolated technological advances, with a positive impact on knowledge generation and risk awareness, but still lacking an institutionalised and integrated structure that ensures continuous monitoring, data sharing and coordination between sectors.

To address these gaps, it is essential to invest in the creation of an integrated national coastal monitoring system that coordinates the different institutions, ensures data interoperability and ensures the continuity of observations in the long term.

Guinea-Bissau's coastal areas, particularly vulnerable to erosion, sea level rise and saline intrusion, rely on observation networks based on remote sensors, remote sensing, drones and GIS. These systems allow to map the coastline, monitor changes in mangrove habitat and assess the impacts of extreme weather

events. Projects such as WACA (West Africa Coastal Areas) have promoted the integration of this data into digital platforms to support decision-making and territorial planning.

5.6.4. Systematic Observation - Biodiversity and Ecosystems

Guinea-Bissau is renowned for its extraordinary biological wealth, hosting vast ecosystems of mangroves, savannas, dry forests, wetlands and islands that constitute habitats of global importance for endangered species, migratory birds and fisheries resources. The Institute of Biodiversity and Protected Areas (IBAP) plays a central role in the conservation and monitoring of this diversity, managing protected areas that cover approximately 26% of the country's territory, including the Orango National Park, the João Vieira and Poilão National Park and the Lagoas de Cufada Natural Park, among others.

In recent years, IBAP and its partners have implemented modern tools and methods of environmental monitoring, complementing the fieldwork carried out by technical teams and local communities. Among the instruments currently used are:

- Satellite and drone imagery to monitor land use dynamics, mangrove areas evolution and identification of areas at risk of degradation;
- camera traps installed in strategic areas, which allow the collection of data on flagship species and the assessment of the abundance and distribution of terrestrial fauna;
- Field inventories: regular surveys, carried out in collaboration with communities and researchers, to assess the floristic and faunal composition, as well as the conservation status of specific habitats.

These efforts have contributed to strengthen scientific knowledge about national biodiversity, support decision-making on conservation and give greater international visibility to the ecological importance of Guinea-Bissau, especially within the Biosphere Reserve of the Bijagós Archipelago, recognised by UNESCO.

However, monitoring biodiversity and ecosystems still faces structural challenges that limit their effectiveness:

- Lack of systematisation: data collection initiatives are often fragmented and dependent on short-term projects, making it difficult to create continuous time series.
- Limited database integration: there is still no unified national platform that centralises, organises and makes information available in an accessible and interoperable way.
- Insufficient linkage with regional and international networks: although there is some collaboration with cross-border conservation organisations and international observatories, full integration into global monitoring systems is still at an early stage.

Thus, the actual state of systematic observation of biodiversity and ecosystems is characterised by a set of relevant and innovative initiatives, but which require greater coordination, continuity and integration. The consolidation of a national biodiversity monitoring system, supported by interoperable digital databases and cooperation with international networks, is essential to ensure the sustainable management of Guinea-Bissau's natural capital and to position the country as an active actor in global biodiversity conservation.

The consolidation of systematic observation and research networks is an essential step for Guinea-Bissau, allowing anticipation of impacts, support for vulnerable communities, strengthening adaptation policies and integrating the country into regional and global climate monitoring networks.

Table 5-0-3: Systematic Research and Observation Networks in Guinea-Bissau

Sector / Network Type	Current Characteristics	Gaps	Causes	Priority measures	Strategic Partners
Meteorology and Climatology	07 synoptic stations (3 partially operational); 04 main stations partially operational; 12 auxiliary weather stations inoperational; 45 rainfall stations (22 operational). Measurement of temperature, precipitation, wind, humidity and solar radiation.	Limited coverage; incomplete data; irregular maintenance; poor data integration; difficult transmission of information.	Political-military conflict (1998/1999); lack of funding; poor maintenance; low technological level; insufficiently qualified personnel.	Repair and modernise stations; expand territorial coverage; digitise data collection and transmission; train technicians; integrate the national observation network.	INM-GB, MABAC, METAGRI, EMERMET, UNDP, GEF, WMO, ECOWAS, regional universities.
Hydrology	Hydrometric and rainfall stations in the main basins; monitoring of flow, water levels and precipitation; support for flood and drought alerts.	Insufficient coverage in inland regions; limited maintenance; data communication not always in real time.	Lack of financial resources; shortage of qualified technicians; obsolete equipment.	Modernise and expand the network; periodic maintenance; integration of data into digital platform; train technical staff.	HRDG, Hydrological Services, UNDP, GEF, UNESCO, ECOWAS.
Coastal and marine areas	Monitoring with remote sensors, drones and GIS; coastal mapping and mangrove monitoring; integration into WACA and Coastal projects.	Limited coverage; integration with meteorological and hydrological networks still insufficient; restricted local technical capacity.	Lack of funding; poorly trained local staff; lack of a continuous national system.	Build an integrated coastal monitoring system; expand coverage; train local technicians; integrate data into a national platform.	WACA, Coastal Project, IBAP, FAO, international NGOs, regional universities.
Integrated/multidisciplinary observation	Combining meteorological, hydrological and coastal data; supporting climate modelling, agricultural planning and early warning.	Poorly coordinated systems; scattered data; limited integrated analytics; reduced ability to predict extreme events.	Lack of integrated national platforms; low investment in ICT; limited human resources.	Develop an integrated national data platform; strengthen analytical capacity; establish inter-institutional sharing mechanisms; update	INM, DGRH, IBAP, MABAC, UNDP, GEF, ECOWAS, WMO, regional universities.

				monitoring protocols.	
Scientific and Academic Research	Studies applied in cooperation with NGOs and partners; involvement of Amílcar Cabral University.	Limited financial and laboratory resources; low critical mass of researchers; poor interdisciplinarity.	Low investment in research; political instability	Create climate research centres; strengthen regional university cooperation; promote scholarships and training programmes.	Amílcar Cabral University, African Union, ECOWAS, EU, UNESCO, Institutions

5.7. Gender and Climate Change

Although not explicitly addressed in Decision 17/CP. 8, it is recommended to include a sixth sub-chapter on gender and climate change.

This sub-chapter addresses the following main points: 1. Current situation of gender consideration in Guinea-Bissau; 2. Impact of climate change on gender; 3rd Women's contribution to mitigation and adaptation activities; and 4. Recommendations to strengthen gender mainstreaming in climate action.

5.7.1. The actual situation of gender consideration in Guinea-Bissau

Guinea-Bissau has increasingly recognised the importance of gender mainstreaming in national development policies and programmes, including in the areas of environment and climate change.

a) National institutions and civil society organisations

In Guinea-Bissau, the promotion of gender equality and women's empowerment are directly linked to climate and environmental action, reflecting the growing awareness of the need to integrate the gender dimension into climate change adaptation and mitigation policies.

- The Institute for Women and Children (IMC) is the main government entity responsible for these issues. In addition to promoting equal opportunities and female empowerment, BMI monitors environmental and climate initiatives, ensuring that policies and programmes take into account the specific needs of women and children, especially in communities most vulnerable to the impacts of climate change.

- The Ministry of Environment, Biodiversity and Climate Action (MABAC) plays a central role in the implementation of adaptation and mitigation programmes. In recent years, it has sought to integrate the gender dimension into Community projects, with a particular emphasis on initiatives for coastal adaptation and sustainable management of natural resources. This approach aims to ensure that women participate actively in decision-making, benefit from introduced technologies, and contribute to the resilience of their communities.

At the same time, civil society organisations have played an active role on the ground. The Women's Network, women's community associations and other local organisations contribute to social mobilisation by promoting sustainable natural resource management practices, empowering women for

climate adaptation initiatives, and advocating for women's rights in vulnerable contexts. These organisations act as bridges between national policies and local communities, ensuring effective female participation and that climate projects respond to specific social and cultural realities.

Together, these national institutions and civil society organisations form a complementary system of governance and community action, essential to promote gender equality, strengthen climate resilience and the sustainable implementation of environmental policies in Guinea-Bissau.

b) National policies, strategies and initiatives

Guinea-Bissau incorporates the gender dimension in climate policies through instruments such as the National Plan for Gender Equality and the National Plan for Adaptation to Climate Change (PANA), which emphasise the need to consider gender inequalities in climate planning.

The National Poverty Reduction Strategy and National Environmental Policy recognise the central role of women in food security, subsistence agriculture, and ecosystem protection.

At the international level, the country has signed commitments under the UNFCCC and the 2030 Agenda (SDG 5 and SDG 13), promoting gender mainstreaming in its national contributions to climate action.

c) Examples of activities already carried out

In Guinea-Bissau, several initiatives have been developed to integrate the gender dimension in climate change adaptation and mitigation efforts. These include awareness-raising campaigns promoted by NGOs and the Institute for Women and Children (IMC), which include workshops, community debates and educational activities to raise awareness of the effects of climate change on women and local communities.

Community-based training programmes focussing on resilient agriculture, water management, and reforestation techniques were also implemented, with special attention to the active participation of rural women, strengthening their capacity to respond to extreme weather events.

Meanwhile, coastal adaptation and mangrove restoration projects incorporate the training of women's groups in the sustainable management of natural resources, promoting female leadership in the protection and conservation of coastal ecosystems.

Moreover, microcredit and green entrepreneurship initiatives have encouraged women to develop small income-generating activities linked to sustainable practices, such as solar fish drying or climate-friendly horticulture, while contributing to food security, income generation, and community resilience.

This set of activities demonstrates the importance of integrating a gender perspective into climate policies, recognising the central role of women in adapting to climate change and promoting sustainable solutions in the country.

Table 5-0-4:Gender Situation in Guinea-Bissau

Institutions	Policies	Activities	Gaps	Opportunities / Partners
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Institute for Women and Children (IMC)	National Plan for Gender Equality	Gender and climate change awareness campaigns; training for women in rural communities	Limited technical and financial capacity; restricted geographical scope	UN Women, UNICEF, NGO Women, MABAC
Ministry of Environment, Biodiversity and Climate Action (MABAC)	National Policy on Adaptation to Climate Change (PANA); National Environmental Policy	Gender mainstreaming in community and coastal adaptation projects	Lack of systematisation of gender mainstreaming in all programmes; insufficient data broken down by gender	UNDP, GEF, local communities, IBAP
Civil society organisations (e.g. Women's Network, Community Women's Associations)	Internal guidelines for socio-environmental participation	Community mobilisation, training in resilient agriculture and natural resource management	Fragmentation of initiatives; lack of coordination with public policies	International and regional NGOs, bilateral partners, rural women's networks
Sectoral Ministries (Agriculture, Water, Health)	National Poverty Reduction Strategy, Sectoral Gender Mainstreaming Plans	Implementation of pilot projects focussing on women, micro-credit programmes and green entrepreneurship	Low intersectoral integration; few gender monitoring indicators	FAO, World Bank, Cooperation

5.7.2. Impact of climate change on gender

Climate change does not affect men and women in the same way. In Guinea-Bissau, women are particularly exposed and vulnerable due to their central role in agriculture, water collection and management, conservation of natural resources and ensuring family food security. This vulnerability is most pronounced in rural and coastal areas, where living conditions depend heavily on ecosystems and climate variability.

a) Increased vulnerability of women

In Guinea-Bissau, women face specific and marked vulnerabilities due to climate change, reflecting the interaction between social, economic and environmental factors.

In agriculture and food security, most women engage in subsistence farming, including rice cultivation, horticulture, and harvesting of non-woody forest products. Irregular rainfall, prolonged droughts and salinisation of coastal soils directly affect agricultural production, compromising the main source of income and livelihood for many families.

Access to water is another crucial factor, given that women are traditionally responsible for collecting and managing water at home. The scarcity or contamination of sources increases the time and effort required for this activity, reducing the time available for education, health and other productive activities.

In the management of natural resources, women play a central role in the collection of firewood and the use of forest products. The degradation of ecosystems increases the pressure on resources, forcing women

to travel longer distances and exposing them to physical and social risks, including accidents and insecurity.

In coastal areas, women who depend on fishing and fish processing face additional challenges due to coastal erosion, rising sea levels and depletion of marine resources, compromising food security and livelihoods in these communities.

Taken together, these factors highlight the need for gender-sensitive climate policies and programmes that recognise and respond to women's specific vulnerabilities, strengthening their resilience and active participation in adapting to climate change.

b) Gender inequalities exacerbating climate impacts

Gender inequalities in Guinea-Bissau amplify the effects of climate change on women, limiting their ability to adapt and increasing their exposure to risk.

Limited access to productive resources is a significant barrier: many women lack formal land rights or access to credit, which limits their ability to invest in resilient farming techniques or small green-economy businesses.

Low participation in decision-making also contributes to vulnerability: women continue to be under-represented in natural resource governance and management bodies, making it difficult to integrate their needs and priorities into climate adaptation plans.

Inequality in education and training further aggravates this situation. Low rates of female literacy reduce access to information on climate risks, adaptation technologies, and climate finance opportunities, limiting women's autonomy and agency.

Finally, climate change has a direct impact on health, increasing the incidence of waterborne and vector-borne diseases such as malaria and diarrhoea, particularly affecting women and children, who play the role of primary caregivers at home.

These inequalities highlight the need for gender-sensitive climate interventions that promote equitable access to resources, participation in decision-making, technical training, and protection of women's health.

c) Social and economic consequences

Climate change has significant social and economic impacts on women in Guinea-Bissau, reinforcing pre-existing inequalities and affecting the resilience of communities.

Work overload increases in climate stress contexts, as women take on greater responsibilities in agriculture, water management, family care, and productive activities, which reinforces existing inequalities.

Structural constraints, such as restricted access to productive resources, credit, and training, reduce women's resilience, directly affecting the resilience of entire communities, given women's strategic role in food production, health, and family well-being.

In extreme climate crises, such as floods, prolonged droughts or population displacement, women and girls face higher risks of gender-based violence, social exclusion, and loss of livelihoods, making them particularly vulnerable and requiring specific attention in adaptation and social protection policies.

These consequences underscore the importance of gender-sensitive climate strategies that strengthen the protection, empowerment, and participation of women in community resilience.

Table 5-0-5: Differentiated impacts of climate change on gender in Guinea-Bissau

Differentiated impacts	Critical areas	Examples in Guinea-Bissau	Social/economic consequences
Reducing agricultural production and food security	Subsistence agriculture and horticulture	Loss of rice crops in Bologna due to salinisation and irregular rainfall	Food insecurity; increasing female poverty; lower household income
Increased effort to collect water	Access and water management	Lack of reliable sources in Bafatá, Gabú and Oio; well drought during dry season	Increasing women's workload; less time for education and productive activities
Pressure on natural resources	Forests and domestic energy	Greater distance for the collection of firewood and forest products in Quinara and Tombali	Physical fatigue; risk of violence; less time available for economic activities
Effects of coastal erosion and sea level rise	Coastal areas and artisanal fisheries	Loss of fish processing areas in coastal communities (Bijagós, Caió, Varela)	Loss of income; greater economic vulnerability of women fishermen and processors
Limitations on access to land and credit	Land rights and financing	Little formal land ownership by women farmers	Failure to invest in resilient farming practices and economic diversification
Under-representation in decision-making processes	Political and Community participation	Low presence of women in natural resources management committees	Specific needs not considered in adaptation plans; perpetuation of inequalities
Vulnerability in health and family care	Public health and climate-sensitive diseases	Increased malaria and diarrhoea during periods of flooding	The burden of women as caregivers; greater impact on children's health
Increased social risks in climate crises	Displacement, extreme poverty and violence	Vulnerability during prolonged floods and droughts	Increased exposure to gender-based violence; social exclusion; weakening community resilience

5.7.3. Women's contribution to mitigation and adaptation activities

Women in Guinea-Bissau play a central and multifaceted role in climate change mitigation and adaptation activities, assuming essential responsibilities in the sustainable management of natural resources, biodiversity conservation, resilient agriculture and the transmission of traditional knowledge to communities.

a) Sustainable management of natural resources and conservation of biodiversity

In Guinea-Bissau, women play a central role in the sustainable management of natural resources and the conservation of biodiversity. They actively participate in the collection, planting and care of native

species, in the maintenance of community gardens and in the management of small local reserves, contributing to food security and the preservation of ecosystems.

Moreover, women are involved in the conservation of mangroves and coastal areas, which are essential for protecting communities from erosion and rising sea levels, and for maintaining marine and terrestrial biodiversity. Through women's community associations, they monitor forest and water resources, promoting sustainable use practices and ensuring the preservation of ecosystems for future generations.

This engagement highlights the strategic role of women in implementing local climate change adaptation solutions and promoting environmental and community resilience.

b) Climate-resilient agriculture

In Guinea-Bissau, women play a central role in subsistence farming, applying traditional and innovative techniques to address climate variability. Among these practices, we highlight the use of drought-resistant seeds and the implementation of community irrigation systems, which help to maintain agricultural production even in periods of water scarcity.

Moreover, women are actively participating in sustainable agriculture and food security programmes, often linked to projects funded by international organisations and NGOs. Their work not only ensures families' resilience, but also strengthens rural communities, strengthening local capacity to adapt to climate change.

c) Participation in Community projects and environmental initiatives

Women in Guinea-Bissau play an active role in community projects and environmental initiatives, contributing significantly to climate adaptation and local sustainability. They participate in reforestation, fruit tree planting and mangrove restoration, supporting carbon sequestration and the protection of vulnerable ecosystems.

They are also involved in renewable energy projects, including the installation and maintenance of solar mini-grids, promoting access to clean energy in rural communities, and strengthening local energy resilience.

Women also excel as leaders in environmental awareness, organising workshops, campaigns and educational events that disseminate sustainable practices and climate warnings, strengthening community knowledge and responsiveness to the impacts of climate change.

d) Women's transformative potential

In Guinea-Bissau, women play a transformative role in their communities, acting as leaders and agents of change. They are catalysts for adopting climate resilience practices, mobilising other community members and influencing local decisions related to the adaptation and management of natural resources.

Women's traditional knowledge, combined with modern practices, enables the development of integrated adaptive solutions, increasing collective resilience and strengthening social cohesion in the face of climate threats.

The active participation of women in mitigation and adaptation strategies contributes directly to the reduction of vulnerabilities, the strengthening of communities' capacity to respond and their preparation to face extreme climate events, consolidating their role as protagonists of environmental and social transformation.

Table 5-0-6: Women's contribution to mitigation and adaptation activities

Dimension / Area	Contribution of women	Concrete examples in Guinea-Bissau	Impacts	Gaps	Strategic Partners
Management of natural resources and biodiversity	Monitoring, preservation and sustainable use of forest and water resources	Protection of mangroves, management of community gardens, maintenance of small local reserves	Ecosystem conservation, coastal protection, environmental resilience	Limited resources; little systematisation of practices; need for technical training	IBAP, MABAC, environmental NGOs, local communities
Climate-resilient agriculture	Implementation of adaptive and sustainable farming techniques	Use of drought-resistant seeds, community irrigation systems, food security programmes	Ensure livelihoods, increase family and community productivity and resilience	Limited access to modern finance and technologies	Ministry of Agriculture, FAO, UNDP, local NGOs
Community projects and environmental actions	Participation in reforestation, mangrove restoration, renewable energy and environmental awareness	Planting fruit trees, maintenance of solar mini-grids, workshops and educational campaigns	Carbon sequestration, improving community infrastructure, raising environmental awareness	Limited geographic coverage; lack of scale and coordination	GEF, UNDP, WACA and coastal projects, local communities
Community leadership and knowledge transfer	Agents of change, mobilisers of resilient practices, transmitters of traditional knowledge	Leadership in local committees, mentoring of youth and other community members	Strengthening community resilience, social cohesion and dissemination of adaptive practices	Formal under-representation in decision-making bodies; need for institutional recognition	Women's NGOs, IMC, MABAC, UNICEF, CF4C-WA

5.7.4. Recommendations for strengthening gender mainstreaming in climate action

Effective gender mainstreaming in climate change policies and programmes in Guinea-Bissau requires structured and systematic actions. Key recommendations include:

a) Strengthening the institutionalisation of the gender perspective

In Guinea-Bissau, strengthening the institutionalisation of the gender perspective in climate policies aims to ensure that differentiated vulnerability and the role of women are systematically integrated into all mitigation and adaptation strategies.

To this end, it is essential to formally incorporate the gender dimension into national climate change policies, plans and programmes, ensuring that all sectors recognise the specific needs of women and promote their active participation.

In addition, the creation of institutional monitoring mechanisms allows the implementation of a gender perspective in sustainable development and climate adaptation projects, ensuring that the actions implemented have a real impact on reducing inequalities and strengthening the resilience of communities.

b) Ensure gender-disaggregated data

In Guinea-Bissau, ensuring gender-disaggregated data is crucial to understanding the differentiated impacts of climate change and guiding inclusive policies.

To this end, systems for collecting and analysing gender-disaggregated climate and socioeconomic data are developed, enabling the precise identification of how women and men are affected differently by climate risks.

These data serve as a basis for the formulation of adaptation and mitigation policies, plans and programmes that effectively respond to the needs of all social groups, promoting equity, inclusion and strengthening community resilience.

c) Specific training and qualifications

In Guinea-Bissau, training and capacity building specific to women and girls is essential to strengthen their participation in climate change responses. Education and training programmes are promoted in areas such as science, technology, risk management and resilient agricultural practices, with the aim of expanding technical knowledge and capacity for action.

In addition, the creation of knowledge networks and the exchange of experiences is encouraged, allowing women to become agents of innovation and local adaptation, capable of implementing practical and effective solutions to address climate challenges in their communities.

d) Access to finance and technologies

In Guinea-Bissau, access to finance and technology is critical to strengthening women's resilience to climate change. Climate funds, microcredit, and productive resources must be facilitated, enabling women to implement adaptive solutions in vulnerable communities.

At the same time, the use of clean and renewable technologies is encouraged, ensuring that women can adopt more efficient mitigation and adaptation practices, contributing to environmental sustainability, local economic development and reducing gender inequalities.

e) Active participation in decision-making

In Guinea-Bissau, the active participation of women in decision-making processes is essential to ensure that climate policies reflect the needs and experiences of all social groups. It is crucial that women's and youth organisations participate in national and international forums on climate change, contributing their perspectives to policymaking and strategies.

Moreover, representation and consultation mechanisms should be promoted, enabling women to influence decisions related to natural resource management, sustainable development and climate adaptation measures, enhancing gender equity and the effectiveness of climate action in the country.

These recommendations aim to strengthen gender equity, increase community resilience and ensure that women contribute fully to climate change mitigation and adaptation in Guinea-Bissau.

Table 5-0-7: Recommendations to strengthen gender mainstreaming in climate action

Recommended Action	Goal	Expected impact	Current Gaps	Strategic Partners
Strengthening gender institutionalisation in climate policies, plans and programmes	Ensure that the gender dimension is systematically considered	Greater inclusion of women in mitigation and adaptation strategies; more equitable policies	Lack of formal mechanisms and intersectoral integration	MABAC, BMI, NGO women, UNDP, GEF
Ensure data broken down by gender	Improving climate impact analysis and guiding inclusive policies	Evidence-based policy decisions; making climate action more effective	Insufficient data collection systems; incomplete data	INE, MABAC, universities, international technical partners
Promoting training and capacity building for women and girls in the fields of climate, science and technology	Boosting female leadership skills and capacities	Women able to act as agents of change; local innovation in adaptation	Limited access to technical and scientific education; social and cultural barriers	Education NGO, UNICEF, universities, IMC
Facilitating women's access to finance, productive resources, and clean technologies	Economic and technical empowerment of women	Greater implementation of adaptive solutions; strengthening community resilience	Restricted access to funds and technologies; lack of specific programmes	Microcredit Banks, GEF, UNDP, International Cooperation, Local NGOs
Encouraging active participation in decision-making processes	Integrating Women's Perspectives on Climate Governance	More inclusive policies; strengthening female representation	Under-representation in fora and decision-making bodies	IMC, women's NGOs, community committees, international partners

5.8. Synergies with other Environmental Conventions

Guinea-Bissau, as a State Party to the United Nations Framework Convention on Climate Change (UNFCCC), recognised the importance of coordinating its climate action with other multilateral environmental conventions to which it is also a signatory, namely:

- Convention on Biological Diversity (CBD);
- United Nations Convention to Combat Desertification (UNCCD);
- Ramsar Convention on wetlands of international importance;
- Basel, Stockholm and Rotterdam Convention on hazardous chemicals and waste.

This coordination is considered essential to ensure coherence, maximise the use of limited resources and avoid duplication of effort.

5.8.1. Institutional integration and coordination

The Ministry of Environment, Biodiversity and Climate Action (MABAC) coordinates the implementation of environmental conventions in close collaboration with relevant national institutes and agencies such as the Institute for Biodiversity and Protected Areas (IBAP), the Competent Authority for Environmental Assessment (AAAC), the Centre for Waste and Chemicals (CRPQ) and the Directorate-General for Water Resources (DGRH). Despite progress, there is still an urgent need to strengthen interinstitutional coordination mechanisms and to ensure that national strategies are integrated across sectors.

5.8.2. Ongoing practical synergies

1. Climate and biodiversity (UNFCCC-CBD):

Mangrove conservation, reforestation and protected area management projects contribute to climate change mitigation and adaptation while enhancing biodiversity preservation. The Coastal Project and the WACA Project are examples of initiatives that combine the protection of coastal ecosystems with climate resilience.

2, Climate and Desertification (UNFCCC – UNCCD):

Agroforestry, assisted natural regeneration and sustainable agricultural practices help to reduce soil degradation and improve the adaptability of rural communities. Pilot projects in Bafatá and Gabú have shown positive results in combating erosion and restoring soil fertility.

3. Climate and Wetlands (UNFCCC – Ramsar):

The integrated management of Ramsar sites, such as the Bolama-Bijagós archipelagos, has enabled the alignment of conservation objectives with coastal adaptation measures, which are essential to deal with rising sea levels and saline intrusion.

4. Climate and Waste and Chemical Management (UNFCCC – Basel, Stockholm and Rotterdam Conventions):

CRPQ's solid and hazardous chemical waste management initiatives reduce pollution and indirectly contribute to climate mitigation, avoiding harmful gas emissions while protecting public health and biodiversity.

5.8.3. Gaps identified

The implementation of policies related to climate change and gender equality faces significant structural and institutional challenges. One of the main shortcomings is the lack of a permanent national inter-institutional coordination mechanism, which makes it difficult to coordinate effectively between the focal points of the various environmental and climate conventions. This lack of coordination undermines the integration of actions and reduces the efficiency of the implementation of policies and action plans.

Available financial and human resources are still limited, limiting the country's ability to implement integrated, sustainable, and large-scale interventions. The lack of qualified personnel and specialised technical support makes it difficult, for example, to draw up harmonised greenhouse gas inventories and produce joint reports, limiting the country's ability to fully comply with international commitments.

Moreover, there is a weak link between sectoral policies, such as agriculture, energy, fisheries, and urban planning, and internationally agreed environmental commitments. This gap compromises the coherence of mitigation and adaptation strategies, reducing the potential impact of the initiatives implemented.

In short, while there is growing awareness of the need for integrated climate policies, Guinea-Bissau faces structural and capacity-building challenges that require coordinated solutions, adequate resources and technical reinforcement to ensure the effectiveness of environmental and climate actions in the country.

5.8.4. Priority measures

The creation of synergies between different environmental conventions is a strategic priority for Guinea-Bissau, aiming at strengthening the governance and effectiveness of environmental policies. In this sense, a key initiative is the creation of a National Committee on Environmental Synergies, created to regularly bring together the focal points of each convention and ensure the coherent integration of international guidelines into national policies and strategies.

Another priority is to promote integrated action plans, leveraging natural intersections between areas such as biodiversity, climate change, desertification, and waste management. This approach allows us to optimise resources, align objectives and implement more consistent and impactful interventions.

Regional and international cooperation is also essential to strengthen these synergies. Participation in initiatives of ECOWAS, the African Union and the South-South Partnership facilitates the exchange of experiences, best practices and technical knowledge, contributing to solutions adapted to the national and regional context.

Finally, mobilising climate and environmental finance must be coordinated and multidimensional, so as to avoid overlapping projects and maximise the outcomes of interventions. The combination of these measures will enable Guinea-Bissau to move towards integrated and efficient environmental management in line with international commitments, while strengthening the country's resilience to environmental and climate challenges.

5.8.5. Future perspective

Given its rich biodiversity and climate vulnerability, Guinea-Bissau is uniquely positioned to adopt an integrated approach that enhances its socio-economic and environmental resilience. The synergy between environmental conventions should not be seen only as an international obligation, but as a national

sustainable development strategy capable of aligning global commitments with local priorities for adaptation, mitigation and conservation.

Table 5-0-8:Synergies with other environmental conventions in Guinea-Bissau

Axis of Synergy	Current Situation	Gaps	Priority measures	Strategic Partners
Climate – Biodiversity (UNFCCC and CBD)	Active participation in biodiversity conservation initiatives (IBAP, protected areas). Projects integrating ecosystem-based mitigation and adaptation.	Poor institutional coordination between UNFCCC and CBD focal points. Absence of an integrated database on biodiversity and climate.	Establish formal mechanisms for coordination between conventions. Developing an integrated inventory of biodiversity and climate.	IBAP, INA, WCMC, CBD Secretariat, UNDP, GEF.
Climate – Desertification (UNFCCC and UNCCD)	Sustainable land management programmes (resilient agricultural projects, community reforestation). Local experiences in adaptation.	Lack of scale and continuity in projects. Poor integration of soil, land use and climate data.	Develop an integrated national plan to combat desertification and adaptation to climate change. Strengthen soil observation and monitoring.	DGRN, FAO, CILSS/AGRHYMET, UNCCD Secretariat, EU.
Climate – Chemical pollution and waste (UNFCCC and Basel/Rotterdam/Stockholm Conventions)	Some waste and hazardous substances management initiatives (pilot projects on pesticides and waste oils).	Lack of integration of chemical and pollution risks into climate planning. Very limited institutional and laboratory capacities.	Create integrated climate and pollution policies. Strengthen laboratories and environmental enforcement.	CRPQ, IGA, Basel/Stockholm Secretariat, WHO, UNEP.
Climate – Oceans and coastal areas (UNFCCC and UNCLOS/SDG 14)	Coastal protection projects (WACA, Coastal). Strong socio-economic dependence on coastal and marine areas.	High coastal vulnerability, accelerated erosion, insufficient coordination with other ocean agreements.	Develop an integrated national climate-ocean strategy. Strengthen coastal and marine monitoring.	DGRH, IBAP, WACA, OMVG, IMO, IOC-UNESCO.
Climate – Human rights and sustainable development (UNFCCC and SDG/Agenda 2030)	Integration of the SDGs in some national plans (National Plan for Sustainable Development, National Plan for Sustainable Development and National Plan for Sustainable Development).	Fragmented implementation. Lack of cross-sectoral monitoring mechanisms.	Strengthen alignment between the National Action Plan (NAP) and the SDGs. Establish a system of integrated indicators for sustainable	INE, Ministry of Regional Planning and Integration, UN-ODS, UNDP, UNICEF.

	Recognition of the rights of local communities and women.		development and climate.	
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5.9. Other relevant initiatives and information from Guinea-Bissau

In recent years, Guinea-Bissau has developed several initiatives that complement its obligations under the United Nations Framework Convention on Climate Change (UNFCCC), strengthening its climate resilience, promoting sustainable development and strengthening international cooperation. These initiatives, although often small-scale, are important in consolidating experiences and laying the foundations for future structural programmes.

a) Complementary national plans and strategies

A number of complementary initiatives and policy instruments have been developed to support the implementation of environmental and climate policies, strengthening the country's capacity to address climate change challenges in an integrated manner.

The National Adaptation Plan (NAP) is currently in the operational phase and is one of the main instruments guiding investments in sectoral adaptation. The plan focuses on priority areas such as agriculture, water, health and coastal areas, setting out specific measures to increase the resilience of vulnerable communities and ecosystems.

At the same time, the National Biodiversity Strategy and Action Plans (NBSAPs) seek to integrate concerns about nature conservation, sustainable use of resources and ecosystem adaptation. This strategy works in synergy with the climate agenda, ensuring that biodiversity conservation actions contribute to both climate change mitigation and adaptation.

In the energy sector, the Renewable Energy Sector Plans focus on the expansion of solar energy and the implementation of community mini-grids, aiming to reduce dependence on fossil fuels and, consequently, greenhouse gas (GHG) emissions. These initiatives not only contribute to climate change mitigation, but also promote access to sustainable energy in rural areas and isolated communities.

Taken together, these national plans and strategies reflect a growing effort by Guinea-Bissau to align sustainable development, environmental conservation and climate adaptation, creating a structured basis for integrated and long-term interventions.

b) Ongoing projects and programmes

Several ongoing projects and programmes have made significant contributions to climate change adaptation, mitigating risks and promoting sustainable development.

The WACA (West African Coastal Areas) Project supports integrated coastal zone protection and management with the aim of reducing erosion and mitigating the impacts of climate change on coastal communities and vulnerable ecosystems.

The Coastal Project, funded by GEF and implemented by UNDP, focuses on restoration of degraded mangroves, community capacity building and hydro-meteorological monitoring. This project combines

scientific knowledge and traditional wisdom to promote sustainable coastal management practices and increase the resilience of local populations.

In the energy field, the Mini-Solar Project aims to expand access to clean energy in rural communities, reducing dependence on fossil fuels and promoting sustainable energy solutions.

The Early Warning Project focuses on the installation of hydro-meteorological stations and the strengthening of the national capacity to respond to climate risks, contributing to the preparation and mitigation of natural disasters.

In addition, community reforestation initiatives have been implemented in various regions of the country, with the active participation of communities and NGOs. These actions support carbon sequestration, biodiversity conservation and livelihood building, while strengthening local adaptation to climate change.

Collectively, these projects and programmes reflect an integrated and multidimensional effort by Guinea-Bissau to address environmental and climate challenges by aligning sustainable development, environmental protection and community inclusion.

d) Participation in regional and international initiatives

Guinea-Bissau has been actively involved in several regional and international initiatives, enhancing cooperation and exchange of experiences on environmental and climate issues. Within the CPLP (Community of Portuguese Language Countries), the country has a significant involvement in environmental forums, with emphasis on its participation in the 10th Ministerial Meeting on the Environment (2025), where joint policies and strategies for mitigation and adaptation to climate change are discussed.

At the regional level, ECOWAS and OMVG have provided spaces for cooperation in the management of cross-border water resources and the promotion of renewable energy, allowing for policy alignment and the exploitation of synergies between neighbouring countries.

In the field of coastal and marine conservation, the Regional Partnership for Coastal and Marine Conservation (RPCM) has been an important tool for strengthening the protection of marine biodiversity, promoting coordinated actions based on scientific evidence.

In addition, Guinea-Bissau has exploited emerging opportunities through the Climate Fund for Children in West Africa (CF4C-WA), which enables resource mobilisation and development of projects targeting children and youth, promoting environmental education, community resilience and the involvement of new generations in the climate agenda.

These participations demonstrate the country's commitment to international and regional cooperation, fostering the exchange of experiences, institutional strengthening and access to finance and technologies that contribute to the implementation of national environmental and climate policies.

d) Additional relevant information

Guinea-Bissau has intensified efforts to strengthen its institutional and technical capacity in the field of climate change and environmental management. In this context, the implementation of training and awareness programmes aimed at national technicians stands out, focussing on the elaboration of emissions inventories, the development of climate scenarios and the application of IPCC methodologies. These actions aim not only to improve the quality and reliability of data produced at national level, but also to consolidate local capacities for continuous monitoring and evaluation of climate policies.

At the same time, the country has sought to strengthen its system of environmental statistics through coordinated efforts between the National Institute of Statistics (INE) and the Ministry of Environment, Biodiversity and Climate Action (MABAC). This work focuses on improving the collection, harmonisation, and management of environmental data, ensuring that available information consistently supports decision-making and the dissemination of international reports on environmental and climate issues.

Another relevant point is the increasing attention given to gender and youth integration in environmental and climate policies. Guinea-Bissau has implemented measures to ensure the active participation of women and young people in the design and implementation of climate change mitigation and adaptation programmes, recognising the central role of these groups in building local and sustainable solutions.

Internationally, the country has strengthened its climate diplomacy, broadening its presence in multilateral negotiations and strengthening its participation in groups of vulnerable countries, such as the Small Island Developing States (SIDS/LDCs) and the Alliance of Small Island Developing States (AOSIS). This action aims not only to promote national interests, but also to contribute to regional coordination and solidarity in responding to climate change.

Table 5-0-9: Summary of other initiatives and relevant information from Guinea-Bissau

Initiative	Current Situation	Impacts	Gaps	Strategic Partners
National Adaptation Plan (NAP)	In the process of operationalisation, some sectors already have measures identified.	Strategic orientation for adaptation in key sectors (agriculture, water, health, coastal areas).	Lack of funding for full implementation; gaps in scientific data.	MABAC, sectoral ministries, UNDP, GCF, civil society.
National Biodiversity Strategy (NBSAP)	Partially implemented, focussing on conservation and sustainable use.	Integrating ecosystem-based adaptation and protecting biodiversity.	Limited financial and technical resources; poor monitoring.	IBAP, environmental NGOs, GEF, CBD.
WACA Project	Ongoing, with activities in priority coastal areas.	Protection against erosion, integrated coastal zone management, Community support.	Cross-sectoral coordination is still weak; there is a need for greater geographical coverage.	World Bank, MABAC, coastal communities, PRCM.
Coastal Project (GEF/UNDP)	Advanced implementation, with mangrove restoration and hydrometeorological stations.	Strengthening coastal resilience; environmental monitoring; community empowerment.	Post-project sustainability uncertain; need for greater local ownership.	MABAC, GEF, UNDP, communities, HRDG.
Mini-solar grid design	Ongoing in several rural regions.	Expanding clean energy; reducing	Coverage still limited; need for	Ministry of Energy, ECOWAS,

		dependence on fossil fuels.	local technical maintenance.	development banks, private sector.
Quick Alert Project	Hydrometeorological stations installed in pilot areas.	Improvement in climate forecasting and disaster risk management.	Need for national expansion; continuous training of technicians.	DGRH, SH, UNDP, OMVG, INM.
Community reforestation	The initiatives have spread to different regions.	Carbon sequestration, local income generation, biodiversity conservation.	Lack of monitoring and scale; lack of stable funding.	NGO, local communities, IBAP, FAO.
Participation in regional forums (CPLP, ECOWAS, PRCM, CF4C-WA)	Increase participation in regional negotiations and platforms.	Strengthening climate diplomacy; access to financing opportunities.	Limited specialised human resources; irregular participation.	CPLP, ECOWAS, PRCM, AOSIS, G77+China.
Technical training system and environmental statistics	Training on GHG inventories and climate data is ongoing; INE and MABAC are currently developing the system.	Gradual improvement in climate and environmental data collection and management.	Lack of skilled human resources and robust digital tools.	INE, MABAC, UNDP, FAO, UNEP.
Gender and youth integration	Growing initiatives in environmental and climate policies.	Social inclusion, participation of vulnerable groups in decision-making processes.	Lack of systematic integration mechanisms; insufficient disaggregated data.	Relevant ministries, women's organisations, UNICEF, UN Women, CF4C-WA.

CHAPTER VI. CONSTRAINTS, GAPS AND FINANCIAL, TECHNICAL AND CAPACITY NEEDS

In accordance with Article 4(7) and paragraphs 3 and 5 of the same Article of the United Nations Framework Convention on Climate Change (UNFCCC), the implementation of the commitments of developing country Parties depends to a large extent on effective support in terms of financial resources, technology transfer and capacity building. Therefore, the national communication should reflect not only the progress made but also the restrictions on its implementation, as well as the remaining needs for full compliance with the obligations set out in the Convention.

This chapter aims to systematically present the constraints faced, the persistent gaps and the country's priority needs in terms of financial, technical and institutional capacity building. obstacles encountered in implementing climate change mitigation and adaptation policies and measures will be analysed, highlighting areas where available resources have been insufficient to ensure consistent progress.

In addition, particular attention will be paid to the shortcomings already identified in previous reports — such as the Second and Third National Communications, as well as the First Biennial Update Report (BBUR) — and to the emerging needs of ongoing climate change projects. The analysis will seek to highlight both structural weaknesses and specific needs for financing, technology transfer and human and institutional capacity building.

In this way, the chapter will function as a diagnostic and guidance tool, allowing not only to understand the limiting factors that condition the national response to climate change, but also to substantiate the requests for international support necessary for the effective implementation of the commitments made by Guinea-Bissau within the UNFCCC.

6.1. Structure for the continuous assessment and reporting of related financial, technical and capacity constraints, gaps and needs, as well as the necessary and received support established.

Within the framework of Article 4 of the United Nations Framework Convention on Climate Change (UNFCCC), Guinea-Bissau recognises the need to have an institutional and methodological framework to continuously assess the constraints, gaps and financial, technical and capacity needs that limit the full and effective implementation of its climate actions.

To this end, an interinstitutional coordination mechanism was established, provided by the Ministry of Environment, Biodiversity and Climate Action (MABAC), with the involvement of national focal points, sectoral technical institutions and development partners. This structure aims to:

- Collect, review and update information periodically on constraints and gaps in the areas of financial, technical and institutional training.
- Identify priorities and needs to support the implementation of mitigation and adaptation measures, in alignment with national commitments (NDC, Sector Plans, Climate Resilience Strategies).
- Facilitate transparent and systematic reporting on the support needed and received, ensuring the traceability of the resources mobilised and their correspondence with the identified needs.

- Promote coherence and integration with other international reporting mechanisms, including the Biennial Transparency Report (BTR), National Communications and Sustainable Development Goals (SDG) reports.

The framework also serves as a tool to support resource mobilisation, allowing expressed needs to be presented in a structured way to international partners, strengthening the country's capacity to attract climate finance, technical assistance, and targeted capacity-building programmes.

6.1.1. Review and update information on related financial, technical and capacity constraints, gaps and needs

Regular review and updating of information on financial, technical and capacity constraints, gaps and needs is a key step towards strengthening the implementation of Guinea-Bissau's climate policies and measures. This process aims to ensure that strategic and operational decisions are made on the basis of up-to-date and accurate data, which reflect the real needs of the country.

To operationalise this activity, MABAC, in coordination with national focal points and sectoral technical institutions, carries out the following actions:

1. Continuous mapping of gaps and constraints: Identification of institutional, technical and financial constraints that may compromise the implementation of climate change mitigation and adaptation measures. This mapping covers both the central and regional levels and the priority sectors, ensuring an integrated view of needs.

2nd Periodic update of information: Gap and need information is reviewed regularly, incorporating recent data from ongoing projects, institutional capacity assessments, industry initiative progress reports, and feedback from implementation partners.

3. Classification and prioritisation of needs: Based on the data collected, identified needs are categorised by type (financial, technical or training) and prioritised according to urgency, potential impact and availability of resources.

4. Integration into the national reporting system: The results of the review and update are systematically incorporated into the national reports, including the Biennial Transparency Report (BTR) and the National Communications, allowing traceability and transparency on the support needed and received.

5. Feedback for resource mobilisation: Up-to-date information provides the basis for planning training programmes, requesting technical assistance and mobilising climate finance from international partners, ensuring that available resources respond effectively to the country's needs.

The NDC of Guinea-Bissau estimates that the costs of implementing the mitigation component will be approximately US\$664 million during the period from 2021 to 2030, of which US\$531 million, or 80% of the total investment needs, are financial support needs (conditional element of the NDC). The sectoral breakdown of financial support needs is detailed in Table 90 below.

Table 6-0-1: International financial support is required to implement the updated NDC (Mitigation Component)

Sectors	Value in millions of US dollars in 2021
Energy	240
Forests and Land Use	264

Agriculture	22
Waste	5
TOTAL	531

The main projects identified are mostly managed by institutions under the auspices of the Ministry of Environment, Biodiversity and Climate Action (MABAC), including the Institute of Biodiversity and Protected Areas (IBAP), the National Institute of the Environment (INA) and the Competent Authority for Environmental Assessment (AAAC). The Ministry of Energy is responsible for the main energy projects, and the Bissau Municipal Council is responsible for waste management projects.

For the preparation of its first Biennial Transparency Report (BTR1), Guinea-Bissau received from the GEF, through UNEP, an amount of 600,000 US dollars, for a period of 27 months (April 2023 to March 2025).

Table 6-0-2: Support received from GEF/UNEP for the BTR1 Project

Project Objectives	Cost \$US
i. Preparation of PIP BTR1 and project initiation activities	50,000
ii. Preparation and submission of BTR1 report to UNFCCC	530,000
iii. Completing an application for GEF funding for subsequent BTRs and/or combined BTR/NC	20,000
Total project cost	600.00

Similarly, for the preparation of the UNFCCC Fourth National Communication (NC4), the country has benefited from financial support from the GEF through UNEP, amounting to USD 500, for a period of 36 months (October 2022 to May 2025).

Table 6-0-3: Support received from GEF/UNEP for the Fourth National Communication Project (NC4)

Project Cost	2022	2023	2024	2025	Total	%
GEF Trust Fund available to Executive Agency	67,750	198,700	199,550	34,000	500.00	83
Co-financing in kind / government contribution		50,000	50,000		100.00	17
Total cost (\$)	67,750	248,700	249,550	34,000	600,000	100

In this way, the continuous review and updating process contributes to building a solid and reliable information base, reinforcing Guinea-Bissau's capacity to implement its climate policies in an efficient, adaptive and transparent way.

6.1.2. Financial resources and capacity needs for the implementation of the National Global GHG Emission Reduction Strategy

The effective implementation of Guinea-Bissau's Global National Strategy for the Reduction of Greenhouse Gas Emissions (GHG) depends on a clear understanding of the financial needs and the institutional, technical and human capacity needed to achieve the defined objectives.

To ensure that the Strategy is operationalised efficiently, the country carried out a detailed assessment of the requirements associated with the different mitigation measures, considering:

- Required financial resources:* Total costs of implementing priority mitigation actions, including investments in clean technologies, renewable energy, energy efficiency, sustainable forest management

and other key sectors, have been estimated. This analysis identifies funding gaps and guides resource mobilisation with international partners, climate funds, and bilateral and multilateral mechanisms.

2. Institutional and technical training needs: In addition to funding, the implementation of the Strategy requires strengthening national capacity. This includes specialised training in emissions inventory and monitoring, transparency reporting, developing technical skills for implementing low-carbon projects, and strengthening climate governance institutions.

3. Integration with national and international instruments: Resource and capacity identification is carried out in close coordination with other national planning instruments, such as Sector Plans, Nationally Determined Contributions (NDCs) and international reporting mechanisms, ensuring coherence between different levels of climate action.

4. Strategic planning and prioritisation: Based on the assessment of financial and capacity needs, mitigation measures are prioritised according to their potential impact on GHG emission reduction, technical feasibility, cost-effectiveness and alignment with national sustainable development goals.

This approach provides Guinea-Bissau with a consolidated view of resource and capacity needs, providing a sound basis for mobilising financing, institution building and ongoing monitoring of the implementation of the Global National GHG Emission Reduction Strategy.

6.1.3. Cost-benefit analysis of the support requested and received

Based on the Vulnerability and Risk Assessment (V&R), Guinea-Bissau conducted a detailed cost-benefit analysis to estimate the potential costs of long-term adaptation measures, with an initial focus on the water and energy sectors. This analysis aims to support strategic planning, prioritisation of investment and mobilisation of adequate financial resources to increase the country's resilience to the impacts of climate change.

The main elements of this approach include:

1. Identification of priority adaptation measures: Critical actions to ensure water and energy security, including water supply infrastructure, water resource management, renewable energy systems, energy efficiency and mechanisms to protect against extreme events were considered.

2nd Estimation of potential costs: The analysis included the costs of implementation, operation and maintenance of adaptation measures, assessing different investment scenarios and time horizon, ensuring that the costs reflected the needs of long-term sustainable adaptation.

3. Assessment of socio-economic and environmental benefits: The expected benefits of the measures were considered in terms of reducing vulnerabilities, protecting populations and natural resources, increasing the efficiency of essential services and promoting sustainable development.

4. Cost-benefit relationship: The study allowed to compare the costs of the measures with the expected benefits, highlighting those that have a higher social, economic and environmental return, contributing to more informed investment decisions.

5. Integration with support mobilisation: The results of the cost-benefit analysis serve as a basis for negotiating and coordinating financial, technical and institutional support with international partners, ensuring that the resources received respond effectively to the identified adaptation needs.

In this way, Guinea-Bissau strengthens its capacity to plan and implement climate adaptation measures, promoting an efficient use of resources and the sustainable resilience of critical sectors, namely water and energy.

6.1.4. Assessment of technological needs and identification of innovative solutions

As part of strengthening climate resilience, Guinea-Bissau conducted a detailed study to assess the country's technological needs and identify effective and innovative technological solutions. This evaluation initially focused on two priority sectors, water resources and agriculture, as identified and prioritised in the National Adaptation Plan (PANA), considering the most vulnerable sectors and still in need of interventions to effectively address the adverse impacts of climate change.

The main objectives of the study were:

1. Mapping of critical technological needs: Identifying gaps in monitoring, management and adaptation to climate change technologies in priority sectors. This includes technologies for water storage and distribution, efficient irrigation, drought- and flood-resilient cultivation, and early warning and forecasting systems.

2. Develop a list of innovative technological solutions: Proven emerging technological solutions have been compiled that can be implemented in the national context to increase resilience and reduce negative impacts on water resources and agriculture.

3rd Prioritisation of solutions: The identified technologies were classified according to criteria of relevance, cost-effectiveness, feasibility of implementation, sustainability and replicability potential, ensuring that resources are applied to the solutions with the greatest impact.

4. Integration with national adaptation strategies: The results of the study were articulated with PANA and other national strategic instruments, serving as a reference for future projects, mobilisation of climate finance and planning of technological interventions in the most vulnerable sectors.

This approach enables Guinea-Bissau to develop a portfolio of technological solutions tailored to its specific needs and challenges, strengthening the country's capacity to address the effects of climate change in an efficient, sustainable and innovative way.

6.1.5. Update of information on financial resources, technology transfer, training and technical support received

As part of the continued strengthening of climate policy implementation, Guinea-Bissau has established mechanisms to regularly update information on financial resources, technology transfer, training and technical support received from bilateral and multilateral donors.

This update involves:

1. Detailed record of support received: Compilation of information on funding mobilised, technology transfer programmes, capacity building initiatives and technical assistance provided by international partners, including multilateral agencies, climate funds and partner governments.

2. Monitoring the use and effectiveness of support: Assessment of how financial and technical resources are applied in mitigation and adaptation projects, ensuring that the support received is aligned with national priorities and effectively contributes to the reduction of climate vulnerabilities.

3. Integration into national reporting systems: Updated information is incorporated into national reports, such as the Biennial Transparency Report (BTR) and National Communications, promoting transparency, traceability and visibility of international support received.

4. Feedback for future mobilisation: Continuous mapping of partners' contributions allows identifying funding or capacity gaps and facilitates the formulation of new support requests, ensuring that future resources respond to the country's real needs.

This systematic updating process reinforces coordination between government, industrial institutions and international partners, ensuring that Guinea-Bissau maximises the use of available resources, improves its institutional and technological capacity, and consistently advances the implementation of climate change mitigation and adaptation measures.

6.1.6. Report on financial resources, technology transfer, training and technical assistance received from multilateral donors and developed countries

As part of the ongoing process of monitoring and reporting international support, Guinea-Bissau has prepared a detailed report on the financial resources, technology transfer, training and technical assistance received from various multilateral and bilateral sources, including:

- Global Environment Facility (GEF)
- Green Climate Fund (GCF)
- Multilateral institutions of international cooperation

The report includes:

1. Detailed inventory of support received: Records the financial resources mobilised, projects financed, technology transfers, training programmes and technical assistance for the implementation of mitigation and adaptation measures.

2. Impact analysis and effectiveness of support: Assesses the practical implementation of resources and technical assistance, highlighting the results achieved in terms of institutional capacity building, development of climate technologies and implementation of national strategic actions.

3. Integration with national and international reporting instruments: The compiled data feed into national reports, such as the Biennial Transparency Report (BTR) and National Communications, ensuring traceability, transparency and alignment with the reporting requirements of the Convention.

4. Provision for future planning: Consolidated information identifies support gaps, emerging needs, and opportunities to mobilise additional resources, ensuring that the country's future climate initiatives are sustainable, effective, and well-funded.

This report reinforces Guinea-Bissau's capacity to monitor, communicate and mobilise climate resources, consolidating coordination among government, development partners and multilateral institutions, and ensuring that international support directly contributes to the implementation of national priorities for climate change mitigation and adaptation.

The training needs for the implementation of the NDC were detailed in the respective document. The main training needs and a quick assessment of whether or not training support has been received are in the table below.

Table 6-0-4:Evaluation of training support

Need for training	Support received?
Institutional capacity building to enable Guinea-Bissau to adequately monitor the implementation of NDCs across sectors. This entails, among other things, establishing a transparency system that enables the regular production of GHG inventories, in accordance with IPCC rules, as well as NDC monitoring indicators.	No
Training in energy transition (energy accounting, forecasting, programming of energy management actions, development of indicators, etc.).	No
Training of stakeholders in the implementation of the NDC MRV.	Partially (in the context of the preparation of the BTR)
Empowering stakeholders to better leverage carbon market mechanisms, as provided for in Article 6 of the Paris Agreement.	No
Training and transfer of technology for the development of renewable energy and energy efficiency in different sectors of the economy.	No
Training in optimised management of the electrical system to increase its capacity for better integration of renewable energies.	No
Training of actors in forest protection and preservation of ecosystems.	Yes
The national and sectoral action plan for the implementation of the NDCs.	No
The investment plan in the energy sector.	No
Portfolio of specific projects and financing mechanisms in the energy sector.	No
NDC update before 2024.	No
The development of a national low-carbon strategy by 2050.	No
Preparation of the first half-yearly transparency report.	No

In addition to the financial investment needs for the implementation of the NDC, the necessary training support costs have been estimated at USD 30 million.

Main training needs:

- Hands-on training in IPCC inventory software to compile and report emissions.
- Remote Sensing and SIGFormation for LULUCF.
- Development of a national system for collecting and managing emissions data.
- Training of national experts to lead future inventories.

During the process of developing this RTB, including the NIR, a number of training needs related to transparency were identified. The table below summarises the needs identified in the respective sectors of this report.

Guinea-Bissau has specific training needs to improve the preparation of the National Inventory Report (NIR), especially in the following sectors:

Table 6-5:Training needs

Chapter	Need for training
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NIR	
Energy	<p>Methodologies of the IPCC 2006 for calculating emissions.</p> <ul style="list-style-type: none"> - Monitoring and reporting of CO₂, CH₄ and N₂O emissions in the energy sector. - Integration of fossil fuel and renewable energy data. - Use of tools such as IPCC Inventory Software and Plan System of Long Range Energy Alternatives (LEAP).
UPI	<ul style="list-style-type: none"> - Collection and processing of emissions data from manufacturing and construction. - Methods to estimate fugitive and industrial process emissions. - Application of specific emission coefficients for materials such as cement, glass and chemicals.
Agriculture	<ul style="list-style-type: none"> - Methodologies to estimate emissions from enteric fermentation and waste management. - Calculation of nitrous oxide (NO) emissions from the use of fertilisers. - Assessment of changes in agricultural productivity and climate impacts.
LULUCF	<ul style="list-style-type: none"> - Methods to estimate carbon stocks in forests and soils. - Calculation of O₂ emissions and C removals in deforested and reforested areas. - Use of GIS and remote sensing technologies for monitoring forest areas.
Waste	<ul style="list-style-type: none"> - Estimated methane (CH₄) emissions from landfills and sewage treatment. - Monitoring the management of solid and liquid waste. - Emissions quantification methods and potential mitigation strategies.
Tools and Methodologies	<ul style="list-style-type: none"> - LEAP (Plan System of Long Range Energy Alternatives) for modelling energy scenarios. - GACMO (Cost Model of Abatement of Greenhouse Gases) to evaluate costs and benefits of mitigation actions. - IPCC Emission Factors Database (EFDB) for emission coefficient-based projections. - UNDP Climate Promise Tools for Strategic Projections.
NDC	
NDC Trace	<ul style="list-style-type: none"> - Development of a Monitoring, Reporting and Verification System (MRV) to monitor the goals of the NDC. - Use of progress indicators to assess contributions to mitigation and adaptation. - Training in the use of digital tools for tracking and reporting. - Integration of sectoral data (energy, agriculture, waste, LULUCF, IPPU) into a unified system.
Monitoring of mitigation actions	<ul style="list-style-type: none"> - Training in IPCC methodologies to monitor emissions reduced by climate action. - Definition of baseline and alternative scenarios to measure the real impacts of mitigation policies. - Training for transparent progress reports to the UNFCCC. - Use of technologies to measure and validate emission reductions
GHG projections	<ul style="list-style-type: none"> - Use of GHG emission projection models to plan effective climate action. - Application of bottom-up and top-down approaches in modelling future scenarios. - Integration of projections into the medium and long-term climate policy plan. - Training to identify data gaps and strategies to fill them.
Tools and Methodologies	<ul style="list-style-type: none"> - IPCC inventory software and Long-Range Alternative Energy Plan (LEAP) system. - MRV techniques for key sectors (energy, waste, agriculture, LULUCF). - Data platforms such as ETF and NDC Registry.
Adaptation improves technical capacity to identify sectors and communities most vulnerable to climate impacts.	
Formation	<ul style="list-style-type: none"> - Use of climate risk assessment models for key sectors (agriculture, water resources, biodiversity, infrastructure). - Application of IPCC (AR6) methodologies for vulnerability analysis and exposure.

	<ul style="list-style-type: none"> - Remote sensing tools and GIS (Geographic Information System) for mapping vulnerable areas. - Participatory methods to integrate local and scientific knowledge into climate risk assessment
Tools and Methodologies	<p>UNDP Climate Risk Assessment Framework.</p> <ul style="list-style-type: none"> - GIS tools (QGIS, ArcGIS) for spatial mapping and analysis. - CMIP6 climate models for climate impact projections.
Support needed and received	
Technical and financial support received from international partners	<ol style="list-style-type: none"> 1. GEF/UNEP <ul style="list-style-type: none"> - NC4 and BTR1 projects 2.GCCA+ (Global Climate Change Alliance Plus) <ul style="list-style-type: none"> Implemented by Expertise France and CILSS - AGRHYMET Regional Centre - Support for adaptation and mitigation training. - Aid in the elaboration of the National GEEE Missions Inventory. - Training in MRV Systems (Monitoring, Reporting and Verification). 3.UNDP (Climate Commitment) <ul style="list-style-type: none"> - Support in updating and implementing the NDC. - Support in the elaboration of the National Adaptation Plan (NAP). - Assistance on access to climate finance (GCF, Adaptation Fund). 4. Lusophone Cluster Centre for Climate Transparency <ul style="list-style-type: none"> - Technical assistance (training and qualification) - Analysis of BTR1 5.Green Climate Fund (GCF) - Preparedness Programme <ul style="list-style-type: none"> - Financing for climate adaptation and resilience actions. - Support in strengthening the institutional capacity to raise climate funds. 6.FundAdjustment <ul style="list-style-type: none"> - Financing for Community adaptation and coastal protection projects.
Support Required	<ol style="list-style-type: none"> 1. Technical and Institutional Training <ul style="list-style-type: none"> - Advanced training in GHG Projections, NDC and MRVmonitoring. - Training in remote sensing and GIS for environmental monitoring and LULUCF. - Develop local capacities for national transparency reports. 2nd element. Infrastructure Development and Monitoring Systems <ul style="list-style-type: none"> - Creation of a national climate data platform for emissions monitoring and adaptation actions. - Strengthening the network of meteorological stations to improve climate projections. - Implementation of early warning systems for natural disasters (floods, droughts, coastal erosion). 3rd element: Mobilising climate finance <ul style="list-style-type: none"> - Technical assistance for the preparation of financing proposals for the Green Climate Fund (GCF) and the Adaptation Fund. - Creating public-private partnerships for renewable energy and climate resilience projects. - Development of innovative financial mechanisms such as climate insurance and carbon credits. 4th element: Implementation of Local Solutions for Adaptation <ul style="list-style-type: none"> - Support the expansion of Ecosystem-Based Adaptation (EbA), including the restoration of mangroves and forests. - Climate-smart agriculture projects to reduce vulnerabilities in the agricultural sector. - Development of water security and sustainable water management initiatives to mitigate the impacts of drought.

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