Strengthen the adaptive capacity and climate resilience of Guinea-Bissau coastal communities vulnerable to climate risks

Strategic Environmental and Social Assessment (SESA) Study in the Coastal Area of Guinea-Bissau

Final Report

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List of acronyms

AAAC	Competent Environmental Assessment Authority (*Autoridade de Avaliação Ambiental Competente)*
AD	Action for the Development (*Ação para o Desenvolvimento*)
ADPP/GB	GB People-to-People Development Aid Association (*Associação de Desenvolvimento de Povo para Povo, Guiné-Bissau*)
AfDB	African Development Bank
AMPCIU	Urok Islands Community-based Marine Protected Area (*Área Marinha Protegida Comunitária das Ilhas de Urok*)
BOAD	Banque Ouest Africaine de Développement
BRLi	BRL ingénierie
CBOs	Community-Based Organizations
CBP	Capacity Building Plan
CEP	Country Environmental Profile
CIMA	International Center for Environmental Monitor
DBT Complex	Dulombi – Boé – Tchetche Complex
DRR	Disaster risk reduction
DRRM	Disaster risk reduction and management
DTM	Digital Terrain Model
ECOWAS	Economic Community of West African States
EEA	Environmental Economic Assessment
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agriculture Origination of the United Nations
GCF	Green Climate Fund
GEF	Global Environmental Facility
GHG	Greenhouse gases
GPC	Coastal Planning Office (*Gabinete De Planificação Costeira*)
GB	GB
IBAP	Institute of Biodiversity and Protected Areas (*Instituto da Biodiversidade e das Áreas Protegidas*)
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IMP	Maritime and Port Institute (*Instituto Marítimo Portuário*)
INEP	National Institute of Research and Studies (*Instituto Nacional de Estudos e Pesquisa*)
INIPO	National Institute for Fisheries and Oceanographic Research
IPCC	Intergovernmental Panel on Climate Change

IUCN	International Union for the Conservation of Nature
GEF	Global Environment Facility
GIS	Geographic Information System
INA	National Institute of Environment (*Instituto Nacional do Ambiente*)
LDN	Land Degradation Neutrality
LOTU	Law for Territorial and Urban Planning (*Lei do Ordenamento Territorial e Urbano*)
MAB	Ministry of Environment and Biodiversity (*Ministério do Ambiente e da Biodiversidade*)
MADR	Ministry of Agriculture and Rural Development (*Ministério da Agricultura e Desenvolvimento Rural*)
MAPTESS	Minister for Public Administration, Labour, Employment and Social Security (*Ministério da Administração Pública, Trabalho, Emprego e Segurança Social*)
MATPL	Ministry of Territorial Administration and Local Power (*Ministério da Administração Territorial e Poder Local*)
MCJD	Ministry of Culture, Youth and Sports (*Ministério da Cultura, Juventude e Desportos*)
MEc	Ministry of Economy (*Ministério da Economia*)
MEd	Ministry of Education (*Ministério da Educação*)
MMFSS	Ministry of Women, Family and Social Solidarity (*Ministério da Mulher, Família e Solidariedade Social*)
MOPHU	Ministry of Public Works, Housing and Urbanism (*Ministério das Obras Públicas, Habitação e Urbanismo*)
MP	Ministry of Fisheries (*Ministério das Pescas*)
MPA	Marine Protected Area
MRNE	Ministry of Natural Resources and Energy (*Ministério o dos Recursos Naturais e Energia*)
MTA	Ministry of Tourism and Handcrafts (*Ministério do Turismo e Artesanato*)
MT	Ministry of Transport (*Ministério dos Transportes*)
M&E	Monitoring and evaluation
NAPA	National Program of Action to Adapt to Climate Change
NGOs	Non-Governmental Organizations
ODZH	Organization for Wetlands' Protection and Development (*Organização para Defesa e Desenvolvimento das Zonas Húmidas*)
OECD	Organisation for Economic Co-operation and Development
OSS	Sahara and Sahel Observatory
PA	Protected Area
PMU	Programme Management Specialist
PNC	Cantanhez National Park (*Parque Nacional de Cantanhez*)
PNGA	National Plan for Environmental Management
PNLC	Cufada Lagoons National Park (*Parque Nacional das Lagoas de Cufada*)

PNMJVP	João Vieira and Poilão Marine National Park (*Parque National Marinho João Vieira e Poilão*)
PNO	Orango National Park (*Parque Nacional de Orango*)
PNTC	Cacheu Mangrove Forest National Park (*Parque Nacional dos Tarrafes do Rio Cacheu*)
PRISE	Project to reduce infrastructure impacts on coastal ecosystems in West Africa
RBABB	Bolama Bijagós Archipelago Biosphere Reserve (*Reserva da Biosfera do Arquipélago Bolama Bijagós*)
REDD	Reducing Emissions from Deforestation and forest Degradation
RfP	Request for Proposals
RGB	Republic of GB
SEA	Strategic Environmental Assessment
SESA	Strategic Social Environmental Assessment
SIDS	Small Island Development States
SLR	Sea Level Rise
SNAP	National System of Protected Areas (*Sistema Nacional das Áreas Protegidas*)
SWOT	Strengths, Weaknesses, Opportunities, Threats
ToR	Terms of Reference
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
WB	World Bank
WIACO	Wetlands International Afrique, Côte Occidentale et Golfe de Guinée

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Executive summary

This document is the final report of the Strategic Environmental and Social Assessment (SESA) study, developed under the "Strengthen the adaptive capacity and climate resilience of Guinea-Bissau coastal communities vulnerable to climate risks" project.

The Guinea-Bissau (GB) entire coastal zone is highly exposed to climate hazards, with the risks and costs gradually increasing over time. The coastal zone is also chiefly important in terms of human settlements and economic activities. Addressing expected climate change impacts in coastal zones is therefore a national adaptation priority (UNDP, 2018).

The general objective of this SESA study is to identify, describe and assess the most significant and probable environmental and social issues of coastal zone development activities and identify key elements for a framework/plan that guides the economic and geo-ecological zoning of these areas, considering the actual and potential resilience of local communities.

The study aims at (UNDP, 2022):

- improving decision-making on the use, occupation of land, planning and promotion of sustainable development in coastal areas, based on reliable information on actual practices of use of natural resources and knowledge on the resilience capacity of ecosystems and potential investments in coastal areas;
- supporting the future drafting of the integrated coastal zone development and management plan.
- better orienting investment programs, plans and policies and conservation initiatives having capacities in management and monitoring of socio-economic and environmental dimensions.

Environmental, landscape and socio-economic analysis have been undertaken, to identify the key-drivers of change affecting coastal zones' ecosystems and local communities' livelihood, carry out a communities' needs assessment and provide recommendations for an overall coastal zone climate adaptation and resilience strategy.

The SESA study highlights the following critical barriers:

- political instability, inadequate financial and human resources (of institutions), low knowledge and weak diffusion of data management systems and mapping tools have been hampering the land planning process, which is essential to effective land governance;
- the frameworks for governing the coastal zone in Guinea-Bissau are not conducive towards ICZM, due to limited public funding, dependent on donor funding rather than sustainable taxation, coupled with systemic capacity weaknesses (UNDP, 2018);
- the growing urban sprawl in areas surrounding Bissau and other main cities, such as S. Domingo, Cacheu, Canchungo, Bula, Quinhámel, Mansoa, Bissora, Bolama, Bubaque, Buba, Catió, due the absence of planning and governance tools;
- some strategic sectoral plans, such as the Water Management Master Plan, the Water and Sanitation Sector Master Plan, the Forestry Master Plan, need to be updated and climate change effects should be taken into account even through an effective integration of the climate change adaptation strategies defined in NAPA, PAN/LCD and LDN National Policy Letter;
- last generation planning tools, such as the National Agricultural Investment Plan (PNIA) (2nd Generation) and the Fisheries and Aquaculture Strategic Development Plan (PSDPA) 2023-2027, show a deeper level of integration of environmental accounting approach and climate change adaptation strategies, but their effective implementation is weak (PNIA) or yet to come (PSDPA);

- regional and local development plans don't address climate change impacts and provide climate adaptation and resilience strategies;
- the National System of Protected Areas (SNAP) and the Bolama Bijagos Archipelago Biosphere Reserve (RBABB) constitute strength elements, pointing out the need for the protection of specific zones and ecosystems so as not to erode the natural capital that can underpin the country's sustainable development;
- many projects and programs have been financed in the last fifteen years to develop strategies and implement actions aiming at ensuring food security and inclusive rural development, strengthening the communities' resilience, but results achieved are lower than expected due to many reasons: lack of institutional coordination and common land governance vision; limited public funding, resulting in bad road conditions, affected by climate change effects; poor access to mobility services and energy; a general lack of public-private partnerships to tackle the weakness of livelihood products' value chains.

Strategies (19) and actions (24) are identified with the aim of reaching general objectives (9) based on Integrated Coastal Zone Management, Sustainable Land Management, Land Degradation Neutrality and Climate Adaptation inspiring principles. The identified strategic actions are expected to orient the planning and development process towards sustainability, considering climate change effects, and support the implementations of other sectorial policies and actions, to be defined in the planning process.

The following processes need to be supported:

- increasing of knowledge based on planning and governance tools, data management and monitoring systems, GIS tools;
- active protection and extension of protected areas to safeguard and enhance natural resources (with re-classification of PAs according to IUCN classification);
- strengthening and integration of the national ecological network, internally and externally linked to large-scale corridors;
- protection of carbon sinks and reforestation/naturalisation of the forest system;
- updating of the legal and regulation framework (i.e. adoption of LOTU, mangrove forest protection law, a sacred areas protection law, a landscape planning law, institution of RBABB and of new protected areas and ecological corridors, SEA and AEA regulations, etc.);
- updating of the policies' framework (i.e land and landscape governance tools, tourism sector sustainable development plan, etc.);
- design and implementation of land planning and management tools for climate-environmental sustainability and community resilience (i.e climate-proof urban plans for environmental sustainability);
- mainstreaming of climate change adaptation strategies in sub-regional and local development plans;
- enhancement of cultural capital (i.e. protection of sacred areas, recovery/restoration/renovation plans for buildings and architecture);
- agro-landscape enhancement of ecologically and environmentally valuable natural heritage for the subsistence of local communities;
- identification and operationalisation of climate finance mechanisms (i.e. REDD+);

- improvement of existing environmental assessment procedures (ref. EIA) and implementation of new tools (ref. SEA, EEA) to orient programs, plans and projects towards sustainability, taking into account natural capital and ecosystem services values and climate adaptation strategies.

Sumário executivo

O presente documento é o relatório final do estudo de Avaliação Ambiental e Social Estratégica (AASE), desenvolvido no âmbito do projecto "Reforçar a capacidade de adaptação e de resiliência das comunidades vulneráveis aos riscos climáticos residentes nas zonas costeiras da Guiné-Bissau".

Toda a zona costeira da Guiné-Bissau está altamente exposta a riscos climáticos, com os impactos e custos a aumentarem de forma gradual. Para além da sua importância estratégica em termos ambientais, as zonas costeiras assumem uma importância em termos económicos e de assentamentos humanos. Como tal, abordar os impactos esperados das alterações climáticas na zona costeira da Guiné-Bissau é uma prioridade nacional de adaptação (PNUD, 2018).

O principal objectivo do estudo de AASE é identificar, descrever e avaliar as questões ambientais e sociais mais significativas e prováveis das atividades de desenvolvimento da zona costeira e identificar elementos-chave para um quadro/plano que oriente o zonamento económico e geoecológico dessas áreas, tendo em consideração a resiliência actual e potencial das comunidades locais.

Este estudo visa (PNUD, 2022):

- Melhorar a tomada de decisão sobre o uso, ocupação das terras, planeamento e promoção do desenvolvimento sustentável nas áreas costeiras, com base em informações fidedignas sobre as práticas actuais no uso de recursos naturais e conhecimento sobre a capacidade de resiliência dos ecossistemas e investimentos potenciais em áreas costeiras.
- Apoiar a elaboração futura do plano integrado de desenvolvimento e gestão da zona costeira.
- Orientar de forma mais eficaz programas, planos e políticas de investimento, assim como iniciativas de conservação que tenham potencial no que diz respeito à gestão e monitorização das dimensões socioeconómicas e ambientais.

Foram realizadas análises ambientais, paisagísticas e socioeconómicas para identificar os principais factores de mudança que afectam os ecossistemas das zonas costeiras e os meios de subsistência das comunidades locais, realizar uma avaliação das necessidades das comunidades e providenciar recomendações para uma estratégia geral de adaptação climática e resiliência na zona costeira.

O estudo de AASE destaca as seguintes barreiras críticas:

- Instabilidade política, recursos financeiros e humanos inadequados (das instituições), conhecimento diminuto e reduzida difusão dos sistemas de gestão de dados e ferramentas de mapeamento têm prejudicado o processo de planeamento do território, que é essencial para uma governação eficaz do mesmo.

- Os quadros de governação da zona costeira na Guiné-Bissau não são propícios para a ICZM, devido ao financiamento público limitado, dependente de financiamento de doadores em vez de tributação sustentável, aliado a fraquezas sistémicas de capacidade (PNUD, 2018).

- A expansão urbana crescente nas áreas circundantes de Bissau e outras cidades principais, como S. Domingos, Cacheu, Canchungo, Bula, Quinhamel, Mansoa, Bissorã, Bolama, Bubaque, Buba, Catió, devido à ausência de ferramentas de planeamento e governança.

- Alguns planos sectoriais estratégicos, como o Plano Director de Gestão de Águas, o Plano Sectorial de Água e Saneamento, o Plano Director de Florestas, precisam ser actualizados e os efeitos das alterações climáticas devem ser tidos em consideração, mesmo através de uma integração eficaz das

estratégias de adaptação às alterações climáticas definidas no NAPA, no PAN/LCD e na Carta de Política Nacional em matéria de LDN.

- Ferramentas de planeamento de última geração, como o Plano Nacional de Investimento Agrícola (PNIA) (2ª Geração) e o Plano Estratégico de Desenvolvimento da Pesca e Aquicultura (PSDPA) 2023-2027, mostram um nível mais profundo de integração da abordagem de contabilidade ambiental e estratégias de adaptação às alterações climáticas, mas a implementação eficaz é fraca (PNIA) ou ainda está por acontecer (PSDPA).

- Planos de desenvolvimento regional e local não abordam os impactos das alterações climáticas e não fornecem estratégias de adaptação e resiliência climática.

- O Sistema Nacional de Áreas Protegidas (SNAP) e a Reserva da Biosfera do Arquipélago de Bolama Bijagós (RBABB) constituem elementos de força, destacando-se a necessidade de protecção de zonas e ecossistemas específicos de forma a não esgotar o capital natural que pode contribuir para o desenvolvimento sustentável do país.

- Muitos projectos e programas foram financiados nos últimos quinze anos para desenvolver estratégias e implementar acções com o objectivo de garantir a segurança alimentar e o desenvolvimento rural inclusivo, fortalecendo a resiliência das comunidades, mas os resultados alcançados são inferiores aos esperados por várias razões, nomeadamente a falta de coordenação institucional e uma visão comum de governança das terras, financiamento público limitado, resultando em más condições rodoviárias, afectadas pelos efeitos das alterações climáticas, e acesso deficiente a serviços de mobilidade e energia, assim como uma falta geral de parcerias público-privadas para enfrentar a debilidade das cadeias de valor dos produtos de subsistência.

Foram identificadas Estratégias (19) e Acções (24) com o objectivo de alcançar objectivos gerais (9), baseados nos princípios inspiradores da Gestão Integrada da Zona Costeira, Gestão Sustentável da Terra, Neutralidade na Degradação da Terra e Adaptação às Alterações Climáticas. Pretende-se que as acções estratégicas identificadas orientem o processo de planeamento e desenvolvimento em direcção à sustentabilidade, considerando os efeitos das alterações climáticas, e apoiar a implementação de outras políticas e acções sectoriais, a serem definidas no processo de planeamento.

É necessário apoiar os seguintes processos:

- Aumentar o conhecimento, tendo por base ferramentas de planeamento e governança, sistemas de gestão de dados e sistemas de monitorização, ferramentas SIG (Sistemas de Informação Geográfica);
- Protecção ativa e expansão das Áreas Protegidas (APs) para salvaguardar e melhorar os recursos naturais (com a reclassificação de APs de acordo com a classificação da UICN - União Internacional para a Conservação da Natureza);
- Fortalecimento e integração da rede ecológica nacional, conectando-a interna e externamente a corredores de larga escala;
- Protecção de sumidouros de carbono e reflorestamento/naturalização do sistema florestal;
- Actualização do quadro legal e regulamentar (p. ex., adoção da LOTU, lei de protecção do mangal, lei de protecção das áreas sagradas, lei de planeamento das paisagens, instituição da RBABB e de novas APs e corredores ecológicos, regulamentos de Avaliação Ambiental Estratégica (AAE) e Avaliação de Impacto Ambiental (AIA), etc.);
- Actualização do quadro de políticas (p. ex., ferramentas de governança de terras e paisagens, plano de desenvolvimento sustentável do sector do turismo, etc.);

- Concepção e implementação de ferramentas de planeamento e gestão de terras para a sustentabilidade ambiental e climática e resiliência comunitária (p. ex., planos urbanos *climate-proof* para a sustentabilidade ambiental);
- Integração de estratégias de adaptação às alterações climáticas nos planos de desenvolvimento sub-regionais e locais;
- Valorização do capital cultural (p. ex., protecção de áreas sagradas, planos de recuperação/restauração/renovação de edifícios e arquitectura);
- Valorização agro-paisagística do património natural com valor ecológico e ambiental para a subsistência das comunidades locais;
- Identificação e operacionalização de mecanismos de financiamento climático (p. ex., REDD+);
- Melhoria dos procedimentos existentes de avaliação ambiental (ref. EIA) e implementação de novas ferramentas (ref. AAE, AIA) para orientar programas, planos e projectos que favoreçam a sustentabilidade, tendo em consideração o valor do capital natural e dos serviços dos ecossistemas e estratégias de adaptação às alterações climáticas.

Résumé analytique

Ce document est le rapport final de l'étude d'évaluation environnementale et sociale stratégique (EESS), élaborée dans le cadre du projet « Renforcer la capacité d'adaptation et la résilience climatique des communautés côtières de la Guinée-Bissau vulnérables aux risques climatiques ».

L'ensemble de la zone côtière de Guinée-Bissau (GB) est fortement exposé aux aléas climatiques, les risques et les coûts augmentant progressivement au fil du temps. La zone côtière est également très importante pour la présence de plusieurs établissements humains et activités économiques. Faire face aux impacts attendus du changement climatique dans la zone côtière est donc une priorité nationale (PNUD, 2018).

L'objectif général de l'étude d'EESS est d'identifier, décrire et évaluer les problèmes environnementaux et sociaux qui pourraient affecter le développement des zones côtières et d'identifier les éléments clés d'un cadre/plan qui guide le zonage économique et géoécologique de ces zones, compte tenu de la résilience réelle et potentielle des communautés locales.

L'étude vise à (PNUD, 2022) :

- améliorer la prise de décision sur l'utilisation et l'occupation des terres, la planification et la promotion du développement durable dans les zones côtières, sur la base d'informations fiables sur les pratiques réelles d'utilisation des ressources naturelles, la capacité de résilience des écosystèmes et les investissements potentiels dans les zones côtières ;
- soutenir la future élaboration du plan intégré d'aménagement et gestion des zones côtières ;
- orienter programmes, plans et politiques d'investissement et initiatives de conservation.

Des analyses environnementales, paysagères et socio-économiques ont été entreprises pour :

- identifier les principaux facteurs de changement affectant les écosystèmes des zones côtières et les moyens de subsistance des communautés locales ;
- évaluer la magnitude des changements et les besoins des communautés ;
- fournir des recommandations pour une stratégie générale d'adaptation climatique et résilience des communautés de la zone côtière.

L'étude d'EESS met en évidence les obstacles critiques suivants :

- l'instabilité politique, l'insuffisance des ressources financières et humaines (des institutions), la faible connaissance et faible diffusion des systèmes de gestion des données et des outils de cartographie ont entravé le processus de planification foncière, qui est essentiel à une gouvernance foncière efficace ;
- les cadres de gouvernance de la zone côtière en Guinée-Bissau ne sont pas propices à la Gestion Intégrée des Zones Côtières (GIZC), en raison d'un financement public limité, dépendant du financement des donateurs plutôt que d'une fiscalité durable, associé à des faiblesses systémiques des capacités (PNUD, 2018) ;
- la croissante expansion urbaine dans les zones qui entourent Bissau et autres grandes villes, telles que S. Domingos, Cacheu, Canchungo, Bula, Quinhamel, Mansoa, Bissorã, Bolama, Bubaque, Buba, Catió, en raison de l'absence d'outils de planification et de gouvernance ;
- certains plans sectoriels stratégiques, tels que le Schéma directeur d'aménagement et de gestion des eaux, le Plan directeur forestier, doivent être mis à jour, tenant compte des effets du changement climatique et des stratégies d'adaptation identifiées par le NAPA, le PAN/LCD et la lettre de politique nationale d'LDN ;

- les outils de planification de dernière génération, tels que le Plan National d'Investissement Agricole (PNIA) (2ème Génération) et le Plan de Développement Stratégique de la Pêche et de l'Aquaculture (PSDPA) 2023-2027, montrent un niveau plus profond d'intégration de l'approche de la comptabilité environnementale et des stratégies d'adaptation au changement climatique, mais leur mise en œuvre effective est faible (PNIA) ou encore à venir (PSDPA) ;
- les plans de développement régionaux et locaux ne prennent pas en compte les impacts du changement climatique et ne proposent pas de stratégies d'adaptation et de résilience au changement climatique ;
- le Système National des Aires Protégées (SNAP) et la Réserve de Biosphère de l'Archipel de Bolama Bijagós (RBABB) constituent des éléments de force, soulignant la nécessité de protéger certaines zones et écosystèmes afin de ne pas éroder le capital naturel qui peut soutenir le développement durable du pays;
- de nombreux projets et programmes ont été financés au cours des quinze dernières années pour élaborer des stratégies et mettre en œuvre des actions visant à assurer la sécurité alimentaire et le développement rural inclusif, en renforçant la résilience des communautés, mais les résultats obtenus sont inférieurs aux attentes pour de nombreuses raisons : manque de coordination institutionnel et d'une vision commune de la gouvernance foncière ; un financement public limité, entraînant de mauvaises conditions routières, affectées par les effets du changement climatique ; un accès limité aux services de mobilité et à l'énergie ; un manque général de partenariats public-privé pour remédier à la faiblesse des chaînes de valeur des produits de subsistance.

Des stratégies (19) et des actions (24) ont été identifiées dans le but d'atteindre des objectifs généraux (9) basés sur les principes inspirants de la GIZC, de la gestion durable des terres, de la neutralité en matière de dégradation des terres et de l'adaptation au climat. Les actions stratégiques identifiées sont censées d'orienter le processus de planification et de développement, en tenant compte des effets du changement climatique, et soutenir la mise en œuvre d'autres politiques et actions sectorielles, qui seront définies dans le processus de planification.

Les processus suivants doivent être pris en charge :

- l'augmentation des connaissances basées sur outils de planification et gouvernance, les systèmes de gestion et de suivi des données, les outils SIG ;
- la protection active ainsi que l'extension des aires protégées pour sauvegarder et valoriser les ressources naturelles (avec reclassement des AP selon la classification de l'UICN) ;
- le renforcement et l'extension du réseau écologique national, relié à des corridors à grande échelle qui traversent l'intérieur et les frontières du pays ;
- la protection des puits de carbone et le reboisement / naturalisation du système forestier ;
- la mise à jour du cadre juridique et réglementaire (adoption de la LOTU, d'une loi de protection des forêts de mangrove, d'une loi de protection des zones sacrées, d'une loi d'aménagement du paysage, institution de la RBABB, de nouvelles aires protégées et corridors écologiques, réglementations de l'ESE et de l'EIE, etc.) ;
- la mise à jour du cadre politique (outils de gouvernance foncière et paysagère, plan de développement durable du secteur touristique, etc.) ;
- la conception et mise en œuvre d'outils de planification et de gestion du territoire visant à l'adaptation climatique et la résilience des communautés (plans de résilience urbaine au changement climatique) ;
- l'intégration des stratégies d'adaptation au changement climatique dans les plans de développement régionaux et locaux ;

- la valorisation du capital culturel (protection des zones sacrées, plans de récupération/restauration/rénovation de bâtiments) ;
- la valorisation agro-paysagère du patrimoine naturel de valeur écologique et environnementale pour la subsistance des communautés locales ;
- l'identification et l'opérationnalisation des mécanismes de financement climatique (REDD+) ;
- l'amélioration des procédures d'évaluation environnementale existantes (réf. EIE) et mise en œuvre de nouveaux outils (réf. ESE, Evaluation Economique Environnementale) pour orienter programmes, plans et projets vers la durabilité, en tenant compte de la valeur du capital naturel et des services écosystémiques et des stratégies d'adaptation au climat.

1 Preamble and purpose

The Guinea-Bissau (GB) entire coastal zone is highly exposed to climate hazards, with the risks and costs gradually increasing over time. The coastal zone is also chiefly important in terms of human settlements and economic activities. Addressing expected climate change impacts in Guinea-Bissau's coastal zone is therefore a national adaptation priority (UNDP, 2018).

The "Strengthen the adaptive capacity and climate resilience of Guinea-Bissau coastal communities vulnerable to climate risks" UNDP/GEF project (hereafter briefly "Coastal project") aims to (UNDP, 2018):

- support the establishment of an enabling political, institutional, and administrative environment for advancing the management of the climate risk in the coastal zone.
- finance additional investments in hard and soft coastal protection measures to help maintain critical economic and natural infrastructure in the face of sea level rise and coastal degradation.
- contribute to strengthening the climatic resilience by having livelihood options for the coastal communities with the special emphasis to most vulnerable groups such as women and youth.

The general objective of this Strategic Environmental and Social Assessment (SESA) study is to identify, describe and assess the most significant and probable environmental and social issues of coastal zone development activities and identify key elements for a framework/plan that guides the economic and geo-ecological zoning of these areas, considering the actual and potential resilience of local communities.

The study is asked to (UNDP, 2022):

- improve decision-making on the use, occupation of land, planning and promotion of sustainable development in coastal areas, based on reliable information on actual practices of use of natural resources and knowledge on the resilience capacity of ecosystems and potential investments in coastal areas.
- support the future drafting of the integrated coastal zone development and management plan.
- better orient investment programs, plans and policies and conservation initiatives having capacities in management and monitoring of socio-economic and environmental dimensions.

2 Methodology of the SESA

2.1 Strategic Environmental Assessment guidelines, approaches and experiences

2.1.1 Introduction

The Strategic Environmental and Social Assessment (SESA) basically refers to Strategic Environmental Assessment (SEA) concepts and approaches, stressing the need of a social assessment. The term "strategic environmental assessment" was first coined by Wood and Djeddour in the late 1980s in an interim report to the European Commission (Wood & Djeddour, 1989). However, the concept of evaluating environmental impacts of PPPs was formally established in the 1969 US National Environmental Policy Act (NEPA). NEPA required an environmental assessment of proposed federal agency actions, arguably constituting the first formal framework for both environmental impact assessment (EIA) and SEA in the world (Jones et al. 2005).

SEA has developed partly from the practice of EIA of proposed projects. It has been suggested that, whereas EIA is primarily concerned with how a proposed development should take place in order to minimise adverse environmental impacts, SEA can have a real influence on the choice of alternative developments during the earlier stages of decision-making. In other words, SEA can facilitate a proactive approach to ensuring that environmental and sustainability considerations are taken into account during early stages of strategic decision-making processes.

The role and aims of SEA vary according to the planning and decision-making context in which it is applied. It has therefore been suggested that SEA should be regarded as a 'family of tools' (Partidário, 2000) or 'a family of approaches' (Dalal-Clayton & Sadler, 2005) and as an 'overarching concept rather than a unitary technique' (Brown & Thérivel, 2000).

SEA is applied at many different levels of strategic activity (e.g., legislation, lending, policies, plans and programmes) around the world. It can be applied to a particular geographical area (e.g., national, regional, local), a particular sector (e.g., spatial planning, transport, agriculture, forestry, fisheries, energy, waste/water management, tourism) or to a specific issue (e.g., climate change, biodiversity) (Fundingsland Tetlow & Hanusch, 2012).

2.1.2 The evolution of SEA. International guidelines and approaches

Since the concept of SEA was established in the USA in the early 1970s, the environmental assessment of PPPs has been introduced into the legal frameworks of national governments, international organisations and development banks across the world.

The need to integrate environmental considerations with development was firmly established by the Brundtland report and became part of World Bank policy in 1987. The 1992 UNCED Earth Summit, the Rio Declaration and Agenda 21 provided further impetus for national governments to incorporate environmental considerations into all levels of decision-making.

The UNECE Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, signed in 1998 and entered into force in 2001, triggered better consideration of public participation in SEA.

The spread of SEA accelerated rapidly from that point in time, partly due to three important triggers: (1) the World Bank and other donor agencies stimulating SEA practice in the development co-operation context, (2)

the adoption and transposition of the European SEA Directive and (3) the adoption and negotiation of the SEA Protocol to the Espoo Convention.

Numerous activities of the UNDP, UNEP, World Bank and other bilateral and multilateral donor agencies led to strengthening the link between the concept of SEA and development co-operation and helped to establish SEA as a crucial tool for capacity building in developing countries as well as in countries of transition (e.g. Partidário, 2011).

A cornerstone within these activities was the "Good practice guidance for development co-operation" (OECD, 2006) prepared by the SEA Task Team within the OECD Development Assistance Committee (DAC) building on the network of Environment and Development Cooperation (ENVIRONET). Based on this, OECD/DAC prepared further guidance covering aspects such as SEA and adaptation to climate change, SEA and disaster risk reduction, SEA and ecosystem services and SEA and post-conflict development and offered training in these fields.

The World Bank produced guides and technical manuals on SEA and SESA.

The African Development Bank published an operational handbook for SESA application. As part of the Integrated Safeguards System, all Bank operations (both public and private sector) are categorized in four categories, determining the type and scale of environmental and social assessment that needs to be undertaken. Bank operations likely to cause significant environmental and social impacts (Category 1) require a full Environmental and Social Assessment (SESA for program operations or ESIA for investment projects), while bank operations likely to cause less adverse environmental and social impacts (Category 2) require an appropriate level of Environmental and Social Assessment tailored to the expected environmental and social risk. Bank operations with negligible adverse environmental and social risks (Category 3) do not require an environmental and social assessment. Nonetheless, to design a Category 3 program operation/project properly, it may be necessary to carry out gender analyses, institutional analyses, or other studies on specific, critical social issues in order to anticipate and manage unintended impacts on the affected communities.

In 2012, The Agência Portuguesa do Ambiente (APA) published a Guide to Strategic Environmental Assessment (SEA), providing practical guidance on carrying out SEA in an innovative, sustainability-oriented and strategic way. The Guide represents an important reference for Portuguese-speaking countries (Partidário, 2012).

The UNEP produced some technical documents on SEA and also reports on the application of SEA to many P/P/P at international level; it is worth pointing out the recent manual for integrating Ecosystem Services into SEA (Geneletti, 2014).

The most common approach is the **impact-centred SEA**, which has its origins in translating the logic of the project-level Environmental Impact Assessment (EIA) process to impact assessment for policies, plans and programmes. The EU SEA Directive and the Kiev Protocol under the Espoo Convention are examples of this approach. The impact-centred SEA approach basically aims to respond to the question: what are the likely significant impacts on the environment from implementing alternative sectoral/national/local development policy options, and how can adverse impacts be mitigated?

A more **strategic approach** to SEA can be illustrated by the model promoted by the European Commission Directorate General for International Cooperation and Development (DG DEVCO). This approach seeks not only to assess the potential environmental impacts of implementing different policy options, but also to answer the following questions: how are environmental degradation processes and climate change affecting and likely to affect sector/national development? Do the options put forward in the strategic document offer an adequate response to these challenges? What further opportunities are available for the strategic document to promote an environmentally sustainable, climate resilient and low carbon development?

Another example of the strategic approach is found in the form of the **Analytical Strategic Environmental Assessment (ANSEA)**, applied in some SEAs in Latin America (e.g. Chile, Colombia), where the focus is more on the examination of strategic options to maximise benefits, rather than on a narrow focus on the analysis of impacts and the definition of measures to mitigate them.

In the case of lending for policy reform, the World Bank has been applying the **Policy SEA (PSEA) approach** (or institution-centred SEA). This approach analyses the robustness and appropriateness of the institutional, policy and regulatory framework of a country to respond to real and likely environmental challenges in a given sector. A PSEA can inform the definition of policy reforms by identifying gaps in existing country systems for managing the environment and natural resources and involving vulnerable stakeholders in the policy dialogue to secure a loan.

Other approaches respond to more specific decision-making situations, such as the **Integrated SEA (I-SEA)** promoted by UNEP to inform relatively urgent decision-making processes on land-use planning in post-crisis situations. The particularity of the I-SEA approach is that it explicitly integrates disaster risk reduction (DRR) and climate change (Palerm, 2018).

2.1.3 The SEA in Guinea-Bissau

The SEA concept was introduced into the country's legislative framework with Law 10/2010. The definition is as follows: “Environmental assessment instrument consisting of a systematic and continuous procedure for assessing the quality of the environment and the environmental consequences resulting from alternative development visions and intentions, incorporated into initiatives, such as: the formulation of policies, plans and programs, in order to ensure the effective integration of biophysical, economic, social and political aspects of planning and decision-making”.

Before being included among the Law 10/2010 assessment tools, SEA was introduced through Resolution 22/ANP/2005, which approved the Convention on Environmental Impact Assessment in a transboundary context and the Assessment Protocol Environmental Strategy, after its approval on the 2nd of March of the same year by the National People's Assembly and published in the Official Bulletin n˚ 22 of the 30th of May 2005.

Anyway, the law doesn’t provide useful indications for effective implementation of the SEA. The legislative act only focuses on the EIA procedure, further detailed with the approval of the Environmental and Social Impact Study Regulation (Decreto nº 7/2017). For this reason, in 2016, a **Guide for implementing the Strategic Environmental Assessment in GB** was prepared under the Capacity Building and Civil and Political Engagement in Natural Resource Management Project UNDP project (Cozzolino, 2016).

The guide proposes two processes for applying SEA: one for plans and programs and another, faster and simpler, for policies. The processes are based on a strict coordination with the processes of elaboration, sharing and approval of the P/P/Ps and changing and adapting the existing EIA process, identifying the AAAC as competent and responsible authority, with a role of coordination and leadership of the processes.

The document deals with specific aspects related to the SEA, such as the analysis of alternatives, cumulative impacts, information and consultation activities, biodiversity compensation and others, to provide guidelines and advice related to the process and the preparation of technical documents.

The analysis of alternatives can be applied as a preventive tool of environmental impacts, during the incipient phases of the SEA process, including contributions arising from public consultation activities and involving institutional actors and civil society. The analysis of cumulative impacts can assume the role of a coordination tool between the evaluation of different projects and works, which, submitted to the EIA process, cannot be

evaluated singularly, effectively considering the strategic aspects. The Guide suggests the use of indicators and indices, GIS, matrices. The issue of disaster risk reduction is tackled with reference to the principles of the Hyogo Framework. The assessment of social aspects can deal with specific issues, such as traditional, religious, ethnic elements, the presence of cultural goods with traditional and social value, access to and use of natural resources by vulnerable social categories, gender equity (AfDB Group, 2015).

Recently, a **SESA for the development of the Archipelago of Bijagos** (BRLi, 2021) was carried out. The document outlines the various development scenarios that are emerging, to identify their potential impacts as well as the measures and actions to be implemented in order to eliminate them or reduce them to acceptable levels. The strategic assessment report presents the institutional, political and legislative context and analyses of the initial state of the area. On this basis, first sketches of vision and zoning are drawn up for the islands. Finally, probable significant impacts are analyzed and then measures are proposed to avoid or reduce these and to oversee the development of the archipelago.

2.2 General approach

The methodology of the SESA considers the international guidelines and best practices, specifically in similar contexts (coastal areas, SIDS, in-developing countries), the Guidelines for the SESA in GB (Cozzolino, 2016), the results of the kick-off meeting and the comments to this document.

The SESA study have been undertaken through the following three phases:

- Phase 1: preparatory activities
- Phase 2: field missions and stakeholders' meetings
- Phase 3: Environmental and Social Strategic Sectorial Analysis of the Coastal Zone

Preparatory activities

Specific preliminary activities are carried out to gather information and documentation relevant to the work. These include documents from personal databases (for instance, repository of laws and regulations, plans and programs, technical reports, etc.) and downloadable from public databases (for instance FAO Lex and legis-palop+tl), outputs and reports from other works developed under the UNDP Project and other key ongoing and upcoming projects of interest for the establishment of synergies with the project.

Field missions and stakeholders' meetings

Field missions in the project's zones have been conducted with the aim of meeting the local stakeholders, sharing information and their point of view on the environmental, social and economic effects of climate change, and analyzing the resilience and adaptive capacity of the local communities.

Figure 2.1 The projects' zones (UNDP, 2018)

One-to-one meetings and focus group discussions have been organized in Bissau, too.

Environmental and Social Strategic Sectorial Analysis of the Coastal Zone

The SESA study have been carried out based on the results of the Scoping study, the comments and suggestions of the PMU, and the data collected in Bissau and during the field missions through direct surveys and interviews. It includes:

1. An executive summary, in Portuguese, English and French, with the resume of the key-elements of the SESA.
2. A baseline environmental, landscape, economic and social analysis, considering all the key-topics, such as demographic dynamics, social structures also with reference to the traditional ones, traditional, ethnic, religious aspects, cultural heritages, special areas identified by the communities (such as sacred forests and other sacred sites[1]), special needs of disadvantaged persons, health, economic activities including the blue and green economy[2], climate change effects, coastal morphology dynamics, water resources, landscape and seascape, ecosystems and biodiversity and others.
3. An analysis of disaster risks and the related management system, with a specific focus on the integration of climate adaptation strategies in the existing policies, programs, plans and specific actions.
4. A SWOT analysis including legal, institutional, social, economic, and environmental aspects.

[1] For instance, the publication "Clara Saraiva, Os sítios sagrados nas Bijagós, projecto "Bijagós, Bemba di Vida! Acção cívica para o resgate e valorização de um património da humanidade, EU, IMVF, Tiniguena" can be an interesting source for this analysis.

[2] The results of the Blue Economy UNDP Project will be used to prepare the sections of the report on the blue and green economy sectors.

5. Contribution to the definition of the general scenarios and the community adaptation and resilience options and alternatives and an assessment of their social, economic, and environmental effects. This analysis includes the definition of objectives, strategies, and the proposal of an action framework.
6. An assessment of the environmental, social, and economic impacts of the proposed strategies and actions.
7. Directives and guidelines for taking into account environmental and social due diligence in policies, plans, programs and projects during the implementation of the government policy within the framework of the resilience project. They will also include the necessary specific field survey and sectorial analysis to be designed and implemented.
8. Specific orientations for the development of the environmental assessment studies procedures
9. An assessment of the institutional capacities to deal with environmental and social issues, and a proposal for an institutional capacity building plan.
10. Lessons learnt, suggestions and recommendations.
11. Annexes (Maps, list of consulted persons and entities, etc.).

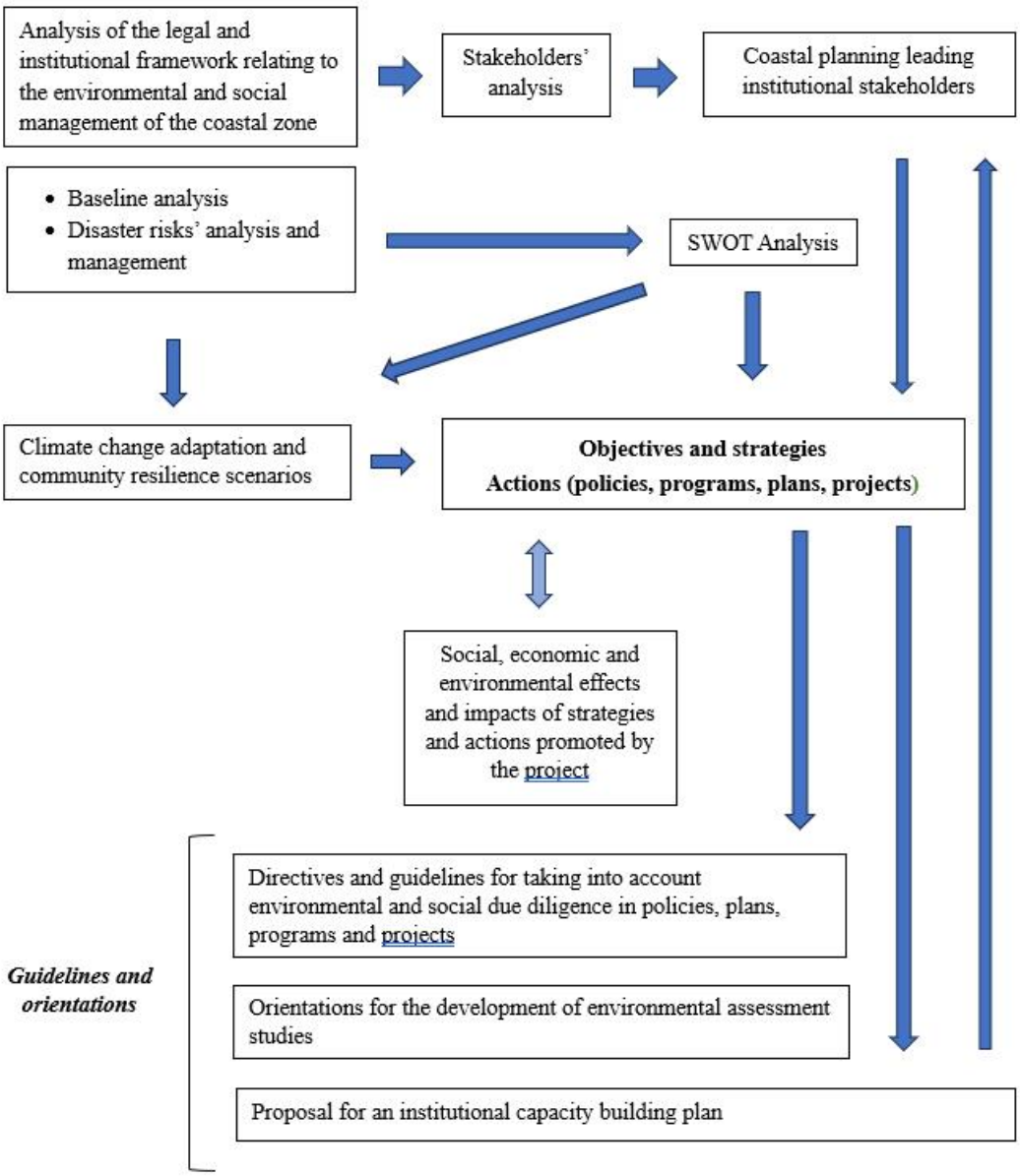


Figure 2.2 Study Logical Scheme

2.3 Assumptions, limitations and potential constraints of the SESA

The SESA has been drafted taking into account the following limitations and potential constraints:

- results depend from data and maps' availability.
- results depend on stakeholders' availability to share point of view and provide strategic orientations.
- despite the SESA is a legal obligation for plans and programs, it is not specifically regulated and the cases of application are very limited. Proponents of plans and programs, including international donors and partners, ignore the SESA. So, there is a risk that the key-stakeholders will not consider this SESA valuable.

3 Analysis of the legal and institutional framework relating to the environmental and social management of the coastal zone

3.1 Legal and institutional framework relating to the environmental management of the coastal zone

Several laws rule environmental issues in GB, this legal framework has developed a lot in the last years, through the incorporation of several guidelines contained in international agreements, including the Rio Conventions. As a relevant outcome of the creation in 1992 of the National Environment Council (CNA), under the direct dependence of the President of the Republic, environmental issues entered the agenda of successive GB governments. The CNA evolved through different stages until the current Ministry of Environment and Biodiversity.

GB's legal framework in terms of biodiversity conservation and sustainable management of resources was issued, in an initial phase, with the Coastal Planning Program (UICN/MADR-DGFC, 1993) and, subsequently, with the assumption of responsibility for environmental problems by public authorities and civil society, while national awareness of environmental issues was developed (BRLi, 2021). As such, several legislative instruments were adopted. The main legal and regulatory documents applicable to the management of coastal zones and natural resources, protection of coastal ecosystems (mangroves, coastal agricultural areas, bolanhas, beaches, etc.) and other environmental issues related to climate change are mentioned and briefly described below.

Table 3.1 Summary of national legal framework for the environmental, land and natural resources' management of the coastal zone

Laws and Decrees	Aspects addressed
Constitution of the Republic of GB (CRGB)	The CRGB is the main law that governs the exploitation of natural resources by establishing its exclusivity in matters of conservation and exploitation of all natural resources, living and non-living, within its exclusive zone, defined by law. The current Constitution of 1996 establishes: *Natural resources* | Article 10 defines that in its exclusive zone, defined by law, the State of GB exercises exclusive competence for the conservation and exploitation of natural resources, both living and non-living. *Environmentl, climate and biodiversity* | Article 15 stipulates that public health's main goal is to promote the physical and mental well-being of the population and the balanced insertion in the social-ecological environment where they live. *Land and territories* | Establishes in Article 12, 2, that the soil, subsoil, water, mineral resources, main sources of energy, forestry resources and social infrastructure are property of the State. Further Article 13 stipulates that the State may grant, by means of concession to cooperatives and other singular or collective legal persons, the exploration of State property, as long as it profits the general interest and increase social richness. *Fisheries* | No provisions.
Law of Environment *(No. 01/2011 of March 2nd)*	The Law of Environment (*Lei do Ambiente* ou *Lei de base do Ambiente*), or Environment Framework Law, aproves the Basic Legislation on Environment and defines the legal bases for a correct use and management of the environment and its components, with a view to materializing a sustainable development policy.

Laws and Decrees	Aspects addressed
Environmental Impact Assessment Regulation *(Law No. 10/2010 of September 24th)*	It specifies the legal framework and regime for the Environmental and Social Impact Assessment (ESIA)[3] process, including auditing, permitting, environmental and social management, monitoring and administrative management. It also defines the contents of the technical documents to be submitted under the ESIA, such as the Environmental and Social Impact Statement (ESIS). The environmental assessment in GB refers to projects, plans and programs. Article 6 establishes the Population Resettlement Plan, the Strategic Environmental and Assessment (SEA) and the risk analysis and hazard study, as instruments of the Environmental Assessment. The Law is complemented by Regulations (Decrees No. 5-7-8-9-10/2017).
Framework Law on Protected Areas (LQAP) *(Decree-Law No. 5A/2011 of March 1st)*	The LQAP, despite its specificity and limitations, common to other national laws, brings together the rules for the creation, classification and management of Protected Areas (PAs), with a view to the conservation and enhancement of biodiversity in GB. It establishes, in particular, the classification of the PAs and lays down competencies and composition of the responsible authorities in order to protect the natural ecosystems, fauna and flora, and promote its sustainable development. Hereafter, the key-elements of LQAP: - Article 4 classifies the protected areas. - Article 6 introduces the obligation to have an Environmental License to obtain a forest concession. - Article 24 defines that a strip of forest or natural vegetation must be conserved within the boundary of the protected area on the coast, along the estuary, lake or watercourse margins that are included in the management plan, and emphasizes the importance of participatory and durable management of natural resources within protected areas. - Article 26 defines zones of integral preservation - works are not allowed. - Article 29 defines zones of sustainable development - destined to zones of development of the economic activities that benefit the communities. Main documents for the coastal protected areas and other area-based conservation measures are: o *Decree No.11/00* instituting the Orango Group of Islands National Park. o *Decree No. 12/00* instituting the Tarrafes do Rio de Cacheu Natural Park. o *Decree No. 13/00* instituting the Lagoas de Cufada Natural Park. o *Decree No. 6-A/00* instituting the João Vieira Poilão National Marine Park. o *Decree No. 8/05* creating the Community Marine Protected Area of the islands of Formosa, Nago and Chediã (Urok Island). o *Decree No. 14/2011* approving the National Park of Cantanhez.
Forestry Law *(Decree-Law No. 5/2011 of February 22nd)*	The Forestry Law regulates the governance and management of forests and their resources in GB. It aims at: the promotion of the sustainable exploitation of forestry resources; at the optimization for the socio-economic and cultural development in line with the protection and preservation of the natural environment; at the improvement of the quality of life of the population, through the promotion and rational exploitation of forestry resources within the GB territory. The key-elements of Forestry Law are: - The first paragraph of this law establishes a forest regime that applies to fragile areas and riverbanks and prohibits deforestation in these areas, with the aim of preventing erosion, desertification and protection of the ecosystem and its wildlife, as well as the regularization of the hydrological regime and defense against erosion. - Article 22 states that the application for a permit to slaughter must necessarily include the rules of slaughtering that best ensure the sustainability of the refuse and the protection of soil or the environment. - Article 24 introduces the obligation to carry out an Environmental License to obtain a forest concession. Some key-legal tools approved before the Forestry Law are still binding. They are: o The *Decree No. 26/91* approving the Regulation of the Forestry Fund. o The *Decree No. 27/91* on the forestry taxation. o The *Law No. 4/87* on firefighting and prevention.
Land Law *(Law No. 5/98 of April 23rd)*	The Land Law profoundly modified the logic of land appropriation (mentioned before in the CRGB), setting three main objectives: (i) guarantee land to local communities; (ii) incorporate the customary land regime into legislation, as well as the institutions that represent it; and (iii) foster investment in

[3] In some documents it's called Environmental Impact Assessment (EIA).

Laws and Decrees	Aspects addressed
	land by creating commercial land value. This law enshrined the legislative right, but also the customary use of land with some innovations. Thus, a new so-called "land concession" regime, be it urban or rural, makes it possible to recognize a "perpetual" use (definitive or temporary). Some articles of this Law deserve particularly attention: - The Article 5 states that soil protection is of general interest and is a part of environmental protection and sustainable development policies. - Guarantees the local communities' land to the extent that they can give them economic utility. - Incorporates the customary land regime into positive law, as well as the institutions that represent them. - It stimulates investment in land by creating a market value for land. - Defines soil protection as being of general interest and integrates policies for protecting the environment and sustainable development. - Explains that soils are a common heritage and a non-renewable natural resource of vital importance for present and future humanity. - Ensures that land use will take into account the multiplicity of its ecological functions and its consideration as a limited resource. - Defines that the policy of soil protection must be accompanied by a process of information and citizen participation. Some key legal instruments that should be highlighted: o *Norms No. 9/11/1992* approving the Legal and Fiscal Regime for Land Occupation, which regulates the requests and concession of vacant land for agro-silvo-pastoral, agricultural purposes, livestock, forestry or other. o *Colonial Decree No. 43894 of 9/6/1961*, on the Regulation of Land Occupation and Concession: allows illegitimate holders of public property land in GB to request, within a period of one year, that they be granted, free of charge, full ownership titles, provided they prove continuous and peaceful possession for over fifteen years. o *Decree No. 8/2006* approving the General Regulation for Urban Construction and Housing, which provides for the execution of new buildings or any civil works, reconstruction, expansion, repair or the demolition of existing buildings and works, also on works that imply alteration of the local topography, within the urban perimeter and the rural protection zones established for the seat of the Municipality, Sector and for other locations subject by law to an urbanization plan and expansion.
General Fisheries Law (*Decree-Law No. 10/2011 of June 7th)*	In the last decade, the legal and regulatory framework of the fisheries sector in GB was updated the first time in 2011. This Decree-Law establishes the requirements to be met in order to perform any activity related to aquatic biological resources exploitation within waters under the jurisdiction of GB. It regulates and manages halieutic resources, as well as fishing licence requirements, mariculture infrastructures and fish product proceeding and treatment. It also applies for hygienic-sanitary quality control of fish products and inspections to be carried out for fishing activities, establishing fines to be paid for illegal fishing activity. The key-elements of General Fisheries Law are: - Definition of the rules for fisheries management and development. - Points out that the exploitation of fisheries resources must comply with the principle of sustainable and rational development. - It defined appropriate measures for the exploration, conservation, and preservation.
Regulation on Artisanal Fisheries *Decree-Law No. 24/2011 of June 7th)*	This Decree approves the Regulation on Artisanal Fisheries to be performed in the water under the jurisdiction of GB (within the inland waters and territorial sea). In particular, it specifies fishing vessels' requirements, fishing zones, as well as fishing licensing, fishing gear and methods, according to the sustainable exploitation of aquatic biological resources of GB. It also defines what constitutes artisanal fisheries as opposed to commercial ones, and regulates their activities, recognizing the needs of local communities and the role of artisanal fisheries in food security for these communities, and prescribes inspections, controls, and fines to be paid for illegal artisanal fishing activities. The following list includes the national legislation on fisheries: o Circular No. 03/DGPI/96 *on new minimum mesh sizes for trawl nets for industrial* vessels. o *Decree-Law No. 4/96* sets out the general principles of the fisheries resources management policy (In the process of being revised). o *Dispatch No. 06/99* on the conditions governing small-scale fishing licences. o Licences for Industrial Fishing Vessels.

Laws and Decrees	Aspects addressed
	○ *Dispatch No. 18/GSEP/2010* approves the Triennial Plan for the co-management and development of fisheries in the fishing reserve area of Rio Grande de Buba and Lagoas de Cufada. ○ *Joint Order No. 38/GSEP/11* establishes the mandatory technical compliance inspection for vessels that have left the EEZ, under the jurisdiction of GB, for a period exceeding 45 days. ○ *Joint Order No. 02/2001* on fishing license fees and other conditions of access to fisheries resources. ○ *Decree-Law No. 9/96* approving the FISCMAR Regulation. ○ *Law No. 2/85* establishes the straight base lines from which the width of the Territorial Sea is measured. ○ *Law No. 3/85* fixes the width of the Territorial Sea and the Exclusive Economic Zone at 12 and 200 nautical miles respectively and accepts the content of the Arbitral Award of 14 February 1985, on the delimitation of the maritime boundaries between the Republic of GB and the Republic of Guinea. ○ Fishing Inspection Regulation, approved by *Decree-Law No. 09/2011*.
Water Code *(Decree-Law no. 5-A-1992 of September 17th)*	Water Code aims to define the general legal framework for all activities related to the management of water resources. Some articles of the Water Code are directly linked with environmental considerations and sustainable water management objectives: - Article 15 specifies that the use of water resources will be planned within the framework of the Master Plan for Water. The purpose of planning is to achieve a better supply of water needs, increasing availability, and aiming at protecting the quality of water, and rationalizing its use in harmony with other natural resources, land use planning and ecological balance. This article integrates the sustainable water management dimension. - The Article 28 refers to forest and erosion control, whoever wishes to undertake work or to carry out equipment on land susceptible of disturbing the existence or flow of water sources, lakes or streams should request prior authorization from the Ministry responsible for water consult the ministries responsible for agriculture and forestry and for territorial planning. - The Article 32 states that problems with water, such as droughts, water erosion, sedimentation, salinization of water and soil and others, will be subject to regulation by the Ministry responsible for water, adopted in coordination with other interested State departments. - Article 35 specifies that "*carrying out any work of a hydraulic nature or any work in the State's water domain will require an administrative authorization*". - Different legal regime of activities reactive to the management of water resources. - General regime of use. - Provisions on various uses (supply, irrigation, fishing, and fish farming and transport. - Introduces measures to protect springs, underground aquifers, lakes, rivers and streams, to prevent pollution and waste of water and to control the exercise of granted rights of use and occupation.
Mines and Quarries Code *(Law No. 3/2014 of April 29nd)*	This code regulates prospecting, research, exploitation and commercialization of mineral substances existing in the soil, subsoil and waters under the jurisdiction of the Republic of GB, with the exception of liquid or gaseous hydrocarbons. The Code provides for seven types of licenses accessible to nationals and foreigners: prospecting license; research license; small exploration license; large exploration license; inert material exploration license; license for industrial quarries; purchase/sale/processing license. - Article 12 the extraction of any materials can only be carried out provided that conditions are not created that can affect in a radical way: (the conditions of circulation and recharge in the aquifers, the chemical characteristics of the superficial and deep waters. - License of small and large mining and industrial quarry. - License for the purchase, sale and transformation of minerals. - Obligates to draw up environmental impact studies and environmental management plans.
The Petroleum Law *(Law No. 4/2014 of April 15th)*	The Petroleum Law regulates the conditions for prospecting, exploring, producing, and transporting petroleum resources in the national territory. Several articles address the principles of responsible exploration and mitigation of environmental impacts, with Article 35 stating that during the execution of the research and exploration work, the construction group should conduct petroleum operations with due respect for the protection of the environment. The Article 36 addresses the issue of environmental studies and specifies how environmental impact assessments must be carried out before starting oil production.
Transport	A complex set of laws regulate the sector, some are important for the coastal sector.

Laws and Decrees	Aspects addressed
Waste and pollution	Despite the Country has ratified different international agreements on waste and pollution, it has not yet adopted framework laws on these themes. The only official legal tool on this topic is the Decree No. 495/1973, which introduces measures and prohibitions against pollution of waters, beaches and banks.

This analysis also considered the proposals and preliminary drafts of legal documents that may, in the near future, influence or require due articulation with the management of coastal areas in GB, namely:

- Draft Law for Territorial and Urban Planning[4].
- Draft Law for mangrove protection[5].
- Draft Decree that formalizes the Bolama-Bijagós Archipelago Biosphere Reserve (RBABB) at the national level and adopts its Statutes[6].

Table 3.2 Summary of significant proposed but not yet approved laws

Proposed Laws and Decrees	Aspects addressed
Draft Law for Territorial and Urban Planning (LOTU)	Land use planning is a process that seldom exists in GB, particularly at the level of zoning/mapping and classifying land use, creating as a consequence a scenario and a sense where almost no rules exists for land use and economical activities implementation. GB does not currently have a framework to plan and guarantee the coherence of territorial development. There is no national policy on land use and urban planning and a complete absence of plans with a macro dimension, regional, municipal or sectoral. What the country has is an urban plan of the city of Bissau, by the Decree nº 17/1995, 30th of October, which was to rule for 20 years, being currently out-of-date, since 2015; and also a macro-zoning inside protected areas exists, where total protection, partial protection, communities zones, etc. were defined. There are some specific examples of plans that have already been carried out but not implemented, such as the Urban Plan of Bissau and the Regional Plan for the Bolama-Bijagós Region (UN-Habitat, 2021a). On the other hand, there are proposals for Urban Plans for Bolama and Bubaque (UN-Habitat, 2021b; UN-Habitat, 2021c); these can be considered the most advanced examples of plans, although not adopted and implemented. The Draft Law for Territorial and Urban Planning, dated 2015, remains pending adoption. This law intends to implement a general conception of the problems of territorial and urban planning, in a system of norms, principles and instruments, that regulate the plans and territorial programs with objectives that actualize them, thus giving value to the soils and space, organising their use, providing them with infrastructure, for the singular and collective use of the populations, as a systematic form of intervention by the decentralized State and local authorities, that is, municipalities in territorial planning. It is important to highlight the importance of the LOTU which will clearly benefit the management of the territory, including coastal areas, and associated tools. The draft foresees, among others, the Special Land Use Plans (PEOT), defining such planning tool as follows (Article 45 of the LOTU proposal): 1. *"The PEOT is the planning instrument that establishes the spatial framework of a coherent set of sectoral actions with an impact on the organization of the territory.* 2. *The special territorial planning plan covers any area that, fundamentally, proves to be adequate to establish the spatial framework of the sectoral actions disciplined by it and is in force for a maximum period of 20 years.* 3. *The PEOT includes, among other things, the following:*

[4] Analysed the contents until October 2022.

[5] Analysed the contents until November 2014.

[6] Analysed the contents until July 2022.

Proposed Laws and Decrees	Aspects addressed
	(a) Costal zones management plans. *(d) Protected areas management plans.* *(e) Fishing management plan, etc.* 4. *The special territorial planning plan cannot act as a global planning tool for the area covered by it."* Land use plans are rather important to organize different land uses expected in the country, such as urban areas, community areas, industrial areas, coastal zones, minerals and mining exploitation areas, forestry areas, agricultural areas, fishery areas, infrastructure (roads, ports, power stations, power lines, dams, etc.) and nature conservation areas. The inexistence of such land use plans amplifies potential conflicts between sectorial economical activities and the sustainable use of natural resources. In the absence of these lad use plans, the stage where the sustainable land use is assessed is at the environmental (and social) assessment process, imposing very high tension on the process itself, often with political pressure from sectorial ministries to let the project go ahead.
Draft Law for mangrove protection	The coastal zones of GB, and in particular mangroves, are of great ecological importance and socio-economic significance as a hub for tropical marine biotopes. The importance of the populations of manatees (Silva & Araújo 2001 in Cardoso 2017), sea turtles (Catry 2008, Catry et al. 2009 in Cardoso 2017) and hippos that depend on the coastal areas of GB, and in particular on the mangroves, as well as concentrations of migratory birds, mainly from Europe and the Arctic cannot be underestimated (Cardoso, 2017).The mangroves are also one of the world's richest storehouses of biological and genetic diversity. Notably, mangroves are extraordinary ecosystems, providing many goods and services to humans particularly fisheries, forest products, pollution abatement and coastal protection against natural calamities. In addition, scientific community finds such an ecosystem as one among the world's most threatened biome due to human intervention in the long past and on-going climate change. The Draft Law for mangrove protection aims to define the rules and management techniques aimed at fostering, conserving, and rationally exploiting the resources of the mangrove ecosystem, as well as the participation of communities throughout the entire extension of the mangroves in the national territory. Under the terms mentioned in the previous paragraph, the use of mangrove resources aims to satisfy, in a fair and equitable manner, the needs of resident communities and resource users, especially the most vulnerable; for agriculture, and the needs for the forestry, aquaculture, fisheries, fauna, flora, tourism and the environment.
Draft Decree that formalizes the Bolama-Bijagós Archipelago Biosphere Reserve at the national level and adopts its Statute	There is a preliminary draft of a Decree, not yet approved at the time of writing this report (March 2023), which formalizes the RBABB at the national level and adopts its Statutes. The national formalization of the Bolama-Bijagós Archipelago Biosphere Reserve (RBABB) results from its recognition, in 1996, by the Man and Biosphere Programme (MAB Programme) of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and its subsequent inclusion in the World Network of Biosphere Reserves (WNBR), constituting a fundamental element in national public policies for sustainable development, nature conservation and its biodiversity and respect for the knowledge and traditions of local communities. This decree also aims to adopt the statutes assigned to the Bolama-Bijagós Archipelago Biosphere Reserve, to guide its governance and management structure in a very articulated and sufficient way.

Several actors belong to the institutional framework relevant to the environmental issues in GB. Coastal zone management and adaptation actions for climate change generally involve different sectors, acting in an integrated manner and seeking optimization in the search for results.

In general, the public sector in GB suffers from many serious structural problems, including the lack of equipment and adequate installations and extremely low wages. In addition, the fiscal control is incipient, both regarding revenues and expenses. In the meanwhile, capacities are being lost, excluded, and poorly utilized, as workers are unmotivated, have precarious working conditions and need better skills and training. There are some active Non-governmental Organizations (NGOs), associations and Community-based organizations (CBOs) in the environmental area. Likewise local governments, NGOs are closer to those that manage natural resources directly, but both lack the necessary institutional support in order to better accomplish their role in the transition to more sustainable practices.

The diversity of government entities that have responsibilities in the management of wetlands and coastal zones is broad, for example the Coastal Planning Office, the Institute of Biodiversity and Protected Areas, the Directorate General for Water Resources, the Maritime and Port Institute, the Ministry of Fisheries and the Ministry of Territorial Administration and Local Power, amongst others. This requires a clear articulation and definition of responsibilities between these public entities, which does not exist, aiming at a more careful and respectful management of the important natural resources and ecosystems services in the country and, in accordance with the commitments ratified by the State of GB in several Conventions. A summary of relevant institutions in GB relating to the environmental management of the coastal zone are presented in the table below.

Table 3.3 Description of key institutions/entities for the environmental and land management of coastal zone

Institutions/entities	Description
National institutions	
Ministry of Environment and Biodiversity (MAB)	The MAB holds a broad mandate for environmental management and is entrusted with the overall responsibility for the development of environmental and climate change policies. Coordinates actions to combat coastal risks in close consultation with other competent institutions. It is home to other subordinate entities/institutions that play an important role in the environmental field, including coastal zone management: i) the Competent Environmental Assessment Authority (AAAC), ii) the Institute of Biodiversity and Protected Areas (IBAP) and the iii) Coastal Planning Office (GPC). The above national institutions are linked to MAB and enjoy different subsidiary legal status, according to the case and the framework in place. Nowadays, the MAB has two General Directions; the first one is of the Environment and another one of the Durable Development, with their own services. In their direct dependence are the National Fund of the Environment, the AAAC and the GPC. Besides IBAP, MAB still houses different departments, services, conventions, programs, and projects that interact in direct or indirect way with the threatened biodiversity problem. The MAB depends directly on the Prime Minister. (*Note:* After the elections on the 4 June 2023 and the appointment of the new government body it became again a Secretariat of State for Environment and Biodiversity.)
National Institute of Environment (INA)	INA was legally established by the Law No. 1/2011 and regulated with the Decree No. 52/2021. The INA is doted of administrative, financial and patrimonial autonomy. The INA's mission is to propose, develop and follow-up the integrated and participatory management of environmental and development policies in the country. INA has also competencies on climate change and air pollution, waste and chemicals, and environmental risks and safety (protection of human and environmental health).
Competent Environmental Assessment Authority (AAAC)	The AAAC is a public institution established in 2004, funded by the World Bank and with IUCN technical support. The statute of AAAC was approved in 2021 (Decree no.52/2021), giving more administrative, financial and technical autonomy. The main objectives of this institution are: • to ensure that environmental and social considerations are better taken into account in decision-making on investment and development projects in the country. • to strengthen the capacity of response through legislation. • strengthen the capacity of the Government to implement the Environmental Impact Assessment (EIA). • to ensure the professional capacity of lawyers in GB in matters of environmental law; and • dissemination of laws and regulations in order to raise awareness of the different sectors of society towards the environment. AAAC is responsible for the implementation of the Environmental Assessment policy (Law No. 10/2010, 24th of September) that aims to assess and mitigate not only the potential impacts of a project on the environment, but also at plans, programs and policies. AAAC should contribute to the promotion of sustainable development and ensure economically viable investments that are socially acceptable and ecologically balanced. At regional administration level the AAAC focal points (so called AAAC Antenas) are not commonly specialized staff with environmental or social background, but rather regional administrative staff that was

Institutions/entities	Description
	given training on Environmental and Social Impact Assessment (ESIA), concepts and procedures, but the capacity is still very low (needs improvement).
Institute of Biodiversity and Protected Areas (IBAP)	The IBAP was also created in 2004 to continue the dynamic begun in the 1990s with a coastal planning program and proposals for establishing a network of protected areas for GB. IBAP's mission is: • managing all protected areas and strategic biodiversity resources. • valuing scientific knowledge and traditional knowledge. • favouring participation and synergies at local, national, and international levels. • promoting sustainable management of biodiversity resources and conservation policies is in line with the agreements GB; and • it plays an important role on the Environment and Social Impact Assessment process of projects that affect protected areas (marine and terrestrial). IBAP benefits from institutional and financial autonomy and has been able to collect the financial resources to build an experienced team and to provide them with more reasonable resources and working conditions, although sometimes IBAP performance on surveillance and control of ongoing activities and infrastructure in protected areas are barely enough, as area covered by the national protected area system has only seen an increase of 26.3% in a decade. The national network of protected areas encompasses a diversity of ecosystems and strategic natural resources that are managed in a participatory manner with stakeholders and national and local actors. With the ongoing creation of terrestrial protected areas, IBAP seeks to enhance the representativeness of protected ecosystems as well as the connectivity between protected areas.
Coastal Planning Office (GPC)	It started as a Coastal Planning Project and was the first initiative to consolidate National Conservation Strategy in GB. It emerged in 1994 at the request of the government and the IUCN, funded by the Swiss Cooperation was coordinated at the national level by the Directorate General of Forestry and Hunting (DGFC) of the Ministry of Rural Development and Agriculture. The GPC is a technical instrument of analysis of the occupation and land uses of the coast, aiming at the harmonization and complementarity of the long-term activities, as well as the resolution of existing conflicts between the different economic sectors. Therefore, the Coastal Planning Office, now integrated with the Ministry of the Environment and Biodiversity, continues to be responsible for coordinating conservation and development actions in the coastal wetlands, which cover an area of 18,000 km^2, but with the mandate weakened, because it lacks the technical and financial capacity to play its part.
Ministry of Territorial Administration and Local Power (MATPL)	Below the regions are 37 sectors/districts (Arvanitis, 2017). This essentially forms the current administrative territorial organization in the country. Regions, which are headed by governors designated by the central government, have direct administrative oversight over districts, as well as cities, towns, and villages (tabancas in the local Creole)[7]. Local authorities are legal entities, with representative bodies, who pursue the interests of local communities and who are not subject to the unitary structure of the State. These local authorities are, however, relatively unstable and thus have little influence on development decisions (BRLi, 2021). This instability sometimes generates continuity problems in the implementation of certain policies or local actions (BRLi, 2021). While, by law, cities are municipalities and are supposed to be ruled by elected bodies, districts are not endowed with a mechanism for political representation, and they are solely administrative divisions, each placed under the responsibility of an administrator of the sector. More specifically, districts are currently being managed by the Ministry of Territory Administration and Local Power through the General Direction of Administrative Decentralization (Arvanitis, 2017). According to the Article 23 of the Decree-law No. 3/2020 approving the Structure of the Government, the Ministry of Territorial Administration and Local Power manages public administration, coordinates and controls the activity of ministries and other bodies of central and local government. According to the legal framework, municipalities should have a high degree of autonomy. They also are the centrepiece of planned reforms outlined in a project law in terms of decentralization, for which a series of competency transfers are scheduled in the fields of education, culture, civil protection, policing, health, and rural/urban equipment, among others. Such reforms are brought together under a project code for territorial

[7] The creation of a municipality theoretically responds to certain criteria set in the project code for local administration, such as a population of 1,500 within the urban settlement, or 3,000 in the wider agglomeration (encompassing tabancas), the existence of a health center, a pharmacy, and other key public services.

Institutions/entities	Description
	administration (*Programa Nacional da Descentralização*, PND) elaborated with assistance from the United Nations Development Programme (UNDP). It embodies and clarifies past legislation on decentralization, forming a plan of what decentralization should look like as opposed to current realities. The plan is, however, yet to be approved, as of mid-2017 (Arvanitis, 2017).
Ministry of Fisheries (MP)	The Ministry of Fisheries is responsible for the definition of the rules for fisheries management (policies, regulations, etc.), as well as for the supervision and control of fisheries resources and marine environment. It defines appropriate measures for the exploration, conservation and preservation of fisheries resources. It has three General Directorates (General Directorate of Industrial Fishing; General Directorate of Artisanal Fishing; and General Directorate of Training, Development and Maritime Economy) and three autonomous entities: National Institute for Fisheries and Oceanographic Research (INIPO), the Maritime and Port Institute (IMP) and the Inspection and Control of Fishing Activities (FISCAP). The Ministry has a focal point, which ensures the interface with the AAAC regarding the environmental and social aspects of the sector. For several years, fisheries administration has been subject to insufficient budgets and a lack of human resources. Although efforts are being made to manage information on licenses and to develop a more effective supervisory system, data on monitoring fisheries and fishery resources could be improved (BRLi, 2021).
National Institute for Fisheries and Oceanographic Research (INIPO)	The INIPO (ex-CIPA - Center for Applied Fisheries Research) is a collective person of public law, of technical and scientific character, under the tutelage of the Ministry of Fisheries, with administrative and financial autonomy. Its main attributions are to coordinate and carry out all research and investigation activities on fishing resources, to study and propose to the Minister of Fisheries the definition of the policy for the protection of fishing resources, as well as to elaborate statistical data on the fishing sector and to control the quality of the fish destined for the internal market and for export. The INIPO is the competent entity that promotes the sustainable management of fisheries resources in GB.
Maritime and Port Institute (IMP)	The purpose of the IMP is the coordination, regulation and administrative, technical, and economic supervision of port activity, maritime transport, and the maritime public domain and, in this capacity, it exercises the role of Maritime Port Authority throughout the national territory. Being subject to the tutelage of the Government Member responsible for the maritime-port sector.
Ministry of Agriculture and Rural Development (MADR)	MADR is the government department responsible for formulating, proposing, coordinating, and executing government policies for the agricultural sector, including the forestry, fauna, livestock and food security sectors. Ensures the improvement of productivity and the sustainable increase of production for consumption and improvement of food security and is a key player regarding mangrove and wetland restoration as well as management and protection of forests. It is made up of three general directorates - Agriculture, Forestry and Fauna and Livestock - with support services and decentralized services (Regional Directorates of Agriculture). In addition, it is also home to the National Institute of Agricultural Research (INPA) that is responsible for the diffusion of new technologies, agrarian training and the dissemination of technical and scientific information.
Ministry of Natural Resources and Energy (MRNE)	The MRNE is responsible for defining the legal regime of all activities relevant to water and mines management. Currently, the Ministry of Natural Resources is made up of the Directorate of Geology and Mines (DGGM), the General Directorate of Water Resources and Petroguine Company (Hydrocarbons). The Administration's ability to control the exploitation of mining resources is difficult to assess so far as mining has not yet started in most locations. In the case of offshore oil, the control capacity seems extremely limited since the country does not yet have a contingency plan to deal with a possible accident causing an oil spill at sea and without means to control its maritime territory.
Ministry of Transport and Communications (MTC)	Responsible for the captaincy of the ports of Bissau (Fight against pollution of ports) and for the development of road infrastructure in the coastal zone.
Regional and local institutions	

Institutions/entities	Description
Delegated / Devolved Environmental Management	Currently, there is no explicit government policy of decentralization, but the country is preparing itself to move in this direction. The Ministry of Territorial Administration and Local Power manages public administration, coordinates, and controls the activity of ministries and other bodies of central and local government, namely the administration at the level of the Archipelago (BRLi, 2021). At regional level, the environmental governance in GB is very weak, particularly because of the lack of qualified human resources at regional public institutions, as well as lack of means and logistics to undertake their job adequately. Therefore, environmental governance at regional and local level hardly exists, which is a paradox, while decisions are made in the capital city of Bissau, the impacts of the sectorial activities are felt in the regions, where very limited resources exist to follow-up, monitor and audit those project's impacts and the implementation of approved management measures to minimize projects' effects on the environment and communities. The General Directorates of the Environment and Durable Development do not have representation in different regions of the country to help regional governments better consider environmental issues and to develop concrete activities to protect or restore the environment, but only in regions where protected areas are located. This lack of specialized technicians in the environmental area in the different regions of the country constitutes a great constraint to the implementation of environmental policy at national level, especially when the exploitation of natural resources takes place in the regions and mostly affects the rural populations. As mentioned above, AAAC has given training to regional focal points (the so called the Antenas in Portuguese). Therefore, very often activities that occur at the regional level do not receive adequate environmental and social treatment, due to lack of acknowledgement of environmental laws (and procedures), lack of human resources and lack of logistics to operate adequate due diligence. For better management of the activities of local stakeholders, there are also regional and local offices that include: • the Office of Coastal Planning that became, under the responsibility of the Minister, a key participant in conservation. • "Casa do Meio Ambiente" is a body that brings together all stakeholders of the Bolama-Bijagós Biosphere Reserve, aiming at: (i) better management of natural resources, (ii) conservation of biodiversity, (iii) promotion of sustainable development activities, and (iv) research, with important and growing participation of local populations. A positive point that contributes to bring environmental awareness and governance at regional level is fact that, due to the existing Protected Areas throughout the country, there are Directors of these Protected areas (IBAP staff) that are housed in the different country regions (countryside, islands – namely Cacheu, Buba, Cantanhez, João Vieira, Orango, Dulombi e Boé) and they bring with them the capacity to identify environmental and social impacts, to promote its follow-up and monitoring, at a certain scale, though limited. This capacity at regional level is also partially extended to the group of guards and rangers of these protected areas, who are responsible for nature and social protection and surveillance.

3.2 Legal and institutional framework relating to the social management of the coastal zone

The analysis of the legal framework related to the social dimension did not allow to identify laws, decrees or other documents specifically related to the social management of the coastal zones. However, the country has a vast production of legal documents regarding citizens' rights and duties and aiming at promoting social inclusion and gender equality. Among them, the creation of the social protection system, the definition of the right and the duty to education, the settlement of the general bases of territorial and spatial planning (the right to participate to the planning processes, the ownership of and rights to use natural resources).

Table 3.4 Summary of national legal framework for the social management of the coastal zone

Laws and Decrees	Aspects addressed
Constitution of the Republic of Guinea-Bissau (CRGB)[8]	Article 3: The Republic of Guinea-Bissau is a constitutionally constituted democratic state founded on national unity and the effective participation of the people in the performance, control and direction of and oriented towards the construction of a free and just society. Article 11 (i) The economic and social organization of Guinea-Bissau shall be based on the principles of market economy, subordination of economic power to political power and the coexistence of public, cooperative and private property. (ii) The economic and social organization of the Republic of Guinea-Bissau shall have as its objective the promotion of the well-being of the people and the elimination of all forms of subjection of the human person to degrading interests, for the benefit of individuals, groups or classes. Article 24 - All citizens are equal before the law, enjoy the same rights and are subject to the same duties, without distinction of race, sex, social, intellectual or cultural level, religious philosophical conviction. Article 25 - Men and women shall be equal before the law in all spheres of political, economic, social and cultural life. Article 34: Everyone shall have the right to information and legal protection, in accordance with the law. Article 46 (i) Workers shall have the right to protection, safety and hygiene at work. (ii) Workers may only be dismissed in the cases and under the terms provided for by law, dismissals for political or ideological grounds shall be prohibited. (iii) The State shall gradually establish a system capable of guaranteeing the worker social security in old age, in sickness or in the event of incapacity for work. Article 49 (i) Every citizen has the right and the duty to education. (ii) The State shall gradually promote the gratuitousness and the equal possibility of access of all citizens to the various levels of education. (iii) The right to establish private and co-operative schools shall be guaranteed. (iv) Public education shall be non-denominational. Article 58 In accordance with the development of the country, the State shall progressively create the conditions for the full realization of the rights of economic and social nature recognized in those titles.
Parity Law nº 4/2018	The Parliament of GB, on the 2nd August, unanimously passed a law to ensure a minimum quota of 36% of women's representation to be respected in elections or appointments to the National Assembly and Local Governments, with a view to achieving parity.[9] Establishes sanctions in case of non-compliance, such as reductions in the total amount of State subsidies for election campaigns and loss of tax benefits, as well as incentives for compliance with the law.
Social Protection Law nº4/2007	The General Directorate of Social Solidarity in the Ministry of Women, Family and Social Cohesion is the entity responsible for the management of social protection and citizenship. The formal social protection framework includes (i) the transfer of revenue under Ministry of Women, Family and Social Cohesion special program (ii) subsidised medicine (iii) food aid and (iv) support for persons with disabilities. The social protection system has a non-contributory regime and a contributory regime. The Law no. 4/2007 states that the first one is funded through revenues from the General State Budget and the second through social security contribution rates.[10]
Decree-Law n. 11/2011, dated February 3	Establishes a public information and legal consultation service for the general population and regulates the collaboration to be provided by civil society organizations on the matter. Establishes the Access to Justice Centers (CAJs) which, under the coordination and supervision of the Legal Information and Consultation Office (GICJU), promote, participate and carry out, in their respective territorial jurisdictions, dissemination and information campaigns aimed at educating the general population about the law and the national legal system.

[8] https://www.stj.pt/wp-content/uploads/2018/01/guine_constituicao.pdf

[9] https://uniogbis.unmissions.org/en/GB-parliament-passes-law-ensure-gender-balanced-political-representation-0

[10] http://www.social-protection.org/

Laws and Decrees	Aspects addressed
Land Law nº 5/98	Article 2 Ownership of the Land (1) In the Republic of Guinea-Bissau land is the property of the State and the common patrimony of all the people.
Draft Law for Territorial and Urban Planning (LOTU)	Article 3 - Fundamental Principles. The State and the municipalities shall be responsible for promoting spatial and urban planning in accordance with the public interest and with respect for the rights, freedoms and guarantees of citizens. The general bases of the structure of spatial planning are based on the following fundamental principles: territorial sovereignty; territorial and national unity; respect for and realization of fundamental rights, freedoms and guarantees; public domain; public utility; state ownership of natural resources; original state ownership of land; principle of transmissibility of the private domain of the State; classification and qualification of land; general territorial and urban planning; territorial defense and internal security; economic and social development; improvement of the quality of life of the populations, the mainstreaming and integration of environmental policies in the land use and urban planning policies (namely through the carrying out of environmental assessments that identify and monitor significant effects on the environment that result from the different types of land use plans); the polluter-pays and the user-pays principles (which obliges the person responsible for the pollution or the user of public services to assume the costs of the polluting activity or the costs of the use of resources). Article 4 - Specific Principles In accordance with the general principle set out in the previous article, the following specific principles shall be observed: (i) Harmonization of the actions of the State and the municipalities: the State and the municipalities, in accordance with their respective powers, must promote the preparation and execution of land use plans and harmonize their actions regarding occupation, use and transformation of the soil; (ii) Citizen participation: citizens have the right and duty to participate in the preparation and execution of land use plans; (iii) Adequacy of the level of planning: the level of planning must be adequate to justify the foreseen actions; (iv) Justification of the development plans: the development plans and, in particular, the proposed measures must be clear and rationally justified; (v) Informing citizens: the entities responsible for the preparation and execution of the development plans must inform citizens about the plans in force and those being prepared; (vi) Enabling private initiatives: the State and the municipalities must enable private urban planning initiatives that respect the public interest and conform to the forecasts and provisions of the development plans.(vii) Protection of the environment, rural, landscape and historical values, rational use of natural resources, ensuring through its instruments conditions that favors a sustainable use in the terms regulated by this law and other legislation in force; (viii) Expropriation for public utility, ensuring the transmission to future generations of a correctly ordered territory and spaces.
Decree-Law nº 6/2018 **Approves the Regulation of the Land Law**	Article 1- (i) the present regulation establishes the measures for the application of Law No. 5/98, particularly in what concerns the customary use of land, rural and surface concessions, the delimitation of local community lands, the commissions land, land registration, pasture land, and to institutions with a specific role in matters of land management.(ii) Establishes the regime for the use and fruition of urban land, the regime of exploitation of geological resources, the pastoral regime, the regime of the island and coastal zones and the tourist sites regime.

It is necessary to point out the challenge to access official documents, which brings some limitations on the elaboration of this chapter, but that can certainly be complemented with actions on the field.

The Decree-Law 3/2020 defines the Government Structure in Guinea-Bissau, identifying institutions with competencies related to social security and welfare, social inclusion and civil infrastructures' development. The following table briefly presents the structure and mandate of the above-mentioned institutions.

Table 3.5 Description of key institutions/entities for the social management of the coastal zone

Institutions/Entities	Description
National institutions	
Ministry of Women, Family and Social Solidarity (MMFSS)	The main goal of the institution is the formulation, proposal, coordination and execution of the Government policy to promote the integration and protection of women, families and society, especially the most vulnerable. Under the ministry, we have several central services that have the responsibility to apply the legal framework and public policies considering social inclusion and gender equality. ***Central cervices:*** • General Secretariat. • General Directorate for Family and Gender. • General Directorate for Social Inclusion. • General Directorate for Social Solidarity. ***Other institutions under the jurisdiction of the Ministry:*** • Institute for Women and Children • Social Action Fund. • The National Committee for the Abandonment of Harmful Practices.
Institute for Women and Children	A public institution of a socio-humanitarian nature regulated by law and endowed with administrative, financial and patrimonial autonomy, created with the purpose of defending and promoting human rights, particularly those of women and children.
Minister for Public Administration, Labour, Employment and Social Security (MAPTESS)	It's the government department responsible for formulating, proposing, coordinating and executing the Government's policies on the modernization and management of public administration and labour. The Public Administration, Labour, Employment and Social Security shall consist of the following central bodies and services: • The General Secretariat. • The Inspector-General. • The Directorate-General of Public Administration. • The Directorate-General of State Modernization. • The Directorate-General of Labour, Employment and Professional Training. The Ministry supervises: • The Guinean Institute of Professional Training (IGFP). • The National Institute of Social Security (INSS). • The Employment and Vocational Training Observatory (OEFP). • The Pension Fund Management Coordination Unit (UCGFP). • The Centre for Professional Training Brazil – Guinea-Bissau (CFPBGB). The Ministry has the following main missions:[11] • designing and exercising national policy in the area of the public service, labor and employment. • ensure the rational use of the State's human resources and set up mechanisms and performance standards to increase the efficiency of public administrations. • evaluate and plan the staffing needs of public services, in harmony with public spending and investment programs. • develop and implement policies aimed at promoting employment, development and efficient management of human resources, in collaboration with the other Ministries concerned; collect, centralize and monitor information relating to job offers and applications; ensure, in collaboration with the ministries concerned, the reintegration of civil servants and state agents affected. • promote the modernization of public management through the introduction of New Information and Communication Technologies. • promote ethics and deontology within the Public Service. • ensure the proper organization of the world of work, the promotion of social justice and the improvement of working conditions.

[11] https://www.developmentaid.org/donors/view/451972/ministry-of-civil-service-labour-employment-and-social-security

Institutions/Entities	Description
	• promote social dialogue in the world of work, in particular by ensuring relations between employers in the private sector and the State. • ensure, in collaboration with other ministries, relations between professional associations and unions in the private sector and the State- • develop strategies aimed at promoting employment and developing human resources for the sectors governed by the Labor Code. • contribute, in collaboration with the Ministry having Youth in its attributions, to the improvement of access to employment for young people.
Ministry of Public Works, Housing and Urbanism (MOPHU)	The Ministry of Public Works, Housing and Urban Development is the government department in charge of formulating, proposing, coordinating and executing the Government's policy in the fields of infrastructures, civil construction and public works, namely bridges, roads, ports, airports, housing and urban development, cartography, topography and cadastre, as well as defining and executing the policy and actions in the field on land planning and urban development. The Ministry of Infrastructures, Housing and Urban Development shall comprise the following central bodies: • the General Secretariat. • the Inspector General. • the Directorate-General of Transport Infrastructures. • the Directorate-General of Urban Planning and Housing. • the Directorate-General of Territorial Planning. The Minister of Public Works shall be responsible for the supervision of the Ministry of Territorial Planning and Urban Development. The Minister for Public Works, Housing and Urban Development shall exercise jurisdiction over: • the Geographic and Cadastral Institute. • the Road Conservation Fund. • the Civil Engineering Laboratory of Guinea-Bissau. • the Agency for Urban Land Development and Real Estate Promotion;
Ministry of Communications (MC)	The Ministry of Communications is the government department responsible for formulating, proposing, coordinating and executing the Government's telecommunications policy. • Telecommunication Regulation Authority. • Guinea Telecom.
Ministry of Tourism and Handcrafts (MTA)	Is responsible for formulating, proposing, coordinating and executing the Government's policy in the areas of tourism and handicrafts. The Ministry includes the following central services: • the Inspector-General. • the Directorate-General of Tourism. • the Directorate-General of Handicrafts. • the Directorate-General of Tourism and Hotel Promotion and Investment. The ministry shall exercise supervision over: • the National Tourism Agency. • the National Tourism School.

4 Baseline analysis

4.1 Environmental aspects

4.1.1 Climate Profile

GB lies in the humid tropics within the tropical zone, between the equator and the Tropic of Cancer, and between the Atlantic Ocean and the Sudanese-Sahelian continental block (RGB, 2018; CCKP, 2021). Under the Köppen-Geiger climate classification system, 1991-2020, GB features a tropical savanna climate (As/Aw) (CCKP, 2021). The Climate Profile of GB[12] available for the current climatology 1991-2020 states that the territory is subject to the movements and impacts of the Intertropical Convergence Zone (ITCZ), which migrates between the equator and the Tropic of Cancer over the course of the year broadly dictating its seasons (RGB, 2018; CCKP, 2021).

There are two pronounced seasons in GB: the hot, rainy season, which lasts approximately from May to November, and the hot, dry season from November to April (RGB, 2018; RGB 2019). The weather throughout the year is mainly conditioned by the situation of the territory in relation to the ITCZ and the subsidiary actions of the semi-permanent High-Pressure cells, commonly known as the anticyclone of the Azores in the Atlantic North and the anticyclone of Santa Helena in the South Atlantic, and also by the summer thermal low that establishes over the Sahara Desert (RGB, 2018; CCKP, 2021).

Temperature

The climate in general is tropical maritime with a mean annual temperature of 28.05°C (CCKP, 2021). However, the crossing by ITCZ[13] through the country places GB under the influence of the monsoon (hot and humid air from the Atlantic Ocean) during the rainy season and the "Harmattan" (hot and dry air that comes from the Sahara) during the dry season (RGB, 2018). Therefore, although temperature in GB is less variable than rainfall, the monthly average temperature varies between 24°C and 30°C. Over the course of the year, the daily temperature typically varies from 18°C to 35°C and is rarely below 17°C or above 37°C (RGB, 2018).

Thermal environment of GB can be divided into **four major periods** during the year:

1. Fresh Period: December, January and February;
2. First Warm Period: March, April and May;
3. Period of Rain: June, July, August and September; and
4. Hot Period: October and November.

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

[13] ITCZ performs shifts to the North and South, tracking the country twice a year in periods of about six months. In May, it stands as a rule that in the Northern territory, the rainy season begins from June to October and ends in late October or early November as the passage to the South occurs. The dry season is from December to April. The months of May and November are transitional months.

Absolute temperatures range between 21,6°C and 39,3°C (monthly average: 30,5°C) in April and May, just before the rainy season, between 21,1°C and 31,5°C (monthly average: 26,3°C) in August and November and between 16,5°C and 38,5°C (monthly average: 27,7°C) in December to March (CCKP, 2021). Spatially, monthly values of maximum air temperature range from 30,90°C to 38,31°C across the regions with minimum temperatures ranging from 17,58°C to 23,90°C (Table 4.1). The climate of GB is humid on the coastal central and southern territory (relative humidity between 62 and 87%) and drier in the rest of the territory (relative humidity between 58 and 68%) (RGB, 2018; CCKP, 2021). The highest temperature ranges take place in the months of January and February when clear skies are frequent and smallest amplitude of the diurnal variation during the rainy season.

Spatially and in terms of homogeneity the thermal regime divides the country by means in two distinct zones with average temperature values above 27.5º C to the east towards the interior in the Bafatá zone and below this value to the West and south towards the coast in the area of Bissau and Bolama (RGB, 2019). The coast has a low temperature range, however, as we move away from the coast towards the interior, the temperature range gradually increases.

Table 4.1 Average annual temperature values for climatic regions (1991-2020) (CCKP, 2021)

Observed Average Seasonal	Mean Temperature (°C) [1]				Minimum Temperature (°C) [2]				Maximum Temperature (°C) [3]			
Units	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**
Country:GB	26,77	30,03	27,91	27,69	18,33	22,67	23,90	22,47	35,25	37,44	31,98	32,96
Highest: Gabu	26,88	30,92	28,06	27,50	19,86	23,08	23,86	23,01	35,50	38,31	32,11	33,06
Lowest: Bolama/Bijagós	26,67	28,02	27,27	27,73	17,58	21,84	23,77	22,56	33,71	34,42	30,90	32,10

[1] The identified sub-national units with the highest and lowest mean temperatures reflect the latest climatology, 1991-2020.
[2] The identified sub-national units with the highest and lowest minimum temperatures reflect the latest climatology, 1991-2020.
[3] The identified sub-national units with the highest and lowest maximum temperatures reflect the latest climatology, 1991-2020.
DJF - December, January and February; MAM - March, April and May; JJA - June, July and August; SON - September, October and November.

The warm season lasts from March to May with an average daily high temperature above 34°C. The hottest days of the year are in May and April, with an average high of 35°C and low of 22°C. The cold season lasts from about June to September with an average daily high temperature below 31°C. The coldest days of the year are in January and February, with an average low of 18°C and high of 32°C. Consequently, the climate induced hydrological balance displays a water surplus from July to October, during the rainy season, and leads to a deficit during the dry season (RGB, 2018).

Rainfall

As mentioned before, GB has two very pronounced seasons: the hot and rainy season, which lasts from May to November, and the hot and dry season from November to April (RGB, 2018; RGB 2019). On average, about 80% of annual rainfall occurs during the months of July, August, and September. Precipitation during monsoon seasons can be intense, with 500 mm per month recorded in August, which represents the median of a quasi-normal distribution with values close to 400 mm/month in July and September (RGB, 2019). The least amount close to zero (0,1 mm) occurs during the months of December to April (dry season) (RGB, 2018; RGB, 2019).

The local climatic features induce rainfall variations in relation to the country's geographical location (South: Tombali, Quinara e Bolama-Bijagós Region > 2000 mm / year; Northwest Regions of Bissau, Biombo, Cacheu e Oio: 1400-1800 mm / year; Eastern regions of Bafatá and Gabú: 1300-1500 mm / year) (RGB, 2018).

Precipitation does not vary greatly with elevation in GB, although it does vary between coastal and inland areas; the coast displaying a tropical maritime condition receives some 60 to 120 inches (1,500 to 3,000 mm / year) of precipitation, whereas the interior is influenced by the tropical savanna climate, with greater variation in precipitation and temperature (RGB, 2018; CCKP, 2021). Notably, the Northeast (NE) of the country displays a climate Sudan type with hot and dry conditions and in the North rainfall can reach 1 400 mm whilst the South displays a more Sub-Guinean type of climate characterized by high rainfall totals and lower temperature than the NE (RGB, 2018).

Table 4.2 Observed Seasonal Precipitation for climatic regions (1991-2020) (CCKP, 2021)

Observed Seasonal Precipitation [1]				
Units	**DJF**	**MAM**	**JJA**	**SON**
Country:GB	0,23	32,25	996,36	582,95
Highest: Tombali	0,19	50,14	1318,52	725,83
Lowest: Oio	0,28	16,25	941,69	529,13

[1] The identified sub-national units with the highest and lowest precipitation sums reflect the latest climatology, 1991-2020.
DJF - December, January and February; MAM - March, April and May; JJA - June, July and August; SON - September, October and November.

4.1.2 Climate change and climate vulnerability

The climate in West Africa already includes significant interannual variability, which presents itself on an inter-annual basis and sometimes with cycles lasting decades, such as those that characterize Sahelian droughts (RGB, 2021). This is due to a remote climatic phenomenon called “oceanic forcing”, which influences the local climate. This phenomenon affects sea surface temperatures in West Africa according to the effects of the El Niño and La Niña cycles. Consequently, this pre-existing natural variability will be further exacerbated by climate change (RGB, 2021).

Environmental projections based on multidisciplinary scientific studies on climate change suggest that severe and extreme events will become more frequent across the globe (RGB, 2018; RGB, 2019). The scientific community has several global climate models to help decision-makers understand projections of future climate change and its impacts, the most widely used of which are the RCPs (Representative Concentration Pathways) included in the Fifth Assessment (AR5) of the Intergovernmental Panel on Climate Change (IPCC).

The new climate scenarios, obtained through the Regional Climate Models of the CORDEX Project (Coordinated Regional Climate Downscaling Experiment), project significant changes in the climate of GB (RGB, 2021):

1. For the short-term climate scenario (2016-2045), an increase temperature between 1,2°C (RCP4.5) and 1,3°C (RCP8.5) is predicted for the coastal zone, and between 1,4°C (RCP4.5) and 1,5°C (RCP8.5) in the interior of the country. Average daily precipitation can increase slightly by 3% (RCP4.5) or stagnate (RCP8.5), except for the Southwest of the country and the Bijagós Archipelago, where an increase between 5% to 10% (RCP4.5) and 2% to 5% (RCP8.5) may be observed.
2. For the medium-term climate scenario (2046-2075), a temperature increases of 1,5°C (RCP4.5) to 2,9°C (RCP8.5) is projected, as well as an increase in average daily rainfall with 5% to 10% (RCP4.5) and 2% to 5% (RCP8.5) in the South of the country and a slight decrease of -2% ~ -5% (RCP4.5) or -2% ~ -10% (RCP8.5) North of Cacheu.

From the point of view of the effects and impacts of climate change in GB, the country can be divided into two major regions: the coastal zone and the interior (Figure 4.).

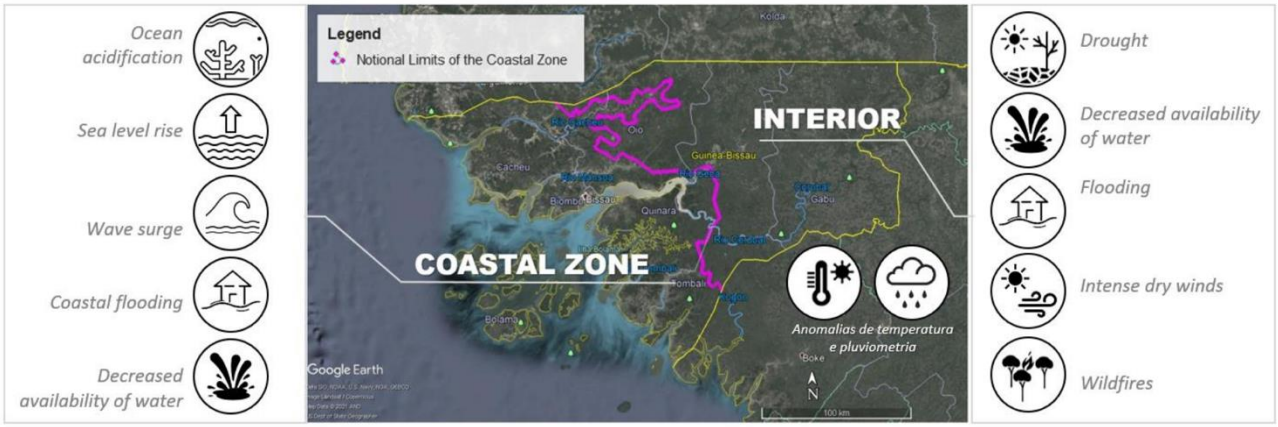


Figure 4.1 Representation of side effects of GB's Climate Change (RGB, 2021)

The coastal zone occupies two thirds of the country's territory. It has significant economic importance, and it harbors approximately 70% of the population. The only large urban center in the country is located on the coast: the capital Bissau, with 300 000 inhabitants (up to 500 000 if the peri-urban area is also considered). The maritime influence is felt in GB's hydrographic basins in places as far from the sea as Farim or Bafatá. The maritime influence mainly includes not only the tides, but also the saline intrusion will be exacerbated in the coastal agricultural fields. The surface of the nominal coastal zone, as plotted on the map in Figure 4., is quite extensive and it will be impacted mainly by sea level rise, tropical storms, coastal erosion, and flooding in low altitude areas. There may be scarcity of water, noting that a good part of the coast already suffers from aridity. The oceans will become more acidic as a global effect of climate change. In GB, this will at some point impact marine productivity, the marine food chain, and it will consequently also affect the availability of fish.

The progressive increase in temperature and, consequently, evapotranspiration and reduced precipitation will harm the productivity of the agricultural sector, exacerbating water shortages in GB. In natural environments, it will be possible to witness a progressive change in vegetation, mainly composed of species more resistant to drought and with a potential loss of genetic resources. Increased salinization of the ocean could also affect rice production or increase coastal erosion (BRLi, 2021). With rising temperatures and decreased precipitation, groundwater, which is the main source of drinking water for the population, can be heavily impacted. In addition, irregular rainfall and rising temperatures would lead to a decrease in the rivers' base flow and a significant drop in the water table. An increase in groundwater salinity is also expected, amplified by the rise in sea level. (RGB, 2021).

Changes in tides and ocean currents could lead to the disappearance of sandbanks used as nesting colonies by avifauna (e.g., the Adonga islet in the PNO). Also, pressure on hippopotamus populations cannot be excluded on some islands due to the silting up of areas of ecological interest for this species (e.g., in the Uno sector) (BRLi, 2021).

In northwestern GB, coastal zones have eroded rapidly over the past few decades. In Varela, the shoreline has retreated by up to 700 m inland in the past 40 years. Both rising sea levels and the destruction of mangrove forests, which act as natural barriers, have been blamed for the loss of land. The loss of mangrove forests is especially visible around Kabrousse and along the coast south of Varela; mangroves have been harvested as fuel wood for smoking fish and for other household needs (West Africa: Land Use and Land Cover Dynamics).

Finally, rising temperatures and humidity will result in increased malaria transmission, more frequent flooding will favor the spread of waterborne diseases, drought could potentially increase the risk of meningitis, which could lead to infections and epidemics, and increased air pollution will result in a threat of acute respiratory diseases (BRLi, 2021).

Climate instability represents a critical problem for the sectors of the country's productive activity that are directly dependent on climatic factors, in the country, such as the energy, forestry, agricultural, farming, and fishing sectors (RGB, 2013; RGB, 2021). However, the impacts, vulnerability, resilience, and adaptation to climate change have been poorly studied in GB from a sectoral and/or geographical perspective. According to the Guinean Government (RGB, 2021), Disaster Risk Management is one of the priority sectors (along with Fisheries and Marine Systems, Water Resources, Human Health, and Infrastructure) that lacks adequate funding for climate change mitigation and adaptation.

4.1.3 Geology and geomorphology

The opening of the Central Atlantic, which started in the Triassic, had important consequences in the geological characterization of GB, as it allows to consider the country as divided into two domains (Alves, 2007; Alves, 2014). The E half is occupied by Paleozoic and Precambrian rocks, although generally underlain by Cenozoic sediments (Alves, 2007; Alves, 2014), while the W half is occupied by the Mesocenozoic Basin strata, where the craton is the oldest unit and is surrounded by the orogenic chains on its western margin, in the form of a poly orogenic mobile belt affected by three tectonic events (Villeneuve & Cornée, 1994 and Villeneuve, 2005 in Alves, 2007): Panafrican I (660 - 640 Ma), Panafrican II (550 - 530 Ma) and Hercynic (320 - 270 Ma).

The Mesocenozoic Basin has been filled ingradationally, collapsing in discordance an ancient marine abrasion Platform formed mainly in the Paleozoic Bové Basin. It presents a remarkable E to W past, that reaches a thickness of about 12 km in the depocentre situated about 150 km Q of Bissau, whereas, under this city, its thickness no longer reaches 1 km and in Mansoa (35 km NE) it is only about 200 m (Alves, 2007; Alves, 2014).

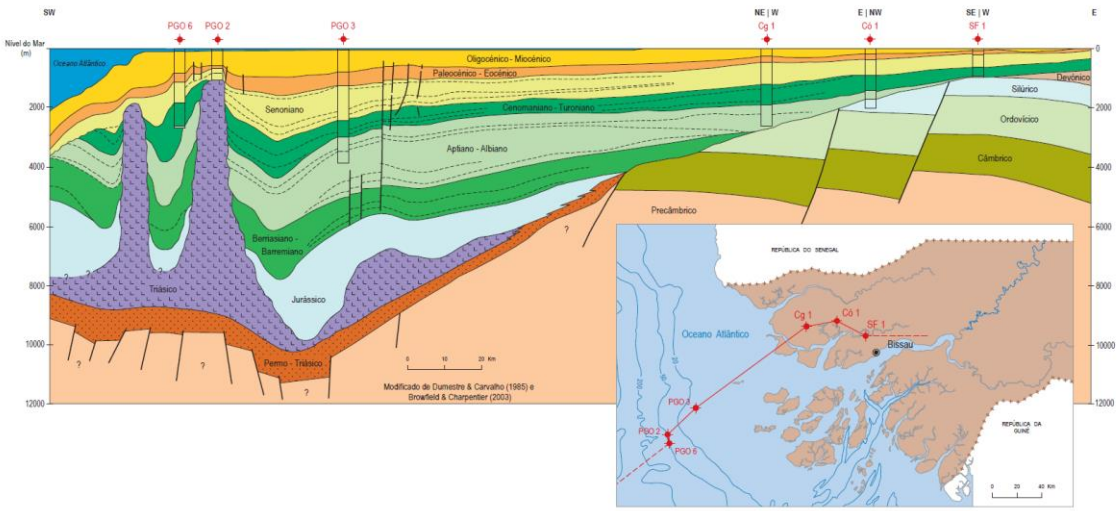


Figure 4.2 Geological section - Mesocenozoic Basin (Geological Map of the Republic of GB, scale 1:400 000. LNEG – DGGM. Lisboa 2011)

According to Alves (2007), the Panafrican is represented in GB at the NE end, with the oldest lithostratigraphic units of the territory, whose ages range from the Neoproterozoic to Cambrian: the Volcanic and Sedimentary Complex (or simply VS), the Multicolored Claystones (C1), and finally the Caium Sandstone (C2). Next are the Paleozoic lithostratigraphic units, with ages ranging from the Ordovician to the upper Devonian, located to the E; these units were affected by the Hercynic orogeny, and are integrated in the Paleozoic sedimentary basin consisting largely of the Bafatá Synclinal, which corresponds to the extension of the Bové Basin from Guinea-Conakry (Alves, 2007). Paleozoic rocks include quartzites and sandstones (Ordovician), siltstones, argillites, quartzites and black shales (Silurian), as well as shales, argillites and sandstones (Devonian) (Alves, 2007). Besides sedimentary and metamorphic rocks, there also exist igneous rocks which are represented by the Pirada Granites, with ages between 740 and 550 Ma, and dolerites and microdolerites, with ages between 153 and 197 Ma (Bassot et al., 1986 in Alves, 2007).

The coastal zone is formed by sedimentary basin substrate terrains of Mesocenozoic age and regolith package of about 20 m high whose existence was conditioned by the so-called Continental Terminal event (IUCN and MDRA, 1992, p. 27 in Fandé, 2020). Recent marine or estuarine sediments (Quaternary deposits) associated with recent sedimentation processes, such as valleys, beaches, mangroves, and banks, which do not exceed 50 m in altitude, were deposited on this structure (IUCN and MDRA, 1992 in Fandé, 2020). Quaternary coastal ridges, including dunes, cover large areas on the slopes of the islands and the mainland, reaching a large extent in the Cacheu and Sucudjaque Rivers and on the island of Pexice (Teixeira, 1962 in Fandé, 2020). On the coast of GB, it is possible to distinguish two predominant sediment types: clay and sandy clay sediments (smectite, fine-grained quartz, and with a high amount of organic matter) from suspension sedimentation, colloid precipitation or solution from the contact between river and seawater, and are also the most common along the entire coast; and lateritic gravel, which forms interlacements in the fine grains of quartz, with a thickness between 20 and 45 cm (Boski, 1991 in Fandé, 2020).

The coastal zone includes the insular and estuarine zones. It is a flattened area, sometimes monotonously low, including extensive spheres, very cut by the lacy network of a very penetrating hydrographic network that is an interface between the sea and the emersed areas (Alves, 2007). The penetrative character of the hydrographic network is translated by the presence of well-developed meanders in several rivers, muddy areas, and dense vegetation mainly of the mangrove type (Alves, 2007). It is possible to frequently observe a level rupture, sometimes verticalized up to 2 to 5 m height, corresponding to a lateralized scarp, situated between the high tide level and the surface that follows it upstream (Alves, 2007). The coast is also characterized, in many cases, by a bench of horizontal laterite armor, extensive and visible at low tide, called "zero elevation laterite" (Alves, 2007).

The hills are narrow and elongated, very jagged at the base, rising from the vast alluvial and muddy plains, while the elevation of the interfluves does not exceed 25-30 m in general; the vegetation is compartmentalized into the forest (along the banks of the larger rivers or as a gallery forest in the smaller courses), savanna, cultivated areas, saline soils, and mangroves (Alves, 2007).

The Bijagós Archipelago, despite being included in this coastal zone, constitutes a universe with its characteristics.

The sum of the area of the islands and islets that make it up is about 7 000 km^2, about 20% of the country's territory, of which 1 600 km^2 corresponds to dry land, 350 km^2 to permanently humid areas, generally with mangroves, and the rest represented by sandbanks (Kaboke, 1981 in Alves, 2007). The altitude does not exceed 20 to 35 m, with a very flat surface, except for lateritic and sandy-clay scarps, visible only in some islands (Alves, 2007).

Figure 4.3 Map of GB's mangrove forests (SIG IBAP, 2015)

4.1.4 Soils

GB is a country characterized by a diversity of soils, which vary significantly in terms of composition, agricultural aptitude, and potential use. In general, Guinean soils are predominantly clayey-sandy and ferralitic, with some more specific types worth mentioning (Medina, 2008).

One of the most common types is hydromorphic soils, which are widely represented on the coast west of the tidal boundary line. They are divided into marine and continental hydromorphic (Baiai, 2009). The marine hydromorphic soils, also known as mangrove soils, constitute the coastal alluvium and estuaries in GB and are widely used for rice cultivation (salt marsh). These occupy an area of 400 km^2 and are considered the most productive in West Africa (Medina, 2008).

On the other hand, continental hydromorphic soils are soils of alluvial depressions, called “lalas”, small valleys, or bas-fonds. These soils are subject to temporary hydromorphy, i.e., they are usually flooded during rainfall and are regularly covered with herbaceous savanna. They occupy 1,039,000 ha (SCET, 1978), of which about 150 000 to 300 000 ha are suitable for growing rice in the lowlands and perennial plants on the slopes (Medina, 2008).

Tropical ferralitic and ferruginous plateau soils are another important soil type in GB. These are soils characterized by their red to yellowish-brown color, with poorly marked horizons, sandy on the surface, and progressively clayey at depth. They occupy about 62% of the emersed surface and present aptitude for annual crops and for arboriculture (fruit growing, forestry, and others) (Medina, 2008).

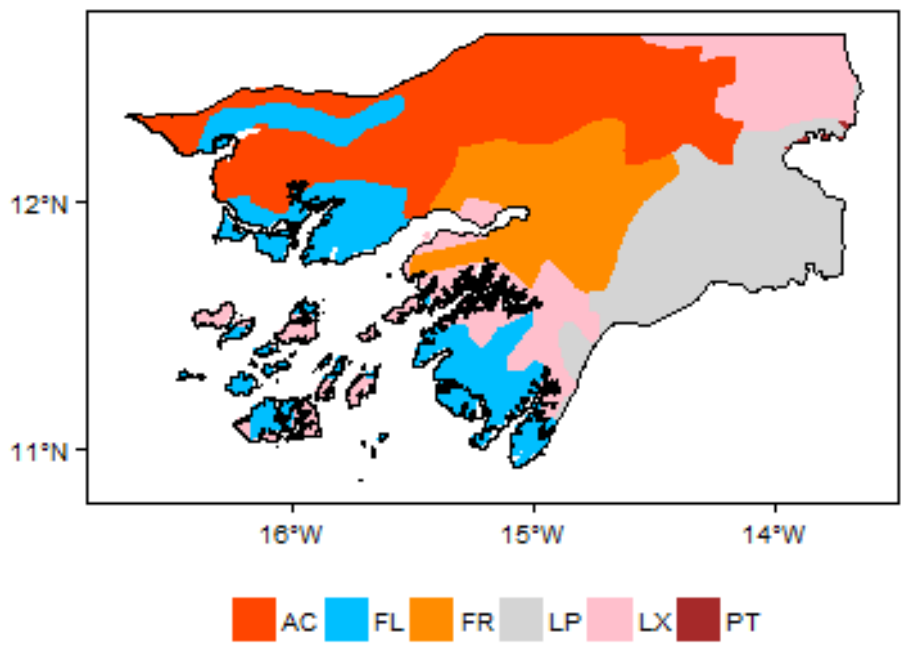
Lithic and lithosols soils are also present in the territory of GB. These soils are characterized by being poorly evolved, consisting of gravel or stones, and having very little or no agricultural value. They extend over an area of 5 500 km^2, or 17% of the total surface area, and are located in the center-east, in the Boé region.

Finally, 1,6% of GB's surface is covered by regosols. These are very poor soils, composed mainly of sand, and are located mostly along the coast (Medina, 2008).

Additionally, in the Bolama-Bijagós Archipelago, soil constitution is very similar to those found in the continental area of the country. This archipelago presents a predominance of natural habitats, with 85% of the surface area occupied by marine areas (channels and shallow waters), and large areas of mangroves and forests. The predominant soils are ferralitic or fersiallic (62%), lithosols and litholic soils (17%), psammitic regosols (1%), hydromorphic soils (20%) continental and derived from marine alluvium ("polders" tropical and halo-hydromorphic) (Teixeira, 1962, p. 100 in Fandé, 2020).

According to "GB - The Biosphere Reserve of the Bolama-Bijagós Archipelago: a heritage to preserve" (Ministry of Agriculture, Food and Environment of Spain & Administration of GB, 2012), ferralitic soils essentially make up the plateaus and small land elevations of the Archipelago, on the coast halohydromorphic and sandy soils predominate. According to the same source, hydromorphic soils also exist in freshwater areas (humid plains) as well as on sandy, muddy, and rocky bottoms, or sandy-clay.

Although there is a diversity of soils in GB, many of them are poor and face challenges from anthropic pressure and a lack of land use planning policies. Hydromorphic soils, in particular, are subject to pressures due to crop production, agglomeration in wetlands, and poor land use planning policy development. In addition, GB faces widespread phosphorus shortages in its soils. However, the total area of two million hectares has the potential for pastoral or forestry agricultural use (RGB, 2006).



Soil Classification: AC – Acrisols; FL – Fluvisols; FR – Ferrasols; LP – Leptosols; LX – Lixisols; PT – Plinthosols.

Figure 4.4 Soil Map of GB, from the European Commission Joint Research Centre: European Soil Portal

4.1.5 Mineral resources

Context of the mining sector in Guinea-Bissau

In a logic of economic diversification and development of mining potential, as well as to drive economic growth, successive governments since the 2000s have laid the groundwork to encourage the exploration of mineral and oil resources as a way to sustain fiscal revenues and create jobs. Consequently, several projects for the prospecting and exploitation of mineral and oil resources are planned, and some are already in development.

Among the most significant mineral resources are the phosphate deposit in Farim, the bauxite deposit in Boé, the heavy sands (ilmenite, zircon, and rutile) in Varela, and the offshore oil reserves in various blocks of the Exclusive Economic Zone (EEZ).

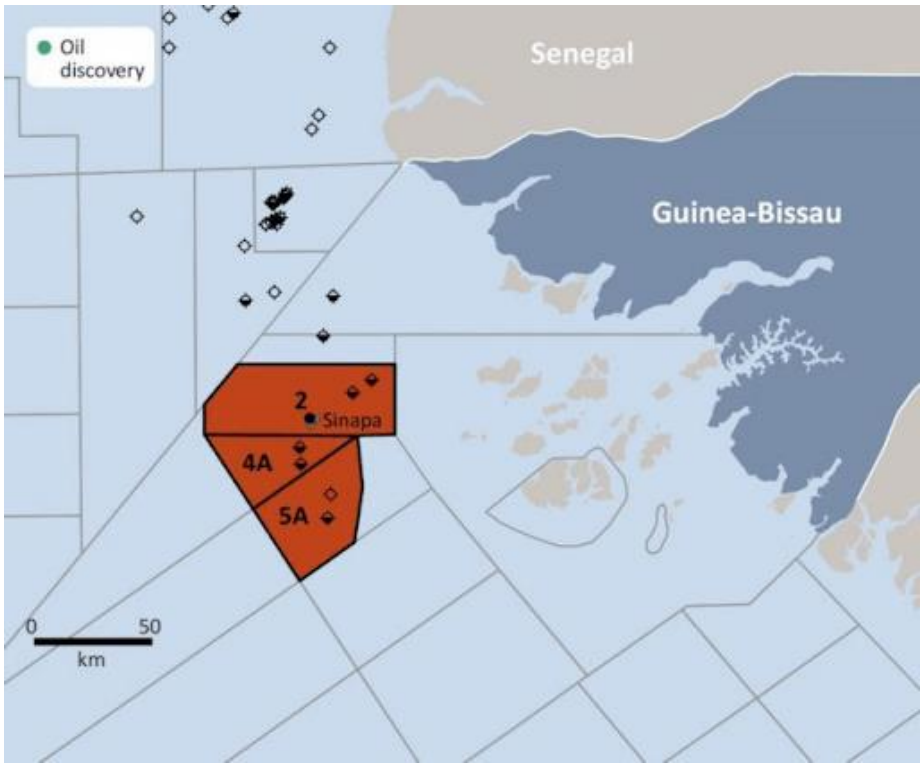


Figure 4.5 ***Map Guinea-Bissau's blocks: Sinapa (Block 2) and Esperança (Blocks 4A and 5A) (PetroAngola, 2019)***

Companies and international organizations have dedicated approximately 40 years to studies and prospecting of mineral resources in Guinea-Bissau. Since the 2000s, foreign investors have closed exploration contracts with the Guinean government. These prospects for mineral exploitation generate positive expectations for the country's economy, promising an increase in public revenues, economic dynamism, and job opportunities.

However, the conclusion of the international assessment of extractive industries (World Bank, 2004 in Cabral, 2016) highlights that, in many cases, oil, gas, and mining have not benefited the poorest populations in developing countries. On the contrary, these industries have often exacerbated the situation of vulnerable people. Countries that primarily depend on extractive industries tend to exhibit higher levels of poverty, infant mortality, conflicts, corruption, and dictatorship compared to more diversified economies. This underscores the importance of democratic governance to ensure that extractive industries can play a positive role, benefiting

the poorest, especially when grounded in press freedom, functional justice, respect for human rights, and the rule of law.

These lessons drawn from the development of extractive industries in other countries partly explain why many actors are concerned about mining and oil exploration projects in Guinea-Bissau. The lack of information circulation and transparency about this sector also fuels distrust and speculation among parties.

Regarding environmental and social impacts, mining and oil exploration projects must adhere to the law, conducting independent Environmental and Social Impact Assessment (ESIA) studies supervised by the Competent Environmental Assessment Authority (AAAC). Obtaining an environmental license requires approval of the ESIA study, conducting public hearings, and the promoter's commitment to implementing the Environmental and Social Management Plan. Although the law introduces the Strategic Environmental and Social Assessment (SESA), this tool is not yet regulated. Policies, programs, and strategies related to mineral resources and the mining industry have not yet been accompanied by SESA.

Regarding the management of revenues from extractive industries, the generation that will exploit mineral resources in Guinea-Bissau will have a significant responsibility since these resources are non-renewable. Good governance requires transparency and traceability of funds, allowing the population to know the amounts received and the investments made.

Guinea-Bissau's mineral resources

The mineral inventory of Guinea-Bissau is compiled by the Directorate-General of Geology and Mines (DGGM), encompassing 85 minerals, out of which 12 are deemed useful. Notable among these useful minerals are: sand, gravel, clay, kaolin, laterite, limestone shell fragments, quartzite, granite, dolorite, bauxite, black sands, and phosphate. The country's mineral potential has been assessed, and a plan has been outlined for its development to assist the Government in guiding its mineral policy (Cozzolino and Biague, 2020).

Existing deposits of bauxite, phosphates, and calcium oxides (black sands) are not economically profitable for exploitation. However, the economic scenario for the Boé bauxite could change through a joint program of exploiting the rich bauxite deposits in the neighboring Republic of Guinea; such a project should include a 175 km railway network, a port, and an aluminum factory in Buba (Guinea-Bissau) (Cozzolino and Biague, 2020).

In the following table, a brief description of the mineral deposits present in the country is presented.

Table 4.3 Summary of mineral deposits in the country

Mineral Deposits	Description
Heavy Sand (ilmenite, zircon and rutile) from Varela	In Varela, there is a small deposit of black sand within the tourist facilities at the beach. This deposit holds 440,000 tons, composed of 20% ilmenite, 4% zircon, and traces of rutile. The Russian company POTO Sarl is exploiting the heavy sands in Varela and obtained an environmental compliance statement after conducting an Environmental and Social Impact Assessment (ESIA) with public hearings. This statement authorizes the company's installation for a year, conditioned upon implementing the mitigation and compensation measures outlined in the Environmental and Social Management Plan. The AAAC regrets that, to date, none of the plan's measures have been implemented, rendering the environmental license for site exploitation invalid.
Phosphate	There is a deposit in Farim, approximately 94.7 million tons, containing 36.5% P2O5 with a 65% recovery rate. The phosphate rock's stratigraphy spans from the Middle Eocene to the Middle Miocene. The productivity beds range in thickness from 1 to 6.2 meters and are deeply buried between 32 and 45 meters beneath the Cacheu River level, which is in close proximity. The phosphate exploration project in Farim, led by GB Minerals, is in the developmental phase. Preliminary Environmental Impact Assessment (EIA) work has been conducted, but the entire process is not yet completed. GB Minerals claims to be collaborating with the SEA (Strategic Environmental

Mineral Deposits	Description
	Assessment) and the AAAC (Competent Environmental Assessment Authority) to expedite the EIA process. Local communities have expressed concerns about the lack of information and transparency in the project, including compensation for displacement and loss of agricultural lands. Phosphate exploration might impact groundwater levels, and GB Minerals plans to regularly monitor water levels. Additionally, there are risks of pollution in the Farim/Cacheu River, threatening the largest mangrove block in West Africa. However, GB Minerals expresses commitment to environmental management, health, and safety, planning to establish a social development fund.
Bauxite	A feasibility study has revealed the existence of 5 bauxite deposits. Most of the reserves are relatively low-grade, and the growth potential is limited. There is a possibility of an integrated joint project to develop the vast Gouaual deposit (in Guinea-Conakry), sharing the same road network, port facilities, and the eventual construction of an aluminum factory in Buba. The exploration and exportation of bauxite raise several concerns regarding the consequences for protected terrestrial areas of Boé and Dulombi in the process of establishment, and the Cufada Lagoons Natural Park (PNLC), where the construction of a deep-water port on the Buba River is planned (over 100 hectares of forest have already been cleared within the PNLC without any Environmental Impact Assessment).
Sand	There are 8 mines and 16 deposits. The potential is very high. Some sand deposits should be investigated due to their feldspar content (arkosic sand).
Clay	There are 3 mines, 8 deposits, and 2 explorations of this ore. The potential for new discoveries is quite significant, with high-quality material concentrated in the lowland areas and located a few meters above mean sea level. However, in coastal areas, good-quality material may be contaminated by saltwater during high tide (soluble salts content should be 20 mg eq./100 g of rock). Further inland, the lowland areas reach altitudes above 3 meters, therefore, mining operations are restricted to the dry season.

The potential for new discoveries is very high, with high-quality material concentrated in the lowland areas located a few meters above mean sea level. However, near the coast, good-quality material may be contaminated by saltwater during high tide (soluble salts content should be 20 mg eq./100 g of rock). Further inland, the lowland areas reach altitudes above 3 meters, and therefore, mining operations are restricted to the dry season (Cozzolino and Biague, 2020).

Table 4.4 Potential mineral deposits in the country

Mineral deposits	Description
Gravel	There is an ongoing site at the Corubal deposits, but access is difficult, and the gravel is poorly sorted. There is a reasonable potential for new discoveries along the Corubal River, where well-selected and good-quality material may be found.
Kaolin	There is an evaluated deposit in Tabassi, with 403,000 m³, containing approximately 70% kaolin and around 45% quartz. The deposit has an average extension of 3.5 by 2.0 meters, covered by a layer of sludge. These deposits present an advanced stage of chemical breakdown of the granite layer. The potential for new discoveries is high in the granitic area of Pirada; however, there is no foreseeable future use of kaolin in Guinea-Bissau.
Limestone Shells	There are around 40 deposits distributed across raised marine paleo-terraces on 9 islands of the Bijagós Archipelago. The CaCO3 content ranges between 45% and 95% in granulometric fractions of 1.0 cm, depending on the quantity of quartz sand. A preliminary study suggested a semi-artisanal use for producing 40 to 50 tons of calcium oxide per month.
Granite	Currently, there are three ongoing explorations. The only recent outcrops were identified in the riverbeds of Bidigor and Mael Jaube, at an average altitude of 15 meters. The nearest plateau rises 15 meters above the erosion plain. The 11 diamond excavations in the Mael Jaube prospect and the two in the Sinchã-Sambo prospect generally indicated that a 15-meter weathering section rests on the granite bed. Therefore, the vast majority of reserves are located below the water table level and under an extensive overburden layer.

Mineral deposits	Description
Quartzite	There are three deposits and two explorations with a high potential for large reserves at shallow depths. The Devonian and Ordovician sandstones were affected by weathering under tropical conditions, resulting in silicification and hardening. The end product, known as Orthoquartzite, is a quartz-rich, cohesive sandstone that is more resistant due to secondary silica growth. Silicification varies with depth and underground fissures, showing different degrees in alternating sections with non-silicified rocks. Existing excavations indicate that silicification is controlled by the distance from the soil surface and subsurface fissures. Non-silicified debris should be cautiously considered in measurements and estimates of recoverable reserves, which should only include hard and silicified materials. Quartzites are potential substitutes for dolerite aggregates, and mechanical and crushing tests on the resulting rocks are recommended.
Dolerite	There are 2 quarries, 6 deposits, and 3 explorations. Mesozoic dolerites are undoubtedly the most important rocks for construction materials in Guinea-Bissau, being predominant in the Devonian formations. These rocks are mainly visible in riverbeds or as large rounded stones at the base of slopes, near surrounding drainages. The difference in elevation between these rounded stones on the slopes and the top of the erosion site can reach 20 meters, constituting an overburden for the layer. With the extraction of these rounded stones, the quarry face turns into a sloping plateau.
Laterite	There are 11 quarries with great potential, mostly operating on an artisanal scale. The deposits form hardened crusts (1 to 5 meters thick hard-cap) under several meters of loose lateritic soil (plasma). The hardening varies from a hard vermiform, pisolitic-laterite to a completely disaggregated material consisting of about 30 to 65% aggregated laterite (0.5 to 5.0 cm in diameter, also called 'gravel' or 'casqueiro') mixed with loose soil.
Copper, lead and zinc	Despite the weak potential, the Silurian black shales (Buba shales) are located in a highly favorable environment to host economic types of SEDEX (sedimentary exhalative) deposits. The regional geochemical assessment conducted by BRGM (1979-1982) did not reveal any anomalies, although the work cannot be considered conclusive.
Tin-tungsten	The potential is very weak. The theoretically only possible medium would be the granitic area of Pirada and the surrounding rugged rocks of the volcano-sedimentary unit. The regional soil geochemical assessment conducted by the Portuguese in 1986 shows consistent values of tin and tungsten below detection limits.
Iron and ferrous metals	There are no prospects for finding iron, magnesium, or other ferrous metals in Guinea-Bissau, with one exception: Nickel (Ni). In the S-35 drilling hole, located in the bauxite region of Boé, at the Eva deposit, the interval between 15.6 and 26.0 meters revealed nickel values ranging between 450 ppm and 0.31%, averaging 0.2% nickel over 4 meters. These samples were extracted from the disaggregated dolerite that forms the bed of the Eva bauxite deposit. The most recent rocks analyzed showed 900 ppm of Ni. Although they do not meet traditional standards to be considered 'ore grades,' there is no doubt that we are facing a highly irregular system.
Dynamite	There is no knowledge of diamond mineralization in the country, and it has never been mentioned in any existing literature. Well-developed gravel is found only in some sections along the Corubal River. There are alluvial lands with poorly developed mineral deposits and insufficiently sorted gravel. An exploration conducted by the Portuguese in 1986 tested two bulk samples in search of diamonds, but the results were negative. Traces of pyrope and ilmenite were found, but the magnesium content in the ilmenites is below what is observed in the Mg-ilmenites of kimberlites.
Gold	lIt is unlikely that economically viable gold mineralization related to magmatic fluids will be found in Guinea-Bissau. The potential is very weak.

The current state of mineral exploration and trends

Currently, almost all three mining deposits (phosphate, heavy sands, and bauxite) are in the prospecting phase, while some quarries are already in the exploitation phase, despite the unavailability of their geo-mining studies and technical feasibility.

In the context of mining exploration in Guinea-Bissau, it is observed that currently, the majority of the three main mineral deposits - phosphate, heavy sands, and bauxite - are in the prospecting phase. Simultaneously, some quarries have already entered the exploitation phase, even without the availability of geo-mining studies

and technical feasibility. The lack of static data on the exploitation of these resources stands out, indicating a challenge in effectively managing these activities.

Regarding gemstones, the absence of official information about their presence contrasts with the announcement of gold exploration during the political-military crisis in northern Guinea-Bissau. The Swiss company West Africa Mining reported positive results in their gold prospecting, including the concession to explore other mineral resources such as bauxite, lithium, iridium, and diamonds.

While gold emerges as a concrete possibility in the northern part of the country, bauxite stands out as a focus of exploration in the Boé region, located in the Southeast. Westafrica Mineral Mining Ltd, based on promising results, chose to expedite the process, commencing an extraction program aligned with international standards. Additionally, the hiring of the company M-Consult from Mali to conduct gold exploration in northern Guinea-Bissau, focusing on areas east of Canquelifa, near the border with the Republic of Guinea, and between this locality and Paunca, near the border with Senegal, is noteworthy. These results indicate significant potential for gold extraction in these regions.

This prospecting phase and the expectations generated by the possibility of exploiting these mineral resources create an ambiguous perspective, highlighting challenges and opportunities that must be carefully considered to ensure a sustainable and beneficial approach for the Guinean economy, as well as for local communities.

In line with the evolution of oil field discoveries in neighboring countries, particularly in Ghana, Liberia, and Ivory Coast - besides Mauritania and Niger, which became producers in recent years - the presence of hydrocarbon oil reserves offshore of Guinea-Bissau has also been referenced, and 14 (fourteen) concession areas are already under exploration (ANEME, 2018).

The areas designated for oil drilling are distinguished between North and South. The Northern area is shared with Senegal, and operators like Eni (Italy), Sterling Energy (UK), and Marmore (Malaysia) have conducted exploratory work, discovering substantial deposits of heavy oil. In the Southern area, 14 blocks have been licensed to six operators, Svenska Petroleum (Sweden), Black Star Petroleum (UK), Supernova (Netherlands), Lime Petroleum (Norway), SHA (Angola), and Larsen Oil and Gas (Dubai). Here, through joint ventures with the state oil operator, Petrolífera da Guiné-Bissau (Petroguin). More recently, in 2020, PetroNor (Norway) acquired the exploration right and assumed an operational stake of 78.57% in the offshore licenses of Sinapa (Block 2) and Esperança (Blocks 4A and 5A) in Guinea-Bissau.

The contiguous licenses of Sinapa and Esperança are in the Casamance saline sub-basin off the coast of Guinea-Bissau, as observable in the following map.

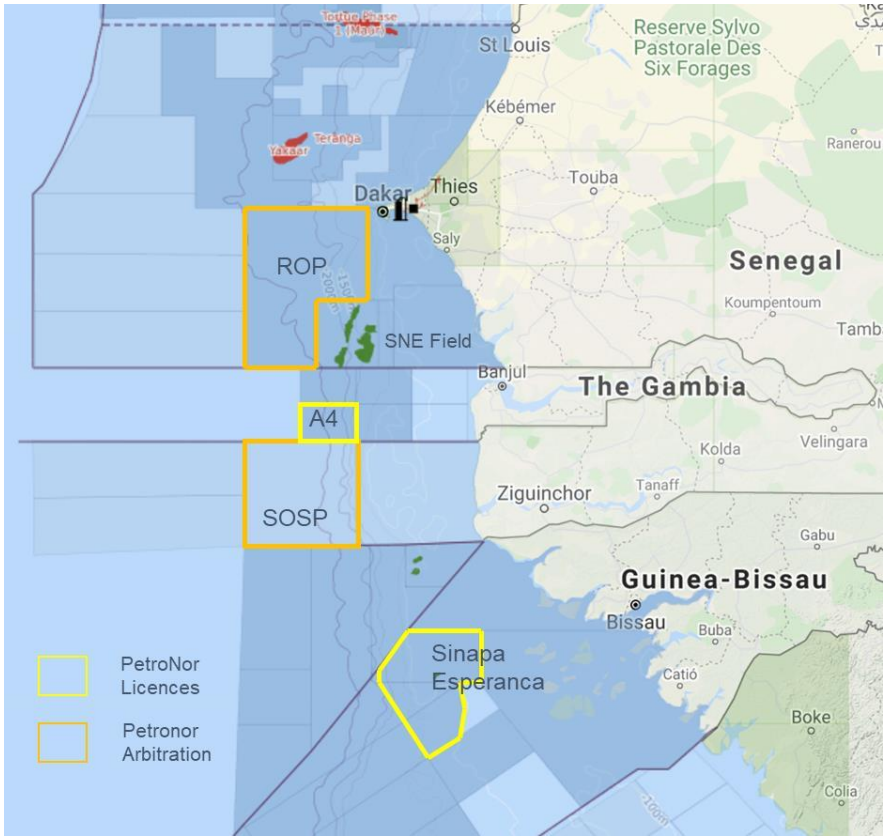


Figure 4.6 ***Sinapa (Block 2) and Esperança (Block 4A and 5A) licences (PetroNor, 2020)***

According to the "Country Economic Memorandum (2015) - Terra Ranca! A new beginning" by the World Bank Group, "some industry experts believe that the country may produce 30,000 to 60,000 barrels per day." However, the offshore oil drilling discoveries in Guinea-Bissau have not yet resulted in commercially viable findings. The Petroleum Law (Law No. 4/2014, dated April 15, and its Decree) permits the bidding of blocks, service contracts, and profit-sharing contracts. However, investors are required to recruit and train national workers, but the requirements are still quite vague.

<u>The current viability of mining exploration in Guinea-Bissau</u>

At this moment, the country lacks the technical, human, and even material and financial capacity to enforce the laws, regulations, and international conventions necessary to monitor and oversee the mining process. This is due to a lack of organization, planning, and prioritization of development actions. Much still needs to be done in terms of organizing, planning, and training/informing/raising awareness/capacitating human resources in this domain.

It is viable to reconcile the exploitation of mineral natural resources with conservation through the ongoing education of the new Guinean individual. This will enable these resources to drive the national economy, reducing poverty and underdevelopment, based on the scrupulous respect for sustainable development principles.

While it is evident that Guinea-Bissau has significant mining potential, the country faces major challenges. It is necessary to conserve biodiversity, natural ecosystems, and improve the living standards of local populations. However, the expected benefits of mining exploitation for the populations are not being met, and

threats and pressures on biological diversity are evident, which may endanger the essential ecosystem services for economic development and the quality of life of the populations.

Thus, it is urgent to adopt a collaborative approach involving the Government, mining companies, local populations, and civil society organizations. The objective would be to reach a consensus on the principles to adopt and the actions to undertake in order to reverse current trends, seeking a balance between mining exploitation, biodiversity conservation, and the sustainable economic and social development of the country.

4.1.6 Hidrology

GB has abundant and important water resources that largely cover current water supply needs. However, these resources are unevenly distributed in time and space and present a high degree of vulnerability and weak adaptive capacities in the face of the adverse effects of climate change (Fonseca, 2017).

Of the three categories of water resources, the following quantities are estimated:

- Surface water resources: 13 820 million m³ (estimated);
- Storm water resources: 45 000 million m³;
- Groundwater resources: 1 756 million m³ of statistical reserves (estimated).

These resources have an estimated annual renewable rate of 180 million m³ (Fonseca, 2017).

GB is a country cut by several rivers, most of them penetrated by sea waters that are felt at a distance of over 100 km inland. The topography favors the existence of two areas of high productive potentiality that are the areas influenced by the tides and the areas surrounding the large basins of the Geba and Corubal rivers, with great availability of surface water. The most important rivers are the Cacheu, Mansoa, Geba and Corubal, being the Geba and Corubal transboundary (RGB, 2008). The Geba river has a surface area of 14 900 km², of which 10,000 km² is in the territory of GB, 4 400 km² in Senegal, and 500 km² in Guinea-Conakry. Meanwhile, the Corubal river has a surface area of 26 000 km², of which 8 800 km² is in GB, 17 200 km² in Guinea-Conakry (Fonseca 2018; Ié, 2016) (See Annex 1, Map 1).

In a country with a poor road network, rivers are considered the best way to penetrate the interior, given their extension through the territory. They also play an important role in providing essential food for the national population (marine resources and rice) and have excellent conditions for energy exploration (RGB, 2008).

Surface water resources are mainly characterized by the existence of 2 major transboundary water rivers: Geba and Corubal. The Geba river has a surface area of 14 900 km², of which 10 000 km² is in the territory of GB, 4 400 km² in Senegal, and 500 km² in Guinea-Conakry. Meanwhile, the Corubal river has a surface area of 26 000 km², of which 8 800 km² is in GB, 17 200 km² in Guinea-Conakry (Fonseca 2018; Ié, 2016).

In the hydrographic basin of the Corubal River, can be found the lagoons of Cufada, Bedasse, and Bionra. These lagoons are part of the Natural Park of Lagoons of Cufada (PNLC). The watersheds of the three lagoons extend over a total area of 143.2 Km2, about half of which corresponds to the basin of the Lagoa de Cufada. The “lala” around the lagoons and downstream to the Corubal River is flooded for several months of the year. Consequently, there is communication between the lagoons and between the lagoons and the river during part of the rainy season and the beginning of the dry season (Catarino, 2019). The three lagoons show a marked seasonal increase and decrease in water surface and depth, with the maximum in the rainy season (2,2 m) and the minimum at the end of the dry season (1,2 m). The Cufada lagoon is the largest permanent lentic freshwater body in GB, with a very characteristic flora, in which water lilies, *Nymphaea lotus*, and *N. micrantha*, and wild rice, *Oryza longistaminata*, are dominant. The Bedasse and Bionra lagoons, although smaller in size, also

generally maintain water during the dry season and have a less human presence, and thus may be more favorable to the permanence of wildlife (Catarino, 2019).

The rainwater resources are generally poorly used, mainly due to the lack of infrastructure to retain these waters for other purposes, such as agriculture. All rainwater drains directly into the sea, a phenomenon facilitated by the conical shape of the national territory. Only a small part of this remaining resource serves to renew the underground aquifers destined for drinking water supply.

Groundwater resources are generally abundant, but with low exploitation rates and with a considered degree of pollution of various kinds, such as problems of saline intrusion facilitated by under-exploitation of these resources, especially in the coastal area of the country (Fonseca 2018; Ié, 2016).

Analyzing the hydrology of the Bolama-Bijagós Archipelago, it is bounded by the deep (30-50 m) channels of the Geba River and the Grande de Buba River, whose orientation contributes to the triangular shape of the delta (Campredon & Catry, 2016). The islands are divided into three large groups of shallower (10-30 m) channels, which are maintained by tidal currents (Campredon & Catry, 2016). The highest tidal amplitudes on the West African Coast with tidal surges occurring occasionally, reaching up to 4.5 m in amplitude are favoured by the extension of the shelf out to sea. T Tidal-generated currents are strong (up to 78 cm/s), and tidal flats have a large extent, where the high turbidity of the waters reveals the dynamic activity of the deltaic environment (Campredon & Catry, 2016).

The hydrology of this Archipelago is also influenced by the existence of currents generated by north and south swells in contact with the platform and the coastline, as is the case of the Canary current and the Guinea current: the Canary current occurs mainly during the dry season (December to April); the Guinea current is more active during the rainy season. The trade winds when reaching the area of the Archipelago cause the increase of the upwelling phenomenon (coastal resurgence), and consequently of the biological productivity, by providing organic matter and plankton, which can explain the presence of fish, crustaceans and molluscs (Campredon & Catry, 2016).

The average water temperature is lowest in February (26.5°C) and highest in October (30.1°C). Salinity is lower during the rainy season (30.4°g/L) compared to the dry season (about 35-36°g/L), when it reaches levels comparable to nearby ocean waters (Lafrance, 1994 in Campredon & Catry, 2016). The waters have a relatively low chlorophyll concentration compared to coastal ecosystems, located further north, which can be explained by the relatively low nutrient concentration. This lower concentration is possibly partially compensated by a high concentration of organic matter from mangroves and continental sources (Diouf et al., 1994 in Campredon & Catry, 2016).

4.1.7 Coastal Dynamics

West Africa is the western part of Africa, bounded in the west by the Atlantic Ocean, in the south by the Gulf of Guinea, and in the north by the Sahara and the Sahel. The West African Coast is influenced by two major ocean currents, the Canary Current and the Guinea Current, which bring about significant changes in the region's climate, marine life, and economy. The Canary Current flows from the north along the coasts of Mauritania and northern Senegal, before diverting its course toward the Cape Verde archipelago. During the months when it has an influence, from October to May, the water temperature is relatively low, around 20°C. From May onwards, the Guinea Current bathes the waters of West Africa, reaching up to Cape Blanc in northern Mauritania. The sea temperature then rises to above 25°C. The alternation between these two currents, and the associated climates, shape the physical and biological characteristics of the coastal waters of West Africa, providing a unique environment that determines the presence of marine species from the north and the south.

The coastal region of GB, characterized by the predominant sedimentary environments, was subjected to periodic variations throughout the Holocene period (CNIMC, 2005).

Currents and waves moving north to south and south to north along the coast of GB have contributed to the formation of sandy ridges and island groups. However, in GB, these sandy ridges and sandy arrows are oriented in a southeast-northwest direction, following the orientation of the coast and coastal drift (CNIMC, 2005).

Several experts and authors state that the marine environment of GB is abundant in biomass and diverse species, whose potential has not yet been fully exploited. This richness comes from several factors, such as: the presence of currents coming from the north and south, the phenomenon of "upwelling", the tranquility of the waters, and the existence of mangroves along the coast. The upwelling phenomenon occurs when the meeting of warm waters from the south, coming from the Gulf of Guinea current, and cold waters from the north, facilitates the establishment of a temperature gradient that in winter allows the arrival of a large amount of nutrients from the north (Biai, 2009).

Thus, from a morphological point of view, in GB there are three types of coast: coast with mangroves, sandy coast, and rocky coast with escarpment.

Coast with mangroves

The coast with mangroves is the most common type of coast in GB, accompanying most areas of river estuaries and inlets along the coastal strip. Mangroves form massifs of considerable importance and well preserved on the banks of the rivers Cacheu, Cumbidja and Cacine, as well as on the complex of Formosa and Orango islands (RGB, 1997).

They are characterized by their low gradient, not very pronounced relief, high amplitude tides, high freshwater flow and high precipitation (>1300 mm), salinity <60%, stability of the substrate with deposition and consolidation of sediments, transport of nutrients obtained on the mainland by runoff and sea water (Biai, 2009).

The ecological functions of these coastal zones are of extreme importance for the country (Odum, 1971). Within these functions stand out:

i) Stabilization of the coastline and protection against erosion caused by daily waves and natural catastrophes through the retention of mud by the roots, functioning as an important "land builder" intervening in the formation of islands and coast extensions protecting the coast from coastal erosion caused by waves and currents.

ii) Retention, production, and distribution of nutritious elements that constitute the basis of the food cycle for the fauna of estuarine and marine waters. Their leaves provide large quantities of organic detritus to the estuaries that are carried by the tides, contributing 70% to primary productivity. This detritus, enriched by the protein and nutrient content of fungi, bacteria, protozoa, and micro-algae, is food for shrimp, crabs, mollusks, and some fish species. These in turn are consumed by other creatures (fish, birds, mammals) creating a link between the production of organic detritus and organisms higher up the food chain. In this way, the mangroves of the coastal zone, are responsible directly or indirectly for 70% of the fishing potential of GB (IUCN & DGFC, 1994).

Although mangroves, seagrasses, and coral reefs can exist in isolation from one another, it is common for them to form an integrated ecosystem of high productivity with numerous biological, physical, and biogeochemical linkages that generate a diversity of ecological services. Mangroves can control coastal water quality by balancing salinity fluctuations in the coastal zone. They act together with seagrasses in the retention of particles (sediments) and the assimilation of nutrients from rivers. The reciprocal dependence of mangroves and seagrasses on coral reefs is mainly since they act as a hydro-mechanical barrier, dissipating the force of waves that wash ashore (Biai, 2009).

Sandy coast

It is predominant in the Bijagós Archipelago, in the islands of Jeta and Pecixe, and in Varela (northwest zone). These are areas with strong patrimonial value and are potentially important for tourism. The sandy coast is susceptible to coastal erosion as in Varela Beach where all the tourist infrastructure under construction was destroyed by natural erosion (Biai, 2009).

The beaches in GB are essentially sandy with modest cross-sectional extension, which can reach in some place's tens of meters at low tides, with the presence of laterites in some points, and simple geomorphology. Due to coastal erosion, the beaches have become increasingly poor in sandy sediments, evidencing the constant transformation of the coastline of the GB islands. An analysis of topographic maps and aerial photography shows that the coastline of the islands exhibits great morphological variability in space and time. This stems from its condition as a system in dynamic equilibrium, characterized by rapid adjustment to the variations introduced in its organization, namely those of human occupation, as well as the diversity that characterizes the seasonal evolution of climatic parameters and sea level (Biai, 2009).

Rocky Coast with escarpment

This type of coast is not prevalent in GB, where the highest point does not exceed 300 meters and the average height of the coastal zone is between 20-25 meters above sea level. However, it can be found in limited segments in the region of Varela, Bubaque Island, João Vieira Island, Meio Island, Carache Island, and Unho Island. This type of coast is subject to coastal and pluvial erosion, and the erosive phenomenon is quite evident in all the mentioned localities (Biai, 2009).

4.1.8 Ecosystems and Biodiversity

GB's biodiversity constitutes a significant natural asset for the country that, if protected, has the potential to serve as the backbone of a future tourism industry) (RGB, 2021). Compared to the neighboring countries in the West Africa the biodiversity of GB is still relatively rich, diversified and unique. This can be seen from the data below of species count by taxa for GB (RGB, 2021).

Table 4.5 Species count by taxa for GB (1991-2020) (RGB, 2021)

Animal / Plant Group	Species count
Birds	**456**
Amphibians	21
Reptiles	69
Fishes	677
Mammals	123
Vascular plants	1 000

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

Nevertheless, the pressure has been increasing on the renewable natural assets, in these most recent years, driven not only by natural factors, but mainly by the anthropological activities, which have been increasing intensively every year due to market demands and the extremely poor people's need for survival. As the flora of GB is very rich, plants are intensively used in the traditional pharmacopoeia; this practice is deeply rooted

among the rural communities of the country. These medicinal plants are essentially for the cure of the most frequent diseases, such as: malaria, diarrhea, skin diseases, hepatitis, hypertension, diabetes, snake bites, among others. There are however several factors of pressure on biodiversity mostly originated by human activities. Among others the (i) effects of extensive livestock practiced in the country, mainly in the east and northeast zones, (ii) forest fires sometimes uncontrolled, which have negative impact on the fauna and floristic composition; (iii) the pressure of the exponential growth of population with rapid urbanization with corresponding needs, including that of woody fuel (firewood and coal), (iv) the practice of the traditional agriculture based on slash and burn; the wild expansion of cashew orchards; the growing production vegetable coal for domestic use as source of energy and firewood search, (v) wood exploitation leading to a frightening degradation of the forest potential taking place particularly in the east frontier zones, namely Pirada, Canquelifá, Pitche and surroundings, accentuating climate change impacts (RGB, 2015). Therefore, due to all these pressures there are currently (2018) several species under threat in GB (RGB, 2021): 14 threatened mammals; 12 threatened birds; 41 threatened fishes; and 6 threatened higher plants.

The Government of GB, aware of the current challenges of this sector has put forward an Action Plan for the Strategy for the Biodiversity of GB with the objective of identifying solid measures to accomplish its goals.

Biodiversity and Coastal Zones

Possessing an incredibly diverse set of ecosystems ranging from dense tropical forests to mangrove swamps, GB has become increasingly more conscious of the value of its natural capital, investing substantially in conservation to the extent that approximately 26% of its national territory is protected (RGB, 2021; BRLi, 2021) (See Annex 1, Map 1). GB's Bijagós Archipelago is one of these protected areas made of a collection of 88 islands that guard the country's capital Bissau. The archipelago, a UNESCO Man and Biosphere Reserve, contains both national protected areas (Orango, João Vieira-Poilão) and community reserves (Urok), all a haven for hundreds of species of birds, fish, and mammals. Poilão is amongst the 10 most important nesting sites for green turtle populations making it one of the greatest biodiversity values of GB.

At the same time, the coastal zone also provides valuable ecosystem services, including nursery and breeding grounds for commercial fish stocks, carbon stocks and a buffer to mitigate against the impacts of climate change. Two additional terrestrial national parks (the Dulombi and Boé parks) and three environmental corridors (Tchetche, Salifo-Xitole, and Cantabane-Quebo Corridors), which connect areas and permit wildlife movement while buffering human communities, were added, establishing the DBT Complex. At present, vegetative cover along the coastline in the identified hotspots has been degraded for several climate and anthropogenic-driven reasons. In GB mangroves are exploited to smoke fish and have reduced mangrove cover that otherwise functions as a natural protective barrier to coastline erosion and sustain fishing activity.

For more details on the Protected Areas National System, see Annex 2.

Land use and land cover

The land area of GB is mostly savannah with low coastal plains either colonised by freshwater wetlands (most converted to rice paddies), salt marshes or fringing mangroves that line the riverbanks (GlobalSecurity.org, s.d.).

Savannas make up about 45 percent of the country's land surface. Although the total savanna land surface remained nearly unchanged, the underlying dynamic is not so simple. Agricultural areas have doubled since 1975, covering 13 percent of the national land surface in 2013 and becoming the second most extensive land cover class. Clearing for cultivation has encroached into natural habitats in all of Guinea- Bissau's ecoregions except the Zone de Colline de Boé (ZCB – Boé Hill or Upland Zone). Agricultural expansion explains the loss of about 2,500 km^2 of savannas (or 16 percent of their 1975 total land surface), and the degradation of woodlands and forests from logging and clearing has produced open landscapes that take on the characteristics

of tree and wooded savannas, increasing the area mapped as savanna in the same period. Deforestation for wood production is responsible for 65 percent of forest habitat losses (forests, woodlands, gallery forests), or 1,700 km^2 of forest that have become savannas in 2013 (USGS Earth Resources Observation and Science Center, s.d.).

Agriculture in shallows and recession, in particular rice cultivation, colonizes alluvial floodplains in the Zone des Estuaires (E-GB – Estuary Zone) and the Zone Côtière (ZC-GB – Coastal Zone). Rice cultivated areas have slightly increased in GB since 1975, encroaching into wetlands, gallery forest and mangroves. Whether from clearing for cultivation, local harvesting of wood, or for external commercial markets, the forest resources have been heavily degraded by rapid exploitation. The rate of deforestation has increased from about 2 percent per year between 1975 and 2000 to 3.9 percent over the 2000 to 2013 period. Overall, GB lost about 77 percent of its forests between 1975 and 2013; only 180 sq km remain, mainly in the south near the Guinea border. Likewise, woodlands regressed by 35 percent over the past 38 years, a loss of 1,750 km^2 (USGS Earth Resources Observation and Science Center, s.d.).

Agriculture in Guinea-Bissau is the economic activity that generates the most income for families, mainly in rural areas. The primary sector represents 56% of the GDP (World Bank, 2020). According to Cabral (1959) and Cateia et al. (2018), agricultural production used to be diversified, allowing for the exportation of rice, peanuts, and other agricultural products. However, observing the recent history, it is noticeable that such a scenario is practically non-existent because agricultural production has undergone changes regarding its diversification. Until 1995, rice (the staple food in Guinea-Bissau) was the most produced agricultural product, which then shifted to cashew nuts (Cateia et al., 2018). The area of cashew plantations has been increasing since the mid-1980s due to market liberalization, the rise in the price of cashew nuts in the international market, and the mandatory exchange of cashew nuts for rice (Djaló, 2013; Temudo, 2009).

Cashew tree plantations are distributed differently throughout the country. The Bolama and Biombo regions have relatively old cashew trees, in some cases already in decline, highly valued in the commercial market due to their relatively large size. In the Eastern region, the plantations are mostly young, in a growth phase, and less valued in the commercial market due to their relatively small size. The regions of Oio, Biombo, and Cacheu concentrate 55% of the entire plantation; Gabú and Bafatá account for 27% of the plantation, and the regions of Tombali, Quinara, and Bolama-Bijagós represent 18% of the plantations (Comba, 2022).

Mangroves are one of the major land cover classes in Guinea- Bissau, accounting for over 9 percent of the country's land surface. This fragile ecosystem is critical to coastal people who take advantage of its rich fisheries and wood resources. They also use tidal flats for traditional rice cultivation. Between 1975 and 2013, mangroves decreased by 6.4 percent, or 220 km^2(USGS Earth Resources Observation and Science Center, s.d.).

Bowé, lateritic landscapes that characterize Guinean plateaus, cover 3.2 percent of the country's land surface and are mainly found in the Colline de Boé (ZCB – Boé Hill or Upland Zone) ecoregions. These rocky, impenetrable soils are usually devoid of woody vegetation but support a herbaceous cover during the rainy season. As a result, bowé is one of the most stable landscapes in GB. Bowé is ill-suited to agriculture but conducive to grazing (USGS Earth Resources Observation and Science Center, s.d.).

Mining, although relatively undeveloped, has been growing rapidly due to government incentives for investments in this activity. GB is known for having about 25% of the global resources of bauxite, an important ore for the production of aluminum, which has attracted the attention of companies interested in developing projects in the region. An Angolan company, for example, planned a $500 million bauxite project in Madina de Boé, but encountered difficulties due to political instability. In addition, mining activity has caused the involuntary resettlement of rural communities, which has generated considerable tension in some areas (Land Portal Foundation, 2022).

Similar to the continental zone, the wealth of the natural environment of the Bijagós Archipelago is mainly linked to the presence of the sea and the natural environment, including mangroves, mud flats, palm groves, littoral woodland savannahs, and semi-dry forests.

Some of the forests have been converted into palm groves or are used for the cultivation of dryland rice, to varying degrees on different islands. About one-third of the archipelago's surface area is covered by mangroves, which are an important natural resource for the local communities. The archipelago is economically significant for tourism, fishing, and the exploitation of native palm trees. Agriculture, forest exploitation, animal husbandry, fishing, shell gathering, and ecological tourism are the main activities undertaken by the communities living in the islands. In addition, some of the islands are protected as a National Park and as a Community Marine Protected Area (GlobalSecurity.org, s.d.).

Land use is dependent on areas considered sacred, which are places where no one can settle and their continued use is forbidden, as is the case of certain spaces in Rubane, Enu, and other islands and islets (Madeira, 2019). Thus, farming and logging are prohibited activities. In addition, parts of some islands are "abandoned", such as the areas of Etebadju on Caravela Island, Cadiguira on Formosa Island, and Ancagumba on Meneque Island. These areas are considered sacred and intended for mystical, social, and economic ceremonies, which are part of the life of the Bijagós communities (Madeira, 2019). Among the most significant sacred areas for the Bijagós are the islands of the Orango group and the western part of the island of Carache.

4.2 Landscape-seascape analysis

4.2.1 Overview and identification of study area boundaries

The environmental assessment of the coastal area of GB is approached here through a landscape analysis at the macro scale, which is explored in detail in the following paragraphs.

The first step is the identification of the perimeter of the coastal area, for a subsequent systemic assessment through landscape systems.

Considering, on the one hand, the delimitation of coastal and inland areas already identified by competent national authorities (included in the Figure 4.1) and, on the other hand, the administrative subdivision into coastal and continental areas commonly accepted by the project stakeholders, the coastal area can be divided into a “Core Zone” and a “Buffer Zone” (Fig. 4.7). The former comprises the regions of Bolama, Cacheu, Quinara and part of Tombali; the latter comprises the regions of Bafatá, Oio and part of Tombali, with the exception of the administrative region of Gabu.

The division of the two coastal areas is based on an analytical survey of the territory, taking into account its physiographic, landscape, settlement, and climate change effects. In this sense, the so-called 'Buffer Zone' differs from the other area. For example, it also encompasses flat terrain crossed by a minor hydrographic network, but it has no contact with the ocean, the coastal and deltaic landscape, and lacks large river sections except for a short stretch of the Rio Cacheu and the Rio Geba. The altimetric profile of this area is of a different nature, especially in the northern and eastern regions, where gentle slopes are around 60-90 meters above sea level (a.s.l.), rising further in the Gabu region, heading north and especially east towards Guinea, reaching around 270 meters a.s.l. Moreover, the settlements in this area do not resemble coastal settlements in terms of location, urban development, dependence on coastal marine activities, etc. They are mainly concentrated in areas adjacent to major road intersections, away from major water bodies and in in the immediate vicinity of extensive forest and shrub reserves, as indicated in the national maps (Annexes, Map 1 and 2). Finally, in terms of meteorological and climatic aspects, the 'Buffer Zone' experiences different phenomena typical of inland

and continental areas, including heatwaves, low rainfall, and prolonged drought, which exacerbate the criticality of fires fueled by dry winds or intentionally set for agricultural and production purposes (par. 4.1.1;4.1.2).

With regard to coastal climate adaptation and the resilience of communities living by the sea and its tributaries, and considering the hydrogeological, altitudinal, anthropic, and physical-naturalistic aspects (par. 4.1), including those related to climatic dynamics, the present work will focus on the coastal area referred to as the 'Core Zone,' as specifically described in the following paragraphs. For the reasons expressed, this landscape territorial analysis and the consequent strategies and actions adopted refer only to the 'Core Area' (Fig. 4.7).

Figure 4.7 Subdivision of the national territory into coastal and continental areas. A buffer area is identified in the centre (Edited by the authors)

In line with the main objectives of the present work, the perimeter includes the main human settlements with different vocations (urban/rural/village) and the pilot-project macro-areas (Bolama-Bijagos Arquipelago, Varela-Cacheu and the South and Mansoa-Buba-Cufada) identified by the Project.

Synthetically, the values that guided the choice of the perimeter ('Core Zone') can be summarised as:

- recognisability of the boundary.
- areas most exposed to coastal impacts/effects of climate change.
- areas with a higher concentration of rural/urban coastal settlements.

The guiding criteria refer to the traditional approach of the study of the landscape[14] and its transformations, its character-vocations and its different functionalities.

If on the one hand the morphological and hydrological aspect (large rivers, delta or estuary river mouths, low altitude above mean sea level) appears dominant in the coastal landscape of the GB (average altitude study

[14] A traditional approach to the study of the landscape, at the various scales, means a critical evaluation of the analysed territory, divided into two large systems or "reading categories" that include within them different subsystems or "layers": the physical-naturalistic system (morphology, hydrography, natural and semi-natural environments, etc.), the anthropic-settlement and infrastructural system (settlements, roads, infrastructures, etc.).

area[15]: 8,7m above sea level), on the other hand it is not the only discriminating factor considering that the entire country is crossed by a dense hydrographic system and is mostly flat (national average altitude 17,5m above sea level) with the exception of a few areas, especially in the east (see Annex 5).

In addition, and to complement the altimetric component, physical-naturalistic (forest, agricultural crops, etc.), anthropic (settlements, main roads, etc.) and legal-administrative (national, regional and/or local sector limits) aspects were considered.

In this respect, the boundaries can be summarised and described as follows:

- to the north and south, the perimeter lies on the limits of the neighbouring countries, Senegal (to the north) and Guinea (to the south) respectively.
- to the west (continental slope) the boundary considers the national border of GB, along the coastline.
- to the east (continental slope), the boundary instead follows several limits, mainly anthropic, such as some main roads, the boundaries and potential expansions of the major fringe settlements (Ingoré, Bissorã, Mansoa, Bambadinca, Xitole), some river bends (Río Geba, Río Corubal) and only partially the administrative limits between the various regions.
- to the south (ocean side) the boundary considers the boundary of the Bijagós Archipelago Biosphere Reserve (UNESCO).

The coastal study area described as follows (Fig. 4.8) was drawn in a georeferenced environment (QGIS) using GIS tools, from geometries and open data acquired from the open-source geo-portals of OSM[16] (Open Street Map) and the ICPAC[17] (IGAD Climate Prediction and Applications Centre).

Figure 4.8 Perimeter of the coastal study area (Edited by the authors)

[15] Source: https://explorer.digitalearth.africa/products/dem_cop_30

[16] Source: http://download.geofabrik.de/africa/GB.html

[17] Source: https://geoportal.icpac.net/

4.2.2 Landscapes and seascapes

The environmental and landscape analysis was conducted through an integrated reading of the major physical-naturalistic and anthropic phenomena in the area in order to identify so-called landscape systems. In landscape planning, we mean the areas characterised by a strong homogeneity among the above-mentioned phenomena as a synthesis expression of the individual topics and relationships between them.

Landscape systems have been identified with respect to three basic components/criteria: a) the morphology of the territory; b) the prevailing land cover and land use; and c) the dynamics of transformation that, in some cases, characterise their environmental and landscape arrangements.

Within the identified perimeter of coastal areas, the following four macro landscape systems have been identified (Fig.4.9):

1. the coastal wetlands system: the boundaries consist of the coastline and the boundary identified by the cartography (Fig. 4.10); within this perimeter, oceanic coastal areas, coastal areas along rivers near the estuary itself are recognizable;
2. the agro-forestry and fringe settlement system: the boundaries consist of the inner boundary of the wetlands and mangrove system to the perimeter of the coastal areas as identified and described in the previous paragraph. It is basically a filter area between the inner boundary of the wetlands and the larger system of inland areas towards the north of the country (Fig. 4.12);
3. the urban system of Bissau: the country's capital is the only major urban settlement, such that it constitutes a system in its own right, as also documented by the transformation and development dynamics identified in the Strategic 2030 study (UN-Habitat, 2019), and for this reason it was deemed appropriate to take the perimeter of the entire municipality as the boundary, and to which the northern expansion area was added (Fig. 4.14);
4. the Bijagos Archipelago system: it is classified as the Reserva da Biosfera do Arquipelago Bolama Bijagos (RBBB) where are three protected areas: Parque Nacional do Grupo das Ilhas de Orango (PNO), Parque Nacional Marinho Joao Vieira e Poilao (PNMJVP) e a Area Marinha Comunitaria de Ilha de Urok (AMCIU); the boundaries of this system consist of the institutional perimeter of RBBB (Fig. 4.16).

What has been mentioned is described in more detail in the following paragraphs for each landscape system and in the final comparison and summary table in the annexes (see Annex 4).

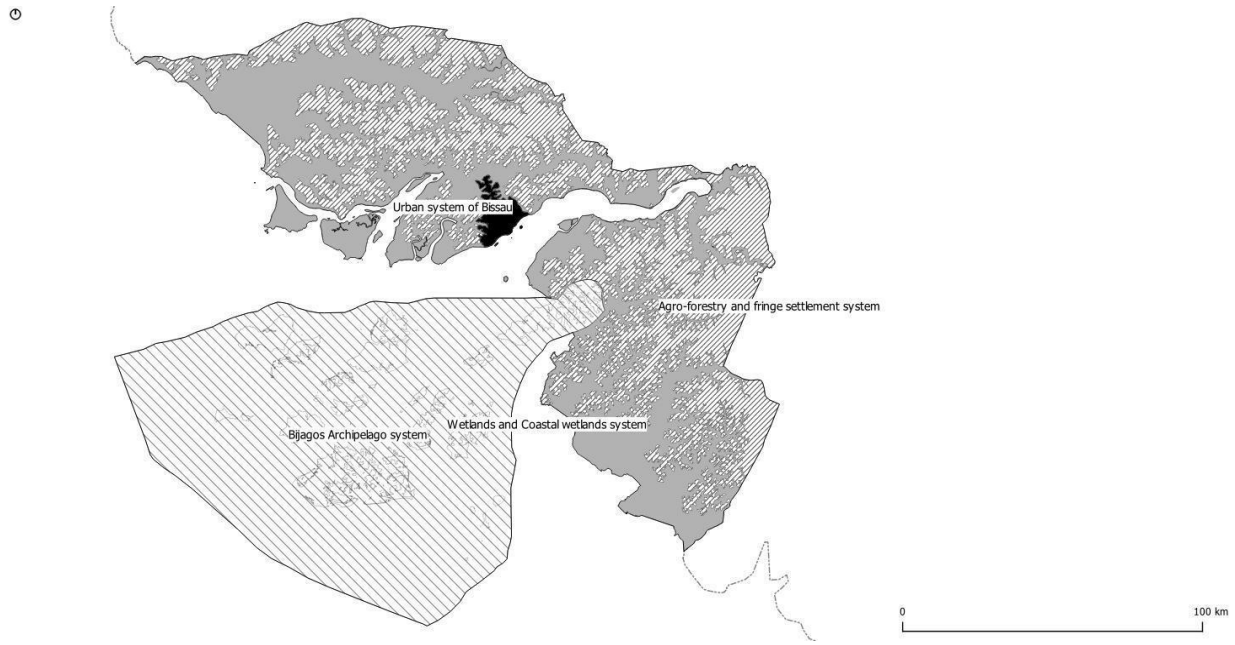


Figure 4.9 The four landscape systems (Edited by the authors)

4.2.3 The coastal wetlands system

The first continental coastal landscape system is characterised by the wetlands system and in particular the mangrove forest system. According to some estimates, mangroves cover approximately 8% of the national territory (Cardoso, 2017), and, at the macro scale, it is an easily recognisable system as it mainly follows the mainstream hydrographic network. With respect to the study area, its concentration is prevalent in the northern sector at the "Tarrafes do Rio Cacheu National Park" of which it is the prevailing system (approximately 40% of the park area) but it is also well represented in the south within the Cantanhez National Park (Cardoso, 2017) and along all the main river loops (Rio Cacheu, Rio Mansoa, Rio Tombali, Rio Combidjam, Rio Cacine, Río Geba) up to the limit of the wetland-pluvial forest. In addition to these two protected national reserves, the landscape system also includes the Natural Park "das Lagoas de Cufada", in the area between Buba, Xilotè and Calafunda. The concentration of established reserves and parks reflects the ecological, landscape and socio-economic importance of this landscape system.

The area of this system[18] (Fig. 4.10), although with local differentiations, appears homogeneous and entirely naturalistic, where the landscape is structured by a main and secondary hydric-morphological system, an altitude of no more than 20-25 metres above sea level, the massive presence of mangroves and the agricultural system of rice paddies.

[18] The boundary of the wetland landscape system was produced by relating the geometric boundaries of wetlands from open OSM (Open Street Map) data with the most recent ones provided by Global Mangrove Watch for 2020 (https://data.unep-wcmc.org/datasets/45)

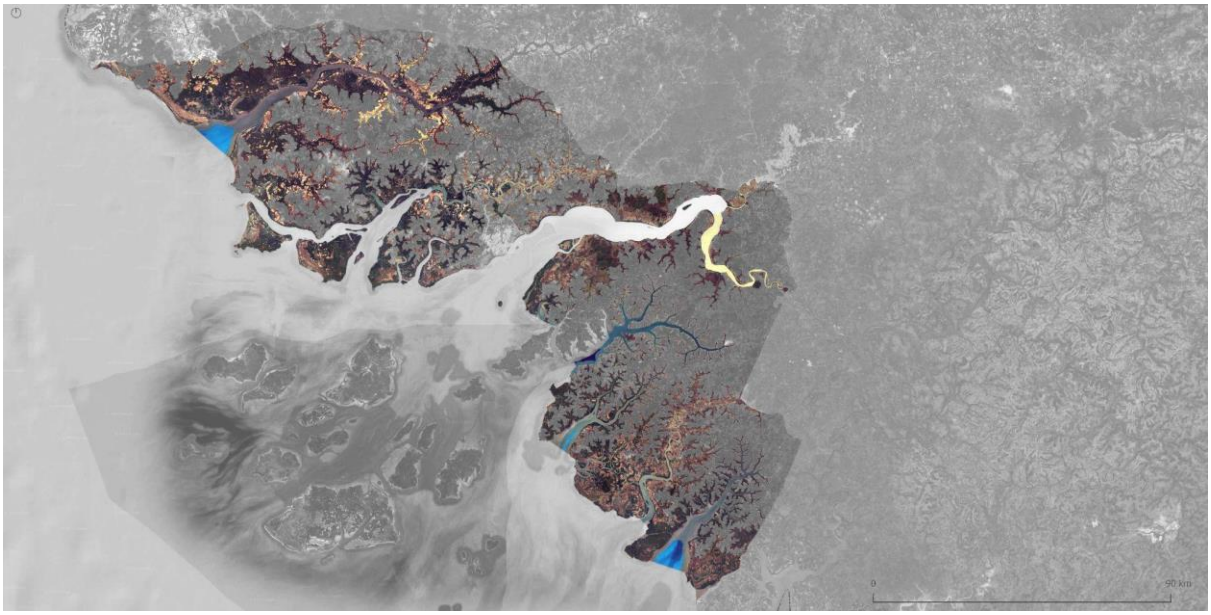


Fig. 4.10 Landscape system number 1: Coastal wetland system (Edited by the authors. Credits: google maps)

The vegetation aspect is therefore the most relevant, and in detail, it is possible to distinguish several landscape sub-systems (Fig. 4.11) with naturalistic and/or productive dominance, including:

(i) the "bolanhas"

These are lowland agricultural areas devoted to rice cultivation that are mainly developed on mangrove soils by means of anti-salt dykes and water retention systems. This land use determines a landscape mosaic of "cells/chambers", whose tesserae are perfectly recognisable both in their overall configuration and in their internal compositional rules (Fig. 4.11 a);

(ii) coastal shrub savannas

This subunit is found on soils with low fertility and a sandy texture, the result of the evolution of marine sediments. Its physical-vegetational composition is simple: a predominantly herbaceous layer (1-2m), and a sparse shrub layer (Fig. 4.11 b);

(iii) the "tannes"

These are salt flat areas of bare ground with halophilic and hydrophilic herbaceous vegetation. It is a subunit that is associated with mangroves and can be found at the edge of coastal herbaceous savannas, recognisable because they are clustered in islets between mangroves, especially in the Cacheu areas but also near Cumbidja and Cacine (Fig. 4.11 c).

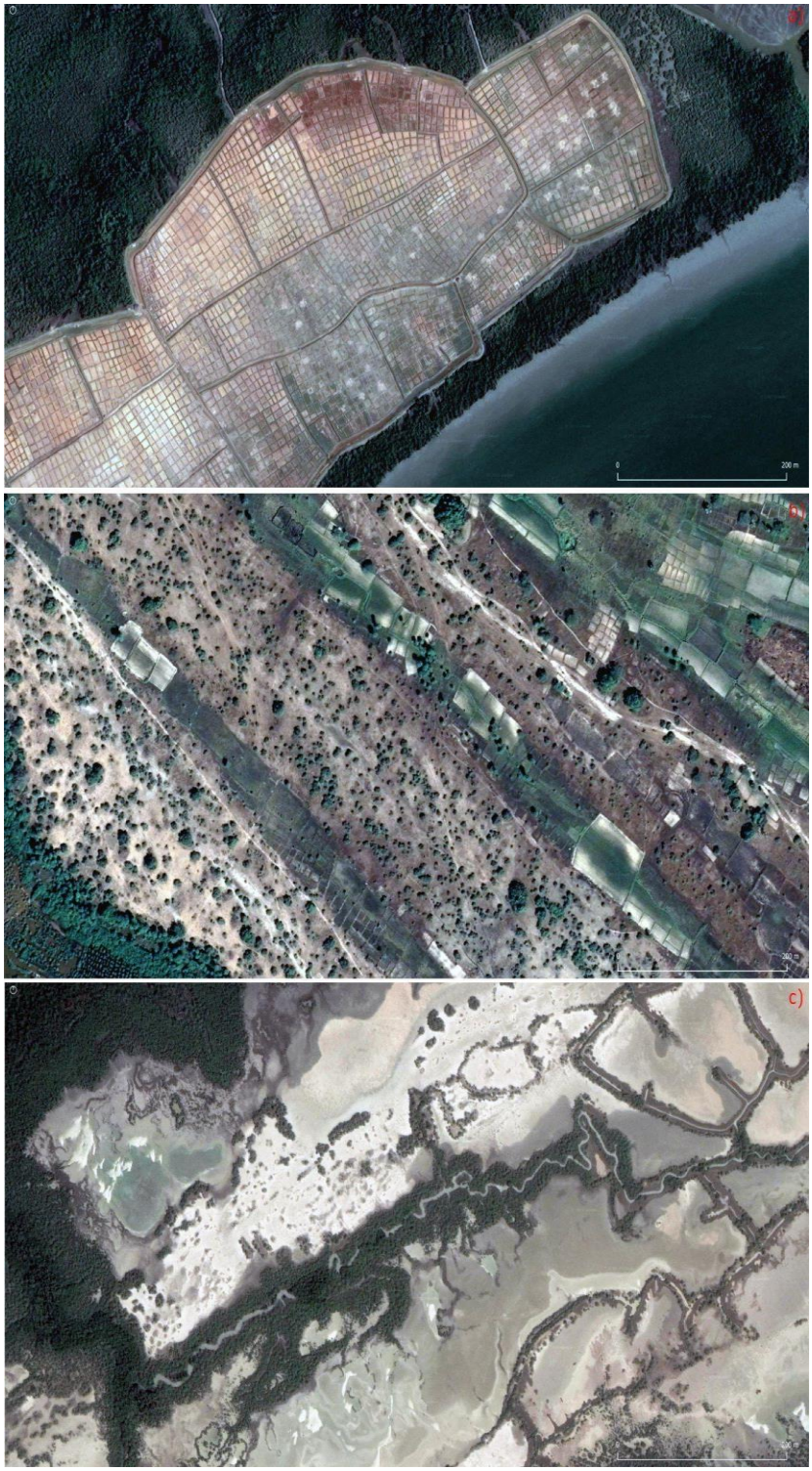


Figure 4.11 Paddy rice fields ("Bolanhas") (a) and a strip of coastal savannah in the Varela area (b). Below, a patch of aliophilous-coastal vegetation (c). Univocal metric scale (Edited by the authors. Credits: google maps)

Equally important riparian areas include the Varela area along the coastline on the northern border with Senegal. This area is characterised by a humid and dense secondary coastal forest with a predominance of palm groves, subject to a strong erosion phenomenon. In addition, the two islands between the Canal de Jata and the Rio Mansoa (to the north) and the island Ilhéu de Melo (to the south), also predominantly covered by

mangroves and wetlands, are also part of this landscape system. There are several small settlements and the bigger Cacheu (north) and Cacine (south), as scattered villages throughout the area. These are generally linearly located along the river-coastal limits and mangrove boundaries, in close contact with the water resource on which they depend for their daily subsistence (see Annex 4.a).

In general, mangroves form the dominant land cover of the landscape system and perform important ecosystem services: protection from coastal erosion, food security and medicinal purposes for local communities, carbon uptake and refuge areas for biodiversity (terrestrial and fish fauna).

The constant search for new land for the most profitable agricultural production (mostly cashew) and the lack of youth labour force due to emigration phenomena associated with anthropic, natural and climatic factors (drought, climate change, soil salinisation and acidification, degradation of hydraulic structures, etc.) have contributed on the one hand to a scattered thinning of the forest cover, and on the other hand to the partial recovery of the potential natural vegetation due to the abandonment of rice fields.

These evolutions and changes in land use make the boundary between wetland-mangroves, wet forest and wooded savannah more discontinuous.

4.2.4 Agroforestry and fringe settlement system

This landscape system (Fig. 4.12) is based on the limits of the wetland and mangrove area and expands inland, up to the eastern limit of the study area considered, which, roughly speaking, can be identified along the main E-W crossing road on which minor urban-rural settlements linearly develop. Among these are those of Sao Domingo, Bissora, Ingorè (north), Mansoa, Bambadinca, Xitole (centre), Buba (south), as well as a series of more inland settlements. The latter, such as Canchungo, Bula (north), Quinhamel, Falacunda, Tite (centre), Empada and Cufar (south), to name but a few, develop linearly along the internal penetration roads, i.e. in the filter areas between the first two landscape systems.

Most of the settlements gravitate around areas slightly elevated from the coastal plain in the strict sense, especially those in the linear “crown” along the continental limit of the study area, to the East. In general, the morphology of this landscape system has an elevation between 25 and 50 m above sea level, characterised by slight foot-hill relief and a ridge to the south, at the edge of the “Rio Grande de Buba”.

From a landscape point of view, the entire unit has a forest and agro-sylvo-pastoral vocation, dotted with small rural centres mostly dedicated to subsistence farming, cashew monoculture and the felling of specific tree-vegetable species, which on the one hand are among the most profitable activities in the country but on the other threaten the forest ecosystem, i.e. the dominant landscape matrix. The rainforest today appears more dense and homogeneous in the southern area, in the Tombali region (i.e. Cantanhez forest), where it is associated with the mangrove system and, to a lesser extent, with the "bolanhas" rice fields.

This second landscape system is in constant transformation to meet the needs of local rural communities where i) cashew monoculture, ii) socio-economic pressure due to marked poverty, and iii) the continuing lack of control and enforcement of environmental matrix laws, are severely threatening the stability and regenerative capacity of the present natural heritage and the biodiversity/heterogeneity of the natural landscape.

The landscape system, despite its relative morphological and agro-ecological homogeneity, can be read through three main subsystems (Fig. 4.13):

(i) The edge rainforest

This subsystem is located at the mangrove margins and is dominated by more or less humid or dry forest, depending on the different locations and climatic-pedological conditions (Fig. 4.13a). If the dry forest formations are more present in the protected area “das Lagoas de Cufada”, the main patches of

humid forest are found in the south where rainfall regimes are more consistent (e.g. Cantanhez forest). The natural park mentioned above is part of this area as the main centre of biodiversity for aquatic avifauna and terrestrial fauna, while at the same time hosting all the 'typical' vegetation formations of this landscape transect: dry and semi-dry forest, humid forest, sub-humid and humid savannah;

(ii) inland areas with an agro-sylvo-pastoral matrix

This area, with different land uses and cover, consists of forest vegetation and annual and semi-permanent crops as well as extensive pastures (Fig. 4.13b). It is also characterised by so-called itinerant farming ("mpam-pam") and cashew fruit farming (especially in the northern area of Biombo and Oio, but also in Cacheu, and Quinará). In particular, this agricultural practice has exploded in recent years due to the declining productivity of the "bolanhas" and the rural exodus to Bissau or to areas with a greater concentration of forestry, again for agro-commercial purposes such as the production of wood energy or valuable wood for the Chinese market (Pô-de-Sangue, or Pteurocarpus erinaceus);

(iii) the system of minor urban-rural settlements

This system, despite its apparent discontinuity/fragmentation, develops linearly along the main roads connecting the various local communities (Fig. 4.13c). In some cases, these centres take on an urban-rural and less structured village character, especially along the north-western boundary of the study area and at the edge of the wetland hydrographic system (e.g. Bissorã, Mansoa, etc.), where it penetrates internally for many kilometres. These are predominantly residential areas, in close contact with the natural heritage and the related resources and by-products on which they are economically dependent (e.g. Canchungo and Quinhamel about 43,000.00 inhabitants each; Mansoa about 46,000.00; Empada and Buba about 17,000.00 each[19]).

All these phenomena characterise a landscape system that is mostly in transformation. These dynamics are undoubtedly also accelerated by the increasing rate of demographic growth and the national/local rate of poverty, which is combined with disorganisation and institutional fragility as well as the dysfunction of the competent bodies, complicit in the environmental degradation and progressive fragmentation of the natural coastal-continental landscape (Tiniguena, 2017)

Last but not least, the landscape system considered includes some sacred sites in the north-west area, within the Colage[20] forest (Rachid Said et al., 2011). These areas are considered sacred by the local ethnic communities as places of initiation and transmission of knowledge and community customs.

[19] Source: https://guinebissau.opendataforafrica.org/GWCENSUS2016/GB-census-data-2009

[20] Further information in paragraphs 2.1, 2.2, 3.5, and Part IV of the cited text

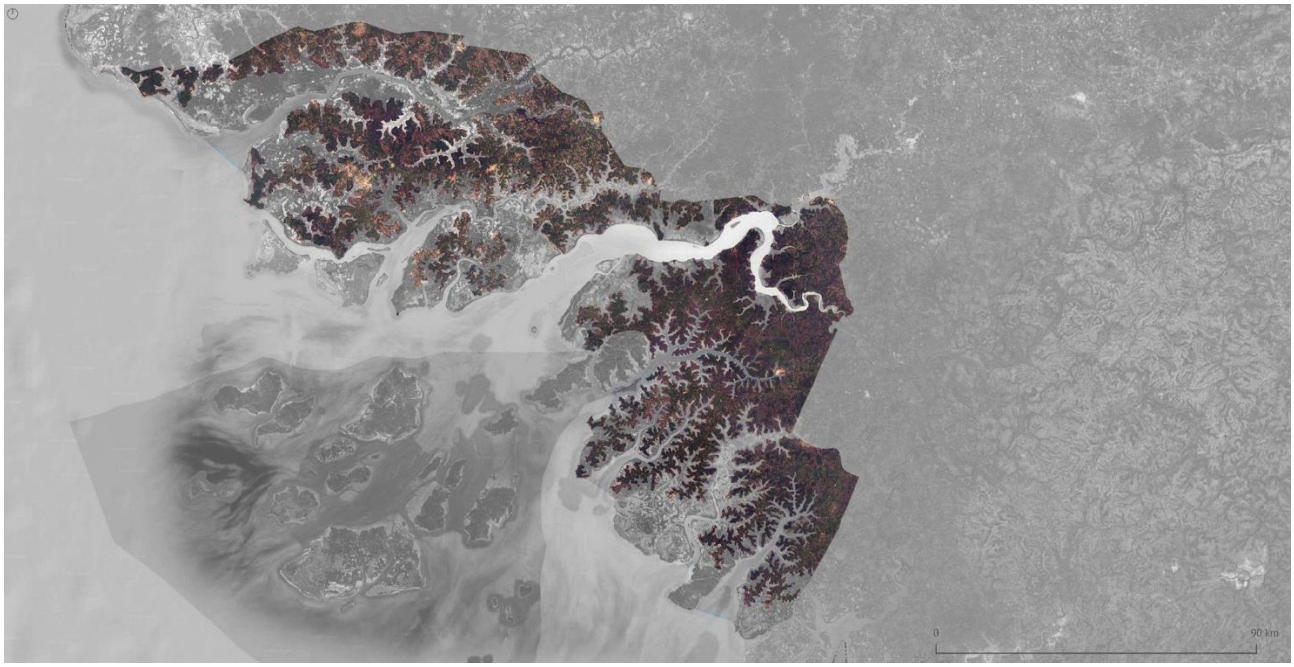


Figure 4.12 Landscape system number 2: Agro-forestry and fringe settlement system (Edited by the authors. Credits: google maps)

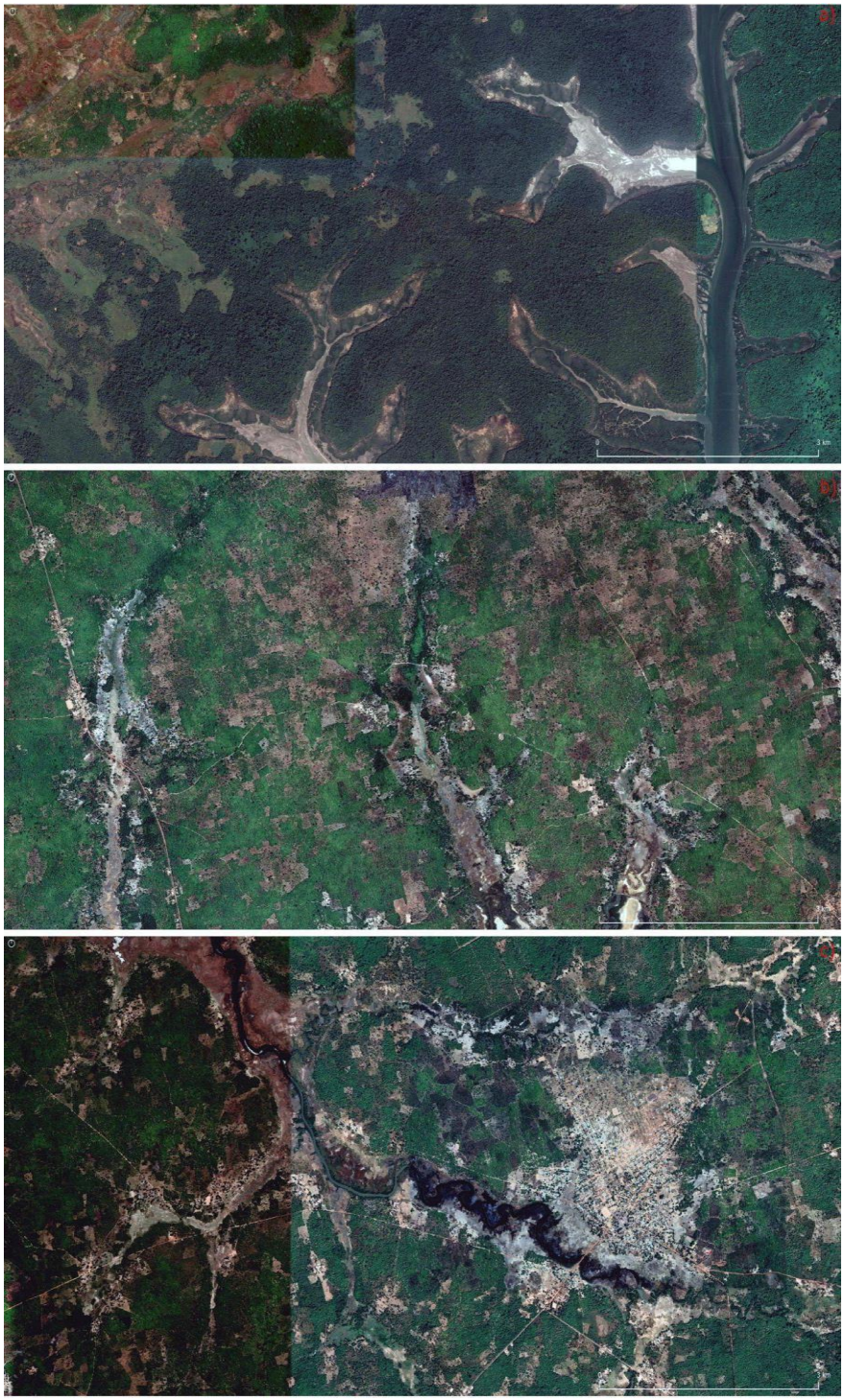


Figure 4.13 From top to bottom: (a) the edge rainforest, (b) inland areas with an agro-sylvo-pastoral matrix, c) the system of minor rural-urban settlements (Bissora area). Univocal metric scale (Edited by the authors. Credits: google maps)

4.2.5 Urban system of Bissau

The landscape system of the country's capital Bissau (Fig. 4.14), unlike the others, is characterised by its urban-settlement matrix (approximately 500,000 inhabitants in the administrative area alone). From a morphological point of view, the city is located in the central coastal area of GB, and is characterised by a very low altitude (approximately 39 m above sea level). The territory is marked by a low plain and by slight depressions in the river area of the Rio Geba and to the east in the Safim area; in these areas, the prevailing destination is agricultural and rice-growing, almost always obtained in deforested areas. The morphology, albeit slightly, changes within the compact city and along the northern expansion axis, where the terrain is slightly raised. The vegetation, in general, belongs to the sub-Guinean type of landscape, consisting mainly of rainforests, mangroves and vegetable-cereal crops.

Figure 4.14 Landscape system number 3: Urban landscape of Bissau. Edited by the authors. Credits: google maps

Three landscape subsystems can be identified within the landscape system (Fig. 4.15), namely:

(i) the compact urban-metropolitan landscape

The central and heavily urbanised area of Bissau (Fig. 4.15a) is administratively subdivided into four districts (zone I, II, III, IV), which broadly speaking represent different land-use categories, such as a) a mixed urban fabric with varying densities, between the city centre and the rest of the urbanised area with a predominantly residential, b) agricultural areas located almost everywhere on the periphery of the more compact city and near the coastal areas, c) existing and expanding port and industrial areas, located on the edges of the city, and d) wetlands, which characterise both the mangrove and rice-growing dominated coastal landscape and some central areas and edges of settlements;

(ii) the changing peri-urban landscape

The urban sprawl of Bissau develops linearly a) in a northerly direction towards Safim, along a main road/morphological ridge on which several continually expanding internal roads are located (Fig. 4.15b); b) in a south-westerly direction along the coast towards Prabis. On the one hand, this brings with it important ecological-environmental impacts; on the other hand, it highlights today's land demand and the phenomenon of *metropolisation* of Bissau along the N-NO axis;

iii) the agroforestry landscape of the margin

The forested areas of margin to the compact/diffuse urbanised fabric, are configured along the wetlands and along the dominant hydrological and morphological system. On the other hand, it is denser and more compact along the E-W coastal area and along the central area of the city, which is furrowed by several river tributaries; in these areas, the vegetation aspect is dominant, around which extensive plots for rice cultivation or more heterogeneous agricultural fields for food subsistence development. (Fig. 4.15c).

To summarise, and especially in the latter two environments, in Bissau there are phenomena typical of the urban fringes of large cities, i.e.: linear expansion dynamics in the vicinity of main roads, along higher-level facilities (airport and port) and along watercourses, with a relative decrease in agricultural and/or forest land of landscape value.

The choice of identifying as the boundary of the Bissau system, the administrative perimeter of the city and, beyond this, the expansion areas in continuity with the city, responds to the need to narrate a recognisable landscape system (predominantly urban-residential), with three landscape sub-systems strongly dependent on each other. In this sense, the three subsystems, although with a different vocation/use, cannot be separated from the dynamics of urbanisation, evolution and transformation of Bissau that cross the administrative boundaries of the capital.

The population growth, and the needs for new spaces for residencial settlements and productive activities, favour the transformation of urban and suburban territory, and of the related landscape resources, to the advantage of spontaneous *urbanisation/metropolitanisation* that produces building continuums and *urban-territorial sprawl phenomena* inside and outside the administrative limits. This dynamic is exacerbated by the non-application of the urban plan of Bissau and of the traditional/common rules on the natural resources management.

Moreover, the geostrategic position of the city makes it an attractive pole for the inhabitants of the rural area (rural exodus) and for investors. This gives and will give rise to migratory phenomena and the related increase in demand for land acquisitions, new realisations and/or increase in industrial areas such as to promote processes of urban development and landscape transformation along the city's fringes, where such phenomena are already found.

Figure 4.15 From top to bottom: (a) the compact urban landscape of Bissau, (b) the changing peri-urban landscape, (c) the agro-forestry edge landscape. Univocal metric scale (Edited by the authors. Credits: google maps)

4.2.6 Bijagos Archipelago system

The landscape system of the Bijagós archipelago (Fig. 4.16), due to its overall forest homogeneity and insularity, is considered unique here and corresponds to the limits of the Biosphere Reserve (UNESCO, 1996). It is worth noting that of the four identified landscape systems, this will be the only one to have in the near future an integrated management plan, currently in preparation.

The Bijagos is the only active deltaic archipelago on the Atlantic coast of Africa and is morphologically made up of islands and islets separated from each other by a network of channels of varying width and depth. The size of the archipelago is approximately 85 km in diameter from east to west and 65 km from north to south.

Administratively, it is divided into four distinct sectors, namely Bolama and Bubaque, which are the main urban-coastal centres, and Uno and Caravela, with a total emerging surface area of approximately 900 km².

The marine areas around the landmasses (see Annex 3.b), i.e. channels and shallow areas characterised by the retreat of waters by the tides, characterise more than 85% of the Biosphere Reserve's surface area and are one of the dominant landscape elements of the entire system that are associated with the 'mudflats' complex. The latter represent a dynamic and changing element of the landscape perception, since when the tide is low, almost a third of the archipelago dries up, while when the tide is high, only the islands emerge in their scenery of beaches or mangroves. Taken together, and at the macro scale, these two elements constitute two subsystems in their own right of significant ecological-naturalistic value.

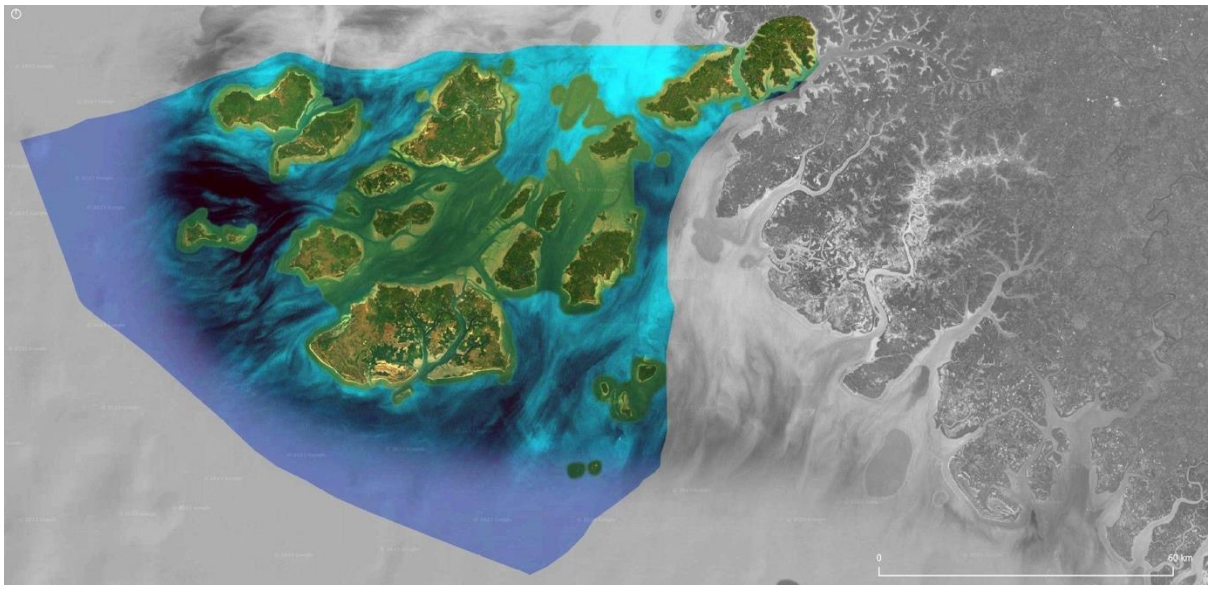


Figure 4.16 Landscape system number 4: Bijagos Archipelago system (Edited by the authors. Credits: google maps)

Within the landscape system thus described, two prevailing landscape subsystems (Fig. 4.17) can thus be traced:

(i) the forest system

This is the dominant landscape matrix within the entire system. It dominates the landscape of all the islands with the exception of a couple of cases where the dense forest cover gives way to wooded savannah and areas with irregular and sparse tree cover (Fig. 4.17a). This subsystem is characterised by the presence of the three protected areas consisting of the 'Orango Islands National Park', the 'João Vieira e Poilão National Marine Park', and the 'Urok Islands Community Protected Marine Area'. As

illustrated below, many of these areas are considered sacred and have a cultural-historical and identity value safeguarded by the policies on the subject and before that by the inhabitants themselves. The settlement component in these areas is limited to small inland or coastal villages, devoted to fishing and agro-sylvo-pastoral activities, and interconnected by a network of roads and paths that follow the morphology of the terrain.

(ii) the coastline and mangrove system

This subsystem is landscape-dominated by mudflats, mangrove-dominated wetlands, coastal marine areas and the minor hydrographic network (Fig. 4.17b). As anticipated, it is a system that is affected by tidal dynamics and thus by the immersion/emergence of land. Here too, as in the first continental landscape system, mangroves have priority ecological and morphological importance, and are mostly concentrated in the central-southern island complex of the Reserve. In close contact with the marine-coastal areas, on the other hand, are the two settlements of Bolama and Bubaque, which emerge as the only urban centres in the Archipelago (see Annex 4.b). Around these two areas, other small rural settlements are developing, linked by a network of connections that appears to be expanding.

Figure 4.17 From top to bottom: (a) the forest system between the 'Ilha de Orango' and the 'Ilha de Bubaque', (b) the coastal and mangrove system on the coast of the 'Ilha de Carache'. Univocal metric scale. Edited by the authors. Credits: google maps

The social and economic life of the archipelago, hitherto based on traditional relational structures, customary rights and a degree of self-sufficiency, has been particularly important for the management of the entire landscape system. Bijagós communities are able to meet almost all their needs independently; agriculture and animal husbandry are conducted without special recourse to imported products, and society is not dependent on state subsidies or services (Campredon, 2010). This model has a very low environmental impact on the landscape, reinforcing the broader concept of the landscape as a social product of the people who inhabit it. A traditional-community model has the effect of protecting resources and biological diversity, which are closely linked to the daily rituals and practices of the inhabitants. The zoning of the Reserve, inspired by this community model, protects and safeguards the various forms of sociality present in line with the traditional organisation of the space. This orientation, in general, has guided the creation of the two national parks and the marine protected area.

The development of cashew cultivation (as in other areas of the entire country) threatens the community/natural environment relationship and is transforming the relationship of the islanders with their land, generally managed communally for rice production and food subsistence. Each island has sacred forests reserved for initiation ceremonies.

This level of protection, on a practical and resource management level, restricts agro-productive activity (e.g. in Rubane, Tufo, Maju-Inorei, Maju-Anchorupe, Ebenga, João Vieira, Meio, Cavalos, Poilão and Cute) and prohibits ploughing and tree cutting in some areas. These traditional management measures reflect the cultural and identity aspects of the place and the more noble and broader meaning of cultural heritage.

4.2.7 Climate change within the landscape systems

The analysis of climate vulnerabilities, i.e., impending and ongoing hazards, as well as the areas most exposed to climate change phenomena was conducted with a cross-sectional analysis of the most recent texts and dossiers produced (Republic of GB, 2018; CIMA, UNISDR, 2018; Röhrig et al, 2021; Temudo et. al, 2022; BRLi, 2021) for Guinea and/or in the African coastal area (see also par. 4.1). Summarily, the main critical trends, the most burdensome impacts and the effects of these on land use and landscape and urban dynamics found above were identified.

In general, the human-environment-climate relationship, in its multiple dimensions, involves on the one hand purely climate-altering effects on the basis of large spatial and temporal scale climate changes; on the other hand, there are effects due to the anthropogenic human footprint, widely documented by the scientific debate and the IPCC reports (2022), i.e., the climate-altering effects of the last century.

After this brief preamble, the main threats of climate change on the coastal territory and the study area in general are listed below:

i) rising mean sea level and coastal erosion

ii) heat waves and thermal stress

iii) intensification of extreme phenomena

iv) prolongation of aridity/drought periods

v) increase in mean sea/river and estuarine temperatures

vi) increasing saline intrusion

Inevitably linked to these climate-based phenomena are, on the one hand, the dynamics of spatial modification/transformation, of the uses and abandonment of the landscapes themselves, because they are degraded, dangerous or unproductive; on the other hand, the socio-productive and food needs of a country with

a growing population and in constant search for cultivable land and resources to use for its subsistence.

Approaching the issue from this dual aspect, we report some of the main cause-effect relationships in the study area, linked to climatic, social and spatial dynamics:

- *coastal flooding and consequent salinisation of 'bolanhas' and coastal crops*: this phenomenon is aggravated by the already present rural exodus, lack of maintenance and infrastructures and the widespread presence of coastal settlements in sensitive areas at high risk of flooding;
- *nutrient depletion and soil compaction due to prolonged drought*: this phenomenon is aggravated by the generalised impoverishment of soils due to monocultural and socio-productive dynamics, to which are added others such as the sewage problems of settlements or the management of local waste that spills over into cultivation areas;
- *erosion of stretches of coastline:* this phenomenon is due to the increase in sea water and tidal phenomena associated with other ocean wave dynamics (e.g. Varela). This leads to the search for more cultivable land and the abandonment/degradation of crops and man-made structures wrongly built on the coastal shoreline.

These climatic and spatial dynamics, to name but a few, are particularly important and to be taken into account for a state like GB, which sustains itself mainly through its fishing economy and agro-industrial productivity.

Despite a general absence of local data in this sense, it is possible to briefly highlight the direct/indirect effects/impacts of climate change described above, and trace them within the four identified landscape systems.

1) **the coastal wetlands system**

climate effects: sea level rise, increased temperature of sea and delta waters

land use and landscape effects: they are related to coastal soil and shoreline erosion with consequent loss of riparian-dunal biodiversity, shoreline modification and excessive salinisation of wetlands and "bolanhas". They trigger indirect impacts such as the decrease/modification of fish stocks, the abandonment of rice fields, the food insecurity of coastal areas, the degradation of mangroves and in general the modification of the composition/structure of marine species as well as their route/direction within watersheds, affecting fisheries;

2) **the agro-forestry and fringe settlement system**

climate impacts: heat waves, rainfall instability, droughts

effects on land use and landscape: effects include a change in the timing of harvests/seeding due to seasonal shifts with relative uncertainty of food productivity in rural areas. The abandonment of coastal crops directly impacts on the overuse of natural resources and forest products in forestry. Uncontrolled logging and the increased need for cropland or grazing land qualitatively and quantitatively impact on forest biomass, which degrades in terms of biodiversity, area and vegetation composition as well as the loss of ecosystem services (regulation, production, etc.);

3) **the urban system of Bissau**

climate impacts: flooding and river overflows, heat waves, sea level rise, drought, rainfall instability

land-use and landscape effects: land-use and landscape effects result in a reduction of agricultural areas and the abandonment of rice fields along the wetlands due to water salinisation and acidification. This entails a transformation of the peri-urban agricultural landscape and a reduction in the size and quality of forest areas due to generalised urban sprawl and agro-food production. In addition, heat island phenomena will occur with greater insistence, especially in the compact city. In addition to physical dynamics, from a social point of view,

there are potential increases in malaria cases caused by the proliferation of mosquitoes in marshy areas due to the lack of rainfall and rising temperatures, which will increase according to trend scenarios (Trisos et. al, 2022).

4) **the Bijagos Archipelago system**

climate impacts: coastal flooding, coastal erosion, salinisation of water, evapotranspiration and changes in moisture levels, reduced precipitation

land-use and landscape impacts: increased temperature and ocean salinisation will reduce agricultural productivity and land and marine biodiversity. Flooding and coastal erosion will particularly affect the eastern part of Formosa or the eastern islands of Orango Park, which are the most populated. The impacts of climate change in a humid territory such as the Archipelago will increase the transmission of diseases such as malaria, meningitis and other infections, as pointed out above.

Climate impacts affect all the identified landscape systems, with an overall magnitude that substantially depends on the distance from the coast. In fact, the ecosystems closest to the coastline are affected not only by variations in temperatures and precipitation, but also by the rise in sea level and the phenomenon of salinisation of aquifers.

Coastal tabancas and towns will be more affected by flooding than settlements located further away from the coast.

The economic activities of communities located near the coast, such as the cultivation of rice in the bolanhas, will be particularly impacted, as well as the mangrove forests, which exert a coastal protection action on local settlements and agricultural areas, including bolanhas.

4.3 Cultural and landscape heritage

Cultural heritage is distinguishable between tangible and intangible. In the study area, and more generally in the country as a whole, the cultural heritage is predominantly social and intangible.

As highlighted in other sections of the report, this cultural and human wealth relates to socio-ethno-anthropological practices (religious beliefs, tribal and initiatory rites, etc.). These traditional customs find a spatialisation within sacred sites and protected forests (e.g. Cobiana, Colage). Other examples of these sites are found in the Bijagos Islands (especially in Orango, Uno or Soga islands) where they form a true sub-system with cultural and identity value. These spaces are occupied by communities whose knowledge, culture and ways of life in general are closely linked to the natural landscapes of GB.

Therefore, art, as another form of GB heritage, is very important to the role it plays in religion and animist rites, with a close relationship with the supernatural, because it allows communication with *Irãs* (Gods) and the ancestors. Indeed, each community refers to a sacred site reserved for male or female initiation ceremonies and other religious-magic ceremonies. The strong cultural sense that invests in these sites gives it a high level of protection, allowing the preservation of the natural heritage and the regulation of the use of resources available to the inhabitants.

Shifting the focus to tangible, architectural and material heritage, reference can be made to the main historic centres (i.e. Bolama, Bubaque and Bissau). The major centres reflect on the one hand a colonial-Portuguese style of architecture (concrete blocks and a tile or fibre cement panels cover); on the other hand some examples of post-colonial African architecture (Pereira, 2009).

Especially referring to the urban centre of Bissau, the urban landscape is characterised by lack of urban identity together with unregulated construction projects. The houses have one or two floors and the colonial architecture is predominant with narrow streets and some of them still using a numbered place names system. Those are mostly two-story with a high ground-floor where usually stood the store or the warehouse and a first floor that served as housing. Furthemore, near the Bissau harbour the predominantly colonial architecture neighbourhoods,in an advanced state of decay till some years ago, are under restoration. In fact, in the recent years, the municipality of Bissau promotes the improvement of some urban public spaces and the restoration of public and private buildings the area of the "old Bissau".

The degradation of urban buildings, a housing deficit combined with a massive influx of poor rural people, lead to an urban growth without planning, and with low comfort levels inside buildings (Pereira, 2009). In Bolama, the buildings of great historical interest are completely destroyed without any maintenance and at risk of collapse. In the other coastal urban/rural villages, which characterise a large part of the settlements within the landscape systems, as well on the periphery of the bigger centres, the forms and materials refer to a traditional-vernacular architecture. There, traditional housing with rammed earth or adobe walls and straw fibre roofs, now with the straw roof being gradually replaced by zinc foil (Lanham, A 2004).

If the physical heritage is dispersed and degraded, partly because it belongs to a very conflictual period like the colonial one, the intangible heritage is vast and very much linked to natural landscapes (Cormier-Salem, 2006), as pointed out above.

4.4 Economic context

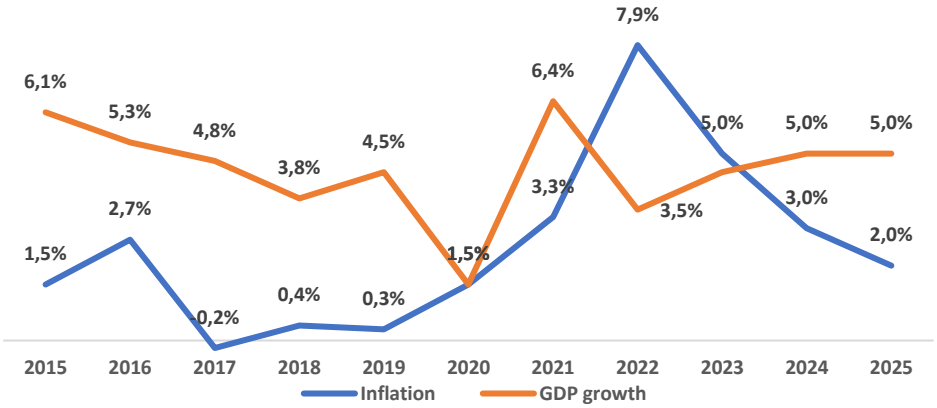
The Republic of GB became an independent state in the 1970s, after 11 years of armed struggle, carried out mainly in rural areas. The country's political history is characterized by recurring cycles of political and military instability, which have had a detrimental effect on the establishment of stable institutions and government bodies. This instability has also hindered socio-economic development, evident in the modest indicators of GDP, GDP per capita, income, education, health, and more. These factors contribute to an increasing pressure on resources and coastal areas in a region with significant coastal dimensions. Due to its environmental and economic importance at the national, regional, and global levels, comprehensive planning, monitoring, and governance are imperative. The continuity of implementing and evaluating public policies must be ensured to safeguard the territory's sustainability and progress (source: consultancy).

The country recently[21] held legislative elections, with the constitution of the new parliament and government scheduled for July/August 2023.

GB's economy is predominantly agrarian, with a focus on exporting cashew nuts and generating revenue from fishing. It is anticipated that in the near future, other lucrative sectors, such as mining, oil and gas, and possibly coastal tourism, may emerge. These sectors could potentially play a role in GB's coastal economy as it progresses, and it is crucial for this transition that the country equips itself with the necessary strategic infrastructure. In addition to these factors, it is essential to take into account the risks posed by climate change when formulating and implementing strategies and actions for economic resilience, especially for households in the coastal territory, which constitute approximately 70% of the national total. (Source: Scoping report/2023, UNDP/2018).

[21] The legislative election was held on June 4, 2023, with the winner being the PAI – Terra Ranka platform.

The pandemic context in 2020, along with the subsequent confinement and mobility restrictions, significantly impacted the economic framework. According to World Bank[22] and International Monetary Fund (n.d.) macroeconomic data, GB's Gross Domestic Product (GDP) increased between 2016-2021 at an average of 3.2%/year (+3.5% in 2022), representing approximately USD 1,6 billion (GDP per capita of USD 795), with a growth rate of 3.5% and 4.5% in 2022 and 2023, respectively, with inflation falling from 7.9% in 2022 to 5% and 3% in 2023 and 2024 (forecast), respectively. In terms of foreign direct investment, after peaking at around 5% of GDP in 2019, the indicator fell to less than 1.5% of GDP in 2021, while the indicator for the receipt of remittances reached 10.8% in 2021 (12.2% in 2020). According to World Economics data, the informal economy in GB comprises approximately 35.5% of the national GDP and is predominantly led by women. On the other hand, public debt is beginning to show a worrying trend, standing at 80%, according to data from the African Development Bank - AfDB[23] (2022).



Graphic 4.1 Evolution of annual inflation and GDP growth (%) between 2015 and 2025[24] (WB data, n.d.)

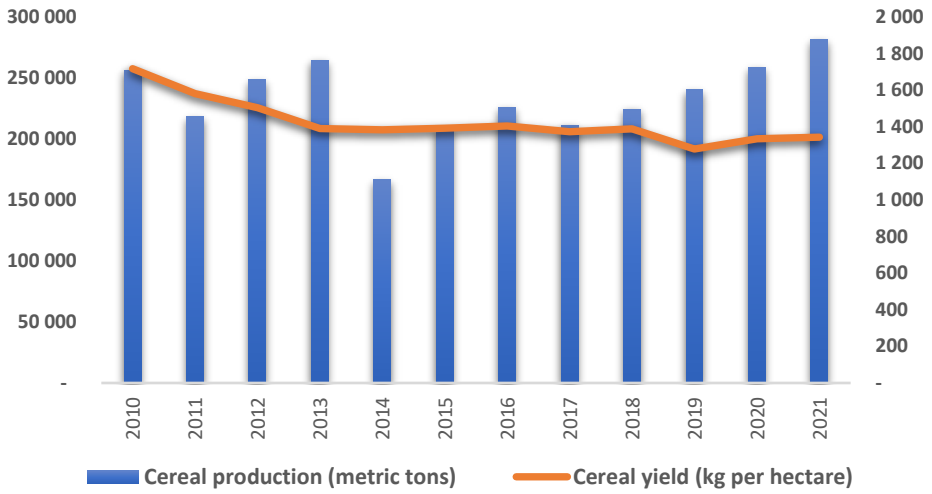
The primary sector accounted for 48% of GDP in 2021. The industrial sector represented 9.1% of national GDP in 2018 (10.5% in 2017), while the internet reaches just under 25% of the national population. Unemployment reached 11.5%, while youth unemployment is estimated at 50% of the working population.

Regarding natural resources, the national income in this field averaged about 15% of GDP between 2010 and 2020, and it reached 10.5% of GDP in 2020 (compared to 9.9% of GDP in 2019). Fishery production reached 62.3 thousand tons (metric) in 2020 (60,1mil tons in 2019), while cereal production was 281.2 thousand tons in 2021 (258.4 thousand tons in 2020), translating into an output of 1.3 tons per hectare (World Bank data/n.d.).

[22] Available in: https://data.worldbank.org/country/GB.

[23] Available in: https://www.afdb.org/en/countries/west-africa/GB/GB-economic-outlook.

[24] Years 2023, 2024 and 2025 correspond to projections by the International Monetary Fund



Graphic 4.2 Cereal production data for GB between 2010 and 2021(WB data, n.d.)

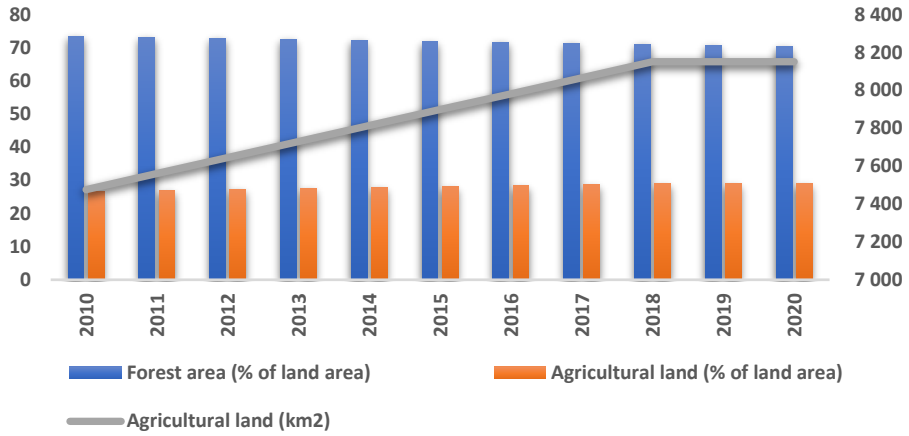
Data collected during the field mission to the three coastal areas targeted by this technical assistance, namely: (i) Bolama-Bijagós, (ii) Varela-Cacheu, and (iii) Mansoa-Buba-Cufada-Sul, confirmed the prominence of four major economic activities with significant impacts on the coastal ecosystem. These activities include 1) agriculture, 2) livestock, 3) fishing, and 4) tourism. The effects of climate change have affected the capacity and sustainability framework in the context of national development.

In relation to the tourism sector, it is important to emphasize that, although this sector is still in its early stages and its contribution to the GDP is relatively low, as are the indicators for visitor arrivals and overnight stays, it is considered one of the activities with significant impacts on coastal ecosystems. The current and future challenge associated with this sector is linked to the lack of regulation and oversight of the activity and the risk it poses to the coastal ecosystem, both on the mainland and especially on the islands of the country. This is of particular concern, given the government's goals for the current term to substantially increase the sector's contribution to the GDP.

The sustainable development of both the green and blue economy sectors is now being harnessed through the implementation of policy and strategic instruments. These efforts are reflected in (multi) sector development programs and plans that aim to promote economic diversification and harness the potential of adopting the Small Island Developing States (SIDS) status. The approach involves an integrated perspective to enhance the value chain, empower stakeholders, and invest in the construction or re-qualification of sectoral infrastructures such as fisheries, agriculture, ecotourism, energy, maritime transport and logistics, shipbuilding, and mining. Additionally, there is a focus on strengthening biodiversity and coastal protection through a well-defined governance strategy and mobilization of funding. Hence, it is crucial to promote a sustainable increase in agricultural, forestry, and fishery production, with special attention given to the local market. Encouraging tourist influx, enhancing energy production efficiency (through greater integration of photovoltaic energy), and improving the transport system and port logistics are also essential steps to be taken.

The agricultural activity (agriculture and forestry), with a significant contribution from women, takes place in nearly 8,100 square kilometers of agricultural land (compared to 7,400 square kilometers in 2010), constituting 28.9% of the country's total surface area. This data is based on information from the World Bank in 2021. Additionally, the forest area covers approximately 70.4% of the total surface of the country. Cashew is the

primary agricultural crop cultivated in the country, accounting for 90% of Bissau Guinean exports and directly engaging 85% of the population[25].

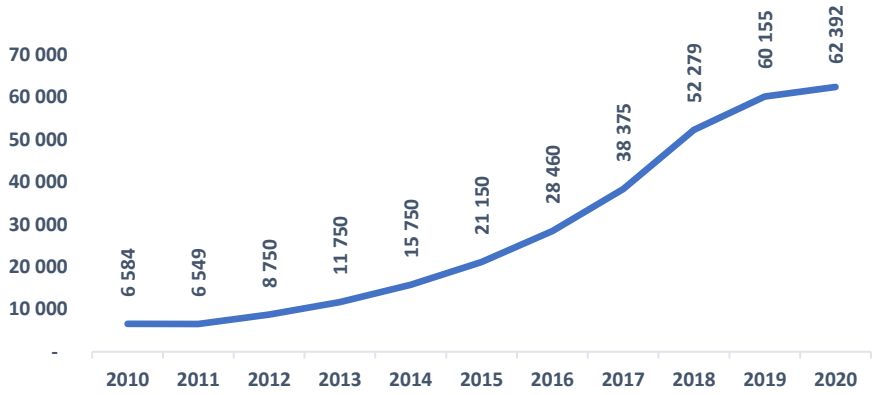


Graphic 4.3 Agricultural and forest area (%) (WB data, n.d.)

In 2018, the livestock activity contributed approximately 16% of the national GDP and 32% of the agricultural GDP. This activity is primarily developed in areas II and III of the projects, particularly in the eastern region of the country, where around 85% of the total number of herds are found. As a consequence, there is significant pressure and degradation of natural resources, as well as potential impacts on animal health (data from the Ministry of Agriculture – n.d.).

The fishing activity is developed along the 274 km coastline, estimating a catch potential of 231 thousand tons/year. In 2011, in terms of artisanal fishing, the number of fishermen was estimated at over 26,000, a large part of whom were foreigners, while the number of vessels reached 1520, 16% of which were motorized. In terms of industrial fishing, there were more than 180 licensed vessels. On average, 22 industrial fishing vessels and 99 artisanal fishing vessels were apprehended. There is a notable trend of landing fish caught in the country at the ports of Abidjan and Dakar due to deficiencies in national infrastructure and support services. This is exacerbated by a per capita consumption of fish amounting to 14.4 kg per year (data from the Strategic Plan for Fisheries Development of GB – 2015/2020).

[25] Available in: https://databank.worldbank.org/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=GNB



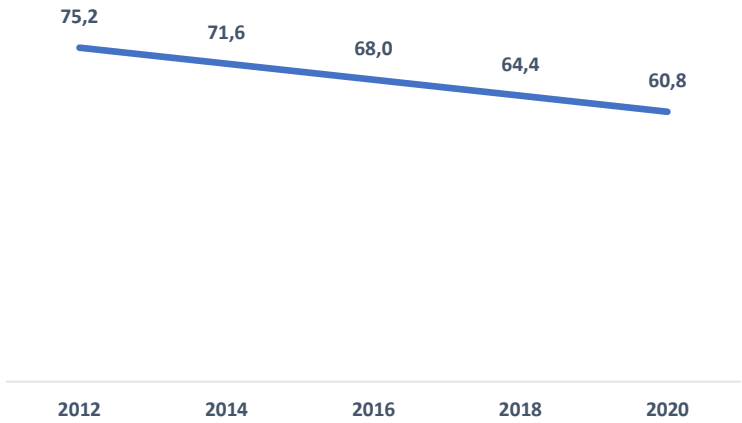
Graphic 4.4 Evolution of fisheries production (tons) (WB data, n.d.)

Tourism activity is developed primarily in zones I (Bolama-Bijagós) and II (Varela-Cacheu) of the project. According to tourism sector statistics, there were just over 52,000 tourist arrivals in 2019 (compared to 55,000 in 2018), with an average spending of 361 USD per stay. This generated a turnover (direct) of 18.9 million USD (compared to 19.7 million USD in 2018). The tourism activity is primarily developed in the coastal and island region of the country. In 2019, tourism contributed approximately 1.3 percent of the national GDP. Back in 1997, tourism revenues reached USD 3.10 million, equivalent to about 1.2 percent of the gross national product. However, there was a limited integration of local communities into the tourism value chain in the country (World Bank data – n.d.).

Graphic 4.5 Evolution of the number of arrivals and tourism revenue (WB data, n.d.)

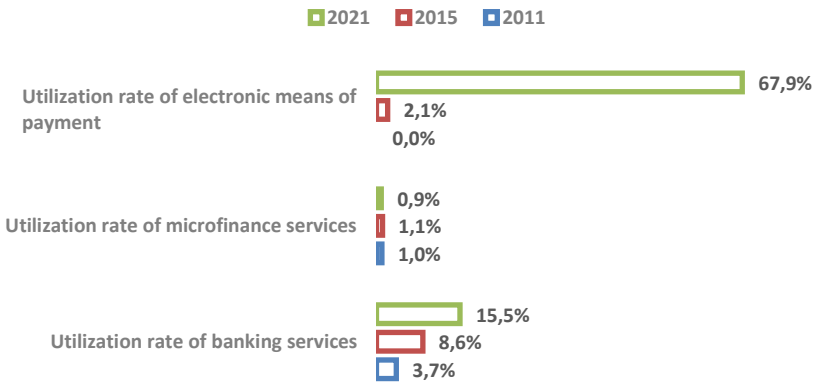
Additionally, other economic activities less relevant to the national economy, such as hunting, fish processing (drying and smoking) and derivatives, coal production, salt production, trade (distribution), etc., are conducted with a low level of procedural, documentary, and financial requirements, lacking regulation and supervision.

In the field of spatial planning and housing, it should be noted that in 2020, 45% of the population lived in urban areas (55% in rural areas), with an annual growth of 3.2%, while 61% of the urban population lived in degraded housing units. An additional note for the totality (100%) of the national population who were exposed to excessive levels of air pollution in 2017, according to World Bank data (n.d.).



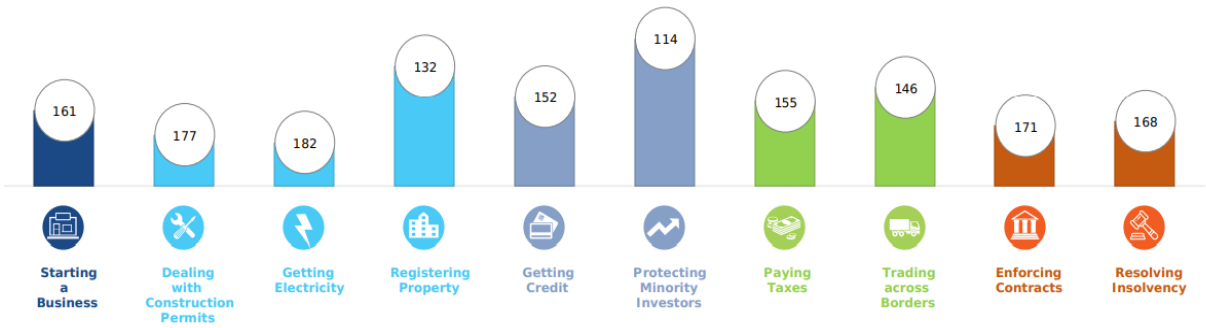
Graphic 4.6 Evolution of population living in slums (% of urban population) (WB data, n.d.)

Regarding access to financial services, according to World Bank data (2018), the country has an average of 4 (commercial) bank branches per 100,000 adults, in a banking system that is predominantly foreign-owned. According to BECEAO data (2021), the usage rate of banking services is 15.5%, while the usage rate of microfinance services is 0.91%.



Graphic 4.7 Evolution of utilization rate of financial services (%) between 2011-2015-2021 (WB data, n.d.)

Regarding the business environment, GB ranks 174th among the 190 economies analyzed in the Doing Business Index (2020). In the 10 indicators analyzed, the country exhibits a negative performance in nearly all of them, with some relatively better performances observed in the following indicators: (i) Protection of minority investors (114th) and (ii) Property Registration (132nd), as depicted in the figure below.



Graphic 4.8 performance of the Guinean economy in the Doing Business 2020 Index (Doing Business data, 2020)

For the coastal planning and occupation domain, we analyze two indicators in detail:

a. Registering Property; and
b. Dealing with Construction Permits.

According to Doing Business data (2020), Registering property implies, on average, five procedures (below the regional average - 6 days), the payment of 5.4% of the property value (below the regional average - 7.3%), and approximately 48 days to complete the process (below the regional average - 51 days). Dealing with construction permits, on the other hand, indicates the need for 13 procedures (below the regional average of 15), a cost of approximately 23.7% of the value of the development (above the regional average of 8.9), and 143 days to complete the process (below the regional average of 145 days).

It is worth noting the institutional level, where the presence of a significant entity, the Association of Women in Economic Activities (AMAE), plays a crucial role. AMAE functions as a confederation of (264) associations led by women across various sectors of activity, present in all regions of the country. Additionally, the institutionalization of the Poles of technical support for access to land for women should be considered. This structure promotes community dialogue and inclusive management of land and has been implemented under the "N'tene Terra" project[26].

Regarding training needs, with an impact on local and national capacity building in different training areas for the purpose of climate adaptation/mitigation, we highlight the following:

- ✓ Blue economy (fisheries, oceanography, port management and logistics, product conservation, management of fishery resources).
- ✓ Cartography.
- ✓ Community leadership and management.
- ✓ Climate change specializations.
- ✓ Environmental planning and management.
- ✓ Data management.
- ✓ Project management.
- ✓ Tourism (strategic and operational).

[26] The project is funded by the European Union and is being implemented by the Food and Agriculture Organization of the United Nations (FAO) in the country.

- ✓ Formalization (business management, accounting, sales and marketing, stock management, associativism and cooperativism, etc.).
- ✓ Agriculture and forestry.
- ✓ Sustainable livestock.
- ✓ Geology and mining.

Endnotes:

(I) A final call for attention to the reports collected during the field mission, which highlight a low yield of cashew (the main export product). The price stipulated by the Government at 0.34 USD (200 XOF) has a significant impact on the terms of trade, food security, and poverty reduction, with potentially increasing community pressure on coastal resources.

(II) According to data from the African Development Bank (AFDB), an estimated USD 688 million in climate finance is needed to address the GB climate mitigation and adaptation between 2021 and 2030, reducing greenhouse gas emissions by 30%, with several development partners and climate funds already positioning themselves for the respective financing.

(III) To access funding, the country should focus on harmonizing the regulatory framework dedicated to climate financing, implementing fiscal incentive measures, promoting good governance, and enhancing technical capacities.

(IV) The state of public accounts hinders strategic access to sustainable financing markets and innovative instrument. However, with the assistance of partners, the country could work towards establishing a national green fund, directing impact funds to enhance sustainability in economic activities developed at the coastal level (agriculture, fisheries, tourism, mining).

4.5 Social issues

Socially, Guinea-Bissau presents itself as a territory marked by secular migrations, slavery, colonialism, ethnic-religious dynamics, and the recent history of the (non)consolidation of the state. Currently, this results in, on one hand, a culturally rich, young, and multidisciplinary social puzzle, and on the other hand, poverty, unemployment, and vulnerability of the economic sector (see previous chapter). The average population density is approximately 48,7 inhabitants/km², with a population growth rate of 1,88%, and the estimated life expectancy at birth is 60 years (SESA ProDoc, 2018, and World Bank Data, 2020).

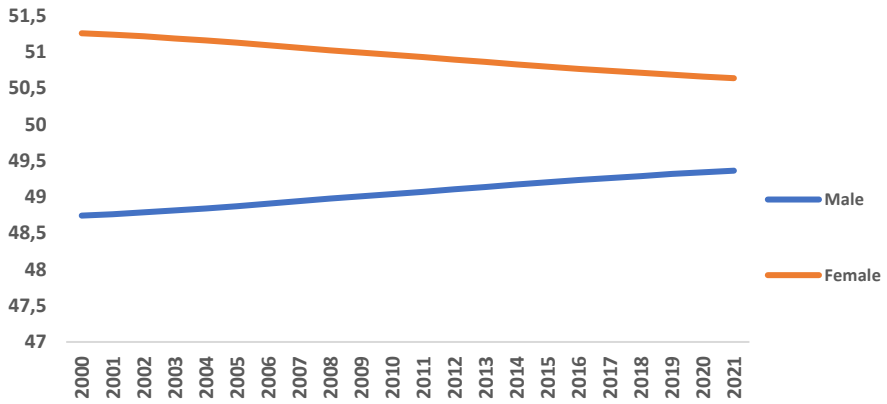
Focusing on the coastal area, where approximately 60% of the national population lives, there is a low level of preparedness among local entities to face the cross-cutting effects of climate change. This lack of preparedness results in a worsening of the impacts on the local population, particularly affecting women and children (Source: consultancy).

The information below depicts the general and specific framework related to demographic, gender equality, social inequalities, and structures.

4.5.1 Demographic dynamics

The demographic data analysis indicates that we are globally experiencing intense demographic changes. The most significant ones are as follows: (i) rapid demographic growth in some developing countries; (ii) an increase in the population between 15 and 64 years of age (productive age); (iii) a growing "urbanization" of the world population, which refers to the increase of the urban population compared to the rural population; and (iv) international migration.

These changes in population dynamics have had several impacts on economic, social, and environmental levels, giving rise to several challenges that can be overcome with relevant and appropriate policies, both public and private.



Graphic 4.9 Percentage of population disaggregated by sex in Guinea Bissau – 2021 (WB, 2022)

The data analysis indicates a decrease in the demographic gap between women and men from the year 2000 to the present date. This suggests a reduction in the existing imbalances in the population. However, the gap remains at 2% in favor of men. According to the UNFPA[27] Dashboard for Guinea Bissau (2023), the population with ages between 0 and 14 years represents 39,6% of the total population, while the age group between 15 and 64 represents 57,4%. The population aged 65 and above accounts for 4%. The data indicates that most of the population is in the productive and reproductive age.

There have been challenges in identifying data disaggregated by sex and region, as well as in the availability of general and specific data on population and demographic dynamics. The National Institute of Statistics (INE) of Guinea-Bissau published, in 2023, population projections by region, but these data were not disaggregated by sex. The lack of data represents a significant challenge in the gender and social analysis of the situation.

Table 4.6 Population projected by region 2019 -2023 (INE – Guinea Bissau, 2023)[28]

	2019	2020	2021	2022	2023
Guinea-Bissau	**1651221**	**1682149**	**1714193**	**1714793**	**1781308**
Region					
Tombali	103862	105807	107823	109898	112044
Quinara	69186	70482	71825	73207	74637
Oio	245206	249799	254558	259458	264524
Biombo	106008	107994	110051	112170	114360
B/Bijagós	36987	37680	38398	39137	39901

[27] Available in: https://www.unfpa.org/data/world-population/GW
[28] Available in: https://stat-guinebissau.com/Menu_principal/IV_RGPH/rgph1/projecoes/relatorio_projecao_2014_2063.pdf

Bafatá	228859	233146	237587	242161	246889
Gabú	234308	238697	243244	247927	252768
Cacheu	210861	214810	218902	223117	227473
SAB	415943	423733	431805	440118	448711

The challenge in implementing policies that respond to these changes lies in the need to establish measures that enable labor markets to absorb the entry of people of working age, thereby boosting economic growth and the country's development. Simultaneously, these policies should provide these individuals with access to greater human capital through improved education opportunities. (Source: UNFPA, 2023).

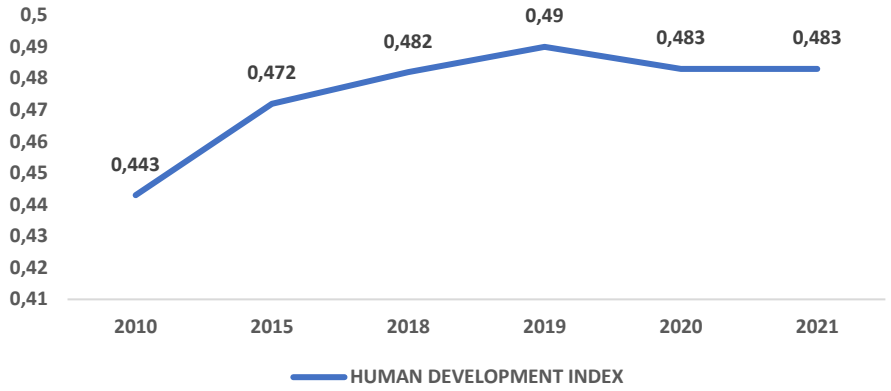
Notes: During the field mission and while listening to the local populations in the project's target areas, we heard repeatedly about the phenomenon of increasing migration, especially among young people, from rural areas to the capital, Bissau, and sometimes abroad. This migration trend has a considerable impact on the sustainability of agricultural and fishery activities. Based on the information gathered on the ground, it was observed that, in most cases, the migration process is initiated by male members of the household, leading to a continuous reduction in the available labor force, which is essential in combating the effects of climate change.

This situation has resulted in increased pressure on coastal natural resources and has also led to an overload of work for women living in rural areas within the project's target regions.

The social and gender analysis of Guinea-Bissau is directly linked to public policies that were designed to achieve human development and gender equality goals in the country. As mentioned in the subchapter on social policies, the country follows a set of measures and public policies that are included in the following planning documents:

i) National Development Plan (PND) 2020 – 2023,
ii) National Plan for Gender Equality and Equity (2017) and
iii) National Strategy for Poverty Reduction (2011 - 2015).

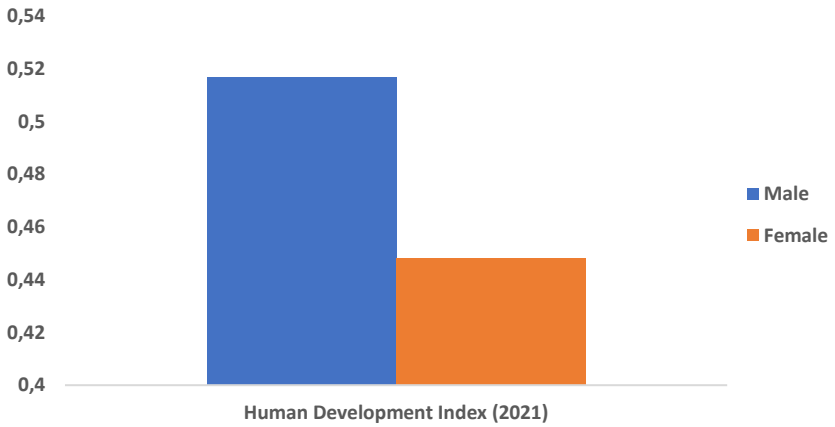
Despite extensive planning and a vision to reduce social, economic, and gender inequality, the country continues to face several challenges when compared with other countries in the Sub-Saharan region. According to World Bank data on the Poverty headcount ratio at national poverty lines (percentage of people), Guinea-Bissau's rates stand at 47,7% (2018) of the population. In contrast, other countries in the region have shown improvement, with average values of 30% of the population living in poverty (e.g., Cabo Verde 35%, Mauritania 34,5%, etc.). The UNDP Human Development Report (2022) ranked Guinea-Bissau 177th in the Human Development Index, categorizing it as a Low Human Development Country with an HDI value of 0.483. Additionally, the country's Average annual HDI growth % (2010-2021) is 0,79 (UNDP, 2022).



Graphic 4.10 UNDP Human Development Index Evolution 2010-2021 (Data from the UNDP Human Development Report 2022)

The analysis indicates a positive evolution from 2010 to 2019; however, due to the COVID-19 pandemic, the country was considerably impacted, resulting in a slight decrease in the Human Development Index. The country has designed measures to mitigate the post-pandemic crisis, which are described in the PND (2020-2023). The main goal was to combat COVID-19 and view it as an opportunity for a new economic dynamic. As for social aspects, the primary measures were aimed at economic reform, promoting growth and employment, and enhancing the living conditions of the population. The World Bank report "Guinea-Bissau, Economic Actualization" indicates a that "in 2022, poverty has returned to its pre-pandemic level and is expected to decline further in the medium term. Although the pandemic of COVID-19 is estimated to have caused an increase in poverty, recent analyses point to a gradual recovery by 2022" (Source: World Bank Data, 2022).

Although a relative improvement in the HDI is expected, gender gaps are evident. As can be seen in the chart below, there are disparities concerning the promotion of gender equality.



Graphic 4.11 Human Development Index (HDI) Disaggregated by Sex (Data from the UNDP Human Development Report 2022)

Gender disparities have a social and economic cost that significantly impacts the country's wealth generation. The World Bank (WB) estimates that in Guinea-Bissau, the losses resulting from the lack of investment in human capital due to gender disparities in income could amount to 5,6 billion USD (estimate in 2018). This

directly affects the country's ability to address the negative evolution of the HDI (Human Development Index) (World Bank Data, 2022).

4.5.2 Social Inequalities in Guinea-Bissau[29]

Social and gender inequalities are multidimensional and intersectional, based on various social and economic categories. They interact, creating a complex mechanism that cannot be interpreted, much less approached, in isolation. These issues require being seen in their relationships, interdependencies, and with an integrative approach. The analysis of social inequalities is based on these interactions and aims to provide a better understanding of the Guinean reality.

One of the main goals of the National Strategy for Poverty Reduction (PSRP II) (2011-2015), was the reduction in the incidence of poverty at the national level from 69,3% in 2010 to 59% in 2015 and in extreme poverty from 33% to 20% for the same period, considering the disparity between men and women. Recent data from the World Bank indicates that the poverty headcount ratio at 2,15 USD a day (% of population 2017 ppp) is 21,7%. According to the World Bank, *"based on the international poverty line of 2,15 USD (at 2017 purchasing power parity), poverty is estimated to fall from 19,9 percent in 2021 to 19,2 percent in 2022, after increasing in 2020 to 21,1 percent from 20,64 percent in 2019. The slow decline in poverty indicates a slow recovery of the economy, underpinned by the spillover effects of external shocks such as the war in Ukraine"*. The poverty rate is expected to continue declining, reaching 18,4% in 2023 and 17% in 2024" (World Bank Data, 2022).

However, the Multidimensional Poverty Index presented in the UNDP Human Development Report 2022 was 64,4%, with 35,9% of the population living in severe multidimensional poverty. The data indicates significant challenges due to social, economic, and cultural differences within the population of Guinea, resulting in gender, ethnic, and geographical disparities (Source: UNDP, 2022).

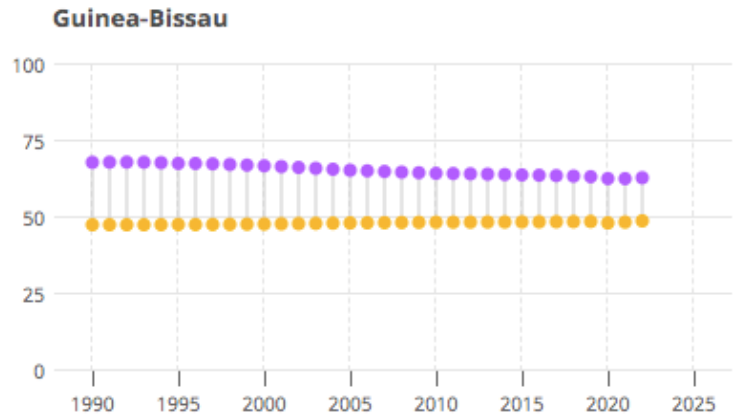
The table below includes a set of indicators regarding inequalities in the country, elaborated based on the UNDP Human Development Report 2022.

[29] The lack of data disaggregated by sex and region made it difficult to carry out an analysis based on the regions that would benefit from the projects. The INE of Guinea-Bissau was contacted and was also unable to provide data disaggregated by sex and region for the requested indicators. The only disaggregated indicator identified was "population projection", which was also not disaggregated by sex.

Table 4.7 Inequality Indicators in Guinea Bissau (UNDP Human Development Report 2022)

Inequality in Guinea Bissau	
Coefficient of human inequality[30]	36,5
Inequality in education (% of population)[31]	42,1
Inequality in income (% of population)[32]	37,9
Gini coefficient[33]	34,8

The Gini Coefficient in Guinea-Bissau indicates that, although inequality in the country is not total, income inequality remains one of the main challenges. The coefficient does not present data disaggregated by sex, which may create a biased perspective, considering that inequalities affect some more than others due to gender biases and other social categories.



Graphic 4.12 Labor force participation rate (% of population ages 15+) by sex - modeled ILO estimate (Source: WB, 2022)

One of the root causes of the existing disparity regarding income per capita is the participation in the labor force. In Guinea-Bissau, the labor force participation rate among females is 49,1%, and among males, it is 63,2% for 2022, remaining almost unchanged over the last 30 years. As pointed out by the World Bank Economic Report (2022), "*Women face other barriers that limit their economic participation, including legal barriers. According to the World Bank's Women, Business, and the Law Index, which assesses legal barriers to women's economic participation, women enjoy less than half the legal rights of men. This reduces their participation in the economy through the workforce and entrepreneurship. On a scale of 0 to 100, Guinea-*

[30] Coefficient of human inequality: Average inequality in the three basic dimensions of human development.

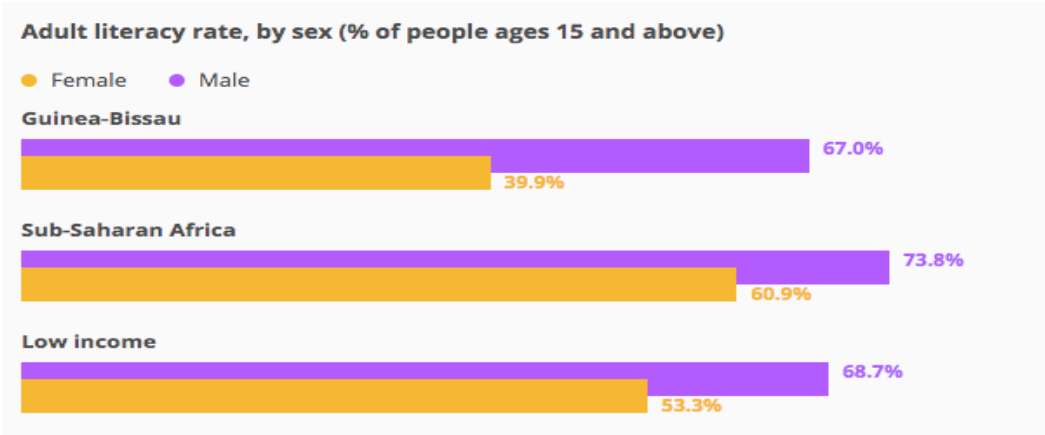
[31] Inequality in education: Inequality in distribution of years of schooling based on data from household surveys estimated using the Atkinson inequality index.

[32] Inequality in income: Inequality in income distribution based on data from household surveys estimated using the Atkinson inequality index.

[33] Gini coefficient: Measure of the deviation of the distribution of income among individuals or households in a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality.

Bissau has an overall Women, Business, and the Law score of 42,5 points, the lowest performance among West and Central African countries". These barriers have a direct impact on the UNDP-estimated gross national income per capita (2017 PPP$) of women, which is 50% less than that of men (Estimated gross national income per capita (2017 PPP$) female 1,561 – male 2,264).

The COVID-19 pandemic had a tremendous impact on access to social services, particularly the Education sector, which was heavily affected by the pandemic. Inequality in education affects 42,1% of the population in Guinea-Bissau. According to the UNDP Human Development Report (2022), the Expected Years of Schooling for women in 2021 is 10 years, while for men, it is 11,2 years. The World Bank indicates that one-third of children aged 6 to 11 years old have never attended school, and only 42% of adults aged 24 to 29 years old have completed elementary school (World Bank Data, 2022).

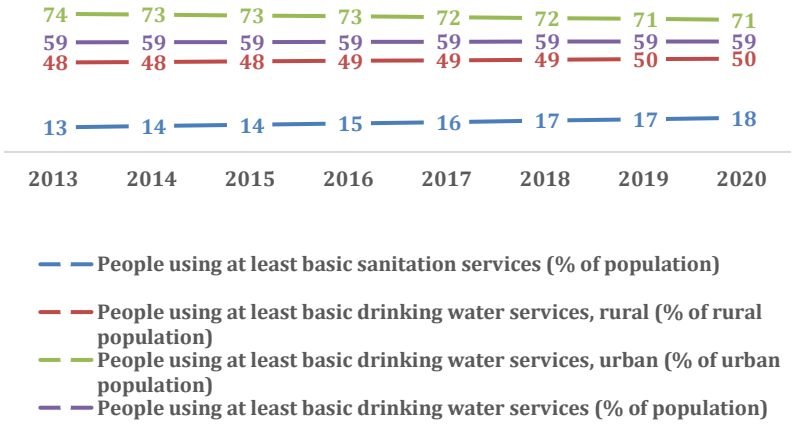


Graphic 4.13 Adult literacy rate by sex (% of people ages 15 and above) in 2021 (WB, 2022[34])

According to the World Bank Data, Guinea-Bissau has lower rates of adult literacy compared to other countries in the Sub-Saharan region and other low-income countries. The gap in adult literacy between men and women, which is 27,1, is larger than the gap of the Sub-Saharan Africa aggregate, which is 13. The adult literacy rate refers to the percentage of people aged 15 and above who can both read and write, understanding a short simple statement about their everyday life. The lack of access and the low quality of the education system in the country continue to represent challenges (World Bank Data, 2021).

In the WASH sector, inequalities persist. Approximately 50% of the population has access to at least basic drinking water services, while only 18% of the population has access to at least basic sanitation (World Bank Data, 2020). The graph below illustrates an almost unchanged situation regarding access to basic water and sanitation services from 2013 to 2020, with slight positive fluctuations observed in access to basic sanitation services in 2020.

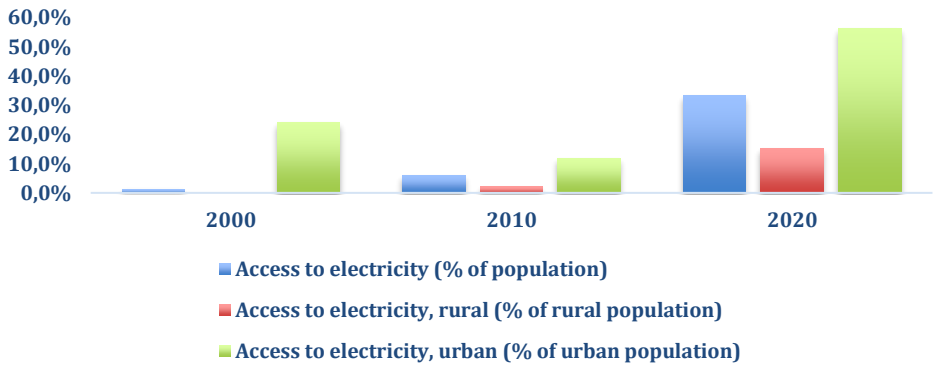
[34]Available in: https://genderdata.worldbank.org/countries/guinea-bissau/



Graphic 4.14 Water and Sanitation in Guinea Bissau 2013-2020 (PD Consult Data Base, 2020)

This situation highlights the challenges that the country could face, not only in the WASH sector but also in Environmental Management, and its impact on environmental degradation, access to basic infrastructure, and social services. However, sex-disaggregated data was not available, and the analysis was gender-blinded in this case.

Access to energy significantly influences people's economic autonomy, particularly that of women, while also impacting the possibilities for sustainable development. Regarding access to electricity, the country has shown positive progress over the last 20 years. However, regional and geographical disparities are still evident.



Graphic 4.15 Access to electricity 2000 – 2020 (PD Consult Data Base, 2020*)*

In the case of Guinea Bissau, important gaps have been identified, especially in access to energy between urban and rural areas. In the urban area, 50% of the population has access to energy (Source: World Bank, 2020), while in the rural areas, only 18% share the same access. Moreover, considering social structures and housing, 61% of the population in urban areas are living in slums (Source: World Bank Data, 2020).

Notes: During the field mission to the project's target areas, it was evident that there is a lack of access to basic goods and services, such as water, sanitation, and electricity.

Concerning clean water, this issue disproportionately affects women, who often have to travel long distances to secure this essential resource.

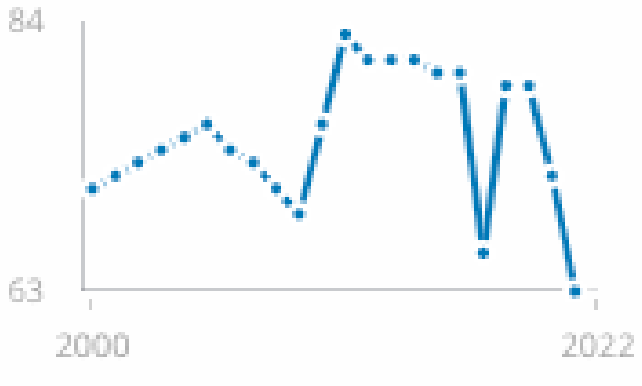
Regarding the limited access to basic sanitation, it is crucial to consider the country's high proportion of continental and island territory at sea level, as well as its tropical climate with extended periods of rainfall. These factors contribute to a regional ecosystem where diseases like malaria, cholera, and other related illnesses are prevalent.

As for energy access, only the capital, Bissau, receives relatively acceptable average frequency of service, although energy cuts are still frequent. Other regions rely on sporadic energy supply, only available in the main urban centers, which hinders the sustainable development of economic activities.

In the coastal areas of Guinea-Bissau, the lack of access to basic goods and services significantly impacts daily life for families, institutions, and businesses. Specifically, it affects (i) the chain of fish and bioproducts conservation (mostly involving female workers) and (ii) the tourism development chain (including complementary services).

Health and nutrition[35] are categories used by the World Bank to measure the country's situation and the existing inequalities. In 2020, life expectancy at birth in Guinea Bissau was 60 years old, indicating a positive evolution from 2000 (50 years old) to 2020 (60 years old).

The percentage of children (12-23 months) who received measles immunization in 2021 was 63%. The country experienced a positive evolution; however, the COVID-19 pandemic had a significant impact. Health infrastructure, along with the provided health services and access to appropriate treatment, represents social inequalities in the country. According to data from the World Bank (2020), 81% of people are at risk of incurring catastrophic expenditure for surgical care, indicating the fragility of the health system (Source: World Bank Data, 2020).



Graphic 4.16 Immunization, measles (% of children ages 12-23 months) (WB, 2021)

4.5.3 Gender Inequalities in Guinea-Bissau[36]

The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) defines the core obligations of the state to eliminate discrimination against women. These obligations include: (i) Ensuring

[35] Available in: https://data.worldbank.org/country/guinea-bissau?view=chart

[36] The lack of data disaggregated by sex and region made it difficultto carry out an analysis based on the regions that would benefit from the projects. The INE of Guinea-Bissau was contacted and was also unable to provide data

that its laws do not contain elements of direct or indirect discrimination and that they protect women against discrimination, (ii) Improving the status of women through concrete and effective policies and programs, (iii) Addressing persistent gender relations and gender stereotypes affecting women, not only through the acts of individuals but also through the legal framework, social structures, and institutions. The concluding observations of the Committee on the Elimination of Discrimination Against Women in Guinea-Bissau, in August 2009 *"commend the State party for ratifying the Convention on the Elimination of All Forms of Discrimination against Women without reservations"*. However, gender inequalities continue to have deep roots in social, economic, institutional, legal, and cultural dynamics of the country.

"The impacts of climate change on human life in Guinea-Bissau is severe and therefore it has become urgent to focus on people-oriented climate change solutions and particularly consider the gender dimension of resilience and adaptation strategies to climate change. Structural inequalities between men and women in Guinea-Bissau are dictated by cultural and economic context and by specific social and political circumstances. Exclusion and discrimination of women in Guinea-Bissau are based on the logics of patriarchal power, reflected in phenomena such as female mutilation, domestic violence, early marriages, limited access to resources, land and credit, weak institutional representation, inequalities in the judicial and economic fields, as well as in education, especially in rural areas. Less literate and less educated, more exposed to health risk factors and with less access to means of production and decision-making, Guinean women are more exposed and vulnerable to climate change and unable to fully participate in the development of the country" (UNDP, 2018).

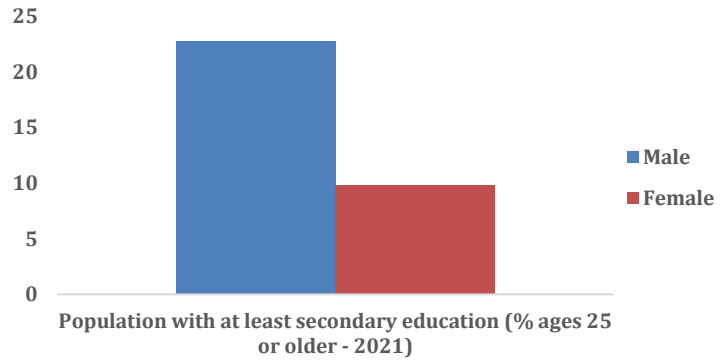
The baseline analysis of the situation will focus on three dimensions of women's autonomy: (i) Economic Autonomy, (ii) Physical Autonomy, which includes Gender-Based Violence (GBV) and Sexual and Reproductive Health, and (iii) Autonomy in decision-making.

According to the UNDP Human Development Report (2022), Guinea-Bissau is ranked 159th in the Gender Inequality Index, with a score of 0.627. This score indicates that gender fares lower in different dimensions of gender equality. Regarding social structures, the UNDP Gender Report (2021) suggests that "*The principal ethnic groups, Fula, Balanta, Mandinga, Manjaco and Pepel all have traditional beliefs and practices that restrict women's roles and rights. The Bujugu group of the Bijagos Archipelago in the Bolama region are an exception as they have a uniquely matrilineal structure*" (Fernandes, 2012).

Economic Autonomy

Access to formal education is crucial for promoting gender equality and providing access to quality employment and economic opportunities. Simultaneously, it contributes to the development of cognitive and non-cognitive skills that impact individuals' production capacity. Ensuring women and girls' access to education is considered an inseparable factor in fostering women's autonomy, allowing them to (i) generate their own income and resources, (ii) have control over their bodies, and (iii) participate in decision-making that affects their collective lives. This guarantees the exercise of their rights in a context of full equality.

disaggregated by sex and region for the requested indicators. The only disaggregated indicator identified was "population projection", which was also not disaggregated by sex.



Graphic 4.17 Percentage of population with at least secondary education in 2021 (UNDP, 2022)

The WB data indicates a gap of over 10 percentage points with respect to women and girls. This gap has a direct impact on their capacity to generate income and resources, while also creating barriers to access the formal labor market and social security and protection. The World Bank points out that "*only 8.6% of girls and 45.3% of boys, complete lower secondary school in Guinea-Bissau. The gap in lower secondary completion rate between boys and girls, 16.7, is larger than the gap of the Sub-Saharan Africa aggregate. Lower secondary education completion rate measures how many children have completed the last grade of lower secondary education regardless of age completed*" (Source: WB Data, 2010).

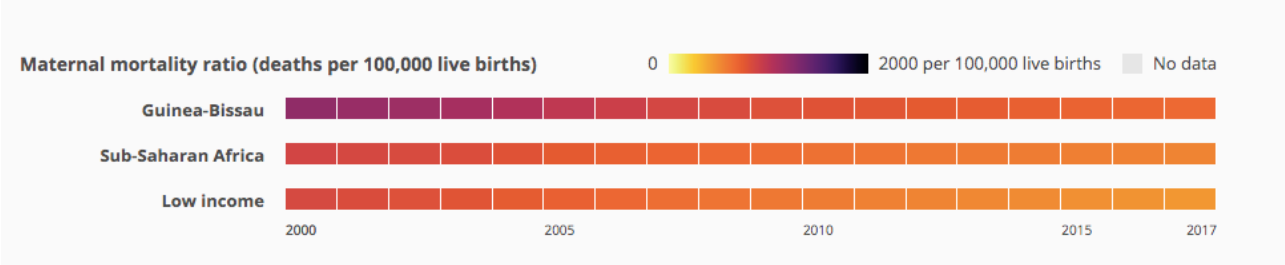
Access to education is crucial for women's autonomy and economic empowerment. There is an assumption that improvement in the level of women's education guarantees access to the labor market and quality employment. However, existing data suggests that women, despite the advances made in education, continue to have greater difficulties in accessing quality jobs. According to WB data, unemployment rates are 9% for the population with advanced education and 3% for the population with basic education. Regarding employment among the population with advanced education, we can identify significant gender gaps. For the same indicator, the value is 16% for men, whereas women in the same situation have a significantly lower value of 5%, suggesting an 11% gender gap that negatively affects women. The data illustrates that improvements in women's level of education alone may not result in greater access to the labor market and quality employment (WB Data, 2018).

There are several issues that can be explored to explain the causes of the difficulties women encounter when accessing the labor market. These issues include poverty of time, reproductive work, institutional and legal discrimination, among others. The UNDP Gender Analysis (2021) refers to certain discriminatory practices. "*Maternal / paternal / parental, paid and unpaid leave for extended periods of child education have to be introduced into the GLL and adapted according to international standards, including public support for the care and education of young children and nurseries integrated in the company. Women's return after maternity to equal work (in terms of quality and payment) are not fully guaranteed, there are no regulations for mothers' part-time work or extended periods for educational objectives (with/without remuneration) without losing their rights in the contract*" (UNDP Data, 2021).

Physical Autonomy

Physical Autonomy is a central dimension in gender equality promotion and it is profoundly related to all the other dimensions. The violations of rights related to physical autonomy have effects on women's economic autonomy in terms of their ability to generate their income, lower productivity levels, work absenteeism, poverty, among others. Additionally, the lack of physical autonomy or difficulties in controlling their bodies have repercussions on the conditions necessary to achieve economic autonomy.

In the country, according to the UNFPA (2018), there is no data on the % of women who make their own informed decisions regarding sexual relations, contraceptive use, and reproductive healthcare (% of women 15-49). This information highlights the lack of public policies on sexual and reproductive health. This is an especially concerning situation that affects the Maternal Mortality ratio (deaths per 100,000 births/2017), which is very high in the country, at 667 deaths per 100,000 births. Maternal mortality[37] in Guinea-Bissau is higher than the regional average. The maternal mortality ratio is the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births.



Graphic 4.18: Maternal mortality ratio (deaths per 100,000 live births) 2000-2017 (Source: World Bank, 2022)

The lack of data regarding sexual and reproductive health is alarming. For instance, we are unable to obtain data regarding:

- demand for Family Planning satisfied by Modern Methods – The percentage of women aged 15-49 who have their need for family planning satisfied.
- women's choice - Percentage of women who make their own informed decisions regarding sexual relations, contraceptive use, and reproductive health care (% of women 15-49).

The National Plan for Gender Equality and Equity (II), validated in 2017, has a specific objective on health, but lacks targets, activities, or any measures on sexual and reproductive health of women.

Gender-based violence (GBV) is a phenomenon deeply linked to issues of power, control, and decision-making, and therefore to women's autonomy and their ability to guarantee the exercise of their rights in a context of full equality. According to the UNDP Gender Analysis (2021), "The acts of GBV include: Domestic violence, sexual abuse and/or rape, including marital rape; gender-specific traditional and cultural practices that cause harm, including FGM (Female Genital Mutilation), sexual exploitation and forced prostitution; intimidation and sexual harassment at the workplace and in public". The report refers that the percentage of women aged between 15-49 years old that have undergone FGM/C, varies among the different regions of the country, ranging from 10% to 80%, with some regions reaching as high as 80%.

There is a lack of official (INE) data regarding GBV in the country on:

- proportion of women victims (15-49 years old) of GBV, exerted by current or former intimate partner by type of violence.
- proportion of women victims (15-49 years old) of sexual violence, exerted by current or former intimate partner.
- proportion of women victims (15-49 years old) of physical violence, exerted by current or former intimate partner.

37

- number of feminicides.

According to the UNDP Gender Analysis (2021), Sylvia Roque (2011) indicates that "*reported cases of GBV are highest in Bissau, Bafatá, Gabú and Oio (p. 14), with a steady increase in complaints from 2006 through 2009, which is interpreted as a positive sign of women's increased willingness to report rather than an increase in violence (p. 21). Among women surveyed, 44% of women said they had been victims of physical violence, and 43% of sexual violence (21% rape and 22% sexual harassment)*".

Gender is a social category, and its complexity of analysis includes the understanding of social norms. The UNDP Gender Analysis (2021) refers that "*Domestic violence, early and forced marriage, levirate marriage and female genital mutilation, as well as deep-rooted stereotypes regarding the roles, responsibilities and identities of women and men in all spheres of life in Guinea-Bissau, continue to shape gender relations*".

The report also highlights cultural practices that raise concerns regarding the promotion of gender equality:

- **the culture of "matchundadi"** – consists of a set of values, behaviors, symbols, and practices guided by a worldview based on characteristics understood as typical of men and masculinities, in which the following aspects stand out: the exercise of strength (both physical and symbolic), the exaltation of courage and rebellion, intimidation (through fear and repression), and the exercise of various forms of violence (physical, institutional, political, social, and symbolic). This is associated with certain symbols of "matchundadi" related to violent gender relations and "Fanadu di mulher" (Female Genital Mutilation).
- **traditional and social norms**: The principal ethnic groups, Fula, Balanta, Mandinga, Manjaco and Pepel, all have traditional beliefs and practices that restrict women's roles and rights. From a cultural point of view, early marriage continues to be a recurring practice in almost all ethnic groups of Guinea-Bissau.

Notes: During the field mission, signs of social inequality between men and women were observed and confirmed, with motivations linked to cultural (ethnic/religious) and economic dimensions. These factors have led to the normalization of phenomena related to violence and the undervaluation of women.

One significant consequence of the gender situation in the country is the access of women to land, which is influenced by the secular practices of ethnic groups. Conversely, there is a different situation among the ethnic group called "Budjugu", which is predominantly present in the Bijagos Archipelago. According to their ethnic traditions, women are the landowners.

It is important to note the relatively successful implementation of the "N'tene Terra" Project, which led to the establishment of the national land commission, 08 regional land commissions, and 38 sectoral land commissions. Additionally, a multi-stakeholder platform was created at national, regional, and sectoral levels, and 254 community lands were demarcated across approximately 90 tabancas of Guinea-Bissau.

Through discussions with various stakeholders, it was evident that different initiatives and projects have been undertaken to challenge the prevailing "Matchundadi" paradigm and the secondary role of women. The impact of these efforts has been positive, fostering greater awareness among the new generation of women, albeit with a relatively slow pace of transformation.

Autonomy in decision-making

Autonomy in decision making is a fundamental right of all human beings and is considered one of the unavoidable issues for the empowerment of women and the exercise of their rights and freedoms in a context of full equality. There are numerous restrictions, both locally and globally, that hinder women's access to

political participation and leadership positions, among them structural barriers that are reinforced through discriminatory laws and practices that are transmitted culturally, socially, and institutionally, among others.

The United Nations Fourth Conference on Women, held in Beijing in 1995, recognized autonomy in decision-making as a key factor in promoting women's empowerment. This issue was picked up in the Beijing Platform for Action as one of the 12 critical areas regarding women's rights. In 2011, the United Nations General Assembly resolution on women's political participation pointed out that: "*Women in all parts of the world remain largely on the margins of the political sphere, often as a result of discriminatory laws, practices, attitudes and gender stereotypes (...)*".

Notes: In Guinea-Bissau, the recent election results of June 2023 show that only 11.3% of the seats in parliament (11 out of 102) are occupied by women, indicating a significant gender gap in political and public representation.

Additionally, it is worth noting the progress made by the Association of Women in Economic Activities (AMAE), which serves as a confederation of 264 women's associations engaged in various sectors across the nation. Furthermore, successful projects promoting cooperativism, intergenerational community dialogue, and capacity building for women have been implemented.

4.5.4 Social structures

The population of Guinea-Bissau is very diverse, consisting of approximately 30 different ethnic groups. These groups occupy specific areas that have been well demarcated throughout its history, based on geographical constraints and determined by wars that led to migration from the interior to more protected regions. These specific settlement areas, with diverse languages and religions (Islam - Sunni, approximately 42%; animist cults - traditional African religions, approximately 45%; and the remainder divided among Catholics and other Christian denominations, including atheists), are distributed as follows:

- the countryside, where the Fulas (about 23 per cent) and Mandingas (about 12 per cent) dominate.
- the north, where the Balantas prevail (around 27%), with the Manjacos of Cacheu in their neighborhood (around 11%), the Papeis of Bissau (around 10%) and, with less representation, the Felupes, Baiotes and Mancanhas or Brames of the northern area.
- on the southern mainland, the Biafares and the Nalus.
- on the islands, the Bijagós.

The UNDP Gender Analysis (2021) indicates "*Ethnic groups that traditionally grow rice and practice traditional African or Christian religions are concentrated on the coast, such as Balantas, Mancanhas, Manjacos and Pepel, the latter predominating in Bissau. In the north, Mandingas, known for their reputation as traders and farmers, are the majority group and, in the east, the Fulas predominate who traditionally practice pastoralism and who, like Mandingas, are commonly referred to as Islamized groups. In this way, the spatial distribution of ethnic groups establishes a certain dichotomy between coastal, Christian and animist groups, and those from the interior, Islamized groups, which is an important factor in the structuring of the Bissau-Guinean society*".

4.5.5 Endnotes

(I) Political instability can be considered the main cause of the socio-economic instability experienced by Guineans in recent decades.

(II) Territorially, there are social phenomena that cut across the target areas of the project, such as unemployment and youth unemployment, lack of access to basic goods and services, school dropout, disruption of the public health and education systems, despite the differentiated impact based on gender, place of residence, degree of periphery, level of education, etc., on different households.

(III) Please note the existence of sacred areas, as stipulated in the Reserve Plan of the Bijagós Region. However, the corresponding mapping and delimitation of the other units throughout the national territory, as proposed in this document, are currently missing.

(IV) There have been successful livelihood-building projects, especially for families led by women, linked to sustainable salt production, an eminently female activity. Hundreds of women have recently been trained, not only in the technical component of production, but also in the financial, cooperative, and marketing components, thus reinforcing the levels of sustainability, integration and ownership of the project.

(V) Despite initiatives to strengthen female access to land, it is necessary to ensure greater continuity in the implementation, monitoring, and evaluation of public policies in this regard.

(VI) The implementation of a sustainable local development agenda is essential, not only as a mechanism to ensure the achievement of the SDGs but also as a strategy to encourage the engagement of local youth and their involvement in key economic sectors such as the agricultural value chain, fisheries, commerce, and tourism. These sectors represent the primary activities in the coastal territory of Guinea-Bissau, wherein women and young people play a significant and leading role.

(VII) Key project institutions (territorial administration, environmental administration, labor administration, administration of economic activities, administration of justice, etc.) should strengthen the respective readiness indices for efficient and sustainable sectoral and multisectoral governance among consumers, investors, funders, and partners.

(VIII) Climate change has greatly impacted the development of various activities carried out in the Guinean coastal territory, namely:

- Agricultural activity, with successive loss of agricultural wafers, by salinization of water and fall of retention dams, exacerbated by the migration of young people from rural areas.
- Fishery activity, by raising the average warming of waters with deregulation of the breeding calendar and migration of certain species, exacerbated by increased pressure on fishery resources. It is important to note that considerable pressure is primarily carried out by fishermen from Senegal and Guinea-Conakry.
- Tourism activity, through increased coastal erosion, affecting tourism investments made on the coast, in addition to tourist activity, which still lacks greater local community integration.
- Extractive activity: The signing of an oil exploration agreement was also recorded in the joint exploration area with Senegal, which could have harmful effects on the country's coastal territory if mitigation measures are not taken.

4.6 Relevant projects related to climate finance in coastal zones of Guinea-Bissau

Hereafter, the results of the analysis aiming at identifying the most relevant projects related to climate finance and addressing climate resilience and climate adaptation in the coastal zones in the Country, are presented. The list also includes climate mitigation projects related to LULUCF. It does not include capacity building, institutional strengthening, and renewable energy projects.

Table 4.8 Projects related to climate finance in coastal zones

Projects	Period	Financial and technical partners	Main objectives
Adaptation of agricultural production systems in Coastal Areas of Northwest GB	2023 - 2028	Green Climate Fund (GCF) Sahara and Sahel Observatory (OSS)	• Strengthened capacity and knowledge management to monitor and address water and agriculture-related climate risks. • Sustainable management of coastal ecosystems leading to climate-resilient communities in Oio and Cacheu. • Enhanced climate-resilient livelihoods, food and water security of the most vulnerable people in coastal communities in Oio and Cacheu Region.
Promoting better access to modern energy services through sustainable mini-grids and low-carbon bioenergy technologies among Guinea-Bissau's forest-dependent communities	2023 - 2028	UNDP-GEF Ministry of Environment and Biodiversity (MAB)	The project objective is "To promote investment and sustainable business models in both solar mini-grids and low-carbon bioenergy technologies", specifically focusing on the adoption and promotion of low-carbon energy technologies for communities dependent on protected areas (Gabu region, Cacheu region, Lake Cufada and Cantanhez Natural Park). The project is structured into 3 Components which are: • Component 1: Policy and financial instruments and incentive scheme for solar mini-grids and low-carbon bioenergy technologies. • Component 2: Capacity building for mini-grid and low-carbon bioenergy. • Component 3: Mini-grids and low-carbon bioenergy technologies roll-out.
Strengthening climate information and early warning systems for climate resilient development and adaptation to climate change in Guinea-Bissau	2022 - 2028	UNDP-GEF Ministry of Transport and Telecommunications – National Institute of Meteorology (INM) Ministry of Agriculture and Rural Development (MADR) / IFAD (PADES and REDE Projects) MRNE Ministry of Natural Resources and Energy / Gambia River Basin Organization (OMVG) Ministry of Environment and Biodiversity (MAB) / West African Development Bank (BOAD)	The objective of this LDCF-financed project is "To strengthen the climate monitoring capabilities, early warning systems and information for responding to climate shocks and planning adaptation to climate change in Guinea-Bissau". The Project is structured across towards 3 Components: • Component 1: Transfer of technologies for climate monitoring infrastructure. • Component 2: Climate information integrated into priority development plans and early warning systems to support the NAP process. • Component 3: Monitoring, evaluation, and knowledge management.
Enhancing livestock resilience to drought in GB [*]	To Be Defined (TBD) Concept note	Green Climate Fund (GCF) Banque Ouest Africaine de Développement (BOAD)	• Restructure the transhumance practice and strengthen the technical and organizational capacities and define the pastoral routes and transhumance corridors. • Stabilize families of pastoralists, particularly young people, through grazing development and

	prepared in 2018		the installation of local hydraulic infrastructures, in particular: human-powered boreholes, reservoirs dual purpose livestock farming. • Share knowledge, disseminate lessons learned and replicate the project.
Family Farming Diversification, Integrated Markets, Nutrition and Climate Resilience Project (REDE Project) [*]	2019 - 2026	Adaptation Fund, Abu Dhabi Fund for Development, Kuwait Fund for Arab Economic Development and the African Development Bank, IFAD, MAF	Assistance for family farming diversification and climate change adaptation to increase access to markets and dietary diversity in the Bafatá, Cacheu, Gabú and Oio regions, while fostering entrepreneurship among rural youth and women, persons with disabilities and migrants.
GCCA+ in GB: building resilience to climate change through enhanced institutional and mitigation capacities [*]	2016 - 2022	EU, State Secretariat for the Environment (SEA), Climate Change Secretariat; IBAP	The specific objective is to enhance national capacities to address climate change through the strengthening of governance systems and reduction of deforestation and forest degradation, mainly in the national protected areas system (SNAP). On this objective, the FREL of the SNAP was realized. Among the main actions the promotion of activities that reduce pressure on forest resources while generating adaptation and development co-benefits
Project on climate adaptation [*]	TBD [38]	Adaptation Fund World Food Programme	TBD
WACA Res IP2[39]	2023 - 2028	World Bank IBAP	• Supporting ICZM plans and land-use strategies. • Supporting to flood and erosion control. • Supporting ecosystem management and restoration and improved management of protected areas. • Supporting effort to reduce emission from land degradation and deforestation (REDD+ and others). • Supporting targeted subproject for local communities.

[*] Projects that do not refer only to the coastal zone

Sources: GCF and World Bank websites and consultative meetings

Additionally, it's important to underline that some readiness and institutional capacity projects on REDD+ were developed. Recently (April 2023), a GCF/FAO project on REDD+ readiness was approved. At this moment, there are no conditions for REDD+ concrete projects in the Country, able to financially compensate measures to carbon emission from forests, but in the future, it's expected that the Country will be able to receive financial contributions for REDD+ projects, at least in pilot-site. Currently, institutions in the country are starting some direct negotiations to sell carbon credits. Two pilot-sites were identified by the IBAP in the Parque Natural das Tarrafes do Rio Cacheu e in the Parque Nacional de Cantanhez.

[38] The project preparation is an early stage.

[39] It interests also other countries in West Africa. The table refers to activities in GB, relevant for this section.

5 Disaster risk analysis and management

5.1 The magnitude of disaster risk

Small Island Developing States (SIDS), such as GB, are considered especially vulnerable to the risks of the negative impacts of climate change and are a major concern to the United Nations Framework Convention on Climate Change (UNFCCC), established in 1992, and subsequent treaties, such as the Paris Agreement (2015)[40]. The vulnerability of these countries is due to the large concentration of population in low-lying coastal areas, small size and geographic isolation, limited resource base and high dependence on the international market, high susceptibility to natural hazards, low economic resilience, and limited institutional and technological capacities for mitigation and adaptation (Fandé, 2020a; Kelman, 2018).

GB is recognized as one of the most vulnerable countries to climate change according to various indexes including the Climate Change Vulnerability Index (CCVI)[41] which ranks GB as the second most vulnerable in the world, and the ND-Gain which ranks it as the 10th most vulnerable country.[42] Historically, GB is vulnerable to natural disasters[43]. It is subject, among others, to risks of technical origin (mining, road, maritime and industrial accidents, and fires), of socioeconomic and political origin (social conflicts, political instability, refugees, and displaced persons), epidemics (cholera, meningitis, avian flu, anthrax, HIV/AIDS), and of natural origin (floods, storms, coastal erosion, drought, soil erosion, and marine intrusion) (RGB, 2013).

Agriculture, water resources and coastal areas are particularly vulnerable. In the coming decades, a number of climate change projections predict that temperatures will increase, drought and flooding are likely to become more extreme, while precipitation may become more volatile (i.e., torrential and heavy rains becoming more frequent in a short period of time). Increased frequency of extreme weather events is expected to result in more disasters due to loss of crops and infrastructure. The spatial and temporal variability of climate change events will also increase, further contributing to greater variability in the existing and future availability of water resources in GB. The main climatic factors are changes in precipitation patterns and amounts, rising air temperatures and rising sea levels. These drivers are already impacting the country in the form of biodiversity loss, desertification, and land degradation, posing substantial and real threats to all vital sectors that constrain economic growth, exacerbate poverty and social inequalities and further threaten the success of development policies aimed at lifting people out of poverty (Elittoral - Gesplan – Sistema Ingenieria, 2023).

The IPCC Fifth Report projected a rise in global mean sea level of 0.26 to 0.98 m by the year 2100, relative to 1985–2005, and recognizes the possibilities for this to be exceeded (IPCC, 2013). However, several studies (e.g., Horton *et al.*, 2014; Jackson and Jevrejeva, 2016; e.g., Jevrejeva *et al.*, 2016; Kopp *et al.*, 2014, 2017) based on different climate models suggest that the IPCC report underestimated future Sea Level Rise (SLR), estimating elevation values greater than 1 m by the year 2100.

A World Bank report indicated that in West Africa, under the RCP8.5 scenario, the SLR should be situated at 1.05 m (0.85 to 1.25 m) in the period of 2080–2100 (World Bank, 2013). A study by Jevrejeva *et al.* (2016)

[40] GB is a signatory to the UNFCCC and ratified the Paris Agreement in April 2016.

[41] Maplecroft's CCVI.

[42] ND-GAIN index available at https://gain-new.crc.nd.edu/ranking

[43] Natural disasters result from a combination of natural hazards and vulnerability factors. In recent years, their frequency and intensity have increased, posing a constant threat to the lives and livelihoods of populations (Fandé, 2020a).

provided SLR projections for some major West African towns for the years 2041, 2083 and 2100, based on the RCP8.5 scenario (Table 5.1).

Table 5.1 Sea Level Rise projections for different towns on Africa West Coast in 2041, 2083, 2100 based on RCP8.5 scenario (Jevreiva et al. 2016 in Fandé, 2020a)

Town/Country	2041	2083	2100
Dakar / Senegal	0.35	1.25	1.99
Conakry / Guinea	0.34	1.22	1.95
Acra / Ghana	0.35	1.24	1.97
Lomé / Togo	0.35	1.23	1.94
Lagos / Nigéria	0.34	1.20	1.92

Sally Brown *et. al* (2011) projected GB sea-level rises of 0.13 m, 0.35 m, 0.72 m, and 1.22 m by 2025, 2050, 2075, and 2100, respectively and estimated that a SLR of 0.13 m in 2025 could result in the annual flooding of 77 800 people, and a SLR of 0,35 m in 2050 could lead to 179 800 people being flooded each year.

Fandé (2020a, 2020b) evaluated risk and adaptation to coastal erosion and inundation in SLR scenarios in the following areas of GB: Bissau, Bubaque and Suzana. For the purpose, various methods were used: aerial photographs and satellite images, to quantify the historical evolution of the shoreline over a period of 41 years; the "bathtub" method, to quantify and map the inundation in different years of the 21st century under the RCP8.5 scenario; a survey by questionnaire, to analyse stakeholders opinions on risk and adaptation; adaptation pathways, to prioritize adaptation measures in different time horizons of the 21st century under the RCP8.5 scenario. A single flood surface model ("bathtub" model) was used, which considers the topography of the land, obtained from the Digital Elevation Model (DEM), and a value of the Total Water Level (TWL), estimated through the sum of Meteorological Superelevation (MS), Tide Elevation (TE) and SLR. MS is the "abnormal water level fluctuation resulting from severe atmospheric disturbances, such as strong winds and atmospheric pressure changes (generally associated with typhoons, extratropical cyclones and other extreme events), which causes the tide level within the affected area to greatly exceed the normal level" (Kang, Ma and Liu, 2016, p. 440). TE was determined with reference to the maximum equinoctial tide of the year 2015. Concerning the SLR, in the absence of local data, projections by Jevrejeva *et al.* (2016) for the city of Conakry - Republic of Guinea were used (0.34 m for 2041; 1.22 m for 2083; and 1.95 m for 2100), based on the upper limits of the RCP 8.5 scenario.

Table 5.2 Total Water Level in the present condition and future scenarios in in each study area (Fandé, 2020a)

	Bissau				Bubaque				Suzana			
Ano	**2018**	**2041**	**2083**	**2100**	**2018**	**2041**	**2083**	**2100**	**2018**	**2041**	**2083**	**2100**
TE (m)	2.95	2.95	2.95	2.95	2.39	2.39	2.39	2.39	1.81	1.81	1.81	1.81
MS (m)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
SLR (m)	0	0.34	1.22	1.95	0	0.34	1.22	1.95	0	0.34	1.22	1.95
TWL (m)	3.25	3.59	4.47	5.2	2.69	3.03	3.91	4.64	2.11	2.45	3.33	4.06

Flooding maps were elaborated in the 2018 condition and in future SLR scenarios in the three coastal areas.

It should be noted that the percentage of flooded area shows a different rate of increase in the study areas, which is strictly associated with the topography, coastal slope and hydrological connectivity with the sea of the inland lowlands. Another important element that reflects on the flooded land area is the variation in the TWL, which is due to TE differences in the three areas. Anyway, future coastal flooding will not only depend

on these factors, as it will also be influenced by the evolution of geomorphological factors (erosion, sedimentation) and by human activity, as well as by coastal processes (waves, currents), geographic location and existing natural protection in each area. For example, the sandy nature of the coast and the high rate of erosion in Suzana could contribute to increase the risk of flooding (Fandé, 2020a).

Table 5.3 Total flooded area (km^2) in the present condition and future scenarios in each study area (Fandé, 2020a)

Ano	Bissau	Bubaque	Suzana
2018	19.60	6.18	2.84
2041	21.76	7.49	2.94
2083	25.62	11.06	14.43
2100	27.78	13.72	52.94

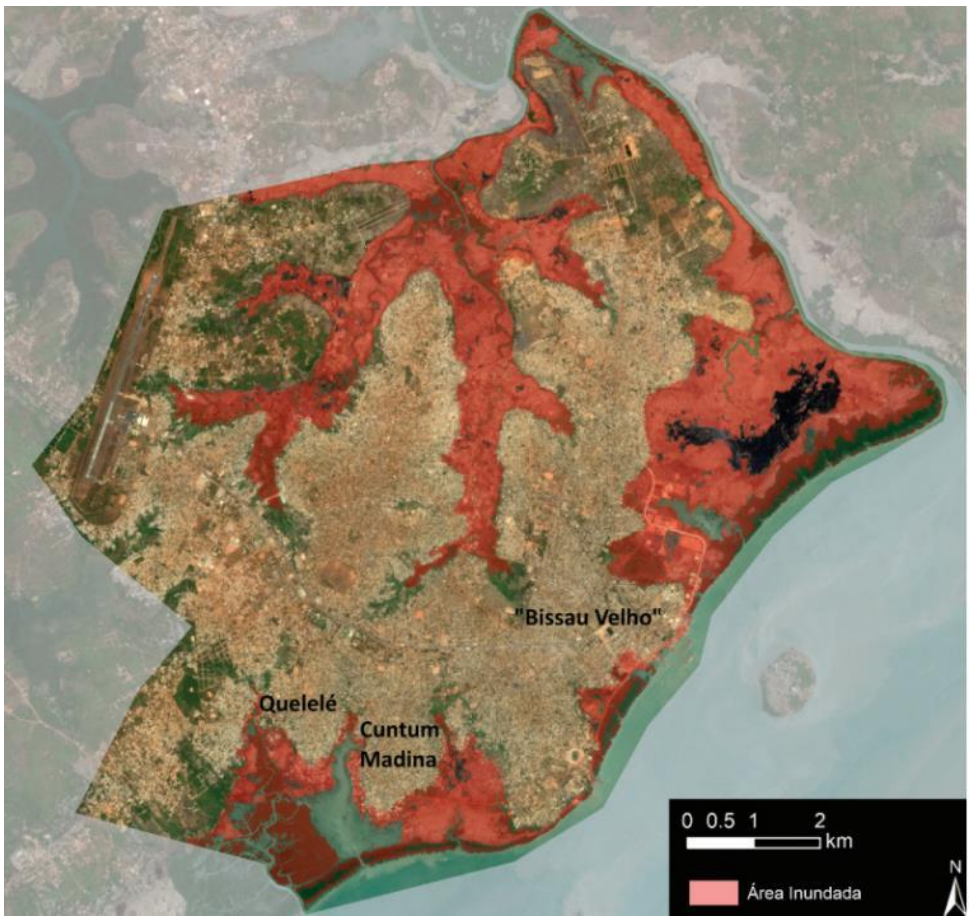


Figure 5.1 Mapping of flooding areas for Bissau city. Mapping limits include peripheric urban areas in rapid expansion where residents share the same services and way of life (Fandé *et al.*, 2020)

In all study areas, land and population at risk increase significantly and progressively from 2018 to the different future scenarios considered. Bissau and Suzana, where housing, infrastructure and agricultural land are located in areas of low elevations, present greater risks than Bubaque, where housing and infrastructure are located in areas of relatively high elevations and agriculture is rainfed.

The estimated population exposed to flood risk in each study area is presented in the following table. It appears that the city of Bissau presents the highest risk, in terms of the number of people affected, in all scenarios. The number of affected populations in each area fundamentally depends on two factors: population density and topography. For example, Suzana would have a flooded area almost twice that of Bissau in 2010, but the low population density of that Section means that the number of people affected is more than nine times lower than that of Bissau in the same period (Fandé, 2020a).

Table 5.4 Population at risk of flooding in each study area (Fandé, 2020a)

Ano	Bissau	Bubaque	Suzana
2018	75 405	657	60
2041	83 715	796	62
2083	98 565	1 176	302
2100	106 875	1 459	1 110

The Elittoral - Gesplan - Sistema Ingenieria Consortium has just carried out, under the UNDP Coastal project, a study on the vulnerability of GB coastal zones facing the effects of climate change. Maritime climate changes were analyzed with reference to the following variables: wave regime, sea level rise, air temperature at two meters above sea level, precipitation, wind. The average regime based on historical data and the climate change projections are calculated using global climate models and validated by satellite information, data from tide gauges close to the study area (Senegal) (for SLR) and other known data sources.

The combination of all climatic forcings and the geomorphological conditions of the coast of GB show that, although there is an increase in the SLR between 10 mm and 12 mm per year, this trend is changing drastically and, in the near future, it could reach maximum SLR values of up to 400 mm. Thus, if this trend continues, SLR could reach maximum values of up to 700 mm by the year 2100.

Based on the meteo-marine data validated by the different databases, the results of the numerical model identified the areas most vulnerable to **SLR**.

The coast of the entire coastal zone was digitized and segmented with an extension of 450 linear m (output resolution of the topographic data from the GEBCO portal), where the output values of the numerical model were arrhythmically measured to generate homogeneous sections.

The ***current maximum flood level*** was determined from the combination of three factors: a) maximum tidal levels; b) cumulative tidal course variation; c) wave height generated during the presence of storms or extreme events. The combination of maximum values showed that the coast of GB is currently exposed to maximum flood levels of up to 0.07 m. This value does not represent a direct relevant threat to infrastructure, much less to communities.

To calculate the ***sea level in the near future (2023-2050)***, the maximum SLR that could occur in the year 2023 was taken into account (calculated from the combination of the 3 aforementioned factors) and the IPCC annual projection was added. This combination of measured data and statistical projections accumulated up to 2050 led to the determination of the SLR, which will specifically affect the coastal, island and river coast of GB. Once the numerical modelling was concluded, it was verified that with the current geomorphological conditions, with the state of the current vegetation cover and the existing soft and hard infrastructures until 2023, the sea level on the coastal, island and river coast could reach maximum values of 0.41 m. This SLR will likely affect the vast majority of coastal crops, in lowlands and accelerate erosion in areas devoid of sufficient and adequate vegetation cover. Its impact will be greater in the insular zone, in intertidal zones and in low coastal zones.

For the calculation of ***SLR in the distant future (2050-2100)***, the maximum value obtained in the simulations for the year 2050 was used and incorporates the values that for this period the IPCC estimates that are feasible to occur worldwide. These values are adjusted to the conditions described for the west coast of Africa and specifically for the coast of GB. SLR by 2100 in coastal, island and river areas of GB could reach maximum values of up to 0.71 m. This condition will comprehensively affect the entire coastline, except for areas that, due to their natural morphology, are sufficiently consolidated or protected. The uncertainty inherent the IPCC projections and models that are developed for this period is greater. However, these data allow boosting national capacity enough to start worrying and finding strategies to reduce the currently projected vulnerability. SLR values for the future scenarios are lower than Sally Brown (2011) and Fandé (2020a, 2020b) ones.

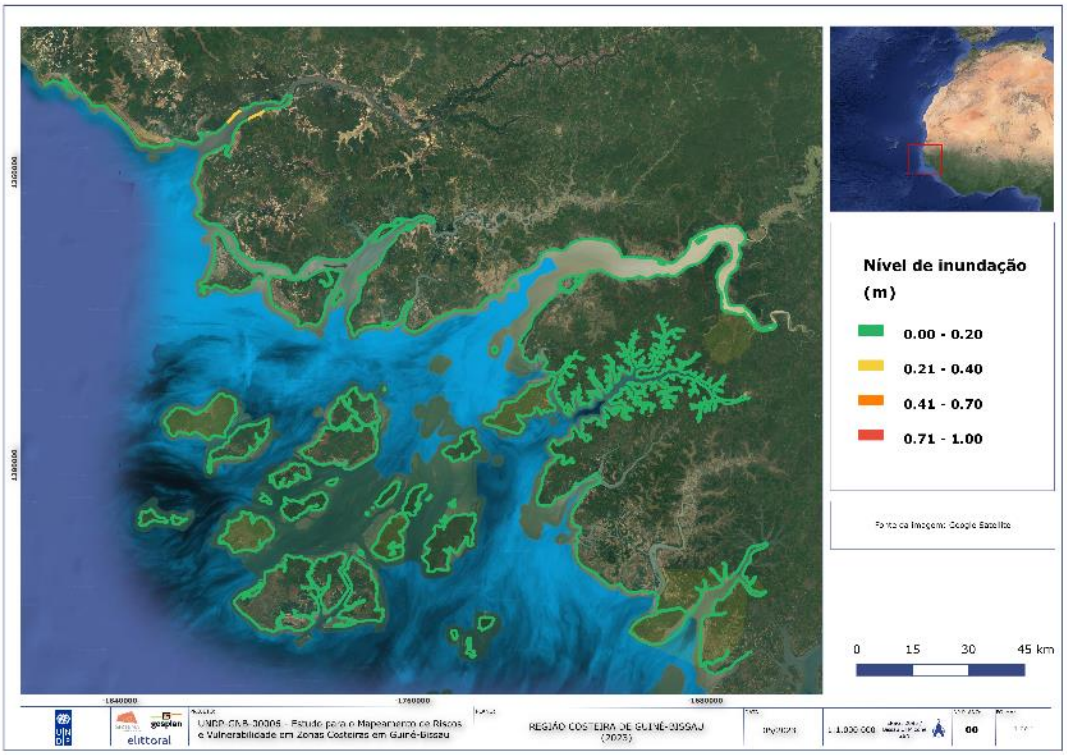


Figure 5.2 SLR on the GB coastline in 2023 (Elittoral - Gesplan – Sistema Ingenieria, 2023)

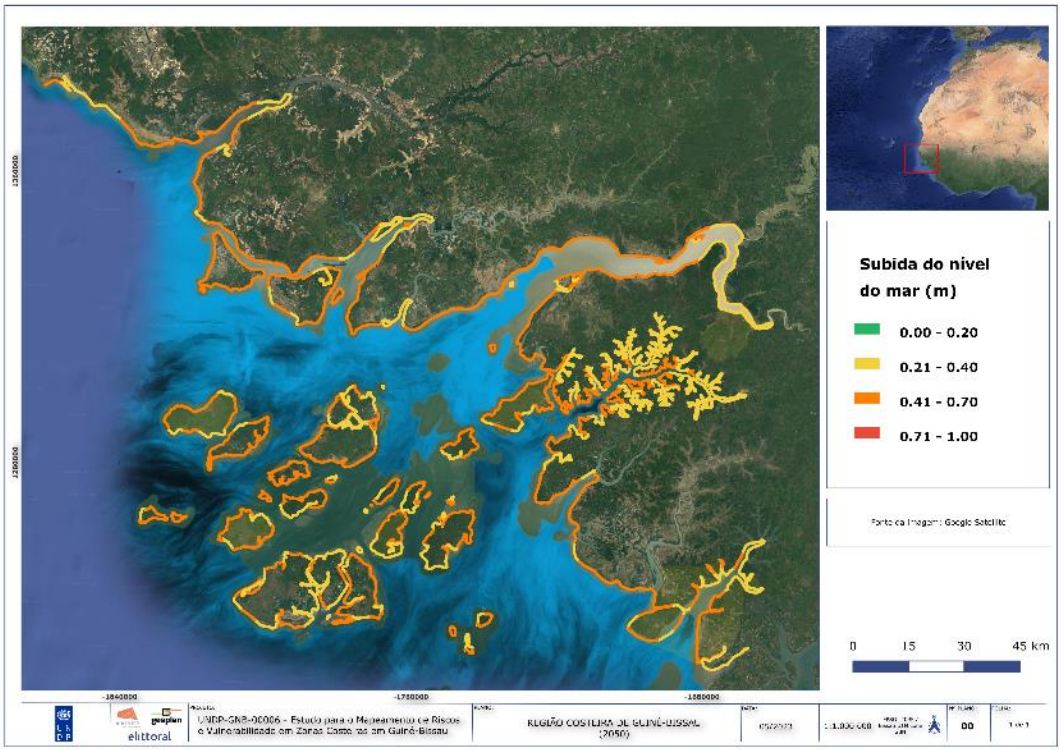


Figure 5.3 SLR on the GB coastline in 2050 (Elittoral - Gesplan – Sistema Ingenieria, 2023)

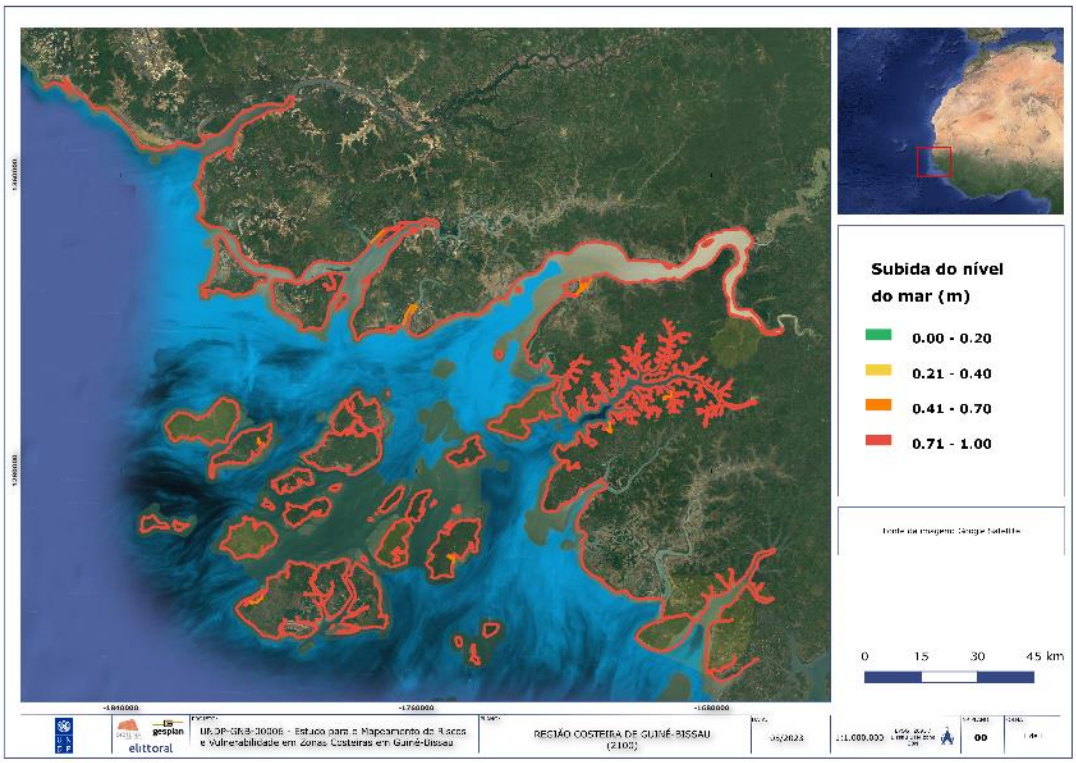


Figure 5.4 SLR on the GB coastline in 2100 (Elittoral - Gesplan – Sistema Ingenieria, 2023)

Flooding maps for each climatic scenario haven't been elaborated because of the lack of good-quality data (time and resolution) for designing the DTM (bathymetry and topography).

The Consortium also calculated a **Coastal Vulnerability Index (CVI)** to assess the impact that SLR will have in the year 2023 in each of the ten locations, based on thirteen criteria covering three categories:

1. Coastal vulnerability variables (8 indicators): Landform, Elevation, Bathymetry, Mean wave height, Mean tidal range, Temperature, Precipitation, Wind speed.
2. Socioeconomic vulnerability variables (3 indicators): Population over 65, Education level, Population density.
3. Coastal Forcers (2 indicators): Sea level rise, Storm surge.

CVI is considered the most effective and simple method to assess coastal vulnerability, according to Djouder & Boutiba (2017).

This index works as a numerical approach in categorizing sections of the coastal region based on the potential impact of coastal hazards, also quantifying the effects of SLR and storm surges on these zones. The index was obtained as a result of the Exposure Index (IE) and the Sensitivity Index (IS), calculated with the CVI model of the InVEST platfom, designed by the Natural Capital Project.

5.2 Evaluation of the adequacy of the existing governance system for climate change adaptation and risks' management

Various laws, regulations and policies serve as governing instruments for managing the coastal zone covering various aspects of the coastal economy, as well as the zone's natural assets. Despite the existence of these instruments, very few entities have a good understanding of how climate change is affecting the coastal economy and none of them are well positioned to respond to the complex governance challenges that are associated with it (UNDP, 2018).

5.2.1 Integration of climate change adaptation strategies in the existing policies

Climate change adaptation considerations and planning in GB are in the very early stages of development (GCF, 2022).

Disaster risk reduction policies and institutional mechanisms exist, yet their effectiveness is limited (RGB, 2013). Although a limited number of climate change mainstreaming activities have been conducted as part of the implementation of the "*Strengthening Resilience and Adaptive Capacity to Climate Change in GB's Agrarian and Water Sectors*" project, the country faces major challenges mainly due to the absence of a national climate change policy framework and an established national adaptation planning process. Therefore, it is necessary to create an enabling environment to facilitate the mainstreaming of adaptation measures into national development objectives and enhance the capacity of the Ministry of Environment and Biodiversity, which is entrusted with the responsibility for the development of climate change adaptation and environmental policies (GCF, 2022).

There is a delay in the implementation of planned adaptation activities: detailed vulnerability and risk assessments and sustained funding are not available. As in other sectors, the intermittent availability of funding is a problem. Furthermore, it is necessary to foster research focused on understanding the functioning of coastal ecosystems and the impacts caused by anthropogenic causes, including climate change, to set up a monitoring system. Without this, the effectiveness of adaptation measures will be limited.

The current legal, policy and administrative frameworks for the management of the coastal zone has various weaknesses. One of them, relevant for this project, is that these frameworks are not necessarily conducive to an integrated and coordinated approach vis-à-vis the effective management of climate related risks and impacts. Neither do they take the specific climatic vulnerabilities on the coastal zone into consideration. In fact, it can be said that, today, coastal zone planning is not being actively used as a modality of governance for the coastal space or for coastal sectors in GB (UNDP, 2018).

Hereafter, an analysis of the level of integration of climate change adaptation strategies in existing policies has been carried out.

CLIMATE CHANGE POLICIES AND PLANS

National Program of Action to Adapt to Climate Change (NAPA)

The National Program of Action to Adapt to Climate Change (NAPA) was developed in 2006 to implement the guidelines of the United Nations Framework Convention on Climate Change (UNFCCC).

National Adaptation Programmes of Action (NAPAs) provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their immediate needs to adapt to climate change, ultimately leading to the implementation of projects aimed at reducing the economic and social costs of climate change.

For GB, the main Climate Related Hazards identified in the NAPA include:

- Seasonal Drought.
- Acute Drought.
- Rise in Ocean Temperature.
- Rise in Atmosphere Temperature.
- Cyclones.
- Average Sea Level Rise.

The NAPA defined several priority strategic actions to deal with the risks and impacts of climate change in GB. These actions aimed at enhancing the food security of rural populations so as to enhance their resilience, reduce pressure on forest and fishing resources, and improve access to potable water. The Program set several priorities directly connected to the coastal zones management, such as reducing pressures on forestry and fishery resources, addressing climate risks in the coastal zone or improving access to drinking water for human consumption and for livestock.

Fourteen projects were chosen in order to achieve the strategic objectives, including:

- Reinforcement of Preventive Capacity and Protection of Mangrove Rice Fields against High Tides.
- Observatory for Mangrove Monitoring and Evaluation.
- Follow up of Erosion on Coastal Zones.
- Evaluation of Climate Changes Impact in Productive Sectors.
- Prevention of Natural Catastrophes.
- Protection, Conservation and Enhancement of Fishing and Coastal Resources.

Nationally Determined Contributions (NDC) and National Communications (NC)

The country has conducted some foundational activities in an effort to cope with climate change including producing the NAPA (mentioned above), a First, Second and Third National Communication (NC), and a

Nationally Determined Contribution (NDC) in 2021. GB formally adopted its first Nationally Determined Contribution (NDC) following the signing of the Paris Agreement on April 22, 2016, then its ratification by the Bissau-Guinean parliament on October 22, 2018.

Although the first NDC (called "iNDC") expressed GB's commitment to the fight against climate change, it did not present a quantified GHG mitigation objective. The updated NDC (October 2021) is part of a broader vision of low carbon and climate resilient development. The document includes both mitigation and adaptation components. The NDC was inspired by the National Poverty Reduction Strategy (PRSP II) and is aligned with the Terra Ranka 2015- 2025. GB's mitigation contribution includes the implementation of policies and planned actions in the forestry and energy sectors. Its *adaptation contribution* broadly identifies agriculture, coastal zone, cross-cutting areas, disaster risk management, education, energy, environment, health and tourism as areas that require adaptation actions. It further identifies gaps and needs, and high-level adaptation objectives. One such gap is the need to carry out a cost benefit analysis of adaptation measures. According to the NDC, the implementation of both adaptation and mitigation measures is contingent on external partners providing financial resources, technology, and capacity building. While climate change impacts and vulnerabilities are presented, they are based on the NAPA (2006) and are therefore deemed to be outdated (GCF, 2022).

The NDC affirms that "*The following priority sectors, as identified in GB's official documents for the UNFCCC, are without adequate funding for adaptation and should be prioritized through new programs and initiatives: Fisheries & Ocean Ecosystems; Energy; Water resources; Human health; Capacity development; Disaster Risk Management*".

The investment required for GB to meet its NDC commitments is significant: for climate change mitigation in the years 2021-2030 it is estimated at USD 664 million, while the NDC adaptation target amounts to USD 531 million, for a total amount of USD 1,195 million, about USD 119.5 million/year (about 66 for mitigation and 53.5 for adaptation). The estimated current annual execution of the adaptation project is between USD 5 and 6 million. The gap is about USD 47.5 million per year, the 84% of the financial needs.

The recommendations of the first (2005), second (2011) and third (2018) national communications identified and ranked six priority sectors for GB, such as: coastal/marine ecosystems, food security and cross-cutting as priorities relating to education and capacity building.

The Third National Communications (TNC) of 2018 presents, amongst other things, the climate induced impacts and associated suggested adaptation needs for the key sectors of agriculture and livestock, energy, forests, biodiversity, fisheries, and water resources. The TNC proposes a range of adaptation measures. For the water sector, it proposes the establishment of a coherent and consistent strategy utilizing an integrated water resource management approach, increasing rainwater harvesting and storage capacities so as to augment surface water and groundwater reserves. For the agriculture sector, it proposes a variety of adaptation measures that vary according to the ecosystems. These ecosystems are mangroves ecosystems, Bas-Fonds Ecosystem (freshwater), plateau ecosystem, and backyard farming ecosystems. The TNC also presents the main national gaps to achieving its mitigation and (to a lesser extent) adaptation goals. With regards to adaptation the main gaps to implementing the suggested adaptation measures is the capacity at the institutional and technical levels (GCF, 2022).

National Action Plan to Fight Desertification (PAN/LCD)

The GB's PAN/LCD (2012) is a strategy to fight land degradation.

The PAN/LCD elaboration process was participatory, involving all the levels of the Guinean society (state institutions, NGO's, base associations). The first stage consisted in the diagnosis of four natural regions of the country (North, South, East and the Archipelago of Bijagós), allowing to gather the populations' main concerns relatively to natural resources management and the threat of land degradation.

Among the specific objectives of the GB's PAN/LCD, the following stand out:

- Conservation of biodiversity.
- Restoration of degraded areas and ecosystems.
- Fight against wildfires.
- Fight against coastal and water erosion.
- Fight against salinization and soil acidification.
- Management of surface and groundwater.
- Development of the plan for the integrated management of the territories of the tabanca.
- Reinforcement of the technical capacities of the different actors and of the legal and institutional framework.
- Education and environmental communication for the issue of desertification.

The priority domains of GB's PAN/LCD strategy are the following: agriculture, livestock, forestry, water resources, strengthening the capacity of rural organizations, training, sub-regional and international cooperation.

Climate change issues and coastal zones resilience are mentioned as an important concern in the GB's PAN/LCD strategy, but it lacks specificity.

NDT / LDN National Policy Letter

The Policy Letter identifies the measures to be undertaken to achieve Land Degradation Neutrality (LDN) by the year 2030, among which:

- the recovery and management of *bolanhas*
- mangroves restauration

NATIONAL AND SUB-NATIONAL STRATEGIC AND DEVELOPMENT PLANS

The following table points out the level of integration of climate resilience and adaptation strategies in national strategic and development plans.

Table 5.5 Integration of climate resilience and adaptation strategies in national and sub-national strategic and development plans

Key national and strategic policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
NATIONAL LEVEL		
Document on the National Strategy for Poverty Reduction (DENARP/PSRP II) (2011 - 2015)	This document analyzes the situation of poverty in GB and identifies the objectives and priority interventions in the fight against poverty. A more complete description of the specific objectives of DENARP II is presented in section 5.2. In 2011, the Guinean Government, through the DENARP II, enshrined, in Axis 3, the promotion of sustainable economic development, having as one of the objectives, the improvement of governance in the emerging sectors of mining and oil, as well as Management and protection of the environment. The DENARP II includes, among its pillars, the implementation of measures for environmental protection. It comprises the preparation and implementation measures, such as the obligation of operators to carry out environmental impact studies and, for those who have already started rehabilitation work of exploited or affected areas, the establishment of fees for the restoration and preservation of the environment and reinforcement of control and follow-up capacities of public services as well as of civil society.	Given the vulnerability of all economic sectors in GB to climate change, these planning exercises incorporate climate change risks as well as strategies to adapt to these risks in order to increase resilience to climate change. The fifth guiding principle of DENARP II is *"Promoting sustainable development that is more resilient to climate change"*. To improve efficiency, the initiatives taken in the context of climate change should not be isolated efforts, limited to individual projects to adapt or mitigate climate change. Rather, they must be consistently incorporated into a wider policy framework with a view to developing strategic and programmatic approaches that integrate climate-related development policies; planning policies and actions at the national, regional, and local levels to involve all sectors of the Guinean economy; and integrating all other dimensions of environmental and natural resource management, including biodiversity conservation and the sustainable management of land and water. Five strategic areas were included, among which is "Integrating climate change into policy, planning and investment decisions in growth-generating sectors to increase their resilience to climate change". Taking climate risks into account allows for the development of agriculture, housing, tourism and coastal areas and the designing of a road and communication infrastructure that is able to face climate-related disasters. The integration of climate change also covers aspects related to reducing greenhouse gas emissions. Therefore, development strategies for the various growth sectors should become development strategies with low-carbon emissions and resilient to climate change in order to promote sustainable development.
Strategy for Development, Employment and Industrial Training "Hora-Tchiga" 2020-2024	This strategy includes actions to improve some sectors and strengthening the sustainable development of the country.	It includes the agricultural, agro-industrial and fisheries sectors, to achieve more efficient, effective and equitable food systems that meet the challenges of environmental, social and economic dimensions in productive landscapes, based on synergies between four pillars: productivity, adaptation, mitigation of climate change and preservation of biodiversity, in particular marine biodiversity.
National Development Plan (PND) 2020-2023	The 2020-2023 PND constitutes the second medium-term planning exercise, following the Development Plan (PD) drawn up in the 1980s, carried out within the framework of compliance with the constitutional provision in force, and aims to promote the socio-economic and regional development of the country. Its elaboration took place in an innovative and interactive way and was the result of intense internal work and several work meetings.	One of the goals of the Plan is to preserve biodiversity and combat climate change as well as other adverse environmental threats and risks. To this end, appropriate public policies should be developed, to enable GB to take advantage of the exploitation of its biodiversity and environmental conservation, while ensuring its conservation as a crucial factor for a sustainable development that benefits present and future generations.

Key national and strategic policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
Government Program for GB 2015-2025 "Terra Ranka"	The program presented by the Government at the Donor Roundtable in March 2015 sets out the broad guidelines for the development of GB. The 2015-2020 Terra Ranka is a strategic and operational plan for GB to ensure the sustainable management of natural capital and to preserve biodiversity, as well as to expand the use of information communication technologies to promote sustainable development. Under this program, the Government considered GB's biodiversity and natural capital as a pillar for development, which is a strong signal and an opening for environmental governance to be improved.	Adaptation is in line with new orientations emanating from the 2015-2025 "Terra Ranka" Program. Under the "Terra Ranka" Program, the government prioritized, among other topics, to make a significant contribution to improving environmental governance at the national level by: (i) Promoting governance at the service of the citizen; and (ii) Ensuring sustainable management of natural capital and preserve biodiversity. Climate change issues are mentioned as an important concern in the "Terra Ranka" Program, but it lacks specificity, as many of the important interventions within the topic were still being developed when the Program was launched. The plan makes a special call for the valuation of GB's natural resources. The Biodiversity and Natural Capital axis includes two main fields of action: a) institutional development aimed at establishing a normative and institutional framework of reference and providing GB with a legal body, a governance model and innovative financing that will give it the status of an African country at the forefront of the world in terms of sustainable development; and b) the sustainable management of ecosystems that implies the following: knowing these ecosystems and biodiversity to better safeguard vulnerable resources; implement the National Strategy for Protected Areas to enhance these areas, which will increase from 13% to 26% of the territory in the coming years; favor the preservation of ecosystems throughout the territory, guaranteeing respect for biological balances; and finally implement a Climate Plan to increase the resilience of the national territory in the face of climate change. A coastal protection plan and an adaptation and mitigation plan will be implemented to respond to the risks faced by man and the territory.
National Environmental Management Plan (PNGA)	The PNGA was institutionalized and legitimated as principal document of the national global policies of the environment through the ordinance no. 03/2004 of February 21. This document seeks, as general objective, the optimization of the existing resources in order to guarantee the economic growth and the improvement of the quality of life of the present generation. The idea is to ensure the conservation of the natural resources for future generations, contributing to the goal of making the country's socioeconomic development durable and sustainable. Beyond this, it supports the search of solutions that seek to guarantee food safety, the eradication of the poverty, control of pollution and harmfulness and sanitation of the environment, conservation of the natural resources and control of the desertification progress (sahelization), as well as the minimization of	The PNGA (2003) is a tool that should guide Guinea- Bissau's environmental policy in integrating the vision, objectives, strategies and actions necessary for its implementation. PNGA preparation had as its focus the integration of the environmental dimension into sector strategies of the fight against poverty and national development. This exercise led to identifying of the agrarian, water supply, health and coastal area sectors as the priority ones in the adoption of immediate adaptation steps and actions, representing an overall financial effort estimated at around US$ 6,300,000, for whose materialization GB counts on the international community's invaluable support and solidarity. As mentioned before, one of the prioritized sectors is coastal areas. The strategic goals are: - assessment of the importance of the coastal area with regard to maintenance of biological diversity, namely the reproduction of numerous species. - adoption of appropriate measures to the areas most vulnerable to flooding, taking into account the costs and benefits in regarding withdrawal, accommodation and protection according to the measures adopted.

Key national and strategic policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
	the anthropic impacts that influence climate change.	
SUB-NATIONAL LEVEL		
Mentor Plan of Coastal Planning	The mentor plan of the Coastal Zone, elaborated in the aspect of the Program of Coastal Planning (UICN/MDRA-DGFC, 1993), whose objective is to define guidelines that lead to a durable development of the coastal zone, guaranteeing a correct and durable exploitation of natural resources and of the environment, preserving coastal ecosystems and their biological diversity. The mentor plan of the Coastal Zone was implemented in the aspect of the Program of Coastal Planning, in partnership with UICN and public institutions, namely: the Ministry of Agriculture, Forests and Livestock; the Ministry of Natural Resources and Energy; the Ministry of Fishing and the Sea; INEP; INITA; National ONG's.	This Plan has been guiding the following actions: - analysis of the soil and the space occupation with a view to the follow up and evolution of the different ecosystems. - creation and management proposal of protected areas with a view to the conservation of the biodiversity and the preservation of the genetic resources. - communication and environmental education of the populations. - exchange of information through the specialist nets (Coastal Planning, Protected Areas, and Fishing).
Strategic Plan for Sustainable Development of the Cacheu Region (PEDSR 2021-2025)	The main objective of the PEDSR in the Cacheu region is to promote the sustainable, inclusive and resilient socioeconomic development of tabancas, communities, sections and sectors, based on the substantial transformation of local State bodies.	*No specific strategies and actions targeting climate resilience and adaptation*
Strategic plan for sustainable development of the Calequisse Sector (PEDSS 2020 – 2025)	The main objective of the PEDSS is to provide conditions for the socio-economic development of each sector, through interaction between public and private agents, non-governmental organizations and civil society in general, aiming at transversal aspects, such as resilience , gender, environment and biodiversity protection, promotion of local culture, among others.	*No specific strategies and actions targeting climate resilience and adaptation*
Strategic plan for sustainable development of the Caió Sector (PEDSS 2020 – 2025)		
Strategic plan for sustainable development of the Canchungo Sector (PEDSS 2020 – 2025)		
Strategic plan for sustainable development of the Bigene Sector (PEDSS 2020 – 2025)		

Key national and strategic policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
Strategic plan for sustainable development of the São Domingos Sector (PEDSS 2020 – 2025)		
Strategic plan for sustainable development of the Bula Sector (PEDSS 2020 – 2025)		
Strategic plan for sustainable development of the Cacheu Sector (PEDSS 2020 – 2025)		

SECTORIAL PLANS AND STRATEGIES

The following table points out the level of integration of climate resilience and adaptation strategies in sectorial plans.

Table 5.6 Integration of climate resilience and adaptation strategies in sectorial plans

Key sectorial policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
BIODIVERSITY CONSERVATION		
National Biodiversity Strategy and Action Plan (NBSAP)	The NBSAP is a policy framework for the sustainable management of biodiversity resources and conservation policies. This document establishes in a detailed way the national guidelines, themes and areas of national intervention relatively to the conservation and sustainable use of biological diversity in the aspect of the implementation of the Convention about Biological Diversity. It also establishes as national objectives the protection of ecosystems, arborization and forest repopulation, optimization of water resources, exploitation of new energy sources, fight against soils and coastal erosion, reinforcement of the participation of the civil society, having as a base, the education and training in the environment domain.	GB designates six intervention priorities in the aspect of this NBSAP, such as: - to continue and to strengthen ongoing biodiversity conservation actions in the representative ecosystems, through an effective and coherent net of protected areas and of other mechanisms and conservation systems. - to restore areas and degraded ecosystems and improve the productivity of the lands and their durability through fight against wildfires, the coastal erosion and rising water levels, the salinization and acidification of the soils, the management of the superficial and underground waters. In addition, national objectives for the biological diversity were grouped in the strategic objectives and goals. The most important goals related to climate resilience and adaptation strategies/interventions, in particular related to the coastal zone, are: *"Goal 10: By the year 2020, to identify the multiple anthropogenetic pressures on the mangroves, mud and sand banks and, moreover, marine and coastal ecosystems affected by climate change or oceanic acidification and to establish strategies and programs to maintain their integrity and operation.* *Goal 11: By the year 2020, to strengthen and to consolidate the National System of Protected Areas and to extend it to 26% of the national territory, covering the areas of special importance for biodiversity and ecosystem services, managed in an effective and equitable way, ecologically representative and satisfactorily interlinked, and to propose other special measures of conservation, integrated in larger terrestrial and marine landscapes.* *Goal 14: By year 2020, supplying ecosystems of essential services, including services related to water, taking into consideration the needs of women, poor, the most vulnerable people and the local ethnic communities.* *Goal 15: By the year 2020, the resilience of ecosystems and the contribution of biodiversity for carbon reservoirs will have been increased through conservation actions and recovery, through the recovery of at least 15% of the most sensitive and degraded forest ecosystems, thus contributing to the mitigation and adaptation to climate change and to combat desertification."*

Key sectorial policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
Coastal Protected Areas' Management Plans	The Management Plans identify the conservation and development priorities of the protected areas, establishing zoning and rules. Hereafter, the list of the Coastal Protected Areas' Management Plans: • Urok Marine Protected Area Management Plan 2014 – 2023 • João Vieira e Poilão Marine National Park Management Plan 2008 – 2018 (the updated 2022 – 2031 plan is going to be approved) • Orango National Park Management Plan 2017 – 2021 • Cacheu River Mangroves National Park Management Plan 2008 - 2018 • Lagoas Cufada National Park Management Plan 2022 - 2031 • Cantanhez National Park Management Plan 2018 – 2023 • DBT Complex Management Plan 2021 - 2030	Each plan defines strategies and rules with the aim of protecting the biological diversity and promoting the communities' sustainable development, through the introduction of alternative livelihood activities replacing environmental harmful practices. The principles that guided the creation of the protected areas were largely inspired by the participatory approaches adopted during the national coastal planning exercise, with the technical support of IUCN. The participatory governance approach was also supported by the IUCN Commission on Environmental, Economic and Social Policies (CEESP).
FISHERIES		
Fisheries and Aquaculture Strategic Development Plan (PSDPA) 2023-2027	The intervention priorities of the PSDPA 2023-2027 derive from the diagnosis and the results of the evaluation of the implementation of the PSDP 2015-2020. They also take into account emerging issues, specifically those relating to aquaculture, the blue economy and climate change. On this basis, five strategic axes have been retained for the PSDPA 2023-2027: • Strategic axis 1 - Good governance and sustainable management of fishery resources • Strategic axis 2 - Sustainable development of industrial fishing • Strategic axis 3 - Sustainable development of small-scale fishing • Strategic axis 4 - Promotion and sustainable development of aquaculture • Strategic axis 5 - Piloting and monitoring-evaluation of the implementation of the PSDPA.	GB operates in a context that has seen significant developments in international practices in the management of fisheries resources. Several international instruments paying increasing attention to the effectiveness of fisheries management, particularly artisanal fisheries, have been developed. In particular, the PSDPA points out the need for the State to develop policies and plans to deal with climate change in the fisheries and aquaculture sector. Strategic Axis 1 seeks to mitigate the effects of pressures on fishing by focusing on the fight against IUU fishing, the generation of knowledge to support the decision-making process in fisheries resources' management, stock assessments, application of ecosystem-based fisheries' management. Under this Axis, two actions are expected to be implemented: • Activity 1.6.5: Assessment of the role of seagrass beds and mangroves in carbon sequestration • Activity 1.6.6: Integration of the fisheries and aquaculture sector into the national climate change adaptation plan
AGRICULTURE		

Key sectorial policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
National Agricultural Investment Plan (PNIA) (2nd Generation)	The 2nd Generation PNIA aims to accelerate agricultural growth, reduce poverty and achieve food and nutritional security. It also takes into account cross-cutting areas such as institutional strengthening, research and agricultural extension and integrates gender, youth, nutrition, resilience, and social dimensions to ensure the sustainability of achievements. The PNIA is broken down into seven sub-programmes, namely: 1. Promotion of Plant Production Sectors 2. Promotion of Animal Production 3. Promotion of Fisheries Production 4. Sustainable Management of Natural Resources (water, soil, forests) 5. Agricultural Research 6. Institutional Strengthening and Sector Coordination 7. Adaptation of agricultural sectors to climate change	The program is expected to build the capacity of rural populations to adapt to the effects of climate change on their activities and promote the dissemination of improved technologies aimed at reducing the adverse effects of climate change. ➢ Sub-Program 6: Institutional Strengthening and Sector Coordination Component 1: Improvement of the institutional environment of the agricultural sector Action 2: Creation of mechanisms favorable to the development of the sector Agricultural insurance is a tool that could significantly contribute to improving the performance of the sector by offering producers, breeders, input suppliers and credit organizations protection against yield losses due to climatic hazards and natural disasters. ➢ Sub-Program 7: Adaptation of the agricultural sector to climate change (alignments with the measures provided for in the NAPA) Component 1- Adaptation to climate change - Research and popularization of plant and animal species resistant to the effects of climate change - Education, information and communication (awareness of the harmful effects of climate change and popularization of good community agricultural practices) Component 2 - Mitigation - Promotion of good practices in the process of processing agro-forestry, fisheries and livestock products - Popularization of improved ovens and hearths - Organization of the firewood and charcoal sector - Selection of fast-growing plant species for energy use
TOURISM		
Tourism Master Plan for GB and Bijagos	The Plan intends to be an instrument of general orientation in the materialization of policies in the tourism sector, namely: • enshrine principles and good practices of sustainable development • boost the multiplier effects of tourism in the economy, with a view to job creation, social inclusion • invest in the quality of the services provided as an instrument of competitiveness, through the best models of professional training; • establish policies and strategic guidelines that guide action programs aimed at achieving previously defined objectives in the tourism sector	*No specific strategies and actions targeting climate resilience and adaptation*

Key sectorial policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
National Ecotourism Strategy (2018-2023)	The National Strategy was conceived specifically to define the guidelines that will allow the development of ecotourism in GB under the best possible conditions, combining the need to offer sustainable employment and income alternatives and guarantee, at the same time, the maintenance and sustainability of ecotourism resources	*No specific strategies and actions targeting climate resilience and adaptation*
Regional Master Plan for Responsible Tourism for the Bolama Bijagós Archipelago Biosphere Reserve (RBABB)	The Plan aims to provide the Government of GB with a document to guide the policy of the tourism sector in the RBABB, through the definition of strategic axes, plans, programs and projects for the development of Responsible Tourism in the short, medium and long term. The Plan is structured around six strategic axes with the following objectives: 1. Governance 2. Organization and impacts' minimization 3. Development of the Responsible Tourism Sector 4. Natural capital and cultural heritage 5. Communities and youngs' engagement 6. Capacity building	The plan identifies some actions that could play an important role in the coastal planning process, aiming at protecting specific vulnerable ecosystems, and constitute entry points for the implementation of climate adaptation strategies: ➢ Strategic Axis 1: Governance - Action I.b.2: Create the statute of the sacred islands ➢ Strategic Axis 2: Organization and impacts' minimization - Action II.a.1: Conclude the identification, selection and cartography of the RBABB's sites of ecological and cultural interest, defining areas of tourist vocation with the rules and criteria for possible use, as well as areas of prohibited use - Action II.b.2: Define the limits of tourist use of each area (load capacity) - Action II.c.1: Map the main pressure and impact vectors, as well as sensitive and vulnerable areas ➢ Strategic Axis 4: Natural capital and cultural heritage - Action IV.a.2: Carry out training actions for public managers, third sector professionals, community representatives and businessmen on topics related to ecosystem services and cultural heritage - Action IV.b.1: Elaborate a calendar of cultural, productive and species observation activities reconciled with the climatic conditions and the tourist season, in order to promote itineraries based on a responsible synergy between supply and demand - Action IV.c.1: Design a Payment for Environmental Services mechanism for cruise visitation activities and responsible sport fishing managed by the Bio-Guiné Foundation
URBANISM AND LAND PLANNING		
General Urban Development Plan of Bissau (PGUB)	The P.G.U.B. is designed for the long-term urban planning and management and should be in force until the year 2010. Its implementation must go through the execution of Detailed Urbanistic Plans.	*No specific strategies and actions targeting climate resilience and adaptation* (The plan, adopted in 2005, is weakly implemented and needs to be deeply updated)
WATER MANAGEMENT		
Master Plan for the Water and Sanitation Sector (1997 – 2006)	This Plan essentially concerns the supply of drinking water and sanitation services, as well as the management of water resources.	*No specific strategies and actions targeting climate resilience and adaptation* (The plan, elaborated in the early '90, needs to be deeply updated)
ENERGY		

Key sectorial policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
SEforALL National Action Agenda (2015–2030) **National Action Plan for Energy Efficiency (PANEE) (2015–2030)** **National Action Plan in the renewable energy sector (PANER) (2015–2030)**	The SEforALL is a document prepared based on PANEE and PANER. The elaboration of these three documents was coordinated and supported by the ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE). The joint elaboration of these three documents therefore reflects a strategy of coherence and synergy between public policy instruments, allowing a more global framework, an integrated reflection and the optimization of resources. The three documents are thus emanations of the same vision and strategy, being intrinsically interconnected.	GB is currently facing the challenge of increasing access to energy and energy security for its population, as well as simultaneously mitigating climate change. GB's vision and targets for achieving SDG07 by 2030: • Target electricity access rates (%): 11,5 (2010) > 80 (2030) • Target rates of access to butane gas as a modern cooking fuel (%): 7 (2010) > 75 (2030) • Target share of renewable energies in the peak load of total electricity demand (%): 0 (2010) > 48 (2030) • Reduction of 13% of the total electricity demand in 2030 (improvement of energy efficiency) The target of access to electricity is expected to be achieved mainly through the extension of the national network/increase in the number of connections to the network and through mini-grids and autonomous systems of renewable and/or hybrid and/or conventional energy (usually of diesel) in communities and homes farther from the network. With regard to cooking, the substitution of sources, or even technologies, generally implies the abandonment of traditional and cultural culinary practices, which will not happen without enormous resistance. The proposal to replace traditional stoves with more efficient ones that use cleaner fuels implies the widespread introduction of improved stoves, LPG stoves and even solar stoves, which means a change in the deep-rooted habits of Guinean families. The goal for renewable energies in the GB electricity system implies the creation of a system that is radically different from the existing one and the mastery of production technologies, distribution management and energy storage. Therefore, it implies new knowledge, new practices and new ways of managing the system. The combination of renewable energy targets and the change in socio-cultural cooking practices, combined with the internalization of rational and efficient energy consumption practices, therefore constitute a starting proposal for changing the energy culture in GB, altering the predominantly carbon dioxide to an eminently more sustainable one.
EDUCATION		
Education Sectoral Plan (2017-2025)	The Plan identifies strategies and actions to guarantee access and quality of the education services. It identifies some teaching subjects of priority importance, such as Portuguese and mathematics, but doesn't provide orientations regarding other subjects.	*No specific strategies and actions targeting climate resilience and adaptation*
SOCIAL WELFARE, GENDER EQUALITY AND HEALTH		

Key sectorial policies	Goals	Climate resilience and adaptation strategies and interventions (in particular related to the coastal zone)
National Plan for Gender Equality and Equity	The main goal of the PNIEG II is to integrate, on a regular, systematic and mainstreamed basis, the gender equality dimension in all development and bilateral and multilateral cooperation policies, strategies, projects and programs developed in the country	*No specific strategies and actions targeting climate resilience and adaptation*
Health National Plan PNDS III (2018-2022)	The Plan aims at reinforcing the National Health System to respond to the real social needs and economic conditions, as an integral part of the global strategies country's development.	*No specific strategies and actions targeting climate resilience and adaptation*

5.2.2 Key stakeholders for climate change adaptation planning and management in Guinea-Bissau

As a result of the institutional framework and stakeholders' analysis, stakeholders have been divided in two groups:

- institutions with key roles or that could play a key role in climate data monitoring and processing and climate change adaptation planning in GB coastal zones
- institutions that can / could support the implementation of climate adaptation strategies in their specific sector and NGOs playing a strategic role in climate change policies' implementation, land and natural resources' planning and management

Institutions with key roles or that could play a key role in climate data monitoring and processing and climate change adaptation planning in GB coastal zones

Ministry of Environment and Biodiversity (MAB)[44]

This Government entity is entrusted with the overall responsibility for the development of environmental and climate change policies. The General Directorate for the Environment under the Ministry of Environment and Biodiversity serves as the Focal Point to the UNFCCC, the Global Environment Facility (GEF) and the GCF. The NAP process will be led by the General-Directorate for the Environment.

National Institute of Environment (INA)

INA is currently integrated into MADS and has competencies on climate change and air pollution, waste and chemicals, and environmental risks and safety (protection of human and environmental health), having administrative, financial and patrimonial autonomy.

[44] During the development of this report, the MAB existed. After the elections on June 4 2023, and the appointment of the new government body, during this report update period (August 2023), it became again a Secretariat of State for Environment and Biodiversity, just as it was four years ago.

Coastal Planning Office (GPC)

The Coastal Planning Office, now integrated with the Ministry of the Environment and Biodiversity, continues to be responsible for coordinating conservation and development actions in the coastal wetlands, but with the mandate weakened, because it lacks the technical and financial capacity to play its part.

Institute of Biodiversity and Protected Areas (IBAP)

IBAP's mission is to manage protected areas and strategic biodiversity resources, valuing scientific knowledge and traditional knowledge, favouring participation and synergies at the local, national and international levels. The institute, currently integrated into MADS, is responsible for the management of all marine and coastal protected areas within the coastal zone (6 PAs), leading to the approval and adoption of Management Plans, with their zoning and rules.

Due to its mission and its institutional autonomy, IBAP has been able to obtain financial support from different international organizations, however, as the territory under legal protection for nature conservation has increased significantly, its resources have also become more limited and disproportionate to their attributions and responsibilities, within the scope of the nature conservation policies that the country has recently adopted (Vilela, 2019).

The National Climate Change Committee (NCCC)

The NCCC is responsible for monitoring activities carried out in the framework of the implementation of the UNFCCC and is responsible for activities related to the preparation of National Communications amongst other areas including related to greenhouse gas emissions. More specifically the NCCC seeks to raise awareness and mobilize those involved in climate change issues (administrative technical services, private sector, NGOs, civil society structures and research, local elected associations, universities, etc.) to fully engage the stakeholders in tackling climate change issues including adaptation planning. The NCCC, which is chaired by and sits within MAB, includes representatives from the President's office, the National Assembly, all ministries, the Secretaries of State of the Environment and Durable Development, Fisheries and Maritime Economy, and Transport and Communication, as well as representatives from civil society and the private sector. It is comprised of a technical committee, a scientific council, and an advisory board. As it relates to the NAP process, the NCCC serves in a scientific and technical advisory capacity (GCF, 2022).

Competent Environmental Assessment Authority (AAAC)

AAAC's mission is to facilitate the application of the Law on Environmental Assessment of 2010 that aims to assess and mitigate the potential impacts of projects on the environment. In addition to the environmental assessment of a specific project, the current Environmental Assessment Act creates the necessary conditions for Environmental Strategic Assessments to be carried out to assess the impact on the environment and other sectors of the implementation of development policies, plans and programs (UNDP, 2018).

At the statutory level, the AAAC has not yet seen its statutes approved by the national parliament, so it still does not have the necessary administrative, financial and institutional autonomy. This regime confers a fragile position, being too exposed to political pressures. The AAAC budget does not benefit from government funding; all operating costs are covered by environmental assessment fees within the scope of the Environmental Assessment process and the environmental licensing process (part of these taxes revert to the AAAC); however, AAAC also benefits from contributions within the scope of protocols with institutions such as ADB, BM, BOAD and the EU, among others, with a view to guaranteeing a minimum environmental and social assessment and monitoring the environmental performance of its projects. At the regional administration level, AAAC focal points ("Antennas") generally do not have specialist staff with environmental or social

academic training, but rather regional administrative staff who have received brief training in environmental and social impact assessment (Vilela, 2019).

National Institute of Meteorology (INM)

The INM is the national authority in charge of meteorology and climatology. It implements national policies related to these two areas and collects, analyses and disseminates meteorological and weather information. The Institute's ability to perform climate modelling and more sophisticated analysis is limited. The INM serves as the Focal Point for the Intergovernmental Panel on Climate Change (IPCC). The climate data is only reliable at the national level up until the year 2000. After that year, there have been problems with data quality due to missing values because of a lack of consistent and systematic observations and deterioration of the equipment resulting from political-military conflict, political instability, and a lack of qualified personnel and finance to maintain existing or acquire new equipment. Currently, climate data (temperature, precipitation, humidity, insolation, atmospheric pressure, cloud cover, solar radiation) is only manually collected in the capital city, via weather and rainfall stations, and is processed by a basic climate data management system at the Climatology Department of the INM (GCF, 2022).

Ministry of Agriculture and Rural Development (MADR)

This Ministry has the role of establishing agricultural sector policies. It supports rural development activities and the collection and dissemination of information, innovations and good practices in each sector. It also supports farmer training and capacity building of Community Based Organizations (CBOs). This Ministry is involved in monitoring, prevention and the GHG emission reduction inventory system and is responsible for adaptation actions in the agriculture sector.

Ministry of Public Works, Housing and Urban Development (MOPHU)

The Ministry is the government department in charge of defining and executing the policy and actions in the field on planning and urban development. In particular, the following directorates are expected to play a strategic role:

- the Directorate-General of Infrastructures.
- the Directorate-General of Urban Planning and Housing.
- the Directorate-General of Territorial Planning.

Institutions that can / could support the integration of climate adaptation strategies in their specific sector and NGOs playing a strategic role in climate change policies' implementation, land and natural resources' planning and management

Institutions

- Ministry of Natural Resources and Energy (MRNE)
- Ministry of Fisheries (MP)
- Ministry of Tourism and Handcrafts (MTA)
- Ministry of Transports (MT)
- Ministry of Territorial Administration and Local Power (MATPL)
- Ministry of Finance (MF)
- Ministry of Economy (MEc)
- Minister for Public Administration, Labour, Employment and Social Security (MAPTESS)

- Ministry of Women, Family and Social Solidarity (MMFSS)
- Ministry of Education (MEd)
- Ministry of Culture, Youth and Sports (MCYD)
- National Institute of Statistics (INE)
- National Institute of Agricultural Research (INPA)
- National Institute of Research and Studies (INEP)
- National Institute for Fisheries and Oceanographic Research (INIPO)
- Maritime and Port Institute (IMP)
- IUCN
- FAO
- IFAD
- Other local institutions

NGOs

- Tiniguena (This Earth is Ours)
- AD (Action for the Development)
- ADPP/GB (Humana) (GB People-to-People Development Aid Association)
- LVIA
- Organization for Wetlands' Protection and Development (ODZH)
- Association of Women of Economic Activity (AMAE)
- ADEMA
- KAFO Federation
- Other local NGOs and CBOs

The Basic Civil Protection Law of GB institutes the **National Civil Protection System (SNPC)**, constituted by the state bodies and services directly responsible for the execution of the civil protection policy and by public and private entities with a special duty of collaboration in the matter (art. 11 of chapter II of the Basic Law). The SNPC must guide and coordinate civil protection activities at the national level, among which:

- promoting, at the national level, actions to reduce the risk of disasters, including the preparation of civil protection studies and plans.
- promoting the assessment of the risks of serious accidents, disasters, or calamities.

6 SWOT analysis

Land Planning is the process of facilitating decision making to carry out development with consideration on the natural environmental, social, political, economic and governance factors and provides a holistic framework to achieve sustainable outcomes. Land planning is influenced by changes within internal and external operational environments. SWOT, the acronym standing for Strengths, Weaknesses, Opportunities and Threats analysis, is a useful tool for analysing internal and external factors in order to attain a systematic approach and support for a decision-making process (Khalifipour *et al.*, 2012).

SWOT analysis has been widely applied in the fields of land-resource planning, urban strategy planning, tourism planning, etc.

The critical assessment of the coastal area of GB is approached here through a SWOT analysis on the topic of landscape/seascape dynamics, coastal governance, climate change, cultural tangible/intangible heritage, socio-economic dynamics.

The resources, weaknesses, opportunities and threats identified and systematised in the following table (Tab. 6.1) are specifically oriented towards urban and landscape planning and climate adaptation in the coastal area. In this sense, and in line with the objectives of the strategic document, communities are considered actors, active participants in a renewed process of protection and enhancement of the natural/cultural/human heritage. In the threefold perspective of i) adaptation to ongoing transformations, ii) eco-sustainable development and iii) community resilience, the contents of the SWOT analysis are structured according to the following themes:

a) Landscape and seascape

b) Urban planning & governance

c) Climate change fragilities & coastal adaptation governance

d) Cultural heritage

e) Socio-economic dimension

Reading the five topics transversally, the main aspects and the responses/activities that can be developed from the emergent dynamics and the state of affairs are highlighted below:

a) GB's coastal natural heritage constitutes the largest existing and potential multifunctional (environmental-social-economic) resource. This importance is recognised by the various protected areas established, without forgetting, in some cases, the sacred and identity value attributed to it by local communities. Similarly, the transformative dynamics underway and the trending scenarios -socio-economic and climatic- seriously threaten the stability/functionality of the landscape system itself, altering its form/perception, productivity, response capacity, etc. In this perspective, it is necessary to promote scientific research of landscape-environmental value as well as new sustainable uses, including eco-tourism.

b) The efficiency of national/local governance and the effectiveness of spatial governance tools are undoubtedly two central aspects for the protection, enhancement and management of the landscape in GB. In this sense, urban planning has to respond to local dynamics, ongoing -internal/external- socio-economic pressures and increasing climate impacts. The presence of transnational and national bodies, as well as recently developed laws, urban plans and ad hoc strategies are the strength and starting point that has to be followed by effective implementation with the contribution and active participation of resident communities.

c) The coastal area's settlement, infrastructural and natural systems are particularly exposed and vulnerable to climate impacts, as already highlighted in the document. This endogenous/exogenous fragility is currently not addressed in coastal planning forecasts, except in some specific projects and/or programmes under development. In this regard, in addition to mainstreaming measures/interventions for climate adaptation, social

and socio-health resilience, it will be crucial to activate a training programme for institutional capacity building/capacity building.

d) The GB's cultural heritage is mainly anchored around the socio-ethno-anthropological knowledge, traditions and customs of local communities. While this human and identity heritage is recognised and preserved, especially in the Bijagos Archipelago, the current socio-economic changes and the constant external pressure to overexploit resources threaten the transmission of a traditional culture, the management of the cultural landscape and its sacred places. In addition to this widespread heritage, there is a more material and tangible one, referable to the ruins/signs of the colonial past and its architectures, today mostly in a state of neglect and awaiting enhancement.

e) The general social and economic conditions of the population hamper the implementation of the sustainable development strategies. The HDI is one of the lowest in the World and social and gender inequalities still characterize the Bissau Guinean society. Young people prefer to emigrate to Bissau, looking for work opportunities and better life quality instead of living in small villages, because of low economic expectations, and the spread of economic dynamics that are not compliant with traditional rules and practices has been weakening social cohesion in the rural areas.

Table 6.1 SWOT analysis

STRENGTHS	
Landscape and seascape	• Network of coastal Protected Areas (PNTC, PNC, PNLC, PNO, PNMJVP, AMPCIU) • Bolama Bijagós Archipelago Biosphere Reserve (UNESCO, 1996) • Presence of a rich marine biodiversity and related fish resources as a driver for blue and environmentally sustainable tourism • The mangrove system and its ecosystem multifunctionality (protection from coastal erosion, food security, medicinal purposes, carbon uptake and refuge areas for biodiversity) • The rainforest system as dominant/landscape matrix and multifunctional resource (environmental, social, economic) • Natural reforestation of mangrove vegetation in abandoned coastal cultivation areas
Urban planning & governance	• Presence of local and national institutions and bodies for land and environmental governance (IBAP, GPC, MOPHU, AAAC etc.) • Legislation in place and/or being drafted on territorial government (LOTU etc.), on environmental management of coastal areas (Plano Diretor para o Planeamento Costeiro, Plano Estratégico de Desenvolvimento Regional de Bolama-Bijagós 2015-2020), on Urban Plans (Bissau, Bolama, Bubaque etc.) and landscape-territorial, socio-economic and climate-neutral strategies (Plano Estratégico "Terra Ranka" 2015-2020, Bissau 2030 Sustainable Development Plan, PANA) • Presence of a network of public/private and NGOs actors for the development of local projects (UNDP, Tiniguena etc.)

	• Presence of institutes for the collection, processing and production of data on a national scale (e.g. National Institute of Meteorology (INM), National Institute for Fisheries and Oceanographic Research (INIPO), National Institute of Statistics (INE), etc) • Participation/recognition of national islands in the organisation Small Island Developing States (SIDS, UN)
Climate change fragilities & coastal adaptation governance	• National Adaptation Programmes of Action (NAPA, UNFCCC) for the development of climate change adaptation actions • Adaptation of coastal planning forecasts to emerging issues through studies and reports for climate adaptation and social resilience (i.e. QUARC-Quadro de Acção para Resiliência da Cidade etc.)
Cultural heritage	• Agricultural management practices (e.g. CSA) and traditional farming techniques (e.g. Zai) • Presence of sacred sites with socio-cultural and spiritual-religious value as identity places of local knowledge and practices (i.e. RBABB, "Colage" and "Cobiana" forests etc.) • Rice cultivation as an identity heritage in terms of landscape design/composition, traditional technical-productive skills (i.e. “bolanha” etc.) and major resource for national food subsistence • Historical settlements of colonial foundation and widespread cultural heritage (i.e. Bolama, Bubaque and Bissau)
Socio-economic dimension	• Availability of a body of technical experts in many different domains relevant to green and blue economy • Implementation of closed seasons for fishing and forestry activities • Integration of climate adaptation strategies in sectorial planning instruments (although in some cases they need to be updated): DENARP/PSRP II (2011-2015), Strategy “Hora-Tchiga” 2020-2024, PND 2020-2023, PSDPA 2023-2027, (PNIA) (2nd Generation), SEforAll, etc. • National representation and capacity for mobilizing communities. • Integration of women and youth in decision-making spaces • Capacity to develop activities for women and youth empowerment • Existence of a legal and institutional framework on gender and social issues • National strategic documents with recommendations on gender equality and social inclusion issues (i.e. National Plan for Gender Equality and Equity)
WEAKNESS	
Landscape and seascape	• Extensive illegal deforestation practices (i.e. logging, uncontrolled fires etc.) for agricultural-forestry and economic-productive purposes • Lack of maintenance of coastal land management/care systems due to the crisis of subsistence farming (i.e. rice fields etc.) and the increasing neglect of traditional coastal farming practices ('rural exodus')

	• Monocultural agricultural practices with particular reference to export products (i.e. cashew, Pô-de-Sangue/Pteurocarpus erinaceus etc.) and related impacts on soil (nutrient depletion, soil compaction etc.) and biodiversity • Low diversification of national/local agro-forestry production affecting the natural heritage • Severe coastal erosion in progress (i.e. Varela) and consequent loss of riparian/dune biodiversity, landscape/vegetation system resilience and abandonment/decline of tourist accommodation facilities
Urban planning & governance	• Absence and/or inadequacy of waste management infrastructure • Non-execution of the provisions of the urban and territorial planning instruments (i.e. Bissau) and of the environmental legislation in place • Inadequacy of the national/local governance system and technical/operational competences in the respective management and planning bodies • Demographic increase and related building and infrastructural pressure on urban/rural systems and natural resources • Phenomena of urban sprawl and 'metropolisation' of Bissau along the south-west (i.e. Prabis) and north-west (i.e. Safim) expansion axis and related criticalities in terms of infrastructure and services in peri-urban and/or hydrological-environmental risk areas • Lack of management-monitoring systems and up-to-date urban and territorial data (technical maps, qualitative-quantitative data, etc.) to support the analysis, planning and management of the transformative dynamics underway
Climate change fragilities & coastal adaptation governance	• Inadequacy of the primary infrastructure network (Sao Vicente bridge over the Rio Cacheu, Bolola road or "the circular" in Bissau etc., PRISE, 2019) and secondary infrastructure with related environmental safety issues in terms of climate and health • Inadequacy of coastal planning forecasts to address emerging issues of climate change (rising mean sea level, coastal erosion, intensification of extreme phenomena, etc.) and ongoing land transformations • Increasing aridity and drought phenomena in inland areas due to meteo-climatic instability (duration/intensity) related to the seasonal rainfall cycle and its impact on agro-productive systems and subsistence agriculture • Fragility of the coastal system in relation to climatic and meteorological dynamics (i.e. sea level rise, coastal flooding, coastal erosion, etc.) • Presence of settlements in alluvial areas and/or in close contact with the coastal area and the main hydrological system (Cacheu, Cacine, Bissau etc.)
Cultural heritage	• Degraded and/or neglected cultural heritage and related loss of historical memory of places

Socio-economic dimension	• Level of vulnerability (technical and financial) of key institutions in coastal governance and planning • Discontinuity of sectoral public policies (agriculture, forestry, fisheries, tourism, land use planning, gender, etc.), resulting from cycles of governmental instability • Social and gender focused institutions lacking technical capacities to work on coastal planning and management and climate change • Coastal management institutions lacking technical capacities and instruments regarding social and gender issues • Lack of coordination between international organizations, national institutions focused on land and environmental planning and institutions acting for sectoral economic development (fisheries, agriculture, tourism, etc) • Climate change impacts on educational programs and activities (see Education Sectoral Plan 2017 – 2025) • Lack of integration of climate adaptation strategies in the tourism sector (see Tourism Master Plan for GB and Bijagos) • Obsolete Water Management Plans (Water Director Plan, Water and Sanitation Sector Master Plan) • Lack of land rights for women • Weakening of social cohesion in villages (especially in islands) due to the spread of economic dynamics that are not compliant with traditional rules and practices • Young people are often not available to work in paddy rice fields due to heavy work conditions and low profit expectations • Young people prefer to emigrate to Bissau looking for work opportunities and better life quality instead of living in small villages • Lack / weakness of the livelihood products' value chains
OPPORTUNITIES	
Landscape and seascape	• Promoting research and studies of ecological-environmental and landscape value (scientific-cultural tourism), with particular regard to local structural phenomena such as the retreat of tides and the coastal mud system (i.e. Bijagós) • Implementing the rainforest and coastal mangrove system to protect the coastal landscape-settlement system
Urban planning & governance	• Shared strategies (institutions, communities, third sector, etc.) for spatial planning oriented towards the protection of the landscape and environment and which is also able to respond to climate change and the production of energy from renewable sources

	• Involvement of local communities in the land transformation and co-planning processes • Promotion of projects and techniques for agri-food security (rice crops, e.g. the 'Ianda Guiné!' project, etc.) that are compatible with natural and landscape resources • Plans for territorial and landscape management and governance currently under development (e.g. Bijagós Archipelago Integrated Management Plan) • Implementation of models of development, management, land use with a traditional-community value characterised by a low landscape-environmental impact to protect the resources, customs and culture of the settled communities (i.e. RBABB)
Climate change fragilities & coastal adaptation governance	• Strengthening the technical skills of local and regional authorities through Capacity Building and/or specific programmes related to emerging issues and the climate crisis • Implementing the acquisition/catalogue and updating of national databases in relation to emerging issues (population growth, climate crisis, natural resources, etc.) and ongoing urban and landscape transformations
Cultural heritage	• Integrated natural/cultural heritage strategies for eco-sustainable tourism based on the protection of the environment and landscape and the valorisation of local material/immaterial resources • Programme for the dissemination/valorisation of local knowledge and practices (intangible cultural heritage) in terms of micro-entrepreneurship and/or ecotourism with the involvement of the communities themselves
Socio-economic dimension	• Availability of entities and mechanisms to support the country's capacity building in coastal planning. • Centrality of climate adaptation/mitigation issues in the public and political agenda (local, national, regional and global). • Possibility of effective participation of local communities in the decision-making process, as well as in the daily monitoring of ecosystems and their resources. • Availability of training opportunities in various target areas (blue economy, green economy, cooperativism, environment, territorial planning, gender perspective, etc.). • Development of mechanisms to strengthen gender inclusion in decision-making processes (i.e. land commissions)
THREATS	
Landscape and seascape	• Exacerbation of mean sea level rise scenarios and related impacts on coastal areas as well as on the agro-forestry and mangrove system (erosion, salinisation, flooding, etc.) threats landscape heterogeneity/complexity

	("bolanhas", coastal shrub savannas, "tannes", etc.) and its different functions, (IPCC, 2022) • Decrease in areas available for grazing due to changes in land use, climate impacts and related changes in the environmental-landscape and agricultural system • Unregulated use of tree-forest resources ("mpam-pam" practice, cashew fruit farming) and related increase of desertification/land degradation phenomena
Urban planning & governance	• Urban sprawl in areas of landscape-environmental value (wetlands, mangroves, etc.) in suburban areas of the capital city • Unregulated access and use of natural resources (fisheries, forests, soil, etc.) between national agencies, international private actors and local communities threatening the landscape-sea system and the livelihoods of settled communities • Inefficiency of the national/local governance system and inefficacy of instruments linked to political instability puts the landscape system and its progressive fragmentation at constant risk • Geo-strategic position and 'metropolisation' of Bissau centralises national development policies and investor interests exacerbating widespread urbanisation, land consumption and landscape transformation
Climate change fragilities & coastal adaptation governance	• Increasing drought phenomena and related threat to crop productivity in different growth periods, also considering aphasic forecasts to 2030-2050 (IPCC, 2022) • Land speculation (i.e. São Paulo neighbourhood, Bolanha de Antula, etc.) and infrastructure projects incoherent with the existing planning framework and/or in areas exposed to environmental/climatic fragilities in the capital (i.e. industrial development along the Antula-Port of Bissau axis, PRISE-Rapport Provisoire, 2020, etc.) • Exacerbation of the global warming scenario and related increase in local temperatures, heat waves, rainfall variations (regularity, intensity, etc.) and extreme weather events (Atlantic storms, storm surges, etc., IPCC, 2022) • Pathogen proliferation and transmission of infectious diseases (Trisos *et al.*, 2022) exacerbated by climate trend scenarios (i.e. IPCC, 2022) and poor quality of primary and secondary infrastructure and local hygiene and sewage systems.
Cultural heritage	• Private interests, external pressures and national/international lobbies for soil and land exploitation threaten areas devoted to traditional uses of the intangible, spiritual and religious culture of communities
Socio-economic dimension	• Internal political instability with impact on the country's socio-economic environment

	• Many stakeholders show a low level of readiness to collaborate on the reform of the coastal planning and occupation framework. • Over-exploitation of natural resources due to lack of regulation, effective monitoring and control (especially in (mining, fisheries, forestry sectors) • Economic, political, and environmental effects of the Ukraine war, which posed a significant inflationary challenge with potential impacts regarding pressure on the country's coastal natural resources. • Fragility in cross-border security, allowing citizens of neighboring countries to enter and exit the national territory without proper control. • Direct impact of climate change effects on economic activities, especially linked to the agricultural, fisheries, and tourism sectors • Lack of fiscal and financial tools aiming at fostering public – private partnerships

7 Climate change adaptation and community resilience scenarios, strategies and actions

7.1 Scenarios

The SESA is based on two scenarios, aligned with ProDoc proposed scenario:

Baseline scenario (scarce effectiveness scenario)

The SESA proposed strategies and actions are not implemented, thus the current trends and problems that are affecting the GB coastal areas (including local communities and economic sectors) would continue into the future. This is the "Scarce effectiveness scenario", representing the "business as usual reality", in a country demonstrating a low adaptive capacity to support the impacts associated with climate change. This scenario represents the extension of the baseline situation without GEF funding under the current project proposal. The baseline scenario is a representation of what would reasonably be expected to have occurred in the project's absence (UNDP, 2018).

"Coastal resilience" scenario (cost effectiveness scenario)

The SESA proposed strategies and actions and the other coastal project actions are implemented.

The following table presents the baseline programs / projects / plans, considering ProDoc baseline programs / projects for Components 1, 2 and 3 and other ongoing relevant programs / projects, including a few recently adopted sectoral plans, focused on coastal zones' planning and natural resources' management and climate adaptation strategies:

Table 7.1 Baseline programs / projects / plans

Lead Agency & ref.	Programs / projects / plans
Adaptation Fund, Abu Dhabi Fund for Development, Kuwait Fund for Arab Economic Development and the African Development Bank, IFAD, MAF	Family Farming Diversification, Integrated Markets, Nutrition and Climate Resilience Project (REDE Project) (2019 – 2026)
AfDB 1	Projet d'Appui au Renforcement de la Gouvernance Economique et Financière (PARGEF) - Ref.: P-GW-K00-005, (2010 - ongoing)
AfDB 2	Projet d'appui au renforcement des capacités d'administration - Reference : P-GW-IAD-001
AfDB 3	Projet de Développement des Chaines de Valeur Riz - Reference: P-GW-A00-003, (2018 + 6 years, i.e. recently started), providing co-financing to the LDCF project
Agence Française de Développement (AFD), Agence de l'environnement et de la maîtrise de l'énergie (ADEME), Pays de la Loire Regional Council, Cap Atlantique,	Développement Durable de l'Agriculture de Mangrove (DEDURAM) (2016 – 2024)

Lead Agency & ref.	Programs / projects / plans
RAJA Foundation, Prince Albert II of Monaco Foundation, Univers-Sel, KAFO	
EC 1	UE-ACTIVA - Eixo 1: Governação territorial - Desenvolvimento Regional através do Reforço da Sociedade Civil)
EC 2	UE-ACTIVA 2 - Projet de désenclavement des zones rurales pour faciliter la commercialisation de la production agricole et améliorer l'accès aux services sociaux de base
EC 3	Projet de Développement des Chaines de Valeur Riz - Reference: P-GW-A00-003, (2018 + 6 years, i.e. recently started), providing co-financing to the LDCF project
EC 4	EC | 2017 - 2021 | Labradur de nó futuro: fortalecimento da formação profissional na região de Cacheu
EC 5	EC |2016 - 2020 | No Intchi Mbemba - Reforço da fileira de sementes de arroz
EC 6	EC 2015 - 2018 | Firkidja di bida digna di n mindjeres ku jovens i purduto di no tchon
EC 7	EC | 2015 - 2018 | Kópóti pa cudji n futuro
EC 8	EC 2016 - 2018 | Pdil Pecixe: Projeto de Desenvolvimento da Ilha de Pecixe
EC 9	EC | 2016 - 2019 | Projet d'appui à la diversification agricole et au développement d'une offre en noix de cajou de qualité en régions de Oio et de Cacheu
EC10	EC 2016 - 2020 | Protected areas and climate change resilience
EC11	EC 2016 - 2022 | GCCA+ in GB: building resilience to climate change through enhanced institutional and mitigation capacities
EC12	Ianda Guiné! Nó lanta, nó pega! (2018 – 2023)
EC13, UEMOA, IUCN, Wetlands International Africa	Sustainable management of mangroves from Senegal to Benin (Project PAPBIO) (2019 – 2023)
EC14	EC 2020 - 2024 | MALMON project. (Mangroves, mangrove rice and mangrove people. Sustainably improving rice production ecosystems and livelihoods)
EC15	Multiannual Indicative Programme 2021-2027
FAO 1	GCP /GBS/034/EC - Support to producers for improving productivity and quality of cashew production in GB (2016 - 2018)
FAO 2	TCP/GBS/3601 - Support for the establishment of technical and organizational systems for multiplication of commercial food crops' seeds in GB (2016 - 2018)
FAO 3	TCP/GBS/3602 - Improving resilience of livelihoods to threats and crises (2016 - 2018)

Lead Agency & ref.	Programs / projects / plans
FAO 4	TCP/GBS/3603 - Support to small producers for improving the productivity and commercialization of cashew (2016 - 2018)
FAO 5	TCP/GBS/3604 - Validation and dissemination of integrated aquaculture - agriculture systems (rice-fish culture + others) through the "Farmer Field Schools" approach (2016 - 2018)
FAO 6	GCP /GBS/035/EC - For a Responsible Land Governance (Project "N`Tene Terra"): Support for the Implementation of the Land Law in GB (2016 - 2020)
GCF 1, BOAD	Enhancing livestock resilience to drought in GB (Concept note prepared in 2018)
GCF 2, OSS	Adaptation of agricultural production systems in Coastal Areas of Northwest GB (2023 – 2028)
IFAD	PADES: Support for the start-up of economic development in the South - IFAD project (Appui au démarrage du projet d'appui au développement économique du Sud-PADES)
Italian Foreign Affairs' Ministry (IFAM), LVIA, IBAP, INPA	Mangrove Project. Enhancement of mangrove rice cultivation and protection of mangroves in the Reons of Cacheu, Oio, Tombali and Bolama-Bijagós (2016 – 2018)
IUCN	"Rice and mangrove" Project (2019 – ongoing)
MAVA Foundation 1	Legacy Landscape Fund project proposal for the South East of GB
MAVA Foundation 2, IUCN, IBAP	Regional Master Plan for Responsible Tourism for the Bolama Bijagós Archipelago Biosphere Reserve (RBABB) (2020)
MP, INIPO	Fisheries and Aquaculture Strategic Development Plan (PSDPA) 2023-2027
Multi-Partner	Regional Project that Provided co-financing to the LDCF Project - Global Alliance for Resilience Initiative / Sahel-West Africa (AGIR), European Union through Club Sahel / OECD
UNDP 1	Capacity building for local governance, including e-governance
UNDP 2	Capacity for natural resource management (national level)
UNDP 3	UNDP-EC Management Capacity Building Program (improved public administration)
UNDP 4	Peace Building Fund / UNDP Development Assistance (governance, sustainability, job creation, gender)
UNDP 5, UN-Habitat, Disaster Risk Management, Sustainability and Urban Resilience - DiMSUR	Projects financed under the Coastal project and executed with the technical assistance of UN-Habitat: - Action Framework for resilience in the city of Bubaque 2023 - 2033 - Action Framework for resilience in the city of Cacine 2023 -2033 - Action Framework for resilience in the city of Mansoa 2023 - 2033

Lead Agency & ref.	Programs / projects / plans
	- Action Framework for resilience in the city of S. Domingos 2023 -2033
UNDP Baseline extrapolated	Extrapolated relevant baseline finance expected during LDCF project implementation
UN-Habitat	Actions financed and executed under the 2018 – 2022 National UN-Habitat Programme: - Strategic Development Plan of the Bolama Bijagós Archipelago Biosphere Reserve – Etikene Kossok (2021) - Bolama General Urban Plan - Bubaque General Urban Plan
WB 1	Participatory Rural Development Project (P117861) (2009-2019)
WB 2	Rural Community-Driven Development Project (P090712, P146746, P151443), including the first and second additional funding (2009-2019)
WB 3	Private Sector Rehabilitation & Agribusiness Development (PSRAD) (P127209) (2014-2020)
WB 4	GB Public Sector Strengthening Project (P150827), excluding the pipeline project for additional finance (2015-2020)
WB 5	Pipeline: Second Additional Finance to Rural Community-Driven Development Project for GB (P151443)
WB6, IBAP	WACA Res IP2
WIACO 1	Conserving the biodiversity of the Cacheu Mangroves Natural Park (2015 – 2018)
WIACO 2, AAAC	Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve (2022 – 2023)

7.2 Objectives and strategies of the coastal resilience scenario

Strategies and actions are identified with the aim of reaching the following general objectives, based on Integrated Coastal Zone Management, Sustainable Land Management, Land Degradation Neutrality and Climate Adaptation inspiring principles:

OB.01 – Ensuring sustainable use of coastal natural resources.

OB.02 – Conservation of critical habitats.

OB.03 – Land degradation neutrality.

OB.04 – Strengthening coastal communities' resilience.

OB.05 – Adapting land use and protecting critical public assets and services.

OB.06 – Ensuring resilient economy through inclusive development.

OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring.

OB.08 – Protecting indigenous cultural heritage.

OB.09 – Increasing the available funds for local communities and institutions, by leveraging financial values of coastal ecosystems (climate finance).

and based on the results of:

- baseline analysis (Ch. 4).
- baseline projects analysis (see Table 7.1).
- analysis of the level of integration climate adaptation strategies in the existing policies, programs and plans (Ch. 5).
- financed and/or ongoing plans and programmes (mentioned by ProDoc baseline and resulting from field mission and stakeholders' meetings).
- actions proposed by Coastal project.
- strategic and operational orientations from local communities and experts met during the field mission.
- SWOT analysis (Ch. 6).

Each objective can be pursued by implementing one or more strategies, just as each strategy can contribute to the achievement of one or more objectives. Hereafter, the list of the identified strategies and a table showing the relationship between objectives and strategies. See Annex 1 for strategies mapping.

Strategies

Environmental and landscape system

STR.01 – Preservation of the protected areas.

STR.02 – Extension of the National System of Protected Areas (SNAP).

STR.03 – Protection of the sacred areas.

STR.04 – Strengthening the ecological connectivity.

STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.).

STR.06 – Reforestation of bare / sparse areas of the mangrove system.

STR.07 – Securing the coastal strip in response to climate change effects (sea level rise, coastal erosion, floods, etc.).

STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest.

STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project).

Historical-cultural and settlement system

STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector.

STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts.

STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture.

STR.13 – Urban and architectural recovery of minor historic centers and widespread assets.

STR.14 – Containment of land take and urban sprawl and urban regeneration interventions.

STR.15 – Coastal settlements' adaptation to climate resilience projects.

STR.16 – Update of existing plan (Bissau) and development of urban plans for the main centers.

STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience.

Governance

STR.18 – Strengthening the governance of coastal and metropolitan areas.

STR.19 – Developing and implementing climate finance mechanisms.

Table 7.1 General objectives and strategies

GENERAL OBJECTIVES	STRATEGIES
OB.01 – Ensuring sustainable use of coastal natural resources	STR.01 – Preservation of the protected areas STR.02 – Extension of the National System of Protected Areas (SNAP) STR.03 – Protection of the sacred areas STR.04 – Strengthening the ecological connectivity STR.05 – Protection and conservation of the carbon sinks (mangroves, other forest, seagrass, ecc.) STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project) STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector STR.14 – Containment of land take and urban sprawl and urban regeneration interventions STR.15 – Coastal settlements' adaptation to climate resilience projects STR.16 – Update of existing plan (Bissau) and development of urban plans for the main centers STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 – Developing and implementing climate finance mechanisms
OB.02 – Conservation of critical habitats	STR.01 – Preservation of the protected areas STR.02 – Extension of the National System of Protected Areas (SNAP) STR.03 – Protection of the sacred areas STR.04 – Strengthening the ecological connectivity STR.05 – Protection and conservation of the carbon sinks (mangroves, other forest, seagrass, ecc.) STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms
OB.03 – Land degradation neutrality	STR.02 – Extension of the National System of Protected Areas (SNAP) STR.04 – Strengthening the ecological connectivity STR.05 – Protection and conservation of the carbon sinks (mangroves, other forest, seagrass, ecc.) STR.06 – Reforestation of bare / sparse areas of the mangrove system STR.07 – Securing the coastal strip in response to climate change effects (sea level rise, coastal erosion, floods, etc.)

GENERAL OBJECTIVES	STRATEGIES
	STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project) STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector STR.14 – Containment of land take and urban sprawl and urban regeneration interventions STR.15 – Coastal settlements' adaptation to climate resilience projects STR.16 – Update of existing plan (Bissau) and development of urban plans for the main centers STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms
OB.04 – Strengthening coastal communities' resilience	STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project) STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts STR.15 – Coastal settlements' adaptation to climate resilience projects STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms
OB.05 – Adapting land use and protecting critical public assets and services	STR.07 – Securing the coastal strip in response to climate change effects (sea level rise, coastal erosion, floods, etc.) STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project) STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts STR.15 – Coastal settlements' adaptation to climate resilience projects STR.16 – Update of existing plan (Bissau) and development of urban plans for the main centers STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms

GENERAL OBJECTIVES	STRATEGIES
OB.06 – Ensuring resilient economy through inclusive development	STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project) STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms
OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring	STR.16 – Update of existing plan (Bissau) and development of urban plans for the main centers STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience STR.18 –Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms
OB.08 – Protecting indigenous cultural heritage	STR.03 – Protection of the sacred areas STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture STR.13 – Urban and architectural recovery of minor historic centers and widespread assets STR.18 – Strengthening the governance of coastal and Bissau metropolitan areas STR.19 - Developing and implementing climate finance mechanisms

7.3 Proposed actions

The consultants have proposed the following actions to implement the identified strategies (at least one action for each strategy).

They are supposed to be strategic actions, meaning that their implementation could orient the planning and development process towards sustainability taking into account climate change effects and support the implementations of other sectorial policies and actions, to be defined in the planning process.

Table 7.2 Proposed Action Framework

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
01	Bissau Urban Plan (update)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.03 – Land degradation neutrality ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring	▪ STR.14 – Containment of land take and urban sprawl and urban regeneration interventions ▪ STR.16 – Urban development plan update (Bissau) and design in line with the Sustainable Development Plan to 2030 ▪ STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience	Bissau Municipality / MOPHU	MT, IMP, MADR, MAB, IBAP, GPC, Tiniguena, AD, ADPP/GB, AMAE
02	Bolama Urban Plan	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.03 – Land degradation neutrality ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring	▪ STR.13 – Urban and architectural recovery of minor historic centers and widespread assets ▪ STR.14 – Containment of land take and urban sprawl and urban regeneration interventions ▪ STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience	Bolama Region / MOPHU	MT, IMP, MADR, MAB, MTA, MATPL, IBAP, GPC, Tiniguena, AD, ADPP/GB, AMAE, ADEMA

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
03	Bubaque Urban Plan	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.03 – Land degradation neutrality ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring	▪ STR.13 – Urban and architectural recovery of minor historic centers and widespread assets ▪ STR.14 – Containment of land take and urban sprawl and urban regeneration interventions ▪ STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience	Bolama Region / MOPHU	MT, IMP, MADR, MAB, MTA, MATPL, IBAP, GPC, Tiniguena, AD, ADPP/GB, AMAE, ADEMA
04	Project for the establishment of new protected areas (Unhocomo – Unhocomozinho MPA, Varela Coastal Park)	▪ STR.02 – Extension of the National System of Protected Areas (SNAP) and creation of cross-border protected areas	▪ STR.02 – Extension of the National System of Protected Areas (SNAP)	IBAP	MAB, IUCN, Tiniguena
05	Project for the establishment of ecological corridors (Cacheu – Casamance, Cantanhez – Boke, Cantanhez – Kogon, Cantanhez – Cufada – Salifo, Cacheu River)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality	▪ STR.01 – Preservation of the protected areas ▪ STR.04 – Strengthening the ecological connectivity	IBAP	MAB, IUCN, Tiniguena, other local NGOs and CBOs

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
06	Project for the establishment of a new Biosphere Reserve (Cacheu Sector West Coast – Jata and Pecixe islands)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality	▪ STR.02 – Extension of the National System of Protected Areas (SNAP) ▪ STR.04 – Strengthening the ecological connectivity	IBAP	MAB, IUCN, UNESCO, Tiniguena, ODZH, other local NGOs and CBOs
07	National mangrove management plan	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.06 – Ensuring resilient economy through inclusive development	▪ STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.) ▪ STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas	IBAP	IUCN, MRNE, INA, INEP, MAB, Tiniguena, AD, LVIA
08	Program for the recovery of abandoned paddy rice fields ("bolanhas") and the restoration of mangroves	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.03 – Land degradation neutrality	▪ STR.06 – Reforestation of bare / sparse areas of the mangrove system ▪ STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts	IBAP / MADR	INA, INPA, MAB, MRNE, IUCN, FAo, IFAD, Tiniguena, AD, LVIA, AMAE

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
09	Sacred areas' protection project (mapping, management guidelines, draft law)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.08 – Protecting indigenous cultural heritage	STR.03 – Protection of the sacred areas	IBAP	MAB, MCYD, IUCN, Tiniguena
10	Land Degradation Neutrality pilot projects in Tombali Region, Biombo Region and an area in the Nort East (to be identified)	OB.03 – Land degradation neutrality	▪ STR.01 – Preservation of the protected areas ▪ STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.) ▪ STR.06 – Reforestation of bare / sparse areas of the mangrove system ▪ STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts ▪ STR.14 – Containment of land take and urban sprawl and urban regeneration interventions ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas	INA	INEP, MRNE, MOPHU, MAB, MADR, INPA, GPC, IBAP, Tiniguena, AD, other local NGOs and CBOs

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
11	Landscape plan of the coastal zone and application to a pilot area (Cacheu Region) (and draft landscape law)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring ▪ OB.08 – Protecting indigenous cultural heritage	▪ STR.01 – Preservation of the protected areas ▪ STR.03 – Protection of the sacred areas ▪ STR.04 – Strengthening the ecological connectivity ▪ STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.) ▪ STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture ▪ STR.14 – Containment of land take and urban sprawl and urban regeneration interventions ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas	MAB / MOPHU / GPC	MT, IMP, MADR, MTA, MATPL, IBAP, MP, Tiniguena, AD, ADPP/GB, AMAE, ADEMA, other local NGOs and CBOs
12	Creation of an Urban Center as a consultative-participatory body for the governance of coastal and Bissau metropolitan areas	▪ OB.08 – Protecting indigenous cultural heritage	STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture	MAB	MOPHU, MATPL, GPC, IBAP, Tiniguena, AD, ADPP/GB, AMAE

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
13	Coastal settlements' adaptation to climate resilience projects in Cacheu, Caió, Prabis, Buba, Catió (i.e. QUARC)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.03 – Land degradation neutrality ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services	▪ STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts ▪ STR.15 – Coastal settlements' adaptation to climate resilience projects	MOPHU / INA / GPC	MT, IMP, MADR, MTA, MATPL, IBAP, MP, Tiniguena, AD, ADPP/GB, AMAE, ADEMA, other local NGOs and CBOs
14	REDD+ and carbon credit negotiations in pilot-sites (PNTC, PNC and other areas to be identified)	▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.09 – Increasing the available funds for local communities and institutions, by leveraging financial values of coastal ecosystems (climate finance)	▪ STR.01 – Preservation of the protected areas ▪ STR.03 – Protection of the sacred areas ▪ STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.) ▪ STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest ▪ STR.19 – Developing and implementing climate finance mechanisms	IBAP	MAB, MF, MEc

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
15	National Disaster Risk Monitoring System	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring	STR.18 – Strengthening the governance of coastal and metropolitan areas	INA / NCCC / INM	MAB, IMP, MADR, IBAP, MP, INIPO, Mec, Tiniguena, AD, ADPP/GB, AMAE, ADEMA, other local NGOs and CBOs
16	Implementation of a garbage management system for villages and urban areas in the flood risks' zones	▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services	STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts	MAB	MATPL, MRNE, ADPP/GB, AD, local NGOs and CBOs (pilot areas)
17	Seagrass Conservation Project (mapping, model regulation of protected areas, draft law)	▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality	STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.)	IBAP / INIPO	MAB, MP, IUCN, INEP

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
18	Historical Heritage Recovery Plan	▪ OB.08 – Protecting indigenous cultural heritage	▪ STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture ▪ STR.13 – Urban and architectural recovery of minor historic centers and widespread assets	MAB / MCYD	IBAP, UNESCO, MMFSS, Tiniguena
19	Sustainable development plan of the tourism sector in the coastal zones (including zoning)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.06 – Ensuring resilient economy through inclusive development	STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector	MTA	MAB, MOPHU, GPC, IMP, MADR, MATPL, MT, MEc, IBAP, MP, Tiniguena, AD, ADPP/GB, AMAE, other local NGOs and CBOs
20	Location and development plan of strategic structures, services and activities for food security (agriculture, fisheries) in coastal zones in response to climate change effects	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.06 – Ensuring resilient economy through inclusive development	▪ STR.07 – Securing the coastal strip in response to climate change effects (sea level rise, coastal erosion, floods, etc.) ▪ STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project)	MADR / MP	INA, MAB, IMP, MADR, MATPL, MT, ME, IBAP, FAO, IFAD, Tiniguena, AD, ADPP/GB, AMAE, KAFO Federation, LVIA, other local NGOs and CBOs

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
21	Implementation of recovery and safety measures for public infrastructures in climate change vulnerable areas	▪ OB.03 – Land degradation neutrality ▪ OB.05 – Adapting land use and protecting critical public assets and services	▪ STR.07 – Securing the coastal strip in response to climate change effects (sea level rise, coastal erosion, floods, etc.)	MAB	MRNE, INEP, IMP, IBAP
22	Draft Law and regulation of mining and petroleum activities in the (land and marine) coastal zones	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.06 – Ensuring resilient economy through inclusive development	▪ STR.01 – Preservation of the protected areas ▪ STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas	MRNE	MAB, MEc, IBAP, Tiniguena, AD, ADPP/GB
23	Design and implementation of stakeholders' capacity building plan	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.04 – Strengthening coastal communities' resilience ▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.06 – Ensuring resilient economy through inclusive development	▪ STR.01 – Preservation of the protected areas ▪ STR.03 – Protection of the sacred areas ▪ STR.05 – Protection and conservation of carbon sinks (mangroves, other forest, seagrass, etc.) ▪ STR.08 – Landscape enhancement through the recovery and diversification of subsistence agro-forestry pastoral activities and the reforestation of the sparse rainforest	MAPTESS / INA	All the governamental institutions (or at least the key entities), Tiniguena, AD, ADPP/GB, AMAE, KAFO Federation, LVIA and other NGOs

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
			▪ STR.09 – Promotion of social and agro-productive projects for food security and landscape enhancement (i.e ARRUS Project) ▪ STR.10 – Mainstreaming landscape enhancement, biodiversity conservation and climate change adaptation in the tourism sector ▪ STR.11 – Strengthening the adaptation and resilience capacity of coastal communities to the climate change impacts ▪ STR.15 – Coastal settlements' adaptation to climate resilience projects ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas		
24	Three coastal zone management plans (sensu LOTU): North, South, Bolama – Bijagós Archipelago (the last one based on the RBABB plan, recently approved by IBAP)	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.05 – Adapting land use and protecting critical public assets and services	▪ STR.01 – Preservation of the protected areas ▪ STR.03 – Protection of the sacred areas ▪ STR.04 – Strengthening the ecological connectivity ▪ STR.05 – Protection and conservation of carbon sinks	MAB / MOPHU / GPC	MT, IMP, MADR, MTA, MATPL, IBAP, MP, Tiniguena, AD, ADPP/GB, AMAE, ADEMA, other local NGOs and CBOs

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
		▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring ▪ OB.08 – Protecting indigenous cultural heritage	(mangroves, other forest, seagrass, etc.) ▪ STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture ▪ STR.13 – Urban and architectural recovery of minor historic centers and widespread assets. ▪ STR.14 – Containment of land take and urban sprawl and urban regeneration interventions ▪ STR.17 - Development of urban planning tools for climate-environmental sustainability and community resilience. ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas		
25	Strategic Environmental and Social Assessment (SESA) and Master Plan of the mineral resources and mining industry in Guinea-Bissau, to identify the no-take zones and promote sustainable practices	▪ OB.01 – Ensuring sustainable use of coastal natural resources ▪ OB.02 – Conservation of critical habitats ▪ OB.03 – Land degradation neutrality ▪ OB.04 – Strengthening coastal communities' resilience	▪ STR.01 – Preservation of the protected areas ▪ STR.03 – Protection of the sacred areas ▪ STR.04 – Strengthening the ecological connectivity ▪ STR.05 – Protection and conservation of carbon sinks	MRNE, MAB	GPC, INA, MADR, MAPTESS, MATPL, MEc, MOPHU, IBAP, national NGOs, other local NGOs and CBOs

ACTIONS		GENERAL OBJECTIVES	STRATEGIES	RESPONSIBLE ENTITIES	OTHER INTERESTED STAKEHOLDERS
Cod.	Title / Description				
		▪ OB.05 – Adapting land use and protecting critical public assets and services ▪ OB.06 – Ensuring resilient economy through inclusive development ▪ OB.07 – Ensuring effective planning and implementation through prioritization and continuous monitoring ▪ OB.08 – Protecting indigenous cultural heritage	(mangroves, other forest, seagrass, etc.) ▪ STR.12 – Promoting active safeguarding of intangible identity heritage and traditional culture ▪ STR.18 – Strengthening the governance of coastal and metropolitan areas		

8 Environmental, economic and social impacts of the proposed strategies and actions

8.1 Baseline scenario

The SESA proposed strategies and actions are not implemented, thus the current trends and problems that are affecting the GB coastal areas (including local communities and economic sectors) would continue into the future, in result of low planning capacities associated with the lack of funding to support adaptive strategies and interventions, the strategic vision of "Coastal collapse" emerges very strongly. This is the "Scarce effectiveness scenario", representing the "business as usual reality", in a country demonstrating a low adaptive capacity to support the impacts associated with climate change. This scenario represents the extension of the baseline situation without GEF funding under the current project proposal. The baseline scenario is a representation of what would reasonably be expected to have occurred in the project's absence. In previous sections of the document, the climatic, biophysical and socio-economic expression of the baseline scenario was described (UNDP, 2018).

If the country achieves a higher planning capacity as a result of other ongoing baseline projects, even if not directly targeting the problems related to coastal management associated with climate change, there might be some conditions to plan and to adapt better to the specific problems, at least in theory. Nevertheless, if that higher planning capacity is not associated to support the actions planned, the strategic vision will not happen (UNDP, 2018).

8.2 Coastal resilience scenario

The SESA proposed strategies and actions and the other coastal project actions are implemented.

The 9 identified objectives are summarised in 19 strategies that, in summary, guide towards key strategic cornerstones and project categories to be considered for the implementation of the Plan:

- **Active protection** (STR.01;05) and extension **of protected areas** to safeguard and enhance natural resources (STR.02);
- **Reforestation/naturalisation of** the **forest system** (STR.06);
- **Agro-landscape enhancement of** ecologically and environmentally valuable **natural heritage** (STR.08), **for** the **subsistence of local communities** too (STR.09).
- **Strengthening and integration of the national ecological network**, internally and externally linked to large-scale corridors (STR.04).
- **Hydro-geomorphological territory safety measures** (STR.07).

This first **set of strategies**, focusing on the physical-naturalistic and environmental system, can be i**ncrementally implemented in the short, medium, and long term** while following the strategic vision and overall framework. The implementation of the proposed guidelines will enhance: i) the country's natural capital, ii) the quality and quantity of ecosystem services supporting the well-being and livelihoods of local populations, iii) the biophysical quality of landscape elements in their various components, and iv) the capacity of the **a) landscape-vegetation-soil system** to respond to extreme events and ongoing phenomena described in the report.

Particularly, the **safety measures**, in a climate already changed, act **as a cross-cutting strategy** to which individual strategies contribute as a whole. This safety measures will not only be physical and infrastructural but will also impact the **b) landscape-city-inhabitant system** of coastal communities, providing them with tools and viable alternatives (STR.11) through proper promotion and communication/information regarding the areas to be transformed. Alternatives may arise from new local adaptation and resilience projects already promoted in the country (i.e., Quarc, STR.15), fostering community awareness of the risks to be faced and opportunities to be seized. The outlined guidelines will lead to a network of coastal communities informed and equipped to adapt to global/local changes while continuing to meet their needs, maintaining the close settlement-deltaic/fluvial context relationship that characterises GB's coastal landscape.

While the **naturalistic heritage** dominates the coastal landscape and serves **as a "resilient infrastructure"** to address ongoing transformations and climate impacts, the renewed adaptive capacity cannot be fully realised without adequate i) **land and landscape governance tools**, ii) **climate-proof urban plans for environmental sustainability** (STR.16-17), and iii) **recovery/restoration/renovation plans for buildings and architecture**, especially in historical centres (STR.13), to be developed, adopted, and approved in the near future. Planning tools will address housing and social demands, especially in the capital (STR.14), while simultaneously tackling contemporary challenges (i.e. climate, habitability, employment, resources, energy, etc.), recovering historical memory of places and artefacts with historical-architectural and identity value through active citizen participation and involvement of local authorities, where possible, for ecologically and culturally oriented tourism.

The strategies, and subsequent actions, will gain added value if they embed themselves in the contexts, involving local inhabitants in the **"top-down/bottom-up" process of mutual exchange (information-knowledge-planning)** to protect anthropo-cultural heritage (STR.3;12) and promote a community planning aligned from a hand with inhabitants real needs from the other with the urgent actions and governance programs expressed above.

In conclusion, **the efficacy of the governance strategies** (STR.10;18;19) **is** particularly **reinforced by their alignment with existing or pending legislation** (e.g., LOTU, mangrove protection, etc.), as well as strategic initiatives in coastal governance and climate emergency response, environmental conservation, and land management. The strategic scenario shown encompass also strategies for the promotion of eco-sustainable and low environmental impact tourism, fully respecting local culture, the vocation of places, and the **new equilibrium that the strategies aim to achieve for a renewed coastal-landscape system for GB**, where inhabitants and relevant institutions must play their part in responding to societal and climatic changes (i.e., i) *environment*: IBAP, MADR, INA; ii) *climate*: NCCC, INM; *urban planning and coastal governance*: GPC, MOPHU, to name a few that closely align with the presented strategies).

The following table presents the results of the proposed actions cumulative impacts' analysis.

Table 8.1 Cumulative impacts' analysis

ACTIONS		ENVIRONMENTAL, ECONOMIC AND SOCIAL CUMULATIVE IMPACTS
Cod.	**Title**	
01	Bissau Urban Plan (update)	According to EU MIP (see Tab. 7.1, EC15), three Urban Plans are expected to be financed and developed. Cumulative impacts are expected considering the potential impacts of: - actions already executed under the Coastal project (see Tab. 7.1, UNDP 5) - actions recently financed and executed by UN – Habitat (see Tab. 7.1) - the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2) Cumulative impacts can also be previewed considering the potential effects of the expected entry into force of LOTU and the expected impacts of the "N`Tene Terra" Project (see Tab. 7.1, FAO 6).
02	Bolama Urban Plan	
03	Bubaque Urban Plan	
04	Project for the establishment of new protected areas (Unhocomo – Unhocomozinho MPA, Varela Coastal Park)	Cumulative impacts are expected considering the potential impacts of: - PAs management plans - the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2) - the LLF project proposal for the Southeast of Guinea – Bissau, if financed (see Tab. 7.1, MAVA Foundation 1) - the project "Protected areas and climate change resilience" (see Tab. 7.1, EC 10)
05	Project for the establishment of ecological corridors (Cacheu – Casamance, Cantanhez – Boke, Cantanhez – Kogon, Cantanhez – Cufada – Salifo, Cacheu River)	
06	Project for the establishment of a new Biosphere Reserve (Cacheu Sector West Coast – Jata and Pecixe islands)	
07	National mangrove management plan	Cumulative impacts are expected considering the potential impacts of recently executed or ongoing projects dealing with mangrove protection and restoration, paddy rice fields' enhancement ("bolanhas") and solar salt production (see Tab. 7.1, AFD, EC 3, EC 5, EC 12, EC 13, EC 14, IFAD, IUCN, WB 1, WB 2, WIACO 1)
08	Program for the recovery of abandoned paddy rice fields ("bolanhas") and the restoration of mangroves	
09	Sacred areas' protection project (mapping, management guidelines, draft law)	Cumulative impacts are expected considering the potential impacts of: - the PAs management plans - the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2) - the LLF project proposal for the Southeast of Guinea – Bissau, if it will be financed (see Tab. 7.1, MAVA Foundation 1)

ACTIONS		ENVIRONMENTAL, ECONOMIC AND SOCIAL CUMULATIVE IMPACTS
Cod.	**Title**	
10	Land Degradation Neutrality pilot projects in Tombali Region, Biombo Region and an area in the Nort East (to be identified)	The LDN Policy Letter identifies the measures to be undertaken to achieve the Land Degradation Neutrality (LDN) by the year 2030, among which: - the recovery and management of paddy rice fields ("bolanhas") - the mangroves restauration So, the expected impacts of recently executed or ongoing projects dealing with mangrove protection and restoration and paddy rice fields' enhancement ("bolanhas") (see Tab. 7.1, EC 3, EC 5, EC 12, EC 13, EC 14, IFAD, IUCN, WB 1, WB 2, WIACO 1) should contribute to the LDN, together with the LDN pilot projects. Furthermore, cumulative impacts can be previewed considering the expected impacts of the implementation of: - National Program of Action to Adapt to Climate Change (NAPA) - Nationally Determined Contributions (NDC) and National Communications (NC) - National Action Plan to Fight Desertification (PAN/LCD) - other financed projects / programs focused on climate change adaptation strategies (see Tab. 7.1, EC 11, FAO 3, GCF 1, GCF 2, Multi-Partner, UNDP 5)
11	Landscape plan of the coastal zone and application to a pilot area (Cacheu Region) (and draft landscape law)	Cumulative impacts are expected considering the potential impacts of: - the PAs management plans - the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2) - the LLF project proposal for the Southeast of Guinea – Bissau, if it will be financed (see Tab. 7.1, MAVA Foundation 1) - actions recently financed and executed by UN – Habitat (see Tab. 7.1)
12	Creation of an Urban Center as a consultative-participatory body for the governance of coastal and Bissau metropolitan areas	Cumulative impacts are expected considering the potential impacts of the entry into force of LOTU and the expected impacts of the "N`Tene Terra" Project (see Tab. 7.1, FAO 6).
13	Coastal settlements' adaptation to climate resilience projects in Cacheu, Caió, Prabis, Buba, Catió (i.e. QUARC)	Cumulative impacts are expected considering the potential impacts of actions already executed under the Coastal project (see Tab. 7.1, UNDP 5). Cumulative impacts are also expected considering the potential impacts of the expected entry into force of LOTU and the expected impacts of the "N` Tene Terra" Project (see Tab. 7.1, FAO 6).

ACTIONS		ENVIRONMENTAL, ECONOMIC AND SOCIAL CUMULATIVE IMPACTS
Cod.	**Title**	
14	REDD+ and carbon credit negotiations in pilot-sites (PNTC, PNC and other areas to be identified)	Cumulative impacts are expected considering the potential impacts of: - readiness and institutional capacity projects on REDD+ recently developed (see par. 4.6). - other financed projects / programs focused on climate change adaptation strategies (see Tab. 7.1, EC 11, FAO 3, GCF 1, GCF 2, Multi-Partner, UNDP 5)
15	National Disaster Risk Monitoring System	Cumulative impacts are expected considering the potential impacts of the other Coastal project actions.
16	Implementation of a garbage management system for villages and urban areas in the flood risks' zones	Cumulative impacts are expected considering the potential impacts of the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2)
17	Seagrass Conservation Project (mapping, model regulation of protected areas, draft law)	Cumulative impacts are expected considering the potential impacts of projects recently financed by MAVA Foundation and executed by WIACO, ResilienSEA and Plymouth University (Touron-Gardic *et al.*, 2022) , aiming at increasing the knowledge on seagrass meadows of Africa West Coast and, in particular, Guinea-Bissau.
18	Historical Heritage Recovery Plan	Cumulative impacts are expected considering the potential impacts of the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2)
19	Sustainable development plan of the tourism sector in the coastal zones (including zoning)	Cumulative impacts are expected considering the potential impacts of: - the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2) - the Regional Master Plan for Responsible Tourism for the Bolama Bijagós Archipelago Biosphere Reserve (RBABB) (2020) - the PAs management plans
20	Location and development plan of strategic structures, services and activities for food security (agriculture, fisheries) in coastal zones in response to climate change effects	Cumulative impacts are expected considering the potential impacts of projects and programs dealing with food security (see Tab. 1, AfDB 3, EC 2, EC 3, EC 5, EC 9, FAO 1, FAO 2, FAO 3, FAO 4, FAO 5, GCF 2, IFAD, WB 1, WB 2, WB 3, WB 4, WB 5) and the recently adopted Fisheries and Aquaculture Strategic Development Plan (PSDPA) 2023-2027.
21	Implementation of recovery and safety measures for public infrastructures in climate change vulnerable areas	Cumulative impacts are expected considering the potential impacts of: - other Coastal project actions

ACTIONS		ENVIRONMENTAL, ECONOMIC AND SOCIAL CUMULATIVE IMPACTS
Cod.	**Title**	
		- other financed projects / programs focused on climate change adaptation strategies (see Tab. 7.1, EC 11, FAO 3, GCF 1, GCF 2, Multi-Partner, UNDP 5)
22	Draft Law and regulation of mining and petroleum activities in the (land and marine) coastal zones	Cumulative impacts are not expected
23	Design and implementation of stakeholders' capacity building plan	Cumulative impacts are expected considering the potential impacts of projects and programs targeting institutions' capacity building (see Tab. 1, AfDB 1, AfDB 2, EC 11, UNDP 1, UNDP 2, UNDP 3). Cumulative impacts are also expected considering the potential impacts of the other Coastal project actions.
24	Three coastal zone management plans (sensu LOTU): North, South, Bolama – Bijagós Archipelago (the last one based on the RBABB plan, recently approved by IBAP)	Cumulative impacts are expected considering the potential impacts of: - the PAs management plans - the Spatial and integrated management plan of the Bolama Bijagós Archipelago Biosphere Reserve, recently financed by WIACO and executed by AAAC (see Tab. 7.1, WIACO 2) - the LLF project proposal for the Southeast of Guinea – Bissau, if it will be financed (see Tab. 7.1, MAVA Foundation 1) - actions recently financed and executed by UN – Habitat (see Tab. 7.1) Cumulative impacts can also be previewed considering the potential effects of the expected entry into force of LOTU and the expected impacts of the "N`Tene Terra" Project (see Tab. 7.1, FAO 6).
25	Strategic Environmental and Social Assessment (SESA) and Master Plan of the mineral resources and mining industry in Guinea-Bissau, to identify the no-take zones and promote sustainable practices	Positive impacts in term of sustainability are expected, as these tools are focused on the identification of no-take zones for mineral resources exploitation and the promotion of sustainable practices

9 Directives and guidelines for taking into account environmental and social due diligence in policies, plans, programs and projects

This chapter provides guidelines for the integration of social and environmental issues and, in particular, climate change adaptation strategies in policies.

The following gaps stands out from the analysis of the policies' framework:

- weak integration of economic environmental accounting into plans and programmes;
- lack of DRRM a strategic plan and monitoring system
- the National Forestry Master Plan was adopted more than 30 years ago, a National Forest Inventory has never been drafted, Forest Management Plans have been carried out only for some protected areas and for some plans an update is expected;
- lack of spatial plans and, in particular, of urban plans, with the exception of the Bissau urban plan, to be considered obsolete;
- lack of landscape plans and need for a legal framework update;
- lack of historical heritage recovery and enhancement plans and strategies;

Some of the proposed actions (see Chap. 7) aim to overcome these critical issues.

Regarding the integration of economic environmental accounting into plans and programmes, it is possible to refer to the studies carried out by Bazzucchi & Sanka (2020), Cozzolino & Biague (2020) and Bazzucchi & Da Silva (2021) under the "Strengthening natural resource valuation capacities for improved planning and decision-making to conserve the global environment" UNDP/GEF Project.

The Coastal project will lead to the preparation of the DRRM Strategic Plan, taking into consideration all the project results. The proposed actions (see Chap. 7) include the implementation of a DRM monitoring system, for which it will be necessary to define data set, monitoring protocols, data collection and processing procedures, GIS infrastructure, data sharing protocols and methods for returning and disseminating the monitoring results. It is a tool essential to supporting the decision-making process and allowing for the development and periodic updating of action plans. The monitoring system can also support the implementation of an economic environmental accounting system.

Therefore, some guidelines are provided for the preparation of:

- forest management plans;
- the coastal areas' landscape plan;
- local urban plans;
- the historical heritage recovery plan.

Forest management plans

The National Forestry Master Plan was adopted in 1992 and the Agrarian Development Policy Charter (LPDA), adopted in 1997, presented the guidelines of the forestry policy, without carrying out assessments based on updated data. The Government of GB doesn't have recent data on its forestry potential and forestry resources continue to be exploited without any concern for conservation or restoration of forestry capital (Bazzucchi & Da Silva, 2021).

The United Nations Forum on Forests (UNFF) has developed a Forestry Instrument (voluntary and legally non-binding) with the intention of providing a frame of reference for actions to be developed at the national

level. Member Countries (among which GB) are invited to follow the Sustainable Forest Management (SFM) approach for the drafting of national and local strategies and management plans.

Furthermore, the assessment and economic valuation of the ecosystem services provided by forest and National Forest Inventory (NFI) are essential to introduce the economic environmental accounting and take climate adaptation strategies into account.

Key to obtaining the necessary statistics for REDD+ accounting are robust national forest monitoring systems (NFMS) that enable countries to collect information related to land use and forestry changes and REDD+ activities. The NFI is one of the most critical components of the NFMS and provides information on, among other things, forest carbon stocks. Through NFIs, countries systematically collect forest data, including composition, status, stock and distribution of resources. These field measurements are essential to calculating emission factors which enable the estimation of forest-related greenhouse gas emissions. NFIs also allow for more accurate information on forest and emissions trends and can serve to increase data transparency, vital for making informed national policy and management decisions. Greater transparency also helps countries meet international reporting requirements, such as those outlined with the Enhanced Transparency Framework of the Paris Agreement (Condor & Tavani, 2022).

The Government of GB affirms in its 3rd National Communication to UNFCCC "*There was no continuity in the estimation of the inventory as there was no data updating from the last (GHG) inventory calculation due to lack of an institutional framework for data base management, deficient archiving system*".

Thus, the need for updated forest data and effective data management system is well known.

Hereafter, the consultants suggest analyses and contents to be considered for the forest management plans' drafting:

- land biophysical description (climate, hydrology, soils, etc);
- assessment of the forest resources' governance;
- assessment of the legal and policy framework;
- forest inventory: density (numbers of trees per hectare), distribution, basal area, growth rates for (at least the main) species, timber volumes available for harvesting (from field surveys and satellite images' analysis);
- mapping of forest ecosystems' spatial distribution and related trends;
- assessment of climate change effects on forest vegetation;
- mapping of forest management structures;
- assessment of the ecosystem services provided by the forest ecosystems;
- proposed forest management systems, including monitoring and record keeping;
- forest protection measures;
- other values of the forest, and proposed measures to retain and enhance these values;
- zoning proposal.

Coastal Areas' Landscape Plan

The objective is to define the safeguarding and protection of landscape resources, ensuring compatible transformations that align with landscape values. Additionally, it aims to implement recovery and requalification actions for degraded areas and intervene to secure the territory and respond to climate change. These interventions should adhere to conscious land use principles, meeting quality and environmental sustainability criteria.

The plan must identify the main landscape systems, including their respective areas and/or landscape units, based on consistent criteria related to orography, physical-naturalistic and vegetation aspects, as well as

anthropic-settlement and cultural nature. For these systems, the plan should establish rules and standards for management, covering both landscape protection and transformation and enhancement. The environmental landscape study presented in this SESA **(**see par. 4.2), can play as a methodological reference in identifying these landscape systems.

The plan could/should include:

a) a descriptive report of the study area, highlighting the essential characters and dominant structural features of the territory subject to planning.

b) the preparation of graphic illustrations. Specifically, the following will be developed:

b1) a comprehensive study and understanding of the territory.

b2) identification of resources and critical issues.

b3) planning scenarios (including alternatives) for landscape protection and transformation, based on the principle of proactive -rather than passive- territory safeguard.

c) a reference regulation for the plan's implementation.

The plan should take precedence over other planning tools (such as urban plans, sector planning, etc.), becoming the primary framework for macro area structural invariants related to landscape, environmental safety, and the climate crisis. In this sense, it could serve as the guiding tool or planning scenario, enabling local and sector planning at various scales of intervention and planning to interact effectively. Additionally, the plan should aim to integrate with the management plans of protected areas.

As mentioned above, the landscape plan for coastal areas can be conceptualised as a planning scenario of reference for macro-scale structural invariants of environmental and landscape value. Within this scenario, implementation can occur either through i) pilot projects (e.g., Cacheu area) that translate the plan's strategies into actionable local actions/interventions or ii) directly through regulations concerning landscape systems.

Naturally, the landscape plan can be applicable to the entire national territory, following the national administrative subdivision and corresponding sector competencies.

Local Urban Plans

The aim is to define development strategies for the main settlements and establish regulations for implementing the plan. Besides the existing knowledge framework, the local urban plan needs to update its understanding with respect to securing the territory, addressing vulnerabilities, fragilities, and issues related to the climate crisis. These themes should not only be incorporated into the knowledge framework but also form a dominant part of the short, medium, and long-term project strategies, providing the foundation for specific projects.

The plan should consist of the following components:

a) a descriptive report;

b) graphical drawings depicting the knowledge framework, ongoing trends in various sectors studied, and the strategic framework to be pursued within a controlled and monitored timeframe;

c) technical implementation regulations;

In this context, the Bissau plan suggests two possible approaches: i) drafting a new local urban plan that takes into account current dynamics and includes emerging issues like the climate and health crises; ii) drafting a strategic plan that updates the existing urban plan. In this case, the strategic plan would serve as a design scenario of reference for the urban structural macro invariants, guiding the adaptation and reformulation of objectives, actions, and interventions in the current master plan, while considering the ongoing phenomenon of 'metropolisation' of the territory.

In general terms, it is crucial to monitor the local urban plan during its implementation, considering the rapid changes occurring in the coastal context, such as the climate crisis and other phenomena. This necessitates the ability to implement/modify plan choices incrementally, in response to ongoing physical transformations and dynamics.

Regarding the introduction of innovative studies, cartographies, and graphic elaborations concerning climate-related aspects and land safety, reference is made to the specific expert training within the training modules provided by CBP.

Historical Heritage Recovery Plan

The objective is to recover the existing urban and architectural cultural heritage through actions for the restoration of urban fabric and architectural assets with historical and environmental value. The recovery is expressed in categories of intervention, which can be categorised as restoration, consolidation and conservative redevelopment, extraordinary and ordinary maintenance, urban restructuring, and building renovation (general terms, to be calibrated/decided with respect to the places and culture of traditional local building knowledge).

The plan, based on a detailed historical knowledge of the historical-urban evolution of the places -where possible- should be composed of:

a) a descriptive report highlighting the state of the places, the historical-cultural values, and the state of conservation;

b) graphic drawings of urban and building surveys able to document and reproduce the fundamental elements of the historical heritage and the state of conservation;

c) graphic design drawings, at the urban and architectural scale, indicating the design intervention categories and the new urban functions;

d) a regulation for the implementation of the plan itself, with the technical contents of the individual intervention categories.

The plan could be configured as an implementation plan/project of the urban master plan (i.e, Local Urban Plan), as an in-depth design of the directives and strategies defined there, or directly as an autonomous instrument for the recovery of historic sites.

Lastly, the plan could be used as a training/action framework for construction workers, previously and specifically trained in local, historical, and current construction techniques, in order to carry out restoration work, building renovation, etc. in harmony with the historical heritage values of the local architectural heritage and urban contexts (i.e., Bolama, Bubaque, Bissau, etc.).

10 Orientations for the development of environmental assessment studies

An environmental impact assessment can be defined by a series of legal, institutional and technical-scientific procedures, with the aim of characterizing and identifying potential impacts of projects, predicting the magnitude and importance of these impacts.

Any human intervention in the use of natural resources that may cause an environmental impact, must be submitted to a competent environmental body, whose mandate is to assess the entity of the projects' potential impacts, provide proponents with orientations for the design and the sustainable management of the construction process to avoid, then minimise, and restore impacted areas and finally offset any remaining impacts, following the mitigation hierarchy.

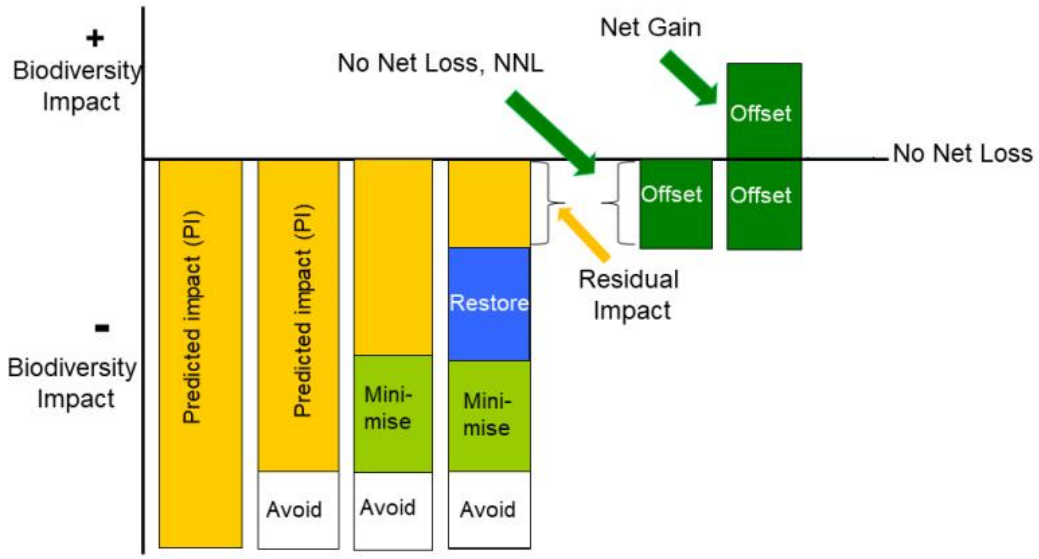


Figure 10.1 The Mitigation Hierarchy (Source: adapted from Forest Trends)

The competent environmental body in GB is the Competent Environmental Assessment Authority (AAAC) and the reference policy is Law 10/2010, adopted on September 24th.

Article 6 of Law 10/2010 presents the different instruments for environmental assessment:

"*1. These are environmental assessment instruments namely:*

a) Environmental Impact Study;

b) Strategic Environmental Assessment;

c) Risk Analysis and Hazard Study;

d) Public Participation;

e) Environmental Audit;

f) Environmental Licensing;

g) Environmental Economic Assessment;

h) Environmental Monitoring;

i) Environmental and Social Management Plan;

j) Social Environmental Management Framework;

k) Resettlement Plan;

I) Internal Occupancy Plan."

The Government of GB adopted a Regulation for the Environmental Impact Assessment (EIA) procedure (Decree n. 7/2017), while for the other mechanisms no regulation hasn't been elaborated and adopted yet.

The Environmental Impact Assessment (EIA), the Strategic Environmental Assessment (SEA), the Environmental Economic Assessment (EEA) are mechanisms/procedures that may constitute entry points for the integration of climate adaptation strategies in the decision-making process.

How can climate adaptation strategies be integrated in these mechanisms?

Projects must be submitted to prior examination to categorize them, taking into account the following criteria (Law 10/2010, Article 6):

a) Type of project

b) Project area

c) Vulnerability of the project area

d) Impact incidence scale

e) Nature of potential impacts

f) Amplitude of impact incidence.

Projects are classified into the following three categories (Law 10/2010, Article 7):

- Category A: projects with a high risk of having a variety of very significant negative impacts on the environment and human health, sometimes irreversible and with effects felt on a large scale.
- Category B: projects likely to have less serious negative impacts on the population and environment than those of the previous category, generally impacts of a local nature with the possibility of devising mitigation measures.
- Category C: negative impacts on the environment and human health are considered insignificant or even null.

Category A and B projects must be subject to an in-depth and simplified environmental impact study, respectively (see also Decree n. 7/2017, Article 3), while for Category C projects no further environmental assessment measures are required (they can be licensed after the prior examination).

So, due to the identification of climate change vulnerable areas and/or the potential impact on "carbon sink" ecosystems, such as mangroves, projects could be categorized A or at least B.

The Project's Environmental and Social Management Plan (ESMP) describes the elimination, minimization or mitigation measures, compensation and monitoring of the various impacts, including the costs, timeframe and responsibility of each party in its implementation (Law 10/2010, Article 19). The mitigation and compensation measures could be identified considering area vulnerability (e.g., to climate change impacts) and the need to reach a No Net Loss or Net Gain level of mitigation.

Programs and plans should be submitted to the Strategic Environmental Assessment (SEA) procedure, applying the described prior examination. Law 10/2010 doesn't provide any orientations for its application. The consultants suggest advancing in the process of implementing the SEA, through the elaboration of a specific Regulation.

The AAAC could require both for the EIA and SEA procedures the application of an ecosystem-based approach, that is the introduction of the ecosystem services' paradigm into the assessment methodological

approach. In case of potential climate change impacts, the ecosystem services assessment could be a powerful tool to duly consider the loss of capacity to stoke and sequester carbon of the ecosystems affected by the project development.

This scenario is compliant with the "Strengthening natural resource valuation capacities for improved planning and decision-making to conserve the global environment" UNDP/GEF Project, aiming at introducing environmental economic accounting in the decision-making process.

The consultants suggest advancing in the process of implementing the Environmental Economic Assessment (EEA) as well.

The introduction of EEA makes it possible to take into account the economic value of environmental impacts as a consequence of the reduction of the extent and/or the degradation of the ecosystems affected by the projects. These changes translate into a loss of the ecosystems' capacity to provide ecosystem services, which can be associated with an economic value (Bazzucchi & Da Silva, 2021).

EEA can be approached through different approaches, which reflect the level of detail related to the information available, the human and financial resources, the objectives of the evaluation, the level of vacuity of the context. In fact, it is possible to address the valuation of ecosystem goods and services and, therefore, the economic assessment of environmental impacts, through 3 types of approaches (Cozzolino, Nakai & Biague, 2017):

- monetary (or financial)
- quantitative
- qualitative (or fast)

It is considered preferable to elaborate a procedure integrated with the one already approved by the Environmental Impact Study (Decree n. 7/2017), rather than identifying another autonomous parallel procedure. The EEA could constitute an annex (EEA Report) to the Environmental Impact Study Report (EISR) (Bazzucchi & Da Silva, 2021).

The EEA requires qualified human and financial resources. For this reason, projects classified as B could be subject to a fast EEA (qualitative economic assessment of environmental impacts) (Bazzucchi & Da Silva, 2021).

If AAAC decides to request an EEA, an increase in the fees associated with the environmental assessment procedure (see Article 45 of Law 10/2010) could be foreseen to cover the assessment costs, the Authority's operation being already hampered by the scarce availability of human and financial resources (Vilela N., 2019).

The EEA could also be applied to policies, plans, programs and norms, within the scope of the SEA process and provide basic elements for the design and implementation of sustainable financing mechanisms (Peru, 2016).

11 Proposal for an institutional capacity building plan

11.1 General scope and specific objectives

The Capacity Building Plan (CBP) focuses on the development of know-how and new skills to guide institutions, the local community, and stakeholders towards the future and the joint adoption of a Climate Change Adaptation and Risk Resilience Plan. The purpose is to reinforce national and local governance processes through the project findings and the potential technical advancement of employees of the administrations and of professionals working in the socio-economic and environmental field as well as in the protection of natural/cultural heritage and the landscape.

This CBP responds to the general programme of the project and the established actions to achieve specific objectives, some already reached through this SESA others to be pursued in future developments:

- Reinforcing institutional capacity and the effectiveness of decision-making processes through the stakeholder consortium and the joint activities of local authorities, NGOs and other stakeholders operating in in the GB coastal area (*collaboration in decision-making processes*)
- Increasing citizens' trust in political programmes by bringing interest holders closer to strategic actions and making them participate in the choices as active subjects (*sense of belonging, public engagement, quality of information-communication*)
- Transferring knowledge and tools for design, implementation, and the management of coastal areas to public and private subjects (*educational process & knowledge exchange, knowledge transfer cycle*)
- Monitoring the activities during time (*goals achieved and lessons learned*)
- Summarising the final strategic guidelines for the national/local stakeholders involved in the Project (*recommendation for planning*)

To this end, the CBP strategically identifies issues, methods, and tools useful for supporting the development of future governance tools and management of the uses of coastal areas, integrating climate risks and climate change impacts on landscapes (see par. 4.2.7). These contributions will be able to update the cognitive frameworks of these areas, aiming for constant communication/collaboration with the settled communities. Underlying this work is a desire to orient the institutions towards adopting a new strategic vision for sustainable coastal development, which requires a more collaborative, inter-sector, and multi-stakeholder approach capable of involving all interested public/private subjects and transferring the acquired knowledge/capacities to other similar subjects, that is, residents, relevant bodies, or related professionals.

In this sense, CBP proposes the activation of an *educational process & knowledge exchange* based on four educational modules aimed at training specific skills in the framework of SESA.

The CBP aims to lay the foundations and presuppositions for building new models of urban and coastal landscape planning consistent with the context in Africa and GB and capable of responding to the impacts of climate change based on accredited scientific evidence for coastal contexts (IPCC, 2019a), current trends, and future global projections (IPCC, 2022; 2019b), as highlighted and reiterated in this work. The possible solutions are found in both mitigation actions, and adaptation/climate-proofing, in which the quality of the operations may be assessed based on the relationship between decision makers and respect for tradition, local socioeconomic dynamics, and the existing natural/cultural heritage.

11.2 Approach and method for development

The proposed CBP is developed from the various analyses carried out throughout the entire work period, from national policies, plans and strategies (*desktop research*) to the assessment of current capacities (*find the gaps*), from the mission on study and project areas, to the final identification of teaching modules (see tables 12.1, 12.2, 12.3, 12.4) as products that can be activated in future project advancements (*bridge the gaps*). The CBP therefore has a practical objective, and is developed through a dual approach, analytical and propositional. The process of analysis outlined a critical summary of the current situation ("state of play" and critical issues) through consultation work with specific stakeholders that highlighted opportunities for growth, needs, gaps to be bridged and challenges to be addressed. The output aims at the development of an educational programme (i.e. educational process & knowledge exchange) and on-site knowledge transfer capable of transcending the project timeframe and having an impact in the near future.

The presentation of the educational programme, potential topics and modes of delivery, is presented in the next paragraph.

11.2.1 Training programme and knowledge exchange

As set out, the CBP is aimed to developing the knowledge, skills, and tools necessary to facilitate the future adoption of the adaptation and resilience plan and adequately addressing the climate crisis in coastal areas of GB (e.g. rising sea levels, coastal erosion, rising temperatures, and the related imbalances in the weather, agriculture, and flora/fauna, etc.).

Strengthening capacity is a priority in the agenda of development in Africa and in many countries; the quality and level of technical/operational and institutional capacity is shown to be inadequate for achieving the goals of the socioeconomic transition (ACBF, 2019; 2017). On this basis, the CBP provides support for the authorities charged with managing coastal areas, and will suggest which strategies, actions, and interventions would be the most effective for mitigating/adapting these areas to hazards and climate vulnerability, making particular reference to projects and strategies initiated in similar contexts (e.g. Cape Verde) and/or in West Africa.

For the purposes outlined before, CBP offers a multi-thematic and transdisciplinary training programme consisting of four thematic modules:

- Strategic Environmental and Social Assessment (SESA)
- Coastal area planning for climate change adaptation
- Climate change adaptation measures and interventions in coastal areas
- GIS-based technical-operational and management tools for climate change adaptation

The four modules have specific and complementary aims that stem from the analyses carried out[45], the gaps identified, the results of the strategy document and the critical reading of the national/local strategy documents mentioned.

The individual modules can be delivered over a period of four working days, through daily seminars with in-person teaching which, only in the case of contributions from external international experts, can also be followed remotely live and/or in asynchrony through audio-video recordings. Each day includes an application

[45] The training programme is based on the expertise of the project partnership and on previous experience in GB, considering that it was not possible to conduct a formal training assessment

part (2 hours) of workshop/training in the classroom and/or in the field, depending on the content and organisation of the module. The training programme is developed within a month of intensive training or it is possible to activate and/or follow the module of interest, as the case may be. The programme is offered to a variety of audiences, especially employees of local authorities and public administrations, but also professionals and representatives of NGOs working in the field. Below, the model sheets of the 4 modules and their contents are presented.

Table 11.1 CBP Module on Strategic Environmental and Social Assessment (SESA)

<table>
<tr><td colspan="6">MODULE 1_ Strategic Environmental and Social Assessment (SESA)</td></tr>
<tr><td rowspan="2">Lessons</td><td rowspan="2">Course title</td><td colspan="2">Modes</td><td rowspan="2">Target</td><td rowspan="2">tot.hours</td></tr>
<tr><td>P</td><td>R</td></tr>
<tr><td>1</td><td>Content, purpose and structure of the SEA report</td><td>X</td><td>X</td><td rowspan="4">employees/managers of PAs, NGOs, professionals, graduates (...)</td><td>4+2</td></tr>
<tr><td>2</td><td>Knowledge frame and emerging issues</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td>3</td><td>SWOT analysis for SEA</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td>4</td><td>Alternative project scenarios</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td colspan="6">COURSE GOALS</td></tr>
<tr><td colspan="6">Provide the technical-operational tools for the construction of a SESA report (...) focusing on: knowledge of current planning and programming; analysis and description of environmental, social and economic characteristics with particular regard to the climate crisis and social dynamics; critical evaluation of the potential, weaknesses, opportunities and threats of the study area; proposal of project scenarios.
The workshop/training will represent the application part of the module and will be carried out every day after the lectures (2h)</td></tr>
<tr><td colspan="6">RELEASE MODE
in-presence (P)
remotely (R), only for contributions from international experts</td></tr>
</table>

Table 11.2 CBP Module on Coastal area planning for climate change adaptation

<table>
<tr><td colspan="6">MODULE 2 _ Coastal area planning for climate change adaptation</td></tr>
<tr><td rowspan="2">Lessons</td><td rowspan="2">Course title</td><td colspan="2">Modes</td><td rowspan="2">Target</td><td rowspan="2">tot.hours</td></tr>
<tr><td>P</td><td>R</td></tr>
<tr><td>1</td><td>Regulatory and legislative framework in coastal areas and territorial governance tools</td><td>X</td><td>X</td><td rowspan="4">employees/managers of PAs, NGOs, professionals, graduates (...)</td><td>4+2</td></tr>
<tr><td>2</td><td>Knowledge frame of coastal areas: environmental and landscape features, territorial fragilities, climate crisis and related dynamics</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td>3</td><td>Community resilience and co-planning</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td>4</td><td>Building the strategic scenario for planning and adaptation to climate change</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td colspan="6">COURSE GOALS</td></tr>
<tr><td colspan="6">Provide the necessary knowledge for the understanding of: current urban planning (national), programming tools and national and international strategic documents; environmental-landscape features, climate vulnerabilities and territorial fragilities and socio-economic dynamics related to urban transformations and the climate crisis; participation processes and involvement of local communities in decision-making procedures; methods for the elaboration of project and strategic scenarios for climate adaptation and urban planning.
The workshop/training will represent the application part of the module and will be carried out every day after the lectures (2h)</td></tr>
<tr><td colspan="6">RELEASE MODE
in-presence (P)
remotely (R), only for contributions from international experts</td></tr>
</table>

Table 11.3 CBP Module on Climate change adaptation measures and interventions in coastal areas

<table>
<tr><td colspan="5">MODULE 3_ Climate change adaptation measures and interventions in coastal areas</td></tr>
<tr><td rowspan="2">Lessons</td><td rowspan="2">Course title</td><td colspan="2">Modes</td><td rowspan="2">Target</td><td rowspan="2">tot.hours</td></tr>
<tr><td>P</td><td>R</td></tr>
<tr><td>1</td><td>Climate-meteorological phenomena and impacts in spatial planning</td><td>X</td><td>X</td><td rowspan="4">employees/managers of PAs, NGOs, professionals, graduates (...)</td><td>4+2</td></tr>
<tr><td>2</td><td>Vulnerability and territorial fragility</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td>3</td><td>Climate projections and climate change adaptation scenarios</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td>4</td><td>Measures and interventions: from planning to project</td><td>X</td><td>X</td><td>4+2</td></tr>
<tr><td colspan="6">COURSE GOALS</td></tr>
<tr><td colspan="6">Provide the necessary knowledge for understanding: climatic-meteorological phenomena (mean sea level rise, droughts, temperature increase, water salinisation, etc.) and anthropogenic impacts (deforestation, abandonment/intensification of agricultural practices, urban sprawl in risk areas, etc.); conditions of vulnerability, fragility and classification of risks in a summarised framework; elaboration of climate adaptation scenarios and related measures and project interventions, also with the help of best practices in similar contexts (hypothesis of a training study-trip to the administrations of Cape Verde or other West-coast African states).
The workshop/training will represent the application part of the module and will be carried out every day after the lectures (2h)</td></tr>
<tr><td colspan="6">RELEASE MODE
in-presence (P)
remotely (R), only for contributions from international experts</td></tr>
</table>

Table 11.4 CBP Module on GIS-based technical-operational and management tools for climate change adaptation

MODULE 4 _ GIS-based technical-operational and management tools for climate change adaptation					
Lessons	Course title	Modes		Target	tot.hours
		P	R		
1	Geodata and Geographical Information Systems (GIS)	X	X	employees/managers of PAs, NGOs, professionals, graduates (...)	4+2
2	Remote sensing and multi-spectral imaging as a tool for diachronic investigation and evaluation	X	X		4+2
3	Urban and climate data database and management for spatial adaptation planning	X	X		4+2
4	Workshop/field training: land survey	X	X		4+2
COURSE GOALS					
Provide the technical-operational tools focusing on the collection, processing, management and production of georeferenced data (e.g. QGIS, ArcGISPro, etc.) as well as desktop and online graphic layouts (e.g. Web-GIS) in a GIS environment concerning the understanding of the systems for accessing and using Geographical Information Systems (GIS), open-source databases developed by the European Union (e.g. Copernicus Project) or other international public bodies (e.g. USGS); learning the management and updating systems of urban and climate data through dedicated applications, computer language (e.g. JavaScript, SQL etc.) and database tools (e.g. PostGIS). The workshop/training will represent the application part of the module and will be carried out every day after the lectures (2h)					
RELEASE MODE in-presence (P) remotely (R), only for contributions from international experts					

11.3 Impacts and expectations

The CBP presented here aims to create a fertile ground to establish long-term, flexible territorial governance tools that will ensure a greater capacity to adaptively resist/respond to the ongoing changing dynamics. On this basis, the plan is able to meet these strategic and practical objectives that impact not only on the ability to manage spatial trends and transformations taking place in the territory but also on values, skills and in general on a renewed awareness of the living environment.

The orientations defined by the scenario alternatives, the topics of the hypothesised training courses and in general the critical issues that emerged from the SESA imply a synergic and multi-sectoral cooperation between actors aimed at developing skills and knowledge as well as using best practices useful to face a challenge common to all, at any social level or spatial scale.

In this perspective, the training programme thus defined can be one of the tools for action and local development, supporting the implementation of the strategies and interventions of the future Adaptation and Resilience Plan and, with different timeframes, laying the foundations for a qualified managerial and professional class to deal with the emerging issues.

In conclusion, the CBP so defined could be able to have a significant impact in adopting effective solutions to cope with climate-altering events by analysing in advance the effects that uses of natural resources and land may have on the coastal environment, the climate and the inhabitants themselves. In this sense, the future Plan and related actions will have to consider as a priority the socio-economic and environmental effects of human activities and climate impacts on the activities themselves, bearing in mind the needs of local populations and the vocations of the landscape in which they live. By strengthening institutional capacities, the CBP also intends to reinforce the channels of participation and active involvement of local communities, which remains a determining process for the success of the project and for future planning activities in coastal areas. Making the communities themselves aware that land care and its qualification have a social, environmental and economic value of which they are direct beneficiaries and actors can be a first step towards a more sustainable use that inevitably also needs the support of the competent institutions.

12 Lessons learnt, suggestions and recommendations

The natural capital of Guinea-Bissau (GB) must be maintained or restored in order to support the national economy, which is very dependent on the consumption of the country's natural resources. Agriculture, forests and fisheries are the basis of the country's economic development, but population growth and climate change are putting great pressure on natural resources.

The Government of Guinea-Bissau ratified the three Rio Conventions, relating to biodiversity (UNCBD), desertification (UNCCD) and climate change (UNFCCC), also adopting policies, strategies and programs for environmental management and sustainable development, such as the National Biodiversity Strategy and Action Plan (NBSAP), the National Program of Action to Adapt to Climate Change (NAPA), the identified Nationally Determined Contributions (NDC) and the Third National Communication to the UNFCCC, the National Action Plan to Fight Desertification (PAN/LCD), the LDN National Policy Letter.

However, critical barriers have hampered the effective implementation of policies, plans and programs.

The SESA study highlights the following **critical barriers**:

- political instability, inadequate financial and human resources (of institutions), low knowledge and weak diffusion of data management systems and mapping tools have been hampering the land planning process, which is essential to effective land governance;
- the frameworks for governing the coastal zone in Guinea-Bissau are not conducive towards ICZM, due to limited public funding, dependent on donor funding rather than sustainable taxation, coupled with systemic capacity weaknesses (UNDP, 2018);
- the growing urban spraw in areas surrounding Bissau and other main cities, such as S. Domingo, Cacheu, Canchungo, Bula, Quinhámel, Mansoa, Bissora, Bolama, Bubaque, Buba, Catió, due the absence of planning and governance tools;
- some strategic sectoral plans, such as the Water Management Master Plan, the Water and Sanitation Sector Master Plan, the Forestry Master Plan need to be updated and climate change effects should be taken into account even through an effective integration of the climate change adaptation strategies defined in NAPA, PAN/LCD and LDN National Policy Letter;
- last generation planning tools, such as the National Agricultural Investment Plan (PNIA) (2nd Generation) and the Fisheries and Aquaculture Strategic Development Plan (PSDPA) 2023-2027, show a deeper level of integration of environmental accounting approach and climate change adaptation strategies, but their effective implementation is weak (PNIA) or yet to come (PSDPA);
- regional and local development plans don't address climate change impacts and provide climate adaptation and resilience strategies;
- the National System of Protected Areas (SNAP) and the Bolama Bijagos Archipelago Biosphere Reserve (RBABB) constitute strength elements, pointing out the need for the protection of specific zones and ecosystems so as not to erode the natural capital that can underpin the country's sustainable development;
- many projects and programs have been financed in the last fifteen years to develop strategies and implement actions aiming at ensuring food security and inclusive rural development, strengthening the communities' resilience, but results achieved are lower than expected due to many reasons, among which a lack of institutional coordination and a common land governance vision, limited public funding, resulting in bad road conditions, affected by climate change effects, and poor access to

mobility services and energy, and a general lack of public-private partnerships to tackle the weakness of livelihood products' value chains.

According to the SESA coastal resilience scenario, the following processes need to be supported:

- increasing of knowledge based on planning and governance tools, data management and monitoring systems, GIS tools;
- active protection and extension of protected areas to safeguard and enhance natural resources (with re-classification of PAs according to IUCN classification);
- strengthening and integration of the national ecological network, internally and externally linked to large-scale corridors;
- protection of carbon sinks and reforestation/naturalisation of the forest system;
- updating of the legal and regulation framework (i.e. adoption of LOTU, mangrove forest protection law, a sacred areas protection law, a landscape planning law, institution of RBABB and of new protected areas and ecological corridors, SEA and AEA regulations, etc.);
- updating of the policies' framework (i.e land and landscape governance tools, tourism sector sustainable development plan, etc.);
- design and implementation of land planning and management tools for climate-environmental sustainability and community resilience (i.e climate-proof urban plans for environmental sustainability);
- mainstreaming of climate change adaptation strategies in sub-regional and local development plans;
- enhancement of cultural capital (i.e. protection of sacred areas, recovery/restoration/renovation plans for buildings and architecture);
- agro-landscape enhancement of ecologically and environmentally valuable natural heritage for the subsistence of local communities;
- identification and operationalisation of climate finance mechanisms (i.e. REDD+);
- improvement of existing environmental assessment procedures (ref. EIA) and implementation of new tools (ref. SEA, EEA) to orient programs, plans and projects towards sustainability, taking into account natural capital and ecosystem services' values and climate adaptation strategies.

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Annex 1 – Maps

- Map 1 Territorial framework
- Map 2 Land cover map
- Map 3a Scenario 0 “Baseline Scenario”
- Map 3b Scenario 1 “Coastal Resilience Scenario”

Annex 2 – The National System of Protected Areas (SNAP)

In 2004, through the Global Environment Facility, the Government established and consolidated five national parks: Cacheu Mangrove Forest National Park (*Parque Nacional das Tarrafes de Caheu*, PNTC), Cantanhez National Park Cantanhez National Park (*Parque Nacional de Cantanhez*, PNC), Cufada Lagoons National Park (*Parque Nacional das Lagoas de Cufada*, PNLC), Joao Vieira and Poilao National Marine Park (*Parque National Marinho João Vieira and Poilão*, PNMJVP) and Orango National Park (*Parque Nacional de Orango*, PNO). These parks were created to form a network covering almost 450 000 hectares and gathering some 70 000 people. Then, the Urok Islands Community-based Marine Protected Area (*Área Marinha Protegida Comunitária das Ilhas de Urok*, AMPCIU) was established, too.

Thus, for years, the attention of both government and donors focused on protecting the costal and marine regions. To correct this imbalance and to protect a more complete and representative part of ecosystems, efforts have been made to create terrestrial national parks: Boé and Dulombi. Three wildlife corridors ensuring the connectivity between these two parks and with the Lagoas du Cufada National Park and the Cantanhez National Park were also created. Several initiatives allowed to establish and operationalize terrestrial Protected Areas (PA) in the Dulombi-Boé-Tchetche (DBT) complex (406 556 ha) and thereby significantly expanded and strengthened Guinea-Bissau's PA system. The national system of protected areas in Guinea-Bissau is now covering 26.3 % of the territory, meeting Aïchi objectives (IUCN, 2017).

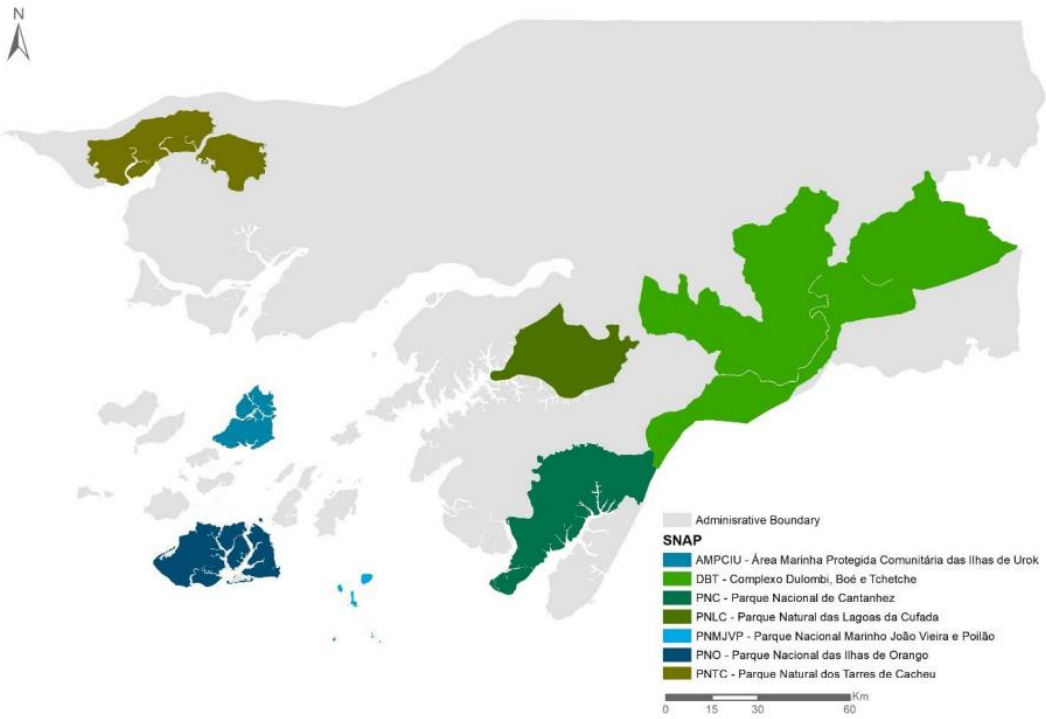


Figure 0 The National System of Protected Areas of Guinea-Bissau with corresponding seven protected area (SEA, 2019)

The institution of the Boé and Dulombi national parks on the nation's mainland, close to the borders with Senegal and Guinea, was a recent effort to safeguard a more comprehensive and representative sample of key habitats. Then, three ecological corridors were established, Tchetche, Cuntabane-Quebo and Salifo-Xitole, to guarantee ecological connectivity between the two national parks and the PNC.

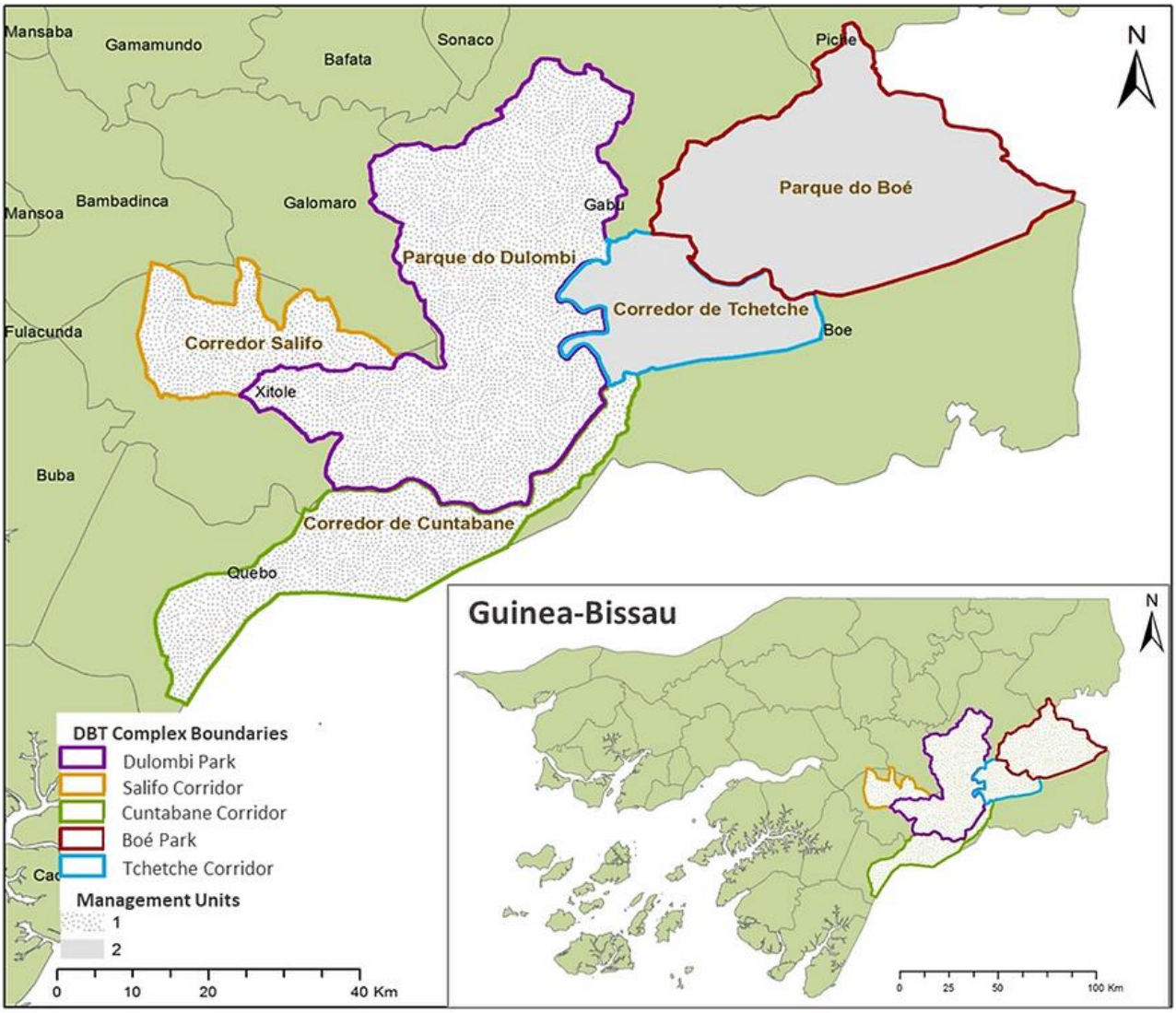


Figure 2 DBT Complex (RSeT website)

Thanks to natural conditions in soil, climate and geomorphology and in particular permanent watercourses, this landscape encompasses lands of great ecological importance such as habitats for numerous species of flora and fauna. Relatively sparsely populated, conditions for the preservation of important habitats and populations of some endangered species are maintained, especially in the part corresponding to the Boé Park. According to studies so far, this area concentrates populations of many animal species, in particular mammals of great ecological importance both nationally and sub-regionally (Cozzolino & Bazzucchi, 2021).

The DBT Complex hosts a biodiversity rich wetland, designated as Ramsar sites (Wendu Tcham).

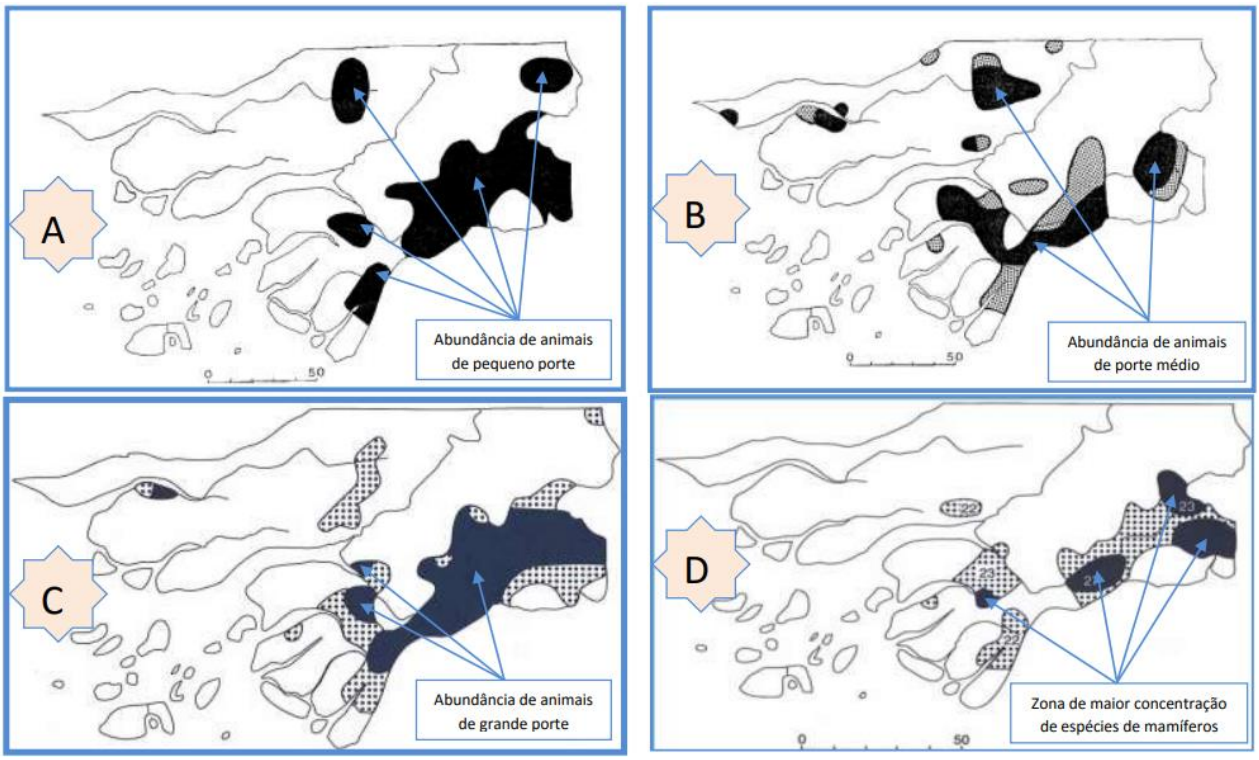


Figure 3 Maps showing: A – Areas with greater abundance of small animals; B - Areas with greater abundance of medium-sized animals; C – Areas with greater abundance of large animals and; D – Areas with the highest concentration of mammal species (IBAP, 2017)

Two other ecological corridors should be established to strengthen the connectivity between the DBT Complex and the PNLC and between the PNLC and the PNC (see Figure 4).

IBAP is responsible for the management of the National System of Protected Areas (SNAP) and the implementation of the country's biodiversity protection policy.

Marine Protected Areas and regulated fishing zones are at the centre of concerns of IBAP and other institutions in the subregion, grouped under a Regional Coastal and Marine Conservation Partnership in West Africa (PRCM). IBAP has been working in close collaboration with many partners to manage these areas, including the BioGuinée Foundation, now at the capitalisation stage, which will provide an essential sustainable funding tool for the proper management of protected areas (PRCM website).

APs are established by Decree with the purpose of safeguarding certain ecosystems as well as the fauna and flora that housed by them, their ecological diversity as well as promoting their sustainable social and economic use. The expansion process of the SNAP was accomplished through the "Support Project for the Consolidation of a System of Protected Areas in the Forest Belt. Guinea-Bissau", which aimed at the creation of the last five new Protected Areas in the DBT complex.

Recently, IBAP and other partners have launched the idea of strengthening SNAP, with the proposal to publish a new proposal for extending the system of protected areas (see image below). Two programmes are being used to start the construction of key and lasting structures, at the level of biodiversity in Guinea-Bissau: The Framework Law on Protected Areas and the strengthening of the Institute of Biodiversity and Protected areas (IBAP) under the supervision of the Secretariat of State of Environment and Biodiversity (SEAB) and the BioGuinea Foundation, which will complement the current financing model for the continuation of financial support through sustainable financial flows.

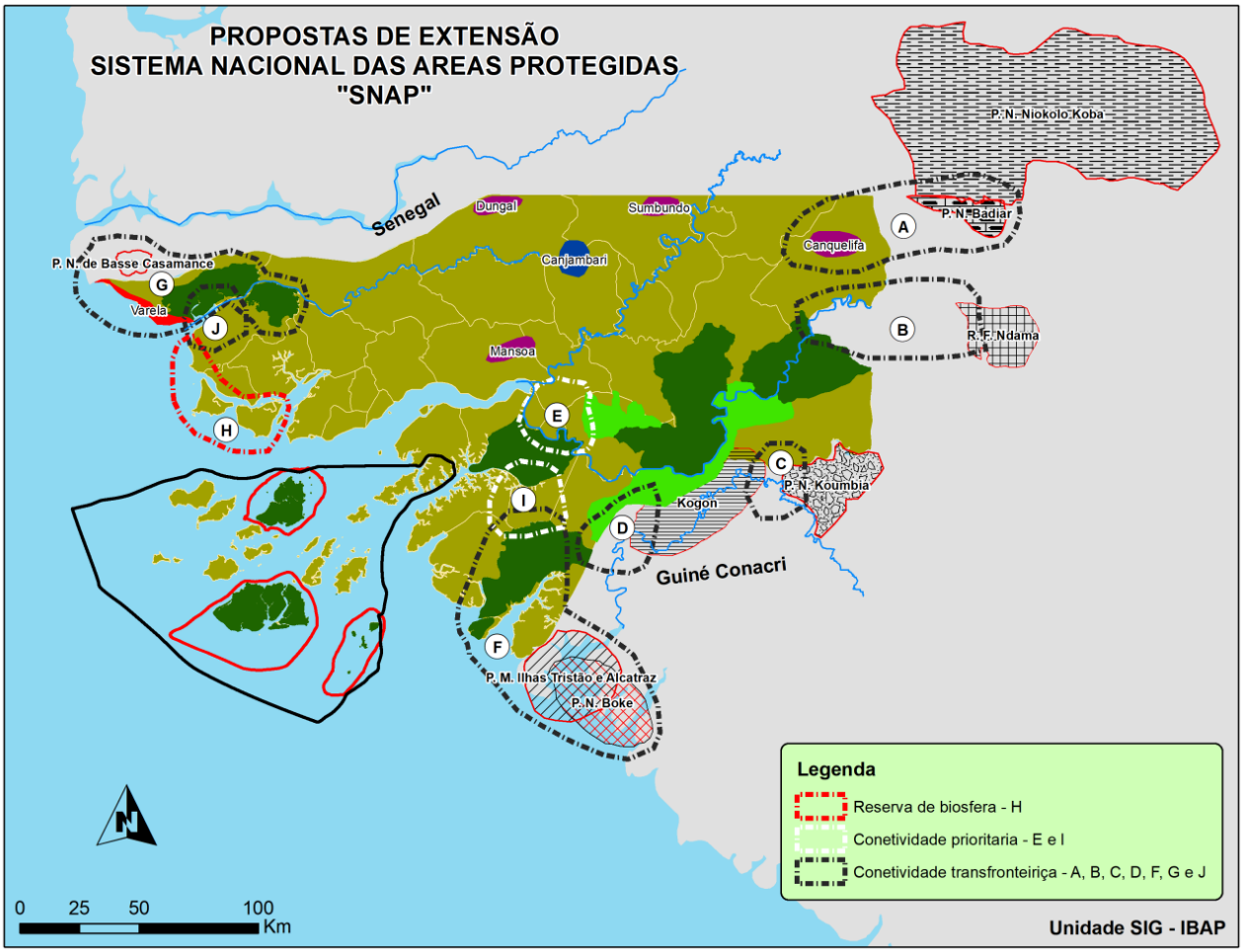
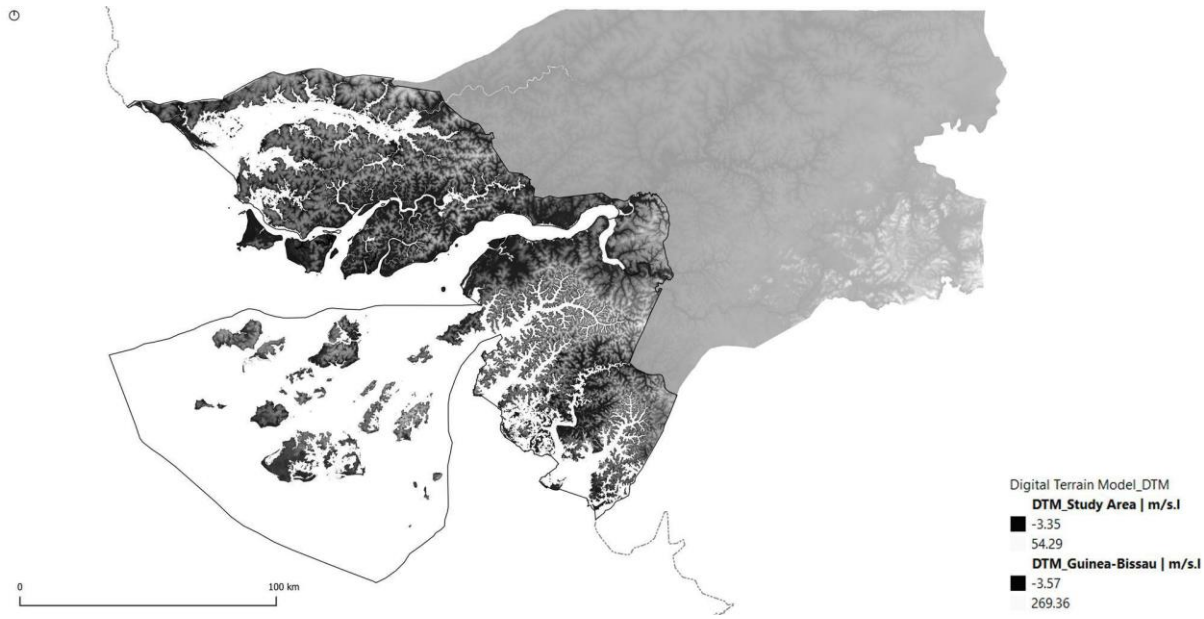
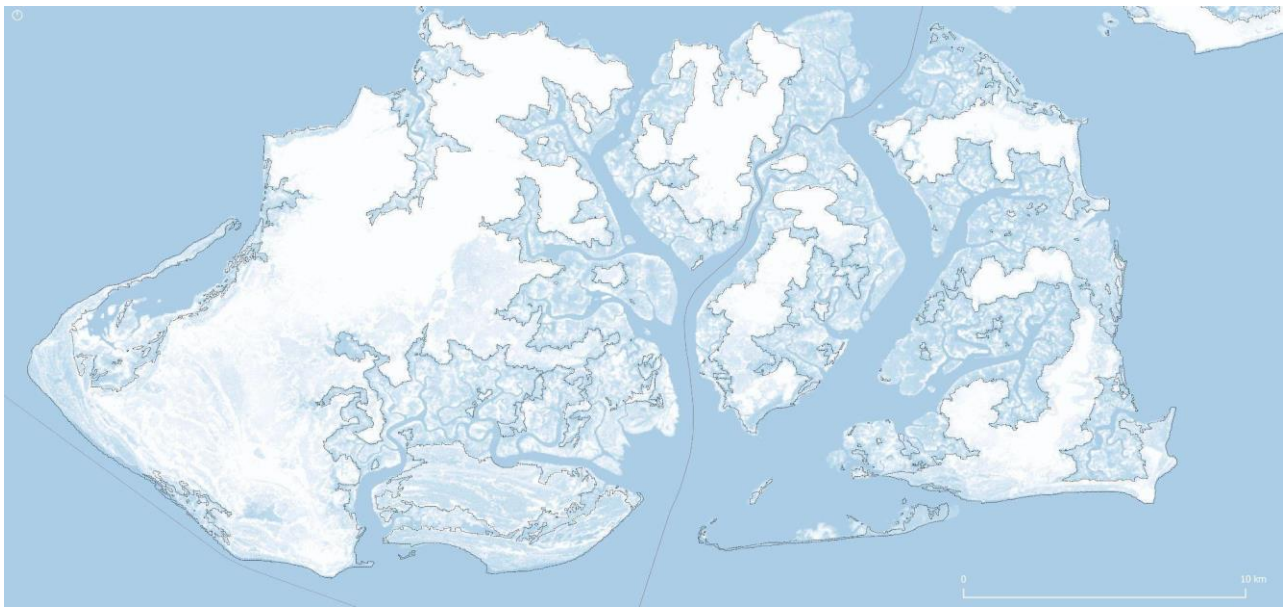


Figure 4 Proposed extension of the National System of Protected Areas (IUCN, 2017)

Annex 3 - National altimetry and coastal geomorphological aspects (edited by the authors)



a) Morphology of the coastal study area and national altimetry. Credits: Copernicus COP-DEM



b) DTM of the 'Parque Nacional do Grupo de Ilhas de Orango'; the blue scale, limited to 10 m a.s.l., reflects the system of wetlands and dynamic mudflats as an added system beyond the national perimeter (in hatching). Credits: Copernicus COP-DEM

Annex 4 – Some coastal settlements, between the mangrove system and the wet rainforest (edited by the authors)

a) The settlements of Cacheu (north) and Cacine (south), in close contact with the wetland system. Univocal metric scale. Credits: google maps

b) The urban settlements of Bolama (north) and Bubaque (south), in close contact with the coastal and sea system. Univocal metric scale. Credits: google maps

Annex 5 – Summary and comparison of the main characteristics of the 4 landscape systems (edited by the authors)

Indicators and analysis criteria[46]	**Landscape Systems***			
	1	**2**	**3**	**4**
geomorphology	very low elevation and flat ground	low elevation, flat ground and light slopes	low elevation and predominantly flat ground	very low elevation and flat ground
elevation[47] *(metres a.s.l.)*	min: -2.32 mean: 0.35 max: 34.74	min: 0 mean: 3.71 max: 68.77	min: -0.02 mean: 6.84 max: 55.80	min: 0.0 mean: 1.55 max: 47.47
main land cover	mangroves, coastal savannahs and rice fields	humid forests and agro-mosaic	urbanised environment and agro-forestry mosaic	forest, mangroves and coastal mudflats
natural protected areas	yes (PNTC, PNLC)	yes (PNTC, PNLC)	no	yes (PNO, PNMJVP, RBBB, Ilhas Urok)
degree of transformation	medium	medium	high	low
human impact	high	high	high	low
cultural-identity values	yes	no data	no data	yes
diffuse urban/rural settlements	yes	yes	no	yes
main urban settlements	no	yes	yes	no
urban planning tools	no	no	yes (not applied)	yes

[46] It is specified that the *low, medium, high* values of the synthetic indicators selected derive from a strictly qualitative and macro-scaled analysis

[47] Altitude values were extracted by processing in a GIS environment, based on the perimeters of the individual landscape systems and from Copernicus DEM (COP-DEM), 30 m/px.

climate change impacts	sea level rise, coastal flooding, coastal erosion, extreme weather phenomena, rising sea/river temperatures	extreme weather phenomena, droughts, heat waves, rainfall instability	extreme weather phenomena, sea level rise, coastal flooding heat waves, heat islands, rainfall instability, droughts	sea level rise, rising sea/river temperatures, evapotranspiration and changes in humidity levels
	* Landscape systems: 1. Coastal wetlands system 2. Agro-forestry and fringe settlement system 3. Urban system of Bissau 4. Bijagos Archipelago system			

Annex 6 – List of consulted stakeholders

List of Consulted Entities (individual or collective)[48]		
Name	**Institution**	**Role**
Abilio Rachid Said	IBAP *Institute of Biodiversity and Protected Areas*	Technician
Adama Djaló	AMAE *Association of Women in Economic Activity*	President
Aissa Regalla	IBAP	General Director
António da Silva	IBAP / PNTC *Cacheu Mangrove Forest National Park*	Assistant Director
António Vladimir Vieira Fernandes	DGOT *Directorate-General of Territorial Planning*	General Director
Artemisa Martins	Coastal Project *"Strengthen the adaptive capacity and climate resilience of Guinea-Bissau coastal communities vulnerable to climate risks" UNDP/GEF project*	Antena Bubaque
Basílio Mendes Catelimbo	DGGM *Directorate-General for Geology and Mines*	Former Director
Bem Cassimo Cunha	MTA *Ministry of Tourism and Handicrafts*	Consultant
Carlos M. T. de Amarante	DGADR *Directorate-General for Agriculture and Rural Development*	Consultant for FAO *(currently)* Former General Director of DGADR, and focal point for the N'Tene Terra Project – a project funded by the EU
Conceição Évora	MMFSS *Ministry of Women, Family and Social Solidarity*	Minister
Constantino Maia	IBAP	Financial Department
Daniel S. Cassamá	INEP *National Institute of Research and Studies*	Coordinator
Eurélia J. J. Silva	INM *National Institute of Meteorology*	Technician

[48] The Entities (individual or collective) listed in the table represent the individuals who were consulted during the missions and/or who also actively participated in the final validation workshop.

List of Consulted Entities (individual or collective)[48]		
Name	**Institution**	**Role**
Fernando L.	GPC *Coastal Planning Office*	Technician
Francesca Roggero	DUE *Delegation of the European Union to the Republic of Guinea-Bissau*	Responsible for the Programs
Francisco Gomes Wambar	ODZH *Organization for Wetlands' Protection and Development in Guinea-Bissau*	Executive Director
Ibraima Djifam	Fundação BioGuiné	Coordinator
INIPO's team	INIPO *National Institute for Fisheries and Oceanographic Research*	-
Joãozinho Sá	GPC	Coordinator
Jorge Camilo Handem	AD NGO *Ação para o Desenvolvimento*	Executive Secretary
Justino Biai	IBAP	Technician
Mary S.	Coastal Project	MCA
Morto Baiém Fandé	University "Livre de Bissau"	Specialist in climate change risk and adaptation, Rector of University "Livre de Bissau"
Pierre Campredon	IBAP	Scientific Advisor
Quintino Imbadji	AAAC *Competent Environmental Assessment Authority*	Technician
Quintino Tchantchalam	IBAP	RB Coordinator
Seli Camará	Coastal Project	Infra. Responsible
Suleimane	AGEFP *Guinean Agency for Employment and Vocational Training*	Director
Taino Monteiro	PNUD *United Nations Development Programme*	Technician
Welena da Silva	AAAC	Genereal Director