THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

FOR OFFICIAL USE ONLY

Report No: PAD4864

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED CREDIT

IN THE AMOUNT OF EUR 93.5 MILLION
(US$100.0 MILLION EQUIVALENT)

TO THE

REPUBLIC OF SENEGAL

FOR A

NATURAL RESOURCES MANAGEMENT PROJECT

JUNE 10, 2022

Environment, Natural Resources and the Blue Economy Global Practice
Western and Central Africa Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective May 31, 2022)

Currency Unit =	West African CFA Franc (XOF)
XOF613 =	US$1
EUR0.93488524 =	US$1

FISCAL YEAR
January 1 – December 31

Regional Vice President:	Ousmane Diagana
Country Director:	Nathan Belete
Regional Director:	Simeon K. Ehui
Practice Manager:	Maria Sarraf
Task Team Leaders:	Philippe Ambrosi, Idriss Deffry

ABBREVIATIONS AND ACRONYMS

AIS	Automatic Identification System
ANA	National Aquaculture Agency (*Agence nationale de l'aquaculture*)
AWPB	Annual Work Plan and Budget
CERSI	Mapping, Resource Assessment, and Information System Unit (*Cellule cartographie et évaluation des ressources et système d'information*)
CGQA	Air Quality Management Center (*Centre de gestion de la qualité de l'air*)
CGUE	Environmental Emergency Management Center (*Centre de gestion des urgences environnementales*)
CLP	Local Fishermen's Committees *(Comités locaux de pêcheurs)*
CLPA	Local Council for Artisanal Marine Fishing (*Conseils locaux de pêche artisanale maritime*)
CONIPAS	National Interprofessional Council for Artisanal Fisheries of Senegal (*Conseil national interprofessionnel de la pêche artisanale du sénégal*)
COVID-19	Coronavirus Disease 2019
CPF	Country Partnership Framework
CRODT	Oceanographic Research Centre of Dakar-Thiaroye (*Centre de recherche océanographique Dakar-Thiaroye*)
CSE	Ecological Monitoring Center of Dakar *(Centre de suivi écologique de Dakar)*
CSRP	Sub-Regional Fisheries Commission (*Commission sous-régionale des pêches*)
CTNE	National Technical Committee for Environmental Assessment (*Comité technique national d'évaluation environnementale*)
DA	Designated Account
DAMPC	Community Marine Protected Areas Directorate (*Direction des aires marines protégées communautaires*)
DEEC	Directorate of Environment and Classified Facilities (*Direction de l'environnement et des établissements classés*)
DEFCCS	Water and Forests, Hunting, and Soil Conservation Directorate (*Direction des eaux et forêts, chasses et de la conservation des sols*)
DFIL	Disbursement and Financial Information Letter
DGEFM	Seabed Management and Exploitation Directorate (*Direction de la gestion et de l'exploitation des fonds marins*)
DITP	Fisheries Processing Industries Directorate (*Direction des industries de transformation de la pêche*)
DPM	Marine Fisheries Directorate (*Direction des pêches maritimes*)
DPN	National Parks Directorate (*Direction des parcs nationaux*)
DPSP	Fisheries Protection and Surveillance Directorate (*Direction de la protection et de la surveillance des pêches*)
DREEC	Regional Divisions of Environment and Classified Facilities (*Divisions régionales de l'environnement et des établissements classés*)
E&S	Environmental and Social
EHPMP	Environmental Health and Pollution Management Program
ERR	Economic Rate of Return

ESCP	Environmental and Social Commitment Plan
ESIA	Environmental and Social Impact Assessment
ESF	Environmental and Social Framework
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standard
FAO	Food and Agriculture Organization
FiTI	Fisheries Transparency Initiative
GAIPES	Association of Fishing Shipowners and Fishing Industrialists in Senegal (*Groupement des armateurs et industriels de la pêche au Sénégal*)
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIE	Interprofessional Economic Interest Group (*Groupe d'intérêt économique interprofessionnel*)
GoS	Government of Senegal
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICR	Implementation Completion and Results Report
IFR	Interim Financial Report
IGA	Income-Generating Activity
IPF	Investment Project Financing
ISO	International Organization for Standardization
IT	Information Technology
IUU	Illegal, Unreported, and Unregulated
LMP	Labor Management Procedures
M&E	Monitoring and Evaluation
MEDD	Ministry of Environment and Sustainable Development (*Ministère de l'environnement et du développement durable*)
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MPEM	Ministry of Fisheries and Maritime Economy (*Ministère des pêches et de l'économie maritime*)
MSC	Marine Stewardship Council
NBSAP	National Biodiversity Strategy and Action Plan
NDC	Nationally Determined Contribution
NGO	Nongovernmental Organization
NPV	Net Present Value
NTFP	Non-Timber Forest Product
OCC	Opportunity Cost of Capital
OECD	Organisation for Economic Co-operation and Development

PAP2-AA	Priority Action Plan, Adjusted and Accelerated (*Plan d'actions prioritaires ajusté et accéléré*)
PDO	Project Development Objective
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PPSD	Project Procurement Strategy for Development
PRES	Economic and Social Resilience Program (*Programme de résilience économique et sociale*)
PROGEDE	Sustainable Management of Traditional and Alternative Sources of Energy Project (*Projet de gestion durable et participative des énergies traditionnelles et de substitution*)
PSC	Project Steering Committee
PSE	Plan for an Emerging Senegal (*Plan Sénégal émergent*)
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SCF	Standard Conversion Factor
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
SEP	Stakeholder Engagement Plan
SMART	Spatial Monitoring and Reporting Tool
SNRMP	Senegal Natural Resources Management Project
STEP	Systematic Tracking of Exchanges in Procurement
SYSCOHADA	West African Accounting System of Organization for the Harmonization of Business Law in Africa *(Système Comptable Ouest Africain de Organisation pour l'harmonisation en Afrique du droit des affaires)*
TC	Technical Committee
UPAMES	Employers' Union of Fishmongers and Export Traders of Senegal (*Union patronale des mareyeurs exportateurs du Sénégal*)
USAID	United States Agency for International Development
VMS	Vessel Monitoring System
WACA	West Africa Coastal Areas Resilience Investment Project
WARFP	West Africa Regional Fisheries Program
WB	World Bank
ZER	Regulated Area of Operation (*Zone à exploitation règlementée*)
ZIP	Prohibited Fishing Area (*Zone interdite de pêche*)
ZIRA	Artificial Reef Immersion Zone (*Zone d'immersion des récifs artificiels*)
ZPP	Protected Fishing Zone (*Zone de pêche protégée*)

TABLE OF CONTENTS

DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Senegal	Senegal: Natural Resources Management Project	
Project ID	**Financing Instrument**	**Environmental and Social Risk Classification**
P175915	Investment Project Financing	Substantial

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	[ ] Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
05-Jul-2022	31-Jul-2028

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The objective of the Project is to improve the management of fish and forest resources and access to related economic opportunities in target areas.

Components

Component Name	Cost (US$, millions)

Component 1 - Institutional Framework for Environmental and Social Risk Management and Strategic Intersectoral Collaborations	17.00
Component 2 - Resilience and productivity of the fisheries and aquaculture sectors	45.00
Component 3 - Sustainable management of forests and ecosystems	32.00
Component 4 – Project management	6.00

Organizations

Borrower:	Republic of Senegal
Implementing Agency:	Ministry of Environment and Sustainable Development Ministry of Fisheries and Maritime Economy

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	100.00
Total Financing	100.00
of which IBRD/IDA	100.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	100.00
IDA Credit	100.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
Senegal	100.00	0.00	0.00	100.00
National PBA	100.00	0.00	0.00	100.00
Total	**100.00**	**0.00**	**0.00**	**100.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2023	2024	2025	2026	2027	2028	2029
Annual	4.48	11.07	13.35	17.43	23.77	29.70	0.20
Cumulative	4.48	15.55	28.90	46.33	70.10	99.80	100.00

INSTITUTIONAL DATA

Practice Area (Lead)

Environment, Natural Resources & the Blue Economy

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Substantial
8. Stakeholders	Moderate
9. Other	Moderate
10. Overall	Substantial

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description

The Recipient shall, no later than one (1) month after the Effective Date for the Fiscal Year in which this Agreement shall become effective, and September 1 of each subsequent Fiscal Year, consolidate and furnish to the Association for the Association's no objection, a consolidated annual program of activities proposed for implementation under the Project during the following Fiscal Year, together with a proposed budget which shall include the funds from the Credit, as well as any other funds which may become available for the implementation of the Project (Schedule 2, Section I.C.1. of the Financing Agreement).

Sections and Description

The Recipient shall prepare and adopt, no later than one (1) month after the Effective Date, and thereafter maintain, throughout the period of implementation of the Project, the Project Implementation Manual (PIM) in form and substance acceptable to the Association, which shall contain a detailed and sequenced description of the Project activities with a timeline and ongoing planning and budgeting procedures, as well as staffing plan, descriptions and guidelines for the application of all implementation, monitoring and evaluation arrangements, reporting, financial management procedures, contract management, grievance redress mechanism, procurement procedures and procedures to implement and comply with the Anticorruption Guidelines and the Environmental and Social Standards, including staff and resources building plans and inspection matters (Schedule 2, Section I.B.1.(a) of the Financing Agreement).

Sections and Description

The Recipient shall, no later than two (2) months after Effective Date, establish and thereafter maintain, two (2) Project Implementation Units (PIUs), one under the MEDD Director of Cabinet and one under the MPEM Secretary General, each with terms of reference, composition and resources acceptable to the Association (Schedule 2, Section I.A.4.(a) of the Financing Agreement).

Sections and Description

The Recipient shall recruit or assign, no later than two (2) months after the Effective Date, the following staff for the MEDD PIU, each with terms of reference, qualification and experience acceptable to the Association: (i) one (1) Coordinator, (ii) one (1) Senior Accountant, (iii) one (1) Procurement Specialist, (iv) one (1) Environmental Specialist, (v) one (1) Social Development Specialist, and (vi) one (1) Gender specialist working part time as further detailed in the PIM (Schedule 2, Section I.A.4.(e) of the Financing Agreement).

Sections and Description

The Recipient shall recruit or assign, no later than two (2) months after the Effective Date, the following staff for the MPEM PIU, each with terms of reference, qualification and experience acceptable to the Association: (i) one (1) Coordinator, (ii) one (1) Senior Accountant, (iii) one (1) Procurement Specialist, (iv) one (1) Environmental Specialist, (v) one (1) Social Development Specialist, and (vi) one (1) Gender Specialist working part time as further detailed in the PIM (Schedule 2, Section I.A .4.(f) of the Financing Agreement).

Sections and Description

The Recipient shall, no later than three (3) months after the Effective Date, establish and thereafter maintain, a Project Steering Committee (PSC) with terms of reference, composition and resources acceptable to the Association (Schedule 2, section I.A.2.(a) of the Financing Agreement).

Sections and Description

The Recipient shall, no later than three (3) months after the Effective Date, establish and thereafter maintain, two (2) Technical Committees (TCs), one under the MEDD Director of Cabinet and one under the MPEM Secretary General, each with terms of reference, composition and resources acceptable to the Association (Schedule 2, Section I.A.3.(a) of the Financing Agreement).

Sections and Description

No later than three (3) months after the Effective Date, the PIUs shall sign a memorandum of understanding, in form and substance acceptable to the Association, as shall be further described in the Project Implementation Manual, with the Recipient's directorate responsible for environment and classified establishments, to support each PIU in the environmental and social monitoring of its Respective Part of the Project (Schedule 2, Section I.A.4.(d) of the Financing Agreement).

Sections and Description

The Recipient shall ensure that all goods, works, services, and operating costs financed by the Association under the Financing Agreement to support or facilitate the enforcement of the obligations included in the Maritime Fisheries Code, the Aquaculture Code, the Environmental Code, the Forestry Code, and/or the Hunting Code shall be used for the sole purpose of enforcing the obligations under such laws and regulations and shall not be used for any national security or military purpose, or for enforcement of any other laws (Schedule 2, Section I.E.1. of the Financing Agreement).

Sections and Description

The Recipient shall ensure that the responsible agency (MEDD or MPEM as the case may be) for the patrols or surveillance missions supported under the Project ensure that all such patrols and surveillance missions are organized in priority for the purpose of monitoring the natural resources under their authority and surveilling the enforcement of the obligations included in the Maritime Fisheries Code, the Aquaculture Code, the Environmental Code, the Forestry Code, and/or the Hunting Code, as the case may be; that each patrol or surveillance mission is conducted by personnel who have been properly trained in the operation of any equipment used in the surveillance patrol; and that the mission task is duly recorded and documented prior and subsequent to the mission, including any repurposing of the patrol or mission while in progress (Schedule 2, Section I.E.2. of the Financing Agreement).

Sections and Description

The Recipient shall cause the agency responsible for the patrols supported under the Project to maintain detailed accounts of the resources allocated to the patrols in a manner enabling effective and verifiable compliance with the provisions of Section I.E.1 of Schedule 2 of the Financing Agreement. In particular, and without limitation to the foregoing, where a patrol or surveillance mission under the Project has multiple tasks, or where a patrol or surveillance mission is repurposed while in progress, in such manner that part of it consists in the enforcement of the obligations included in the Environmental Code, the Maritime Fisheries Code, the Aquaculture Code, the Forestry Code, and/or the Hunting Code, and part of it consists in other tasks, the Recipient shall cause the responsible agency (MEDD or MPEM as the case may be) (i) to maintain accounts in a manner acceptable to the Association, which demonstrates that the resourcing of the other tasks is independent of any financing provided by the Association; and (ii) to provide access to such accounts to the Association or its auditors (Schedule 2, Section I.E.3. of the Financing Agreement).

Conditions

Type	Financing source	Description
Disbursement	IBRD/IDA	No withdrawal should be made: (a) under Category (1) unless and until the MEDD PIU has adopted the PIM in accordance with Schedule 2 Section I.B.1 of the Financial agreement) and (b) under Category (2) unless and until the MPEM PIU has adopted the PIM in accordance with Schedule 2 Section I.B.1 of the Financial agreement)

I. STRATEGIC CONTEXT

A. Country Context

1. **Senegal's strong economic performance over the last decade has been disrupted by the coronavirus disease 2019 (COVID-19) pandemic.** The country's economic growth was among the highest in Africa between 2014 and 2018, averaging around 6 percent annually. Most of the foreign exchange came from fisheries, phosphates, groundnuts, tourism, and services. The COVID-19 pandemic disrupted this upward trend: economic growth contracted to 4.6 percent in 2019 and 1.3 percent in 2020, as the pandemic set back services such as tourism and transport, and key export markets shut down. Growth rebounded to 6.1 percent in 2021, but the recovery outlook remains fragile, given current global high food and energy prices.

2. **Despite impressive growth in the past, poverty and inequality reduction has been slow in Senegal and the COVID-19 pandemic is threatening any gain that has been made, putting additional pressure particularly on the rural poor.** Poverty levels have reduced by 5.0 percent, from 43.0 percent in 2011 to 37.8 percent in 2018–19,[1] but relative to other Sub-Saharan African countries,[2] and considering the country's strong pre-pandemic economic growth, poverty reduction has been slow. In addition, inequality persisted over the same period, with the Gini coefficient remaining at 0.35 and persistent spatial and sociodemographic disparities, including lagging regions in the southeast and gender gaps. The COVID-19 pandemic worsened the situation, especially in urban areas, where service activities are concentrated. However, the poverty gap deteriorated more in rural areas, suggesting that the rural poor suffered most.[3] Vulnerable rural households may not benefit immediately from the recovery with food insecurity rising, following reduced incomes and disrupted supply chains. Additional stress is coming from already-depleted natural resources[4] and growing exposure to climatic shocks such as floods and droughts. The number of moderately or severely food-insecure people in Senegal grew by 20 percent (to 6.7 million) from 2014–16 to 2018–20 and could further increase with the difficulties of importing agricultural raw materials due to the conflict in Ukraine.[5]

3. **The country's eroding natural capital and climate vulnerability are affecting Senegal's prospects for sustainable and resilient future economic growth and development.** While the gross domestic product (GDP) per capita, produced capital per capita, and human capital per capita have grown on par from 1998 to 2018, natural capital (that is, forests, mangroves, fisheries, agricultural land, protected areas, and

[1] World Bank. 2021. *Sub-Saharan Africa - Macro Poverty Outlook: Country-by-Country Analysis and Projections for the Developing World.* Washington, DC: World Bank.
[2] Between 2005 and 2015, poverty reduction in several countries in Sub-Saharan Africa exceeded 1 percent per year: Tanzania (–2.6 percent), Rwanda (–1.5 percent), and Ghana (–1.3 percent). Source: World Bank staff calculations using PovCalNet 2020 harmonized surveys, and Macro Poverty Outlook Fall 2019.
[3] World Bank. 2022. *Sub-Saharan Africa - Macro Poverty Outlook: Country-by-Country Analysis and Projections for the Developing World*. Washington, DC: World Bank.
[4] For instance, due to the pandemic and associated response, forested and protected areas in Africa have witnessed increased pressure from communities whose livelihoods have been threatened by the pandemic (for example, logging, harvesting, and game hunting); a drop in revenues (for example, from natural tourism); and at the same time, postponement of management, protection, and conservation measures. Source: Attah, A. 2020. "Initial Assessment of the Impact of COVID-19 on Sustainable Forest Management African States." Background Paper prepared for the United Nations Forum on Forests Secretariat. https://www.un.org/esa/forests/wp-content/uploads/2021/01/Covid-19-SFM-impact-Africa.pdf.
[5] FAO (Food and Agriculture Organization), IFAD (International Fund for Agricultural Development), UNICEF (United Nations Children's Fund), WFP (World Food Programme), and WHO (World Health Organization). 2021. *The State of Food Security and Nutrition in the World - Transforming Food Systems for Food Security, Improved Nutrition and Affordable Health Diets for All*. Rome: FAO.

minerals) has not followed the same pattern and decreased in per capita terms.[6] Ecological modeling confirms this worrying trend, whereby Senegal has become a net borrower of natural resources since 2007.[7] Senegal's natural base is rapidly thinning, given high human and economic pressures, inadequate management (for example, overfishing and deforestation), and mounting risks (for example, pollution and climate change). This declining natural capital will act as a head wind on future growth, and Senegal's economic growth cannot be sustained unless natural capital is adequately and sustainably managed and climate resilience strenghtened.

4. **Senegal's high vulnerability to climatic shocks is likely to increase, affecting the country's economic and livelihood prospects.** Senegal ranks among the bottom third of those countries most vulnerable to climate change according to the Notre Dame Global Adaptation Initiative Country Index. The annual cost of coastal zone degradation alone, mainly caused by flooding and erosion, was estimated at 7.6 percent of GDP in 2017 (much higher than in Benin, Côte d'Ivoire, and Togo).[8] In a 3°C temperature increase scenario, Senegal's GDP is expected to decrease by 1.27 percent by 2030 and 3.91 percent by 2050.[9] The number of people in extreme poverty could double as early as 2030, due to food price and production shocks as well as human health impacts (more information on climate change in annex 4).

5. **The Government of Senegal (GoS) has taken decisive measures to mitigate the COVID-19 pandemic's socioeconomic impact and return to its pre-pandemic growth trajectory, including by sustainably leveraging natural resources and addressing climate change impacts.** In addition to its comprehensive support and recovery plan, the Economic and Social Resilience Program (*Programme de résilience économique et sociale*, PRES), on September 5, 2020, the GoS issued a new version of its Priority Action Plan 2, Adjusted and Accelerated (*Plan d'actions prioritaires ajusté et accéléré,* PAP2-AA). The PAP2-AA spans 2021–23 and seeks to catch up with the initial growth path of the National Development Plan (*Plan Sénégal Emergent*, PSE) while considering the new challenges from the pandemic and fostering an internally driven development. The PAP2-AA targets sectors with high growth and job potential, including fisheries, aquaculture, and nature-based tourism. Senegal also updated its Nationally Determined Contribution (NDC) in 2020,[10] in which it commits to reducing its greenhouse gas (GHG) emissions by 7 percent by 2030, and 21 additional percent conditional on external support. In the NDC, the GoS prioritizes the agriculture, livestock, fisheries, and forestry sectors, as they are dependent on natural resources and land use and significantly threatened by climate change.

[6] Over 1995–2018, GDP per capita (constant 2010 US$) grew by 50 percent, produced capital per capita by 50 percent, and human capital per capita by 73 percent. In the meantime, natural capital per capita decreased by 20 percent. Source: World Bank. 2021. *The Changing Wealth of Nations 2021: Managing Assets for the Future*. Washington, DC: World Bank.

[7] Global Footprint Network. 2021. National Footprint and Biocapacity Accounts (data up to 2017). Data and analysis show a long-term trend of increasing ecological footprint (defined as how much area of biologically productive land and water an individual requires to produce all the resources s/he consumes and to absorb the waste s/he generates) and decreasing bio capacity (defined as the capacity of ecosystems to regenerate what people demand from those surfaces). Senegal ceased being a creditor in 2007.

[8] Croitoru, L., J. Miranda, and M. Sarraf. 2019. *The Cost of Coastal Zone Degradation in West Africa: Benin, Côte d'Ivoire, Senegal, and Togo*. World Bank.

[9] World Bank. 2020. *The Next Generation Africa Climate Business Plan: Ramping Up Development-Centered Climate Action*. Washington, DC: World Bank.

[10] République du Sénégal. 2020. *Contribution Déterminée au Niveau National du Sénégal*. Dakar: République du Sénégal.

B. Sectoral and Institutional Context

Environmental and Social Management

6. **With the adoption of the Environmental Code in 2001, Senegal has developed a national environmental and social (E&S) management system.** This management system, which is coordinated by the Directorate of Environment and Classified Facilities (*Direction de l'environnement et des établissements classés,* DEEC), includes a system to handle urgent environmental issues by the Environmental Emergency Management Center (*Centre de gestion des urgences environnementales,* CGUE), a National Technical Committee for Environmental Assessment (*Comité technique national d'évaluation environnementale,* CTNE) with representation from different line ministries and stakeholders, and a decentralized system to monitor environmental performance at the regional level through Regional Environmental and Social Monitoring Committees and the Regional Divisions of Environment and Classified Facilities (*Divisions régionales de l'environnement et des établissements classes,* DREECs).

7. **As Senegal is engaging in large-scale investments in various strategic sectors (for example, extractive industries, transport infrastructure, and land reform), it is necessary to strengthen its national E&S management system.** Beyond the growing impacts of these investments, the need to strengthen E&S management system is also motivated by the need to respond to expanded E&S requirements of public and private international companies and investors. To accompany development ambitions and meet enhanced E&S requirements, several areas need strengthening: (a) legislation, to provide guidelines for considering environmental challenges (for example, climate change—on reducing the footprint of proposed investments and undertaking risk screening and resilience assessment—and various types of pollution—including marine pollution in the context of offshore hydrocarbon exploitation, or biodiversity management) and prepare E&S management instruments that are operational, and (b) institutions, to address insufficient human resources and low technical capacity for the satisfactory preparation of the required E&S instruments, tackle budgetary (that is, lack of sustainable financing mechanism) and operational (that is, lack of supervision equipment and need of technological upgrade) bottlenecks in the supervision of the implementation of these instruments, and overcome centralization of resources and need for greater coordination on the ground. The new Environmental Code (under final approval) partially addresses these concerns and creates a need for technical and operational capacity building to facilitate its successful application.

The Fisheries Sector

8. **Senegal's fisheries are of strategic value considering the sector's role in supporting the economy, strengthening livelihoods, and contributing to food security.** Fish production and trade represent about 3.2 percent of Senegal's GDP and 10 percent of exports, a main source of foreign revenue.[11] Reported total annual fish catches have averaged around 400,000 metric tons over the last decade, with about 80 percent being caught by the artisanal sector and the remainder by the industrial sector. Artisanal fishing is essential to overall household well-being in Senegal, providing both income and nutrient-rich food. The sector is estimated to sustain about 600,000–800,000 direct and indirect jobs, though this estimate might have to be revised to reflect the impact of the COVID-19 pandemic.[12] Artisanal fisheries

[11] Agence Nationale de Statistique et de la Démographie. 2015. *Comptes Satellites de la Pêche.* Dakar: République du Sénégal.
[12] Ministère des Pêches et de l'Economie Maritime. 2021. *Document Introductif au Conseil Présidentiel sur la Pêche et l'Aquaculture*. Dakar: République du Sénégal; République du Sénégal. 2016. *Plan National d'Adaptation du Secteur de la Pêche et de l'Aquaculture face au Changement Climatique Horizon 2035*. Dakar.

and aquaculture are also crucial for the country's food security by providing more than 70 percent of the population's protein intake and calories.

9. **Weak governance and management, however, have led to overexploitation of fish resources and degradation of associated habitat.** Out of 15 fish stocks that are monitored (small pelagics),[13] one-third are considered overexploited, one-third fully exploited, and the remainder underexploited.[14] Inadequate fisheries management (that is, uncontrolled access regime for artisanal fisheries) has resulted in a proliferation of the fleet and corresponding capacity and consequently in overexploitation and degradation of the main coastal demersal and pelagic stocks. The demersal stocks have also been affected by an expanding industrial fleet characterized by limited transparency of permit attribution and control and illegal, unreported, and unregulated (IUU) fishing. While Senegal was estimated to have lost about US$300 million due to IUU fishing in 2012,[15] increased surveillance in recent years seems to have partially kept the growth of IUU fishing under check. Yet, IUU fishing is still considered a critical threat, with more than 50 percent of the catches estimated to have not been reported in 2018.[16] Collisions and accidents with artisanal fishers also remain an issue: between 2011 and 2015, there have been 1,015 fatalities.[17] Finally, important fish habitats have been degrading because of industrial bottom trawling together with destructive fishing practices, pollution, marine plastics, and the reduction of key coastal habitats, such as mangroves, which have an important fish nursery function.

10. **The economic value of fish products generated in Senegal is underexploited and aquaculture is underdeveloped.** The seafood supply chain registers high post-harvest losses due to inadequate fish handling and storage (for example, on board fishing boats, at landing sites, during transport stages, and at processing sites or plants) and insufficient food safety (for example, poor preservation conditions and low levels of compliance with sanitary norms required for export). Degradation of fish quality also compromises intake of nutrients, decreasing its nutritive value. The development of aquaculture, which offers the potential to rebalance inland development with economic activity, jobs, and food security in the hinterland, has been hampered by the lack of a regulatory and institutional framework, key infrastructure, and technical skills.

11. **Women play a significant role along the fisheries value chain and in fishing communities, but inequalities disadvantage their participation.** Women are estimated to comprise about 15 percent of the workforce involved in fish harvesting while constituting about 90 percent in the fish post-harvest sector, including processing and marketing. However, persistent gender inequalities because of fewer training opportunities, lack of access to credit, and conservative gender norms cause their contribution to often be unrecognized, undervalued, and underpaid. Women also tend to have limited decision-making power in fisheries governance institutions and communities.

[13] Coastal small pelagics are the main fish resources in Senegal (approximately 75 percent of all landings). About 80 percent comprise sardinella, while other important small pelagics include the bonga shad, chub mackerel, horse mackerel, and anchovy. Coastal demersal resources occur within the shelf area or approximately 200 m from the shore. This group includes crustaceans (shrimps, lobsters, and crabs), cephalopods (octopus and cuttlefish), and fishes (soles, groupers, seabreams, and so on).

[14] Palomares, M. L. D., M. Khalfallah, J. Woroniak, and D. Pauly, eds. 2020. "Assessments of Marine Fisheries Resources in West Africa with Emphasis on Small Pelagics." *Fisheries Centre Research Reports* 28 (4): 96.

[15] USAID (United States Agency for International Development). 2013. *The Importance of Wild Fisheries for Local Food Security: Senegal.* (accessed October 8, 2021, https://pdf.usaid.gov/pdf_docs/PA00KQB4.pdf.)

[16] Sea around us website and data portal. 2018: 254,210 tons reported and an estimation of 312,260 tons unreported.

[17] MPEM (Ministry of Fisheries and Maritime Economy, *Ministère des pêches et de l'économie maritime*). 2021. *Document Introductif au Conseil Présidentiel sur la Pêche et l'Aquaculture*. Dakar: République du Sénégal.

12. **Climate change is expected to compound these challenges, especially as a large proportion of Senegal's population depends on fisheries for their livelihoods, food security, and nutrition.** By some estimates, for a low and a high GHG scenario, the maximum catch potential could decrease by about 17 and 19 percent by 2050, respectively, and by about 9 and 36 percent by 2100. Fisheries are considered at high risk in both scenarios.[18] The impact of climate change on fisheries will be serious, with fisheries' resources under multiple pressures, leading to severe socioeconomic consequences such as the impoverishment of fishing communities. It is projected that depletion and migration of fish stocks will make it difficult for small-scale fishermen to reach the stocks, enhanced climate variability will cause an increase in accidents at sea, and coastal erosion and flooding will affect fishing communities and infrastructure.

13. **The GoS recognizes not only the value of the country's fisheries and aquaculture sectors but also the need to address the associated challenges.** The sectors went through great changes over the last decade, including with support from the West Africa Regional Fisheries Program (WARFP - P106063), implemented over 2009–16. Several reforms have been implemented including (a) a regulatory reform consisting of the adoption of the Maritime Fisheries Code,[19] the development of the Aquaculture Code, and establishment of the related National Aquaculture Agency (*Agence nationale de l'aquaculture,* ANA); (b) the planning and monitoring of specific national and shared fisheries[20] based on research data[21] and the modernization of the information and data monitoring system for fisheries management; (c) the setting up of issuance and monitoring systems for fishing licenses; (d) the development of community-based management of fisheries; (e) reinforcement of the fight against IUU fishing; (f) the progressive modernization of certain value chains of fishery products; and (g) the importance given to the aquaculture sector in the country's development strategies and planning. Senegal's Fisheries and Aquaculture Strategy (2016–23)[22] lays out how the sector's contribution to food security, economic growth, and local development can be increased in line with the PSE, while the country's National Climate Change Adaptation Plan for Fisheries and Aquaculture 2035[23] describes how the fisheries sector can better adapt to climate change, particularly by increasing the resilience of coastal fishing communities. The updated NDC[24] identifies and targets specific climate adaptation measures, including sustainable management of fisheries resources, restoration of marine habitats and mangroves, expansion of marine protected areas, increased safety at sea, and development of aquaculture.

The Forestry Sector

14. **Forests in Senegal are critical to sustain economic development and livelihoods and mitigate climate change.** Forests provide a range of ecosystem services that are important to Senegal's population, particularly the poor. Forest ecosystems produce and conserve soil and stabilize water runoff, preventing land degradation and reducing the risks of droughts, floods, and landslides, all important adaptation functions. Forest growth sequesters and stores carbon, contributing to climate change mitigation. As

[18] "World Bank. 2019. *Climate Change and Marine Fisheries in Africa: Assessing Vulnerability and Strengthening Adaptation Capacity*.
[19] Act 2015-18 of July 13, 2015, on the Maritime Fishing Code.
[20] Management plans for cymbium and coastal shrimp (WARFP), octopus and deep-sea shrimp (European Union), sardinella (USAID), and joint Senegal-Mauritania management plans for shared stocks of mullet and croaker (Sub-Regional Fisheries Commission [*Commission sous-régionale des pêches*, CSRP] joint project).
[21] With the support of the Oceanographic Research Center of Dakar - Thiaroye (*Centre de recherche océanographique Dakar-Thiaroye*, CRODT).
[22] MPEM. 2016. *Lettre de Politique Sectorielle de Développement de la Pêche et de l'Aquaculture.* Dakar: République du Sénégal.
[23] République du Sénégal. 2016. *Plan National d'Adaptation du Secteur de la Pêche et de l'Aquaculture face au Changement Climatique Horizon 2035*.
[24] République du Sénégal. 2020. *Contribution Déterminée au Niveau National du Sénégal*.

habitat for a wide range of species, forests also support biodiversity conservation. Furthermore, forests contribute to poverty reduction and economic development by providing food; fiber; timber; and other forest products, such as honey, nuts and fruits, natural gums, or medicinal plants for income generation and subsistence, and serve as a safety net for rural populations during lean periods. Forests are a major source of charcoal and timber with about equal production value. Up to 80 percent of Senegal's households rely on fuelwood for their energy consumption. Finally, forests and forested landscapes sustain the tourism sector, providing resources for natural resources management and creating jobs. While a quantification of the contribution of forests to economic activities and livelihoods in Senegal is not available, recent estimates from Burkina Faso (also in the Sudano-Sahelian zone) indicate that the forestry sector contributes around 9.6 percent of Burkina Faso's GDP and 40 percent of households derive income from forest-based economic activities.[25]

15. **Despite their crucial role in development, the country's forest areas have significantly declined.** Senegal has engaged in a set of reforms and programs toward improving the sustainable management of its forests, including through support from the Sustainable Management of Traditional and Alternative Sources of Energy Project (*Projet de gestion durable et participative des énergies traditionnelles et de substitution,* PROGEDE), implemented over 2010–18. According to analysis of global forest change data, both PROGEDE I (P046768 & P085708) and II (P120629) helped significantly reduce the deforestation rate in the project area by a factor of 4 to 5.[26] However, deforestation and forest degradation continue to be major issues. In line with the country's forest definition, the country's forest cover is estimated to have been reduced by 131,000 ha between 2001 and 2020, resulting in approximately 24.5 million tCO_2 emissions. Almost all deforestation is linked to shifting cultivation, which is the last step in a cascade of drivers of deforestation and is most pronounced in the southern and southeastern regions, which are hubs for fuelwood production.[27] Loss of forested areas between 2010 and 2017 is estimated to have been four times greater than reforestation efforts over the same period. In terms of biomass, around 11 million m^3 have been lost in less than 10 years (2010–17), corresponding to 3 percent of standing stock.

16. **The drivers of deforestation and forest degradation include fuelwood/charcoal overexploitation, illegal logging, clearing for agricultural uses, mining, and forest fires.** These drivers are often interlinked and act in sequence: first illegal logging and then fuelwood production open a dent in the forest, leading to clearing for agricultural activities or encroachment. This process also results in forest fires. Demand for fuelwood is increasing due to population growth, and although cleaner and more efficient options exist, such as liquefied petroleum gas and alternative biomass stoves and fuels, they are largely unaffordable to most of the households. Illegal trade of fuelwood and timber at the border with The Gambia causes revenue loss and further degradation of habitats and ecosystems. Finally, economic shocks such as the COVID-19 pandemic disrupt forest livelihoods, for example, those that derive income from ecotourism,

[25] World Bank. 2021. *Burkina Faso Forest Country Note: Deep Dive into Forest-Smart Investments.*

[26] Annual rates of deforestation in PROGEDE I areas before community-based management (2001–08): –0.35 percent and after community-based management (2009–20): –0.07 percent; PROGEDE II areas before community-based management (2001–14): –0.22 percent and after community-based management (2015–20): –0.06 percent; new areas pre-identified for development of community-based forest management (2001–20): –0.23 percent; classified forests (2001–20): –0.09 percent; and Niokolo-Koba National Park (2001–20): –0.11 percent; Analysis using global forest change data: Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." *Science* 342 (6160): 850–53. http://earthenginepartners.appspot.com/science-2013-global-forest.

[27] According to data presented by Global Forest Watch, Senegal lost 131,000 ha of tree cover (>10 percent) from 2001 to 2020.

and consequently lead to rural communities increasing their extraction from forests, contributing to deforestation.

17. **The important role women play in the forestry sector is widely recognized, but the full contribution of women has not been realized.** Forestry tends to be perceived as a male-dominated sector, even though women are significantly involved in forest work such as (a) gathering fuelwood, medicinal plants, and other non-timber forest products (NTFP); (b) collecting food for income and family consumption; and (c) processing secondary wood products. Although women significantly contribute to the forestry sector, they are often employed in seasonal, part-time, low-paying jobs, with wage gaps between male and female workers. Women continue to be disadvantaged by insecure property rights and limited access to forest, trees, and land resources. As in the fisheries sector, women are affected by discrimination and bias in the provision of services and are often excluded from participation, leadership roles, and decision-making at the household, community, and national levels and from access to information, credit, benefits, and technologies and inputs. Finally, women spend a significant share of their time (and sometimes also own resources) collecting wood (or acquire charcoal) and thus cannot devote time to more productive uses. They are often exposed to health hazards (that is, particulate matter and dioxins) given the conditions under which they cook or smoke fish (or more generally use these solid fuels).

18. **Climate change threatens both forest cover and forest integrity, which in turn affects the livelihoods of those depending on forests and the ecosystem services they provide.** Climate change affects the forest-dependent poor by impeding livelihoods, destroying assets, and reducing ecosystem services. Droughts and more intense precipitation are increasing forests' susceptibility to wildfires and floods, causing forest defoliation, declines in forest productivity, and tree mortality, which consequently reduce the provision of products critical for livelihoods.

19. **In recognition of the challenges that are affecting the country's forest sector, Senegal has embarked on reforming the associated policy environment toward promoting more sustainable approaches.** The following actions have been taken: (a) preparation of a Forest Policy 2005–25[28] and adoption of a new Forestry Code in 2018 (whose implementation is still hampered by a number of factors);[29] (b) recognition of the sector's contribution to climate mitigation, as reflected in the NDC; (c) promotion of community-based forest management linked to fuelwood production; (d) promotion of modern and alternative energy sources; (e) protection of natural forest areas; and (f) increased efforts to reduce illegal logging and forest fires.

C. Relevance to Higher Level Objectives

20. **The proposed project directly responds to Senegal's development priorities in the context of the COVID-19 recovery by supporting the PAP2-AA.** The project will support key PAP2-AA priorities, including accelerating the development of the aquaculture sector to preserve fish resources and enhance food security and job creation inland, developing strategic value chains linked to natural resources, and developing tourism through promotion of protected areas.

21. **The proposed project is also aligned with Senegal's updated NDC and National Climate Change Adaptation Plan for Fisheries and Aquaculture 2035.** In the NDC, the agriculture, livestock, fisheries, and forestry sectors are prioritized given their high vulnerability. In terms of climate adaptation, the project

[28] *Ministère de l'Environnement et de la Protection de la Nature*. 2006. *Politique Forestière du Sénégal 2005-2025*.

[29] These factors include lack of regulations facilitating the Code's implementation, lack of proper understanding of its provisions by the authorities, and its poor dissemination to stakeholders.

will support income-generating activities (IGAs) to diversify communities' livelihoods, integrated marine and coastal management for healthier and more resilient resources, climate-smart coastal infrastructure and increased safety at sea, and accelerated development of aquaculture. On the climate mitigation side, the project will support two of the NDC's priority sectors and related objectives: (a) in the forest and land use sectors, by promoting mitigation measures, through sustainable forest management including with community-based forest management for fuelwood production and management of classified forests and community-based natural reserves, and (b) in the energy sector, through diversification of domestic fuels, diffusion of efficient practices, and promotion of improved technologies and equipment such as improved cookstoves.

22. **The proposed project is also consistent with Senegal's National Biodiversity Strategy and Action Plan (NBSAP) and the country's participation to the Great Green Wall (GGW) Initiative.**[30] The NBSAP will be supported by (a) improving knowledge on natural resources and supporting capacities of national institutions in charge of natural resources management (Pillar A); (b) reducing pressure on natural resources and supporting restauration of ecosystems (Pillar B); (c) enhancing the value chains of selected natural resources (Pillar C); and (d) supporting community management and securing access to natural resources (Pillar D). Senegal is part of the GGW Initiative, which was launched in 2005 and endorsed in 2007 by the African Union. Project activities will complement those of the GGW Initiative on land restoration, improved management, job creation, and resilient livelihoods in other areas of the country and will contribute to three core indicators of the GGW Initiative (hectares of land restored, GHG emission reduction, and job creation).

23. **The proposed project will support two focus areas of the Country Partnership Framework (CPF) for Senegal (FY20–24).**[31] It will support the second focus area (competitiveness and job creation) and its associated objective to lower energy costs and carbon footprint and optimize the energy mix, with activities that modernize and diversify domestic energy sources, away from unsustainably collected fuelwood. It will further contribute to the third focus area (resilience and sustainability) with the objective to promote and protect resilient livelihoods, ecosystems, and infrastructures in the face of climate change, with activities that support community based-management practices and promote alternatives to counter the overexploitation of ecosystems (for example, community-based managed forests and fisheries, aquaculture, and IGAs for alternative livelihoods).

24. **In line with corporate mandates, the proposed project will contribute to the World Bank's COVID-19 Crisis Response[32] and to global and regional World Bank strategies on climate action and gender equality.** The project is in line with the key pillars of the World Bank's COVID-19 crisis response by focusing on protecting poor and vulnerable households, ensuring sustainable business growth and job creation, and strengthening institutions. The project's climate mitigation and adaptation activities will support two strategic directions of the Next Generation Africa Climate Business Plan:[33] environmental stability (with managed landscapes and seascapes that increase ecosystems' resilience and carbon sequestration and contribute to socioeconomic resilience) and clean energy (with activities that contribute to achieving

[30] MEDD (Ministry of Environment and Sustainable Development, *Ministère de l'environnement et du développement durable*). 2015. *Stratégie Nationale & Plan National d'Actions pour la Biodiversité.* Dakar: République du Sénégal

[31] World Bank; International Finance Corporation; Multilateral Investment Guarantee Agency. 2020. *Country Partnership Framework for the Republic of Senegal for the Period FY20–24 (Report No. 143333-SN)*. Washington, DC: World Bank.

[32] World Bank. 2020. *COVID-19 Crisis Response Approach Paper: Saving Lives, Scaling-up Impact and Getting Back on Track*.

[33] World Bank. 2020. *The Next Generation Africa Climate Business Plan: Ramping Up Development-Centered Climate Action*. Washington, DC: World Bank.

universal access to affordable, sustainable, reliable, and modern clean energy services, thereby strengthening community resilience and promoting economic diversification). The proposed climate activities are also in line with the World Bank's new Climate Change Action Plan 2021–2025 (Report No 160888)[34] by integrating nature-based solutions, strengthening blue economy aspects, and avoiding deforestation by promoting landscape restoration and sustainable forest management. Furthermore, the project is consistent with the World Bank's Gender Strategy FY16–23(Report No 102114)[35] by supporting its objectives to remove constraints for more and better jobs and enhance women's voice and agency. Specifically, it will support improving the integration of women in fish trade and processing and NTFP processing (with targeted equipment and training), as well as increasing female representation in natural resources' community-based management organizations (for fisheries and forests).

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

25. The objective of the project is to improve the management of fish and forest resources and access to related economic opportunities in target areas.

PDO Level Indicators

26. The PDO level indicators are the following:

(a) Forest area brought under management plans (ha)

(b) Targeted artisanal fishing areas brought under territorial use right regimes for fishing monitored by geolocation system (number)

(c) Income generating activity program implemented in targeted forest areas (Percentage) and Female-led enterprises certified in forest product schemes (Number)

(d) Share of fisheries products landed and transformed according to improved practices at project-supported sites (percentage) (gender disaggregated)

(e) Aquaculture production (tons/year).

27. Specific climate-related, gender, and citizen engagement indicators have been integrated in the Results Framework.

B. Project Components

28. The project has four components. An overview is provided in the following paragraphs with a summary of costs in Table 1Table 1. A more detailed project description and breakdown of funding is presented in annex 2. A more elaborate explanation of climate links can be found in annex 4.

29. **Component 1: Institutional framework for managing environmental and social risks and strategic intersectoral collaboration (US$17 million equivalent).** This component aims to strengthen institutional

[34] World Bank. 2021. *Climate Change Action Plan 2021–2025 - Supporting Green, Resilient, and Inclusive Development*.
[35] World Bank. 2015. *World Bank Group Gender Strategy (FY16–23): Gender Equality, Poverty Reduction, and Inclusive Growth*.

capacities for managing the E&S impacts of projects and programs and intersectoral coordination for managing natural resources.

30. **Subcomponent 1.1: Strengthening the E&S risk management framework (US$13 million).** Senegal has developed a national E&S management system and 20 years after the adoption of the Environmental Code in 2001,[36] Senegal is committed to modernizing the existing systems, institutions, and tools. This subcomponent will support: (a) strengthening management of E&S risks, including dissemination of a new Environment Code; preparation of related regulations and guidelines including on climate change risks and mitigation measures; development of an E&S management training program for key ministries, staff of the Project Implementation Units (PIUs), and young professionals; and development of a digital monitoring system for Environmental and Social Impact Assessments (ESIAs) and Environmental and Social Management Plans (ESMPs) and (b) enhancement of environmental monitoring systems, including the management of environmental emergencies in the regions (technical assistance, training, equipment, and information systems) and the expansion of the air quality monitoring system. A revamped CGUE will facilitate the monitoring of, and response to, climate-related emergencies (such as floods and forest fires), which are expected to become more prevalent as climate change intensifies. This is well aligned with the disaster risk management objective of Senegal's climate adaptation efforts as outlined in its NDC. Improving the forecasting capacity of the Air Quality Management Center (*Centre de gestion de la qualité de l'air,* CGQA) and its communication and alert system will also contribute to climate adaptation as air quality could deteriorate in future with more prevalent dust storms.[37]

31. **Subcomponent 1.2: Streamlining the management of natural marine, coastal, and forest resources (US$2 million).** This subcomponent promotes an integrated approach to manage forest and fishery resources to improve their climate resilience, sustainability, and productivity:

    (a) **Ensuring consistent management of artisanal fisheries and marine and coastal natural resources to support sustainable regeneration of fish stocks by enhancing ecosystem services.** This landscape management approach for fisheries will strengthen the resilience of coastal communities by stabilizing local conditions so that the impact of climate change on fish abundance can be mitigated. Activities will include strategic analyses and development of tools as climate-smart marine spatial planning, harmonization of management rules for artisanal fisheries in marine protected areas and restricted artisanal fisheries areas, and improvement of the coordination of marine surveillance of fisheries and protected areas.

    (b) **Enhancing the sustainability of smoked seafood product chains,** both in terms of sustainable supply (of marine resources and fuel) and sustainable practices and technologies (ensuring a reduction of fuelwood consumption from mangroves and forests and therefore a reduction in GHG emissions from deforestation).

32. **Subcomponent 1.3: Strengthening citizen engagement in relation to environment, climate, fisheries, aquaculture and forestry (US$2 million).** This subcomponent is meant to increase citizen engagement in favor of environmental protection, sustainable management of marine and forest resources, and climate

[36] Act no 20001-01 of January 15, 2001, on the Environmental Code/Decree 2001-282 of April 12, 2001, on Code implementation

[37] Including the occurrence of more extreme wind events and a shift to drier climates and increasing wind erosion and sand and dust storms: Simulations suggest that global annual dust emissions have increased by 25 to 50 percent over the last century due to a combination of land use and climate changes:
https://uneplive.unep.org/redesign/media/docs/assessments/global_assessment_of_sand_and_dust_storms.pdf.
https://documents1.worldbank.org/curated/en/483941576489819272/pdf/SAND-AND-DUST-STORMS-IN-THE-MIDDLE-EAST-AND-NORTH-AFRICA-MENA-REGION-SOURCES-COSTS-AND-SOLUTIONS.pdf.

action. It will do so through awareness-raising and education activities on the value of these resources and the services they provide for climate regulations and environmental protection. The activities financed by the project include the development and implementation of communication strategies and a project action plan for the MEDD and MPEM.

33. **Component 2: Resilience and productivity of the fisheries and aquaculture sectors (US$45 million equivalent).** This component will support Senegal's efforts to reform the fisheries and aquaculture sectors to make them more productive and resilient to climate change. In line with Senegal's Fisheries Adaptation Action Plan, activities will provide important climate adaptation co-benefits (list provided in annex 4), such as strengthened fisheries management, which will help fish stock recover and become healthier and thus more resilient to the ongoing impacts of climate change; climate-smart co-management plans and income diversification activities implemented for vulnerable fishing communities; improved safety at sea and climate-resilient coastal infrastructure built to cope with more prevalent storms and coastal erosion; and aquaculture sector supported, acting as a buffer to mitigate the volatility that climate change could impose on marine fisheries.

34. **Subcomponent 2.1: Strengthening fisheries management and community-based fisheries management initiatives (US$17.6 million).** This subcomponent will build on the fisheries reforms achieved under the WARFP (starting with co-management). It will strengthen the functional links between the different pillars of fisheries management and scale up community-based fisheries management initiatives through the following activities:

    (a) **Implementation of selected fisheries management plans, vessel registration systems, and allocation of fishing permit and licenses** through legal and technical assistance for (i) the development of territorial user rights for fisheries and a fishing rights allocation process together with their application to targeted fisheries;[38] (ii) scientific monitoring from the CRODT; (iii) capacity building at the MPEM to monitor management plans (institutional diagnosis, training, technical, and information technology [IT] equipment); (iv) modernization of the canoe registration and key professions and personal identification systems (IT equipment and software, registration virtualization, and campaigns); (v) dematerialization of the industrial fishing license allocation system (development of procedures and transparent license application, issuance, and monitoring system); and (vi) carrying out of specific studies on strategies, economic, and sustainability to strengthen fisheries management.[39]

    (b) **Enhancing maritime monitoring, control, and surveillance and improving information systems for transparency.** The project will (i) improve the intervention capacities of the MPEM in combating IUU fishing (provision of technical equipment, patrol boats and other operational support, and training program); (ii) promote the use of new technologies such as an electronic logbook for industrial fishing declarations and geolocation of artisanal fisheries for monitoring and safety at sea (through technical assistance for data processing, capacity building, equipment, and software); (iii) facilitate construction and equipment of surveillance and control infrastructure to complement the existing network, including coastal surveillance stations, units, and checkpoints in key areas for monitoring and control (see pre-identified sites in annex 2); and (iv) support the development and rollout of the MPEM's

[38] For volute (Cymbium), white shrimp (Penaeus notialis), and octopus.

[39] That is, assessment and update of the sectoral policy declaration and related investment framework and fisheries and aquaculture satellite accounts; contribution of the fishing sector to the economy, taxation, and subsidies; profitability of artisanal and industrial fishing units, and supply and demand for fishery products; impact of deep-sea trawling practices; impact of climate change and update of the fisheries adaptation plan; mainstreaming of a gender perspective; and integration of international seafarer labor standards in the national regulations.

information and M&E system (through technical assistance and IT equipment to support data collection and processing, community-based monitoring operations, and training program) and its use to support international fisheries transparency processes.[40]

(c) **Strengthening and scaling up community-based fisheries management initiatives** that were initiated in 2005.[41] The proposed project will help strengthen and expand community-based management initiatives through (i) climate-informed management planning and regulation for existing and new community-led management initiatives and zones; (ii) support to communities in co-management initiatives (for example, technical assistance for awareness raising, capacity building, including on climate change considerations, and operations of community-led fisheries management committees); (iii) support for income diversification (for example, strengthening the resilience of vulnerable fishing communities by diversifying their source of income away from a source under threat)[42] with specialized NGOs' support; and (iv) construction of infrastructure in support of fisheries community-based management initiatives (that is, construction and equipment of 'fishermen's houses', which serve as a headquarters for the network of local councils for artisanal marine fishing [*Conseils locaux de pêche artisanale maritime,* CLPA] and immersion of new artificial reefs). Pre-identified sites are presented in annex 2.

35. **Subcomponent 2.2: Strengthening the value chains of selected fisheries (US$17.4 million).** This subcomponent will contribute to improving the environmental, economic, and social sustainability of selected fishery product value chains, through (a) climate-informed construction and/or upgrading of landing, preservation, and processing infrastructure for fish products in support of community-led management initiatives in targeted areas (that is, fishing docks processing units, and centers for experimentation and promotion of fish products) with climate-smart options (that is, shift to renewable energy sources and enhance resilience to coastal erosion and storm surges); (b) technical assistance to improve the technical and commercial aspects of the related value chains through capacity building of the beneficiaries from activities listed under Subcomponent 2.2.a[43] and support for marketing, labeling, and certification of initiatives that promote specific local products (that is, technical assistance to develop guidelines for fish production and processing, support compliance system, marketing of labels,[44] and Marine Stewardship Council [MSC] accreditation process);[45] and (c) monitoring/inspecting and controlling operations to improve the sanitary quality of targeted fishery product value chains by setting health standards and control rules (that is, technical assistance to develop health control plans, inspection protocols, quality guidelines for processing units and landing sites and an associated regulatory framework, and related awareness-raising activities) and operationalizing of the monitoring and control activities of the Fisheries Processing Industries Directorate (*Direction des industries de transformation de*

[40] As the Fisheries Transparency Initiative (FiTI), International Commission for the Conservation of Atlantic Tunas (ICCAT), or Organisation for Economic Co-operation and Development.
[41] Community-based fisheries management was piloted in Bétenty, Foundiougne, Ngaparou, and Ouakam in 2005 and the first Regulated Area of Operation (*Zone à exploitation règlementée*, ZER) and Prohibited Fishing Area (*Zone interdite de pêche*, ZIP) were created in Ouakam in 2008 and extended to the Petite-Côte sites: Mballing, Mbodiène, Nianing, and Pointe Sarène.
[42] Beekeeping, soapmaking, plastic recycling, firewood nurseries, aquaculture/mariculture, and so on.
[43] Economic interest groups (*Groupes d'intérêt économique interprofessionnels*, GIEs) to manage wharves and small-scale processing centers, women associations responsible for the modernized smoking units, and managers of the centers for experimentation and promotion of fish products.
[44] Pre-identified local products labeling initiatives include (a) casamance shrimps; (b) seafood from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) world heritage site of the Saloum Delta; or (c) mollusks from the Petite-Côte, selected because of the support for these fisheries within the project and promising value chains.
[45] MSC pre-assessments have been completed in February 2021 on sole, line tuna, and flat sardinella.

la pêche, DITP) (that is, provision of equipment and vehicles for inspection and certification processes, capacity building, and support accreditation to inspection bodies standard ISO[46] 17020). Pre-identified sites are presented in annex 2.

36. **Subcomponent 2.3: Supporting the development of aquaculture (US$10 million).** This subcomponent, to be implemented with the ANA, aims to strengthen the aquaculture sector by (a) creating an enabling environment for sector attractiveness (that is, technical assistance for aquaculture regulation support,[47] sector's growth potential, and spatial planning for sector's development); (b) building climate-informed technical capacities of stakeholders with support of a research program (in food sustainability, genetic improvements, aquaculture zootechnics, or disease management), capacity building of ANA teams (that is, provision of technical and IT equipment and vehicles and monitoring operations), and capacity building of the sector's stakeholders (that is, technical assistance, training program for the producers, and support for structuring national and regional associations of producers); and (c) developing aquaculture hubs through the construction or rehabilitation of key infrastructure, including hatcheries/nursery stations and farm schools/training centers. A series of aquaculture sites has been pre-identified and the technical and socioeconomic feasibility studies should confirm the investments that will be carried out under the proposed project. The feasibility studies will incorporate climate considerations and trends, so that the hubs are appropriately placed to mitigate climate risks. Pre-identified sites are presented in annex 2.

37. **Component 3: Sustainable management of forests and ecosystems (US$32 million equivalent).** This component will support integrated forest management to slow down forest degradation in the strategic regions of Kédougou, Kolda, Sédhiou, and Tambacounda. Good forest management practices are critical for landscapes to be climate resilient, which in turn will provide resilience to communities and their livelihoods. As forests are a carbon sink, this component will also lead to GHG mitigation.

38. **Subcomponent 3.1: Strengthening the institutional framework for forest management and monitoring (US$6.4 million).** This subcomponent will support regional and national activities toward improved integration and coordination through (a) coordinating interventions in the forestry sector by the Water and Forests, Hunting, and Soil Conservation Directorate (*Direction des eaux et forêts, chasses et de la conservation des sols,* DEFCCS) central management unit (that is, Forestry Code regulation support,[48] technical capacity building,[49] and operational capacity building including provision of IT equipment and field vehicles, training on use of new technology, and contribution to costs of field supervision by head office); (b) improving forest knowledge and monitoring (that is, technical assistance, training, and fieldwork to support a national forest monitoring system[50] and a forest product traceability system); and (c) facilitating cooperation on illegal timber trade by building on the high-level dialogue initiated between Senegal and The Gambia (that is, regional study on illegal timber trade to identify measures to stop illegal cross-border timber trafficking and provide support to regional coordination meetings with relevant regional and international stakeholders).

[46] ISO = International Organization for Standardization.
[47] The Aquaculture Code was adopted by the Council of Ministers on October 20, 2021.
[48] Support the implementation of the Forestry Code (that is, implementation decrees, translation into local languages, and awareness raising).
[49] Regulations of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), support systems for forest monitoring including the Mapping, Resource Assessment, and Information System Unit.
[50] The last national forest inventory was carried out in 2004.

39. **Subcomponent 3.2: Strengthening community-based forest management, domestic energy sources, and sustainable use of fuelwood (US$11.2 million).** This subcomponent will support the following activities:

    (a) **Community-based forest management** (as the rate of forest loss in these forests is significantly lower than in non-managed areas)[51] for fuelwood production (that is, capacity building for local fuelwood producers, definition of forest management rules, logging rights for a fair access to the resource,[52] and development of standards for sustainable forest management), forest conservation in classified forests and community nature reserves (technical assistance for simplified management planning and governance bodies), and income diversification with the support of national NGOs to develop agroforestry and ecological activities targeting women's and youth groups to reduce the pressure on forest resources.

    (b) **Energy efficiency and diversification of domestic energy sources** to reduce fuelwood consumption with diffusion of improved cookstove, expected to result in a 30 percent reduction in fuelwood consumption compared to traditional cooking in Senegal[53] (that is, technical assistance and direct support to the value chain) and supporting selected NGOs for the development of promising alternatives such as bio coal from Typha and charcoal dust or the use of bio digesters and biogas. Pre-identified sites are presented in annex 2.

40. **Subcomponent 3.3: Strengthening and valorization of natural forest capital (US$14.4 million).** In addition to promoting community-based forest management, the enhancement of natural forest capital requires public authorities to protect natural forests, including protected areas and classified forests, and eliminate or reduce illegal logging, export of timber, and forest fires. This subcomponent will therefore support (a) strengthening of decentralized forest management and the fight against illegal timber trade and forest fires (that is, technical support, use of new technologies and digital systems,[54] minor infrastructure and forest protection works, provision of IT and technical equipment, and provision of bushfire fighting vehicles) and (b) management and valorization of the Niokolo-Koba National Park (that is, providing technical assistance to update the management plan and capacity building for field rangers and National Parks Directorate [*Direction des parcs nationaux*, DPN], constructing minor infrastructure, providing technical/IT equipment and field vehicles, developing a destination vision and Investment plan, and contributing to missions and operations).

41. **Component 4: Project management (US$6 million equivalent).** This component will support the operating costs of the two PIUs, at the MEDD (Subcomponent 4.1) and at the MPEM (Subcomponent 4.2), which are responsible for overall project management and oversight, and related bodies (for example,

[51] Annual rates of deforestation in PROGEDE I areas before community-based management (2001–08): –0.35 percent and after community-based management (2009–20): –0.07 percent; PROGEDE II areas before community-based management (2001–14): –0.22 percent and after community-based management (2015–20): –0.06 percent; new areas pre-identified for development of community-based forest management (2001–20): –0.23 percent; classified forests (2001–20): –0.09 percent; and Niokolo-Koba National Park (2001–20): –0.11 percent; Analysis using global forest change data: Hansen et al. (2013).

[52] Depending on the status of the area in which a community-based managed forest is developed, the practical procedures for recognizing rights for access to the resource are different: (a) in the classified forest estate (*Domaine forestier classé*), including in classified forests, the signature of 'concession agreements' between the authority and the communities to delegate the management of forest is required and (b) in forest areas outside the classified forest estate (protected forest estate, *Domaine forestier protégé*), the recognition is done by deliberation of the local authorities and recorded in the cadaster.

[53] Bensch, G., and J. Peters. 2015. "The Intensive Margin of Technology Adoption - Experimental Evidence on Improved Cooking Stoves in Rural Senegal." *Journal of Health Economics* 42: 44–63. ISSN 0167-6296. https://doi.org/10.1016/j.jhealeco.2015.03.006.

[54] The SMART-Spatial Monitoring and Reporting Tool is used by officers of the DPN and can be extended to the entire water and forestry teams in the targeted regions. https://smartconservationtools.org/.

National Steering Committee and Technical Committees [TCs]). Support will be provided for implementation planning, coordination and support, technical expertise, fiduciary management, compliance under the Environmental and Social Framework (ESF) including operationalization of the grievance redress mechanism (GRM), monitoring, evaluation, and project reporting.

Table 1. Project Component Funding in Total and Associated Breakdown per Ministry

Project Components	IDA Financing (US$, millions)		
	TOTAL	Share MPEM	Share MEDD
Total Project	**100.0**	**50.0**	**50.0**
Component 1: Institutional framework for managing environmental and social risks and intersectoral collaboration	**17.0**	**2.0**	**15.0**
1.1 Strengthening the E&S risk management framework	**13.0**	**0.0**	**13.0**
a. E&S framework for project compliance and monitoring	*2.2*	*0.0*	*2.2*
b. Environmental monitoring systems (CGUE and CGQA)	*10.8*	*0.0*	*10.8*
1.2 Streamlining the management of marine, coastal and forest resources	**2.0**	**1.0**	**1.0**
a. Zoning and management models for marine and coastal natural resources management and community-based fisheries initiatives	*1.0*	*0.0*	*1.0*
b. Resilience and sustainability of smoked seafood value chains	*1.0*	*1.0*	*0.0*
1.3 Citizen engagement for the environment, climate, forests, and fisheries.	**2.0**	**1.0**	**1.0**
Component 2: Resilience and productivity of the fisheries and aquaculture sectors	**45.0**	**45.0**	**0.0**
2.1 Fisheries management and community-based fisheries management initiatives	**17.6**	**17.6**	**0.0**
a. Fisheries management plans, licensing, permits and fishing rights	*3.9*	*3.9*	*0.0*
b. Monitoring, control, surveillance, safety and information systems for transparency	*6.6*	*6.6*	*0.0*
c. Community-based fisheries management initiatives	*7.1*	*7.1*	*0.0*
2.2 Strengthening the value chains of selected fisheries	**17.4**	**17.4**	**0.0**
a. Climate-informed infrastructures for artisanal fisheries	*14.9*	*14.9*	*0.0*
b. Technical assistance to strengthen value chains	*1.3*	*1.3*	*0.0*
c. Monitoring and control for sanitary quality	*1.2*	*1.2*	*0.0*
2.3 Aquaculture development	**10.0**	**10.0**	**0.0**
a. Enabling framework for aquaculture attractiveness	*0.5*	*0.5*	*0.0*
b. Stakeholders' capacity building	*3.0*	*2.4*	*0.0*
c. Key infrastructures for aquaculture development and training	*6.5*	*7.1*	*0.0*
Component 3: Sustainable management of forests and ecosystems	**32.0**	**0.0**	**32.0**
3.1 Institutional and legal framework for forest management and monitoring	**6.4**	**0.0**	**6.4**
a. Capacity building for forest management	*0.7*	*0.0*	*0.7*
b. Forests knowledge and monitoring	*5.5*	*0.0*	*5.5*
c. Regional cooperation on illegal timber trade	*0.2*	*0.0*	*0.2*
3.2 Community-based forest management and sustainable domestic energy	**11.2**	**0.0**	**11.2**
a. Community-based forest management	*8.0*	*0.0*	*8.0*
b. Domestic energy efficiency and diversification of energy resources	*3.2*	*0.0*	*3.2*
3.3 Strengthening and valorization of natural forest capital	**14.4**	**0.0**	**14.4**
a. Decentralized forest management and fight against illegal timber trade and forest fire	*9.4*	*0.0*	*9.4*
b. Management and valorization of protected areas	*5.0*	*0.0*	*5.0*
Component 4: Project management	**6.0**	**3.0**	**3.0**

C. Project Beneficiaries

42. **Project beneficiaries include fisheries and aquaculture value chain stakeholders together with communities living near, and relying on, forested areas.** In addition, relevant officials at the central and decentralized levels, notably from the MEDD, MPEM, and the Ministry of Finance and Budget, will benefit from institutional, technical, and operational project support. Main, nongovernment beneficiaries include the following:

(a) **With regard to fisheries and aquaculture activities,** beneficiaries will include all those active in fishing, fish farming, sale, and transformation of seafood and the groups/organizations they have formed, including local fishermen's committees (CLPs), CLPAs, and interprofessional GIEs. At the project sites, they are estimated to represent close to 52,000 individuals, of which 80 percent are engaged in co-management. The project will provide them with new or upgraded landing and transformation infrastructure and numerous capacity-building/skill enhancement opportunities on safe and sustainable aquaculture, fishing, and seafood transformation practices as well as labeling, marketing, and financial management (FM). More than 5,000 jobs are planned to be created around new aquaculture opportunities. Beneficiaries will also benefit from technical assistance to develop and implement co-management plans and will receive financial and technical assistance to engage in alternative IGAs. Finally, the project will pilot the use of new technologies for monitoring and surveillance and enhanced security at sea as well as, more generally, seek to strengthen the management and governance of fisheries for the benefit of all. Improving fisheries management to maintain fish stocks and increasing aquaculture production will also have an impact on the availability of animal protein in the domestic market and therefore improve food security and nutrition quality for inland populations.

(b) **With regard to forests and ecosystems activities,** beneficiaries will include (i) local populations living near, and relying on forest (and the groups/organizations they have formed, such as the village or intervillage management committees); (ii) enterprises/businesses targeting the sale and transformation of timber, charcoal, and other NTFPs and the production/sale of efficient cookstoves and alternative domestic energy sources (for example, biodigesters); and (iii) to a lesser extent, enterprises/businesses engaged in the ecotourism value chain. Communities at project sites account for 650,000 people. More than 2,000 jobs at the new sites for fuelwood production are expected to be created and, more generally, involvement of enterprises and businesses during the project (for example, NTFP and tourism) will be monitored. Communities will be engaged in numerous capacity-building/skill enhancement opportunities on managing forest resources sustainably and productively and will also receive financial and technical assistance to engage in alternative IGAs. Better managed forest landscapes will offer new or better opportunities for those collecting, transforming, and selling NTFPs, and project activities that support efficient cookstoves and alternative domestic energy sources will benefit companies active in this domain.

43. **Particular attention will be given to gender gaps in terms of improving representation and creating more and better jobs.** The role of women will be strengthened within local organizations in charge of implementing community-led fisheries or forestry management as the project will ensure that important positions of responsibility are entrusted to women. The project will also support artisanal processing activities (for example, NTFPs and oyster farming and smoking) where women are the majority. The project will finance infrastructure construction or rehabilitation and the acquisition of new, modern equipment for more efficient and safer working conditions (for example, lower exposure to smoke and particulate matter). It will also provide training opportunities to enhance technical, sales and marketing,

and management and entrepreneurial awareness and skills. Together, these interventions are expected to improve business prospects and opportunities, offer better job conditions, and support the creation of new jobs. Finally, gender- and vulnerable people-related issues will be considered in some activities with a social dimension, especially alternative livelihood activities, for instance, by (a) ensuring equitable access of women and men to planning and decision-making committees and processes; (b) ensuring equal access of women and men (or groupings thereof) to all economic activities supported by the project; and (c) paying attention to the different needs, availabilities, capacities, and receptivity of men and women in organizing awareness-raising and capacity-building activities. The same will be true for infrastructure to be built or renovated, where the differentiated needs of men and women will be considered, such as in fishermen's houses where separate toilets for men and women, a multipurpose room for women's activities, a day care center, and so on will be provided. Table 2 summarizes gender gaps, project activities, and proposed indicators to be used to track how the project addresses these gaps.

Table 2. Gender Gap Analysis

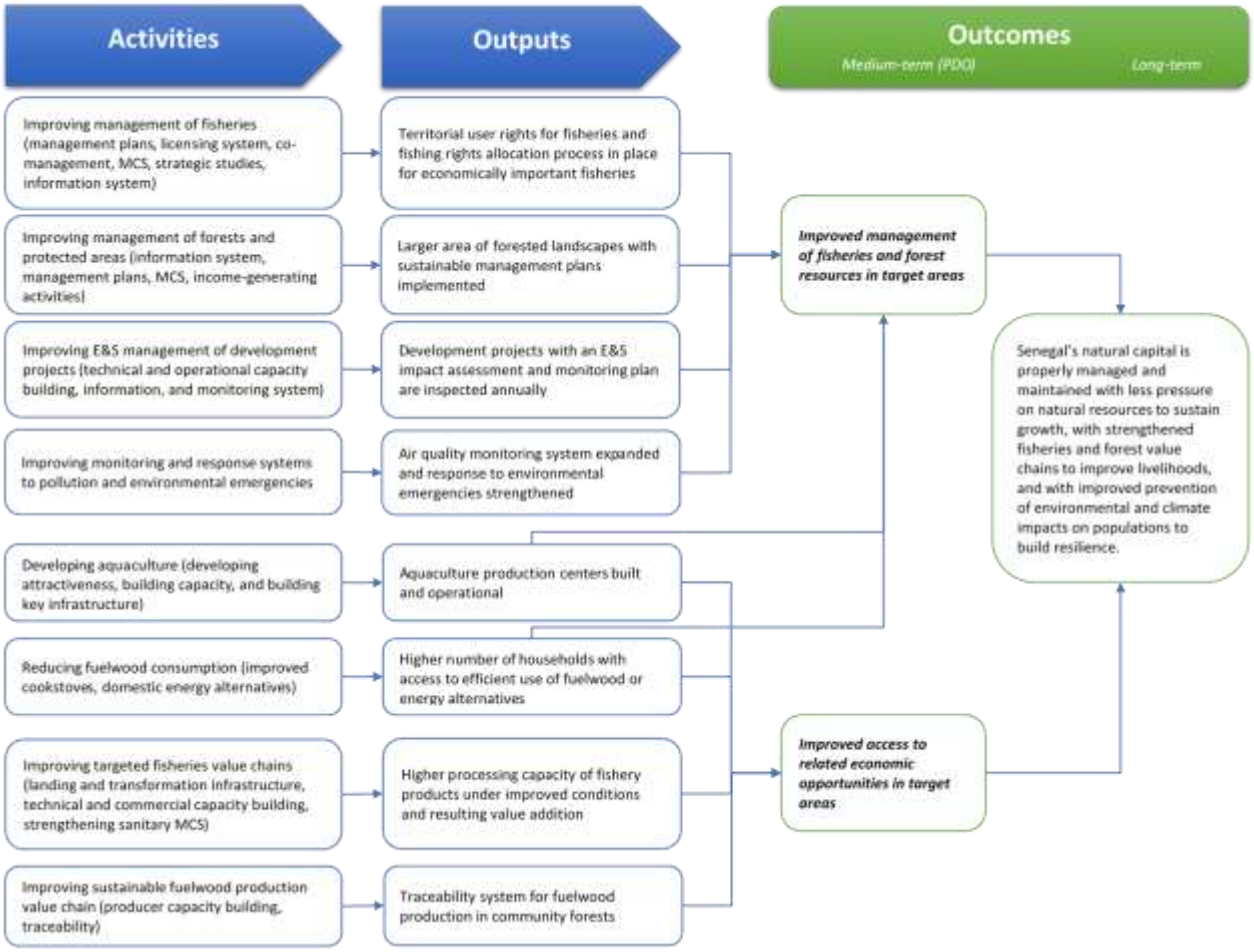
Gender Gap	Actions	Indicators
Women are poorly represented and insufficiently involved in community-based fisheries or forest resources management efforts.	For new communities, support the establishment of new management committees with requirements for women's participation. Develop and offer training programs in leadership, networking, and communication, so that women can progressively occupy leadership positions.	2 intermediate results indicators on Marine (IR2d) and Forest (IR3b) areas under active co-management that include women in leadership positions
Post-harvest losses due to the lack of appropriate processing technology, preservation equipment and storage facilities, appropriate facilities, and so on lead to revenue losses, harming particularly women who account for the majority of processors.	Build, restructure, and modernize artisanal processing sites and equip them for the activities of women processors. Develop and implement appropriate training programs in technical, sales, and marketing skills as well as management and entrepreneurial skills.	Share of processed fisheries products transformed by women according to improved practices at project-supported site (sub-indicator for PDO4)
Low jobs opportunities in the aquaculture and community-based managed forest for fuelwood production	Improve job opportunities by supporting the development of aqua-poles and new community-based forest management. Develop and offer training programs to facilitate women's access to targeted jobs	2 intermediate results indicators on share of women in (a) jobs created in the aquaculture sector (IR2e) and (b) jobs created in new community-based managed forest for fuelwood production (IR3c)
Low number of female entrepreneurs in the NTFP and nature-based tourism (particularly, in higher value chains) due to inadequate business development skills and market links Low selling price of NTFP and reduced access to specific markets allowing an increase in the value of the products sold	Support female producers/entrepreneurs (for example, honey producers) to increase productivity through activities to increase economic outcomes in forest landscapes and including ecotourism and commercialization of NFTPs (for example, honey and mushrooms).	Female-led enterprises certified in forest product schemes (sub-indicator for PDO3)

Gender Gap	Actions	Indicators
Weakness of statistics and information on women in the fishing sector	Commission a census and/or study on women active in fishing (artisanal and industrial processing, fish trade, and so on).	Not tracked in the Results Framework

D. Results Chain

44. **The vision of the project is to address the continuous erosion of Senegal's natural capital to sustain growth, improve livelihoods, and build resilience.** The declining natural capital and dwindling of related ecosystem services will act as a head wind for growth in Senegal's resource-dependent economy, and economic growth cannot be sustained unless natural capital is properly managed. The project thus seeks to address governance and management issues in the fisheries and forestry sectors toward restoring and expanding the country's blue and green capital as the basis for enhanced sustainability, productivity, and resilience (Figure 1). It will support the Government's reform and modernization efforts in these sectors, through (a) scaling up community-based approaches to manage fisheries and forest resources, to reverse degradation, boost ecosystem productivity, and improve livelihood and economic productivity, and (b) upgrading information and monitoring systems for more granular and frequent monitoring and control of the status of fisheries and forest resources and their exploitation and increased transparency on information sharing with the greater public. In parallel, the project aims at strengthening the capacity to improve the management of the E&S impacts from development projects and enhancing the sustainability of their development outcomes. The project will leverage information and communication technologies for monitoring implementation and enforcement of environmental assessments and modernize and expand the air quality monitoring network for timely alerts and population protection. The project also seeks to foster dialogue, consensus, and coordination for environmental action across sectors and institutions on common and shared environment and sustainability issues. Finally, the project aims to improve access to economic opportunities associated with better managed and more productive natural resources. It will provide investment financing and technical assistance for modern, cost-effective, safe, and compliant technologies and practices to support increase in production; access to markets and better sale prospects, better prices, and value addition; and job creation. These economic opportunities, in turn, are expected to contribute to reducing pressure on natural assets through increased awareness and ownership (that is, communities measure the value of the resources and their benefits), intensification (that is, better technologies and practices necessitate less intrants), and alternative deployment (for example, improved cookstoves).

Figure 1. Project Results Chain



E. Rationale for World Bank Involvement and Role of Partners

45. **The World Bank has significant expertise in developing and implementing interventions that target barriers to sound management of public goods such as marine and forest resources.** Barriers commonly include low awareness and capacity, weak institutional frameworks and misaligned incentives, funding gaps, and perceived risks associated with, for instance, deploying new green and blue technologies and practices. The project draws on the World Bank's experience in Senegal from past and ongoing operations, particularly with respect to implementation arrangements and community mobilization for productivity, livelihoods, and resilience based on healthy natural resources. In particular, the project builds on lessons from the WARFP and PROGEDE I and II, both of which have pioneered community-based approaches in sustainable natural resources value chains, and is thus well positioned to promote these approaches systematically.

46. **The proposed project was prepared in collaboration with a wide range of stakeholders, including development partners and nongovernmental organizations (NGOs), and complements and/or scales up ongoing and planned programs financed by them.** With regard to E&S management, the project

complements initiatives financed by the MAVA foundation[55] and the Netherlands Commission for Environmental Assessment.[56] With regard to fisheries and aquaculture, the project is aligned with programs financed by the FAO;[57] USAID;[58] Japan International Cooperation Agency;[59] Netherlands;[60] Belgium;[61] and Regional Partnership for Coastal and Marine Conservation in West Africa;[62] and the European Union through the fisheries agreement. The project also complements activities targeting forest and biodiversity management, which are financed by the French Development Agency,[63] the Global Environment Facility, and the United Nations Development Programme.[64] For effective collaboration, exchange of ideas, and information sharing, the World Bank team will continue liaising with development and other partners during project implementation.

F. Lessons Learned and Reflected in the Project Design

47. **The proposed project design incorporates lessons learned from sector and thematic studies, ongoing and completed World Bank projects, as well as international good practices.** Key lessons reflected in the project design relate to (a) building consensus and facilitating the implementation of reforms or adoption of new practices and technologies and (b) building successful community engagement to deliver livelihood and sustainability benefits on the ground.

48. **Build consensus for reforms, technical innovation, and behavior change.** There might be resistance to change in fisheries or forestry management due to deep traditional and societal roots or vested interests. The project will therefore pursue strategies that aim to gain broader support, favor change and innovation, and increase the likelihood of success based on the following lessons and experience:

    (a) **Support realistic steps toward incremental results.** Project activities are aligned with sectoral strategies and long-term reforms (for example, NDC and support to communities as part of the national decentralization process). They are either the replication and scaling-up of well-proven approaches (that is, demonstrated through WARFP and PROGEDE) or pilot innovations at a meaningful but realistic scale (that is, one community in one protected fishing zone [*Zone de pêche protégée,* ZPP]).

    (b) **Allocate adequate resources for capacity building to support policy reform, technical innovation, and behavior change.** The project has budgeted resources to support the MPEM and MEDD and related institutions as well as implementation partners, at central and decentralized levels, to strengthen technical and operational capacity in all major departments relevant to the project.

[55] Project to reduce impact of coastal infrastructures on ecosystems aiming to strengthen DEEC to manage E&S impacts
[56] Providing capacity building and independent advice on the scope and quality of E&S Impact Assessments and Strategic Environmental Assessments.
[57] Program for the Sustainable Development of Fisheries and Aquaculture Value Chains in African, Caribbean, and Pacific Countries 2020–24 supporting oyster production and valorization.
[58] The 'Dekkal Geej' Project (2019–24), supporting co-management initiatives for aquaculture investment framework.
[59] The Sub-Regional Capacity Building Project for Fisheries Co-management 2019–23 and Technical Advisor assignment to the MPEM.
[60] Preparation of the Casamance fishery value chain support project for the modernization of selected artisanal fishing infrastructure
[61] Project to set up an aquaculture site at Mbellacadiao as part of the Fatick's Agropole.
[62] Project to reinforce the fight against IUU fishing funded by Ocean5 and the project for transparency in small pelagic fisheries.
[63] Project to support marine protected areas policy and TyCCAO Project (Typha Combustible & Construction en Afrique de l'Ouest) to use Typha as domestic energy source and as construction material.
[64] Project to strengthen the management of land and ecosystems in Niayes and Casamance, project to promote innovative finance and community adaptation in municipalities around community nature reserves, and the project for enhanced carbon sequestration through green habitat technologies.

Capacity diagnostics have been completed to define an appropriate technical and operational capacity strengthening program.

(c) **Highlight benefits and engage with stakeholders.** The project will communicate on environmental degradation and mounting risks and on Government strategies in response to these challenges and how the project addresses them while emphasizing benefits on the ground and sharing evidence of the positive impact from project activities. The project will also support radio stations discussing management issues relating to fisheries, forestry, and climate change, as well as develop and implement a training program for journalists as part of the implementation of the two ministries' and the project's communication plans.

(d) **Increase knowledge and information for decision-making, accountability, and transparency.** The project will fund strategic studies to inform future reforms and strengthen monitoring and evaluation (M&E) systems to provide information for policy formulation and adjustments. The project will also work with the Government, to improve transparency of information, and with journalists and civil society, to maintain strong stakeholder engagement.

49. **Build community engagement for livelihood and sustainability results.** PROGEDE and WARFP have demonstrated that community-based approaches can successfully contribute to improving sustainability, productivity, and resilience,[65] and they have also generated valuable insights on community mobilization:

(a) **Manage expectations and generate quick tangible benefits.** Reversing natural resources degradation trends takes time, making it important to invest in pedagogy and education on the rationale for community interventions and their expected results. It is equally important to accompany the implementation of local fisheries management plans with promotion of, and support for, alternative livelihoods for fishers, fishmongers, and fish processors with an aim to generate economic development within the community and benefits in the future. Education can also address concerns by community members that may be negatively affected by community measures. Other quick community gains include infrastructure investments such as landing, processing, and meeting facilities.

(b) **Engage early and empower community stakeholders.** Scoping is under way to identify where communities need support and also start awareness raising of future project interventions. Substantial technical assistance is planned to support both fishing and forest user communities in developing and implementing management plans in a participatory and inclusive manner. The project will also support networks of community associations in their organization and strengthening.

(c) **Link communities and markets for success.** It is essential to establish these links in two ways. First, ensure that community-sponsored activities are linked to markets, to generate income and improve livelihoods. Fisheries and forest communities will thus, for instance, receive support in terms of IGAs, including marketing, sanitary and health processing, obtaining sale authorization,[66] and so on. Conversely, no enhancement in the post-harvest segment of the fishery value chain can take place in the absence of evidence of strong upstream management (nationwide or community-based). This

[65] Some key outcomes include increased fish size in all areas under community-based management under WARFP and increased sustainable fuelwood production (from 180,000 to 2,500,000 m^3), reduced deforestation (by 74,127 ha), increased carbon sequestration under PROGEDE II (3,220,826 tCO_2), and four-time income increase from forest resources by participating villages/local communities under PROGEDE II.

[66] Similar to the FRA authorization, which authorizes the fabrication and sale of human and animal food products in Senegal.

would help avoid the prospect of increased profits in post-harvest operations, which could motivate harvesters to catch more, in an unsustainable way.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

50. **The institutional and implementation arrangements for the project seek to ensure clear accountability and effective coordination among the two ministries.** The proposed institutional and implementation arrangements include (a) the establishment of a single steering committee; (b) the operationalization of two TCs, one for each ministry; and (c) the establishment of two PIUs. In addition, decentralized services of the MEDD and MPEM and experienced firms/NGOs will support implementation on the ground. The MEDD and MPEM confirmed their interest in preparing a joint project to address common issues (for example, smoked seafood value chains and management of coastal and marine zones and resources) and share experience on how to scale up community-based natural resource management initiatives. The Government has also requested to maintain technical and fiduciary management autonomy for each of the sectors to ensure flexibility in implementation.

51. **The establishment of a single Project Steering Committee (PSC) for overall strategic guidance, coordination, and oversight of the project.** The committee will meet on a semiannual basis to (a) review the project progress report and validate the Annual Work Plan and Budget (AWPB); (b) provide guidance on policy matters and major project realizations or deliverables; (c) facilitate coordination across agencies and implementation as needed; and (d) support outreach and resource mobilization. The PSC will be co-chaired by the Minister of the Environment and Sustainable Development and the Minister of Fisheries and Maritime Economy or their designee. The Secretariat will be jointly managed by the two project coordinators and will organize the PSC meetings and prepare the related documents to be discussed. The costs of organizing the meetings will be borne in turn by each PIU. The PSC must be established by interministerial decree within three months following project effectiveness and membership will include representatives from other key ministries and national agencies, professional organizations, representatives of associations, and NGOs. Between the meetings of the PSC, further interagency coordination will be supported by regular (that is, on a monthly basis) meetings of the project coordinators and Directors at the MEDD and MPEM.

52. **The establishment of two TCs, one for each ministry, to facilitate coordination among the various departments and institutions involved in the implementation of each of the sectoral technical components.** These two committees will meet every six months ahead of the meeting of the PSC to validate documents and agenda items to be discussed during said meeting, and more frequently as needed. The TCs will (a) provide technical guidance and oversight in implementing project activities within the purview of each ministry; (b) undertake coordination among the various departments and institutions involved in the implementation of those activities; (c) ensure coordination between project activities and other technical and financial partners initiatives; and (d) assess and recommend technical expertise required to implement project activities. The TCs will be chaired by the Secretary-General of the MPEM or the Director of Cabinet at the MEDD, or their designees, with their respective PIUs as Secretariats. They must be established within three months following project effectiveness and their membership will include all relevant directorates, institutions, and agencies for each ministry. Further intraagency coordination will be managed day-to-day and as relevant by the project director and coordinator.

53. **Two PIUs, one for each ministry, for overall project management, facilitation of work programs, fiduciary management, supervision of ESF compliance, monitoring, evaluation, and project reporting.** The MEDD PIU will be responsible for activities under Components/Subcomponents 1.1, 1.2.a, 1.3.a, 3, and 4.1 and the MPEM PIU for activities under Components/Subcomponents 1.2.b, 1.3.b, 2, and 4.2. Each PIU will be headed by a project coordinator supervised by the project director (the Director of Cabinet at the MEED and the Secretary-General at the MPEM), supported by a core team of specialists in technical topics and project management. The responsibilities for reporting are clearly assigned and include (a) activity report, compiled and submitted by the Secretariat, based on contributions by each PIU according to a well-defined outline; (b) ESF: each of the two PIUs, as stipulated in the Environmental and Social Commitment Plan (ESCP); and (c) FM (unaudited quarterly financial reports, annual audit reports, and AWPB): the MEDD fiduciary team in charge of consolidating the contributions of the two PIUs (see paragraph 611 and following). The financial and procurement functions of the MEDD PIU will be carried out by the existing fiduciary team of the West Africa Coastal Areas Resilience Investment Project (WACA)/Environmental Health and Pollution Management Program (EHPMP) PIU hosted by the DEEC, which will be strengthened with the recruitment of an additional accountant (senior accountant) and an additional procurement specialist to cope with the increased level of activity (including FM responsibility and coordination for the project as mentioned earlier). This arrangement will help strengthen project management capacity within the MEDD and retain experts with experience. Contracts and terms of reference (ToR) for fiduciary personnel working across several World-Bank financed projects will duly reflect these cross-support arrangements. The DEEC and the two PIUs (at the MEDD and MPEM) will sign a memorandum of understanding (MoU), no later than three months after project effectiveness, to support E&S monitoring through the mobilization of the CTNE and the Regional Committees for E&S monitoring in the project areas. Each PIU will be staffed according to the following modalities: (a) the secondment of civil servants by the ministry for project management and (b) the recruitment, on a competitive basis, of the PIU staff (the latter modality also being open to civil servants made available by their ministry) on terms acceptable to the Association.

54. **Decentralized services of the MEDD and MPEM and experienced firms/NGOs will support implementation on the ground.** Local representatives of the two ministries will assist with monitoring and surveillance of activities and also liaison with local authorities and headquarters. They will benefit from targeted capacity building and equipment to assist them in their mission. In addition, experienced firms/NGOs will be selected for capacity building and facilitation activities, especially in support of community-based management activities and IGAs.

55. **A detailed Project Implementation Manual (PIM) will be prepared no later than one month after project effectiveness and will condition the first disbursement.** The PIM will detail the roles and responsibilities at the national, subnational, and local levels and implementation arrangements for the project components, technical activities, E&S risk management, M&E, FM including coordination process, and procurement procedures.

B. Results Monitoring and Evaluation Arrangements

56. **M&E activities will be the direct responsibility of the MEDD and MPEM through their respective PIUs, with support from the implementing partners and consultants, as needed.** The Results Framework, which outlines indicators and their definition, data collection responsibility and frequency, and data source, will be the main tool for M&E, in conjunction with the M&E section of the PIM, which will provide more details (for example, on indicator definition, if required). The M&E specialist in each PIU will oversee

data and information collection and related quality control, with the help of implementing partners (directorates in the two ministries, beneficiary communities, and the facilitating NGOs supporting them). The Results Framework will be updated in the progress reports for biannual review by the PSC in conjunction with the World Bank's implementation support missions. The project will include ad-hoc external evaluations before the midterm review (MTR) and the Implementation Completion and Results Report (ICR) stages.

57. **The project will also support the overhaul of the M&E systems of the two ministries,** through support for the development and modernization of information systems (for example, geographic information system [GIS]-based systems), statistical databases (for example, natural capital satellite accounts), and related analytical products (for example, on value chains). These systems will both reinforce the rationality of decision-making based on accurate and up-to-date information and increase transparency on natural resource capital and its management.

C. Sustainability

58. **The proposed project will strengthen the institutions overseeing two key natural resources that are under pressure in Senegal and support the Government's reform efforts towards their more sustainable and productive management.** The project will provide participating ministries with tools, information, and capacity building to improve their knowledge base and strengthen their technical and operational capacity for better decision-making, timely monitoring, and stronger enforcement. Along Senegal's commitment to decentralization and empowerment of communities, this project's support goes beyond central and local administrations and affiliated bodies and entities to include the primary users of these natural resources, who will receive financial and technical support to be empowered in their management and introduce more sustainable practices and technologies. The project will also seek to broaden the consensus on the necessity to manage natural resources more sustainably by emphasizing their level of degradation and the benefits of better managing them and by training journalists on these topics. Select entry points on sustainability beyond project closing include the following:

(a) **Emphasizing the financial sustainability of community-based natural resources management initiatives.** While community-based natural resource management initiatives are proven to be successful for improving the livelihood of communities,[67] it remains challenging to maintain these initiatives over time, once initial support/seed funding has been spent. The project will specifically address this long-term sustainability issue with direct support and training to build administrative and financial capacity of community-based organizations and assess the efficiency and sustainability of their funding models.

(b) **Catalyzing private sector engagement in aquaculture.** The proposed aquaculture hubs seek to raise interest in aquaculture, increase familiarity with production models, and encourage replication by interested entrepreneurs. At MTR and beyond, the project will examine, as exit strategy, sustainable financing solutions to accompany individuals (or GIEs) interested in developing aquaculture.

[67] As supported by evidence from WARFP (133 percent productivity gain at a community-led fisheries management pilot site) and PROGEDE II (increased income from forest resources in participating villages from US$18 to US$70 million in five years).

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

Technical

59. The project is formulated in response to a request to consolidate and extend the achievements from PROGEDE and WARFP. As a result, the project incorporates lessons and uses well-proven approaches and arrangements from these successful past projects (and broader experience from within the World Bank relevant to Senegal). To ensure strong capitalization and sustainability, large resources are devoted to capacity strengthening, both for administrations (at the central and decentralized levels) and communities (in new and previous project areas). During implementation, special attention will be given to new domains of intervention, including activities supporting dialogue and collaboration among the MEDD and MPEM, or activities supporting development or upgrade of information systems or use of new information and communication technologies, to rapidly identify any issues that might arise and troubleshoot them accordingly. The project will also continue engagement with journalists, civil society, and populations to build consensus on the needs to protect, restore, and sustainably manage fisheries and forest resources that are heavily depleted to support behavioral changes in that direction and foster greater transparency in frequently communicating information and decisions on natural resource management. Finally, preparatory studies have been launched to inform the design of major project investments (for example, coastal infrastructure or information systems) and get bidding documents ready reasonably soon after the project starts.

Economic and Financial Analysis

60. The economic analysis of the project shows its viability in a wide range of configurations. In the central case, the economic rate of return (ERR) of the project is 77.9 percent. The economic net present value (NPV) is positive (US$206.2 million) and the benefit-cost ratio is 4.3, that is, greater than unity. These three efficiency indicators are particularly acceptable considering that part of the project's benefits could not be quantified and weighed against the costs. The sensitivity analysis focused on the following: increases/decreases in costs, increases/decreases in benefits, delays in achieving costs/benefits, the opportunity cost of capital (OCC), the standard conversion factor (SCF), and the price of carbon. This analysis demonstrates that the economic efficiency of the project is quite robust to a large deviation from the central case for key parameters. The ERR remains at an acceptable level, especially as the analysis could not take into account certain direct and indirect benefits. The price of carbon has the largest influence on the project's viability, but even for low values, the project remains profitable.

B. Fiduciary

(i) Financial Management

61. An FM assessment of the PIU at the MEDD was carried out in February 2022. The objective of the assessment was to determine whether the PIU has adequate FM arrangements in place, which include the entity's system of planning and budgeting, accounting, internal controls, funds flow, financial reporting, and auditing, and to ensure that the IDA project proceeds would be used only for the intended purposes, with due attention to economy and efficiency. A PIU's FM arrangements are adequate if they (a) are considered capable of recording all budgets, transactions and balances; (b) support the timely preparation of reliable financial statements; (c) safeguard the entity's assets; and (d) are subject to audit arrangements acceptable to the World Bank. The assessment complied with the Financial Management

Manual for World Bank-financed Investment Operations, which became effective on March 1, 2010, and as last revised in September 2021.

62. The FM arrangements of the SNRMP will be based on the existing arrangements in place under WACA and EHPMP. The PIU at the MEDD will have the fiduciary responsibility for the project. The overall FM performance of the MEDD PIU during the last supervision in December 2021 was Moderately Satisfactory. Staffing remained adequate, and book keeping was up-to-date. The PIU is familiar with the World Bank FM requirements. The interim financial reports (IFRs) for the ongoing project are also submitted on time and acceptable to the World Bank, and the external auditor has issued an unqualified (clean) opinion on the 2020 financial statements. The PIU has an adequate FM manual of procedures, which can be updated to include specificities of this project. However, the internal inspection at the MEDD, which was designated to ensure the internal audit function of the previous projects, has not covered the projects since 2020. A diagnosis was undertaken, and an action plan was prepared for strengthening the PIU's capacity in November 2020. This action plan has however still not been validated by the minister.

63. For swiftness and greater efficiency in project implementation, a Designated Account (DA) will be opened for the MPEM. An assessment of the FM capacity of the MPEM was also conducted to identify the risks and propose mitigation measures. The ministry has experience in implementing World Bank-financed projects. It also has an operational internal inspection that uses the general manual of procedures published by the General State Inspection. However, the assessment revealed the following weaknesses: (a) no adequate staffing to manage the project's FM aspects; (b) lack of an adequate financial and administrative procedures manual; (c) absence of an accounting software; and (d) no internal audit manual of procedures specific to the ministry. For proper management of the DA, a senior accountant will be recruited to carry out all FM activities. The accounting software used by the MEDD PIU will be upgraded to a web-based version and used by the MPEM to facilitate the consolidation of financial information by the MEDD PIU. All procedures will be detailed in the project manual. The project will strengthen the capacity of the internal inspection by assisting them in the elaboration of a procedures manual specific to the MPEM.

64. To ensure readiness for implementation and maintain an adequate FM system in place, the following measures should be taken:
    (a) No later than one month after project effectiveness and before the first disbursement, update of the MEDD PIU's financial and administrative manual to include the specificities of the project for both the MEDD and the MPEM
    (b) No later than one month following project effectiveness, validation of the action plan for the capacity building of the internal inspection at the MEDD, with a request of interventions on a biannual basis
    (c) No later than two months following project effectiveness, recruitment of one senior accountant for the management of the DA at the MPEM and recruitment of a senior accountant at the MEDD
    (d) No later than six months after project effectiveness, elaborate a manual of procedures for internal inspection at the MPEM.

65. To ensure efficient implementation of the Project it is suggested to: (i) upgrade of the accounting software to a web-based version to consider book keeping of the new project, which will be handled by the MPEM and MEDD; (ii) sign an MoU with the internal inspection at the MPEM to perform internal audit engagement on a biannual basis and share it with the World Bank; and (iii) sign an addendum with the external auditor covering already the two World Bank-financed projects at the MEDD (WACA and EHPMP) for the audit of the project consolidated financial statements; within four months following project effectiveness.

66. **Conclusion of the assessment:** The FM risk is rated as Substantial due to the multiple entities involved in the FM of the project and the lack of an internal audit function. However, the FM arrangements of the project will be adequate and satisfy the World Bank's minimum requirements under World Bank Policy and Directive on Investment Project Financing (IPF) effective in 2021, once all mitigation measures are in place.

(ii) Procurement

67. The Borrower will carry out procurement for the proposed project in accordance with the World Bank's 'Procurement Regulations for IPF Borrowers' (Procurement Regulations), dated July 2016 and revised in November 2017, August 2018, and November 2020 under the 'New Procurement Framework' (NPF); the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016; and other provisions stipulated in the Financing Agreement.

68. The Borrower has prepared a Project Procurement Strategy for Development (PPSD), which describes how the procurement activities will support project operations for achievement of the PDO and deliver value for money. The PPSD highlights that (a) the procurements packages identified are not complex; (b) technical assistance is likely to be necessary for the preparation of some ToRs or technical specifications; and (c) there is no obstacle to the use of competitive process for the main procurement items identified.

69. The main findings arising from the procurement assessment of the two ministries and existing PIU (at MEDD), conducted in February 2021, was that if both ministries have already implemented World Bank projects, the current available human resources are not adequate to implement the project (additional details on the procurement assessment are presented in annex 1).

70. The overall procurement risk is rated Substantial mainly because of (a) the existence of two implementing agencies; (b) a multiplicity of implementing departments, at the central and decentralized levels, and institutions; (c) the type of planned activities; (d) the country's and project's inherent risk level; (e) the design of the project, which will operate across the country in several regions; and (f) the weak procurement arrangements in place with no existing PIU in the MPEM and the MEDD PIU fiduciary functions requiring additional capacity.

71. Regarding the procurement functions associated with the risk level, the conclusions were as follows:
    (a) No later than two months after project effectiveness, the MPEM will appoint/assign to the project a procurement specialist, who will work under the supervision of the project coordinator;
    (b) The MEDD will maintain and strengthen the existing PIU procurement team (a senior procurement specialist and one procurement specialist) of WACA/EHPMP with the recruitment of an additional procurement specialist.
    (c) Procedures will be detailed in a PIM no later than one month after project effectiveness and before the first disbursement.
    (d) Training will be provided to tender committee members and other partners on World Bank procurement procedures.

C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

D. Environmental and Social

72. **The overall project E&S risk classification for this project is Substantial (both for environmental and social risks).** This classification considers the capacity of the implementing agencies and other stakeholders involved to manage E&S risks in line with the ESF's Environmental and Social Standards (ESS).

73. **Eight of the ten ESS are considered relevant to the proposed project**: ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), ESS2 (Labor and Working Conditions), ESS3 (Resource Efficiency and Pollution Prevention and Management), ESS4 (Community Health and Safety), ESS5 (Land Acquisition, Restrictions on Land Use and Involuntary Resettlement), ESS6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources), ESS8 (Cultural Heritage), and ESS10 (Stakeholder Engagement and Information Disclosure).

74. The project is expected to have overall positive E&S impacts as it seeks to strengthen the management of natural resources (fisheries and forest resources) in target areas, aiming for enhanced productivity, livelihoods, and resilience, as well as strengthen E&S risk management. The project activities to be financed under Components 2 and 3, including constructions/rehabilitations, tree plantation and other forest management activities, and aquaculture hubs development, will entail risks related to (i) occupational health and safety, labor and working conditions, and community health and safety, including sexual exploitation and abuse and sexual harassment (SEA/SH) risks; (ii) possible land acquisition and involuntary resettlement; (iii) resource efficiency; and (iv) pollution, mainly due to the disposal and management of construction waste, water pollution, biodiversity loss, and contamination. Most of these impacts are expected to be site specific and shall be managed in a systematic manner throughout the project cycle with robust mitigation measures proportionate to the nature and scale of the project.

75. Measures to mitigate risks and impacts are set out in the following prepared documents: the Environmental and Social Management Framework (ESMF) in line with ESS1; the Resettlement Policy Framework (RPF) in line with ESS5; the Stakeholder Engagement Plan (SEP), including the project GRM in line with ESS10; the Labor Management Procedures (LMP) in line with ESS2; and the SEA/SH Prevention and Response Action Plan (included in the ESMF) in line with the World Bank Good Practice Note on Addressing SEA/SH in Investment Project Financing.

76. Site-specific ESIAs with their ESMPs and Resettlement Action Plans (RAPs) will be prepared during project implementation according to the result of the E&S screening process in line with the prepared ESMF. The ESMF provides guidance for the preparation and implementation of the E&S process and the preparation of the specific ESIAs for subprojects, as they are identified, including ESMPs. All prepared instruments mentioned in the previous paragraph have been disclosed in-country and on the World Bank's external website by April 27, 2022.

77. Borrower commitments regarding the management of risks are captured in the ESCP disclosed on June 7, 2022 and negotiated and agreed upon with the World Bank. The ESCP provides concrete measures and timelines and assigns responsibility for their implementation. This includes requirement for the PIUs to hire and maintain key E&S staff throughout project implementation, regular reporting, management of contractors with the obligation for them to prepare, as part of their contract, a contractor-ESMP before starting the field activities.

78. **Organizational capacity and competency.** The project will be implemented by the MEDD and MPEM. Both ministries have experience with implementing World Bank-financed projects using the World Bank operational policies on E&S safeguards but have limited experience with the World Bank ESF. Each ministry will host a

dedicated PIU, with qualified staff and resources to support management of E&S risks and impacts of the project, including an environmental specialist, a social development specialist, and a gender specialist (part time). An assessment of their capacity to monitor the management of E&S risks related to the project will be conducted by the World Bank team once the PIUs are established. These staff shall be recruited no later than two months after project effectiveness and will be retained in the PIUs for the duration of the project. Risk factors, related to low capacity, including for using the ESF, will be mitigated through capacity-building activities, including the World Bank team providing the project's team close support, even in the preparation of E&S instruments in accordance with the ESS requirements.

79. **Gender.** The gender gap analysis emphasizes that women are poorly represented and are insufficiently involved in community-based fisheries or forest resources management efforts and that they have significantly less qualified jobs opportunities and operate in rudimentary conditions (for example, significant post-harvest losses). Also, information on women activities and involvement is scant, particularly in the fishing sector. To address these gaps, the project will promote the establishment of new management committees with requirements for women's participation; build, restructure, and modernize artisanal processing sites and equip them for the activities of female processors; and offer training programs to enhance leadership and networking, technical, sales and marketing, and management and entrepreneurial awareness and skills. The project will also improve job opportunities by supporting the development of aquaculture hubs and new community-based forest management. A census and/or study on women active in fishing (artisanal and industrial processing, fish trade, and so on) will be commissioned to provide an insight on women's involvement in these activities. Several indicators in the project's Results Framework will help monitor how the project is contributing to filling gender gaps in fisheries and forestry, including the (a) participation of women's groups in marine and forest co-managed areas; (b) improvement of women-led enterprises in forest product value chains; and (c) improvement in working conditions and the quality of fish products processed by women.

80. **Citizen Engagement.** The project has developed an SEP incorporating an accessible GRM with significant provisions for addressing gender-based violence complaints. The SEP has also established channels for consultation and access to communities to ensure regular feedback. The project is anchored in an inclusive approach that promotes the strong involvement of local communities in the management of forest areas and natural reserves as well as marine and coastal resources. This is achieved through the structuring and training of communities, particularly women and vulnerable groups, and specific surveys and studies will be carried out to better assess the participation of communities, particularly women and vulnerable groups. The access and use of the environmental emergency alert mechanism by local communities is another important channel for citizen engagement. All these channels are monitored through the Results Framework (IR1b, IR2c, and PDO3).

V. GRIEVANCE REDRESS SERVICES

81. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/en/projects-operations/products-

and-services/grievance-redress-service. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI. KEY RISKS

82. The overall proposed project risk is 'Substantial' based on risks linked to politics and governance, macroeconomy, institutional capacity, fiduciary management, and environmental and social dimensions rated 'Substantial. Key risks and mitigation measures are as follows:

83. **Political and governance risk (Substantial).** There may be resistance to change in fisheries and forest management due to deep traditional and societal roots or vested interests. Several mitigation actions will be taken during implementation: (a) continue to reinforce the implementing agencies' commitments, so far demonstrated by the active engagement of the project formulation groups and supported by the sectoral strategies; (b) include participatory design and implementation approach for community activities in Components 2 and 3 to increase ownership from community beneficiaries; and (c) pay attention to benefits and pedagogy on the ground to build consensus for the reforms/innovation the project is supporting. To address continuous pressure on natural resources at sites outside the project's scope (that is, without community-based management activities), the project will support capacity building of authorities (especially on monitoring, control, and surveillance) and active communication and awareness raising. In addition, the lack of transparency in the fisheries sector is a major issue. While some dimensions (illegal fishing by foreign ships) are difficult to tackle, the project will work with the Government, to improve the availability and transparency of information, and with journalists and civil society to maintain a strong engagement with stakeholders.

84. **Macroeconomic (Substantial).** The risk is rated Substantial given the current context and outlook of COVID-19 recovery and external macroeconomic shocks (such as current global high food and energy prices). Slow recovery and inflation could increase pressure on natural resources to cover the basic needs of populations. While this project cannot mitigate such macroeconomic risk, it will accompany populations by supporting development of aquaculture to increase food production and by distributing efficient cookstoves to lower fuelwood needs. In addition, widespread inflationary pressure might translate in higher costs for planned civil works, which will require close monitoring throughout implementation.

85. **Sector strategies and policies (Moderate).** Project activities are well aligned with and supportive of the strategies of the two implementing agencies, and the project has been prepared in response to two requests from the Government for follow-on projects. As a result, there is a positive authorizing environment and limited uncertainties regarding implementation of activities. Mitigation measures will include a strong stakeholder engagement strategy and close collaboration with all relevant ministries and development actors.

86. **Technical design of project (Moderate).** Overall, the proposed project will build and expand on results, lessons, and achievements from the WARFP and PROGEDE. Activities are the replication and scaling-up of well-proven approaches (demonstrated through the WARFP and PROGEDE, with well-established technical specifications and implementation arrangements) or innovation pilots at a meaningful scale (for example, one community in one ZPP). To facilitate implementation, the project has budgeted resources to support the MPEM and MEDD and related institutions as well as implementation partners, at the central and decentralized levels, to strengthen technical and operational capacity in all major departments relevant to the project. Thorough capacity diagnostics have been undertaken to define an appropriate technical and operational capacity strengthening program.

87. **Institutional capacity for implementation and sustainability risk (Substantial).** The consolidation of the World Bank portfolio translates into developing one project with two sectors (fisheries and forestry) and working with two implementing agencies, which may pose increased accountability and coordination issues. In addition to activities having been designed with clear ownership and responsibilities, the proposed project will establish two PIUs and two accounts to separate funding and implementation. This will help avoid mistrust about use of funds and penalizing one agency for possible delays caused by the other. As for implementation capacity, both ministries have experience with implementing World Bank-financed projects. However, at the MPEM, the WARFP was closed several years ago and the management unit for this project is no longer operational, and at the MEDD, there are two World Bank-financed projects under implementation, WACA (P162337) and the EHPMP (P167788), but the PIU implementation capacity is limited considering its workload. The PIUs will be (re) staffed accordingly, adding required expertise and experience. In addition, within the two ministries and implementation partners, the project will reinforce technical and operational capacity for smooth implementation, higher likelihood of success, and sustainability.

88. **Fiduciary (Substantial).** The FM risk is rated Substantial due to the multiple entities involved in the FM of the project and the lack of an internal audit function. However, the FM arrangements of the project will be adequate and satisfy the World Bank's minimum requirements under World Bank Policy and Directive on IPF effective in 2021, once all mitigation measures are in place. The overall procurement risk is rated Substantial mainly because of (a) the implementation of the project by two ministries; (b) a multiplicity of implementing departments, institutions, and agencies; (c) the type of planned activities; (d) the country's and project's inherent risk level; (e) the design of the project, which will operate across the country in several regions; and (f) the weak procurement arrangements in place with no existing PIU in the MPEM and the MEDD PIU fiduciary functions requiring additional capacity. Key mitigation measures include: elaborate financial and administrative manual with clear and detailed rules and procedures; recruit PIU fiduciary staff and build their capacity; and strengthen internal inspection at both ministries.

89. **Environment and social (Substantial).** The project will finance activities with important positive impacts for the fishery and forestry sectors as well as overall E&S risk management. However, E&S risk is considered Substantial, noting potential impacts from some activities and possible capacity issues. From an environmental standpoint, investments in Subcomponents 2.2, 2.3, 3.2, and 3.3 could entail risks related to occupational health and safety, labor and working conditions, community health and safety, resource efficiency, and pollution, mainly due to management of construction and waste; nuisances related to air and noise emission; and risks of disturbance to land, water, and biodiversity. However, most of these impacts are expected to be site specific and managed in a systematic manner throughout the project cycle with robust mitigation measures proportionate to the nature and scale of the project. From a social standpoint, land acquisition and involuntary resettlement, physical and economic displacements, community health and safety, including SEA/SH risks, are likely during the implementation of Subcomponents 2.2 and 3.3. Some of these impacts might be only temporary (displacement during rehabilitation of a wharf for instance). There might also be social conflicts arising from the exploitation and management of fisheries and forestry resources if mitigation measures are not taken in a concerted manner with those who specifically draw their livelihoods from these resources. The project has proceeded with a framework approach regarding the preparation of E&S risks and impacts management instruments, which have been finalized and disclosed by April 27, 2022: the ESMF and RPF. The project has also prepared the ESCP, SEP including the project's GRM sensitive to SEA/SH complaints, and a project LMP. Site-specific instruments (ESIA/ESMP and RAP) will be prepared once the locations and details on planned activities are known. In addition, risk factors related to low capacity will be mitigated through capacity-building activities and ensuring that adequate staff (one environmental specialist, one social

specialist, and a gender/gender-based violence/community development specialist) will be recruited by each PIU, and that they are well trained.

90. **SEA/SH (Low).** The SEA/SH risk assessment using the World Bank's SEA/SH Risk Assessment Tool indicates that the risk is Low.

91. **Stakeholders (Moderate).** The proposed project has several channels to engage with stakeholders, directly or indirectly. They can be used to monitor, communicate, or actively engage with stakeholders toward addressing concerns, raising awareness on the project's activities and benefits, and associating them with project implementation. Private sector stakeholders, in particular, should be aware and supportive of project actions for them to succeed. These channels include direct engagement and capacity building of beneficiaries through the project's components, targeted communication and outreach activities and, more indirectly, the National Steering Committee and local committees and networks thereof, which can be used as forums for engagement and expression of views to be reflected in project-related decision-making.

92. **Other (Moderate).** There is a risk that the funds of the credit allocated to certain law enforcement activities under the project (patrols for instance) be used for other activities which fall outside of the World Bank's mandate, such as national security or police activities. As mitigation tools, the Financing Agreement includes strong legal covenants to prevent prohibited use and to correctly document in a verifiable manner any case of mixed use of vehicles, the change of purpose and authority of patrols, and the financing of such use not permitted under the project from other sources than the credit.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY: Senegal
Senegal: Natural Resources Management Project

Project Development Objectives(s)

The objective of the Project is to improve the management of fish and forest resources and access to related economic opportunities in target areas.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
Improve management of fisheries and forests resources in targeted areas					
Forest area brought under management plans (CRI, Hectare(Ha))		2,243,831.00	3,000,000.00		3,476,306.00
PDO2. Targeted artisanal fishing areas brought under territorial use right regimes for fishing monitored by geolocation system (Number)		0.00	5.00		10.00
improve access to related economic opportunities					
PDO3. Income generating activity program implemented in targeted forest areas (Percentage)		0.00	30.00		60.00
Female-led enterprises certified in forest product schemes (Number)		0.00	30.00		40.00
PDO4. Share of fisheries products landed and transformed according to improved		0.00	40.00		80.00

Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
practices at project-supported sites (Percentage)					
Share of processed fisheries products transformed by women according to improved practices at project-supported site (Percentage)		0.00	25.00		50.00
PDO5. Aquaculture production (Tons/year)		1,374.00	2,374.00	3,374.00	5,374.00

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
C1-Institutional framework for managing E&S risks and intersectoral collaboration							
IR1a. Proportion of projects with an ESIA registered in the national database having a valid ESMP and annual monitoring (Percentage)		40.00	60.00				80.00
IR1b. Share of annual requests/complaints addressed by citizen to the environmental emergency management center handled with satisfaction (Percentage)		40.00		60.00			70.00
IR1c. Air quality monitoring stations operational (Number)		2.00	6.00				10.00
C2-Resilience and productivity of the fisheries and aquaculture sectors							

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
IR2a. Modernization of licencing/permit, registration, monitoring and control systems (Number)		5.00	9.00	12.00	15.00	18.00	24.00
(i)a. Generalization of canoe registration (Number)		0.00	1.00	2.00			3.00
(i)b. Publication of fishing licenses to industrial vessels fishing in Senegalese waters (Senegalese and foreigners) (Number)		1.00	2.00				3.00
(ii)a. Establishment of a fishing permit system linked to management plans (Number)		0.00	1.00	2.00			3.00
(ii)b. Industrial licenses are linked to fisheries management plans (Number)		0.00	1.00	2.00			3.00
(iii)a. The use of canoe geolocation systems has been generalized in the targeted areas (Number)		0.00	1.00	2.00			3.00
(iii)b. All industrial fishing vessels fishing in Senegalese waters are monitored by AIS and/or VMS (Number)		2.00					3.00
(iv)a. Artisanal fishing is controlled (Number)		1.00	2.00				3.00
(iv)b. Industrial fishing is physically controlled (Number)		1.00	2.00				3.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
IR2b. Reliable key fisheries management data published online regularly (Number)		1.00	4.00				5.00
IR2c. Representation of all relevant local stakeholders groups in community-based fisheries management planning processes (Percentage)		0.00	70.00				80.00
IR2d. New marine areas under active community-based management that include at least one women in leadership positions including President, Secretary General or Treasurer (Number)		0.00	5.00				10.00
IR2e. Jobs created in the aquaculture sector (Number)		1,854.00	3,500.00				6,854.00
Share of women with a job created in the aquaculture sector (Percentage)		0.00	30.00				40.00
C3-Sustainable management of forests and ecosystems							
IR3a. Forest monitoring system operational (Yes/No)		No					Yes
IR3b. Forest areas under active community-based management that include at least one women in leadership positions including President, Secretary General or Treasurer (Number)		29.00	35.00				42.00
IR3c. Jobs created in new community-based managed		0.00	1,500.00				2,457.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
forests for fuelwood production (Number)							
Share of women in job created in new community-based managed forests for fuelwood production (Percentage)		0.00	10.00				25.00
IR3d. Improved cookstoves distributed (Number)		836,253.00	900,000.00				1,086,000.00
IR3e. Annual man/days of forest surveillance and control missions carried out in the target sites (Number)		22,320.00	44,000.00				66,960.00
IR3f. Management effectiveness of the Niokolo-Koba national park (IMET) (Number)		334.50	390.00				410.00

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Forest area brought under management plans		Annual	Management plans of targeted forests	Transmission of management plan and regulation (see details in annex 5)	MEDD - DEFCCS & DPN

PDO2. Targeted artisanal fishing areas brought under territorial use right regimes for fishing monitored by geolocation system	Monitoring to the development and the implementation of local community-based management plans (details in annex 5)	Annual	Local management plans and annual implementation reports	Analysis of plans and reports	MPEM
PDO3. Income generating activity program implemented in targeted forest areas	Monitoring the number of targeted forest areas benefiting from the IGA program (details in annex 5)	Annual	IGA program annual reports	Analysis of annual reports	MEDD - DEFCCS
Female-led enterprises certified in forest product schemes	Monitoring the number of female-led enterprises certified in forest product scheme with IGA program support.	Annual	IGA program annual reports	Analysis of annual reports	MEDD - DEFCCS
PDO4. Share of fisheries products landed and transformed according to improved practices at project-supported sites	Monitoring the improvement in the quality of fisheries landings and transformation of seafood products (details in annex 5)	2 times during project lifetime	Project implementation reports and fisheries statistics	Analysis reports and statistics	MPEM
Share of processed fisheries products transformed by women according to improved practices at project-supported site	Monitoring the share of women-led processed fisheries products	2 times during project lifetime	Project implementation reports and fisheries statistics	Analysis of reports and statistics	MPEM
PDO5. Aquaculture production	Monitoring aquaculture production including in the 8 aquaculture hubs (details in annex 5)	Annual	ANA statistical database	analysis of database	ANA

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
IR1a. Proportion of projects with an ESIA registered in the national database having a valid ESMP and annual monitoring		Annual	National ESIA and ESMP database and E&S annual inspection reports	Annual analysis of database and annual reports	MEDD - DEEC
IR1b. Share of annual requests/complaints addressed by citizen to the environmental emergency management center handled with satisfaction	Monitoring the effectiveness of the CGUE to manage citizen complaints/requests in accordance with procedures.	Annual	Complaints database managed by the CGUE	Analysis of the database	MEDD - CGUE
IR1c. Air quality monitoring stations operational	Monitoring air quality monitoring stations network efficiency	Annual	CGQA annual reports	CGQA annual reports review	MEDD - CGQA
IR2a. Modernization of licencing/permit, registration, monitoring and control systems	Monitoring of the modernization of licencing/permit, registration, monitoring and control systems in fisheries sectors (details in annex 5)	Annual	Reports on licencing/permit, registration, monitoring and control systems	Analysis of reports	MPEM
(i)a. Generalization of canoe registration	Monitoring the generalization of the canoe	Annual	fishing canoe database and	census on active canoes and regular update of	MPEM

	registration process		registry	the canoe registry	
(i)b. Publication of fishing licenses to industrial vessels fishing in Senegalese waters (Senegalese and foreigners)	Monitoring industrial fisheries licenses publication process.	Annual	Industrial fishing vessel licences database and DPSP reports	Comparison of the list of licensed vessels and the list of fishing vessels identified by the national surveillance system including AIS/VMS	MPEM - DPSP
(ii)a. Establishment of a fishing permit system linked to management plans	Monitoring the process of establishing a fishing permit system linked to management plans.	Annual	MPEM annual report on permit	Analysis of reports	MPEM
(ii)b. Industrial licenses are linked to fisheries management plans	Monitor the increase in the links between the licensing system and management plans	Annual	Industrial fisheries licenses database and regulation	Analysis of database and regulation	MPEM
(iii)a. The use of canoe geolocation systems has been generalized in the targeted areas	Monitoring the generalization of the canoe geolocation in targeted area.	Annual	Annual report on geolocation initiative	Analysis of report	MPEM
(iii)b. All industrial fishing vessels fishing in Senegalese waters are monitored by AIS and/or VMS	Monitoring the industrial fishing vessels tracking system process.	Annual	Industrial fishing vessels database and DPSP annual reports	Analysis of database and annual reports	MPEM - DPSP

(iv)a. Artisanal fishing is controlled	Monitoring the control from authorities on artisanal fisheries.	Annual	artisanal fisheries registration database and artisanal fisheries control reports	Analysis of database and reports	MPEM
(iv)b. Industrial fishing is physically controlled	Monitoring the physical control of industrial fishing vessels.	Annual	Industrial fishing vessel database and inspections reports	Analysis of database and reports	MPEM - DPSP
IR2b. Reliable key fisheries management data published online regularly	Monitoring the transparency of the fisheries sector with publication of selected data on MPEM website (details in annex 5)	Annual	databases on industrial licenses, artisanal permits and annual report on control.	Analysis of databases and reports	MPEM
IR2c. Representation of all relevant local stakeholders groups in community-based fisheries management planning processes	Monitoring citizen and stakeholders engagement in the local planning of fisheries management (details in annex 5)	Annual	Annual report on local management planning processes	Number of people consulted in the groups / Total number of people in the groups.	MPEM

IR2d. New marine areas under active community-based management that include at least one women in leadership positions including President, Secretary General or Treasurer	Monitoring the inclusion of women in leadership positions in local community-based management planning	Annual	local community-based management plans implementation report	Analysis of management plans and report	MPEM
IR2e. Jobs created in the aquaculture sector	Monitoring the number of direct and indirect jobs in the aquaculture sector	Annual	ANA statistical database	Analysis of database	MPEM - ANA
Share of women with a job created in the aquaculture sector		Annual	ANA statistical database	Analysis of database	MPEM - ANA
IR3a. Forest monitoring system operational	Monitoring the development and operationalization of a national forest monitoring system.	Annual	Report on the development of a forest monitoring system	Report analysis	MEDD - DEFCCS
IR3b. Forest areas under active community-based management that include at least one women in leadership positions including President, Secretary General or Treasurer	Monitoring involvement of women in community-based forest management for fuelwood production (details in annex 5)	Annual	community-based forest management annual report	Analysis of annual reports	MEDD - DEFCCS

IR3c. Jobs created in new community-based managed forests for fuelwood production	Monitoring jobs created in new community-based managed forest for fuelwood production (details in annex 5)	Annual	Report on the development of community-based managed forest	Analysis of the report	MEDD - DEFSCC
Share of women in job created in new community-based managed forests for fuelwood production		Annual	Report on the development of community-based managed forest	Analysis of reports	MEDD - DEFSCC
IR3d. Improved cookstoves distributed	Monitoring the dissemination of the use of improved stoves (details in annex 5)	Annual	Annual report on improved cookstove su pport	Analysis of reports	MEDD - DEFCCS
IR3e. Annual man/days of forest surveillance and control missions carried out in the target sites	Monitoring the effectiveness of surveillance missions in the field for the protection of forests and protected areas (details in annex 5)	Annual	SMART reports	Analysis of reports	MEDD - DEFCCS & DPN
IR3f. Management effectiveness of the Niokolo-Koba national park (IMET)	Monitoring the management effectiveness	2 times during the	Management plan, annual	IMET assessment	MEDD - DPN

	of the Niokolo-Koba through the Integrated Management Effectiveness Tool (details in annex 5)	project mid-term and end of the project	reports and IMET workshop		

ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: Senegal
Senegal: Natural Resources Management Project (P175915)

1. **The institutional and implementation arrangements for the project seek to ensure clear accountability and effective coordination among the two ministries.** The proposed institutional and implementation arrangements include (a) the establishment of a single steering committee; (b) the operationalization of two TCs, one per ministry; and (c) the establishment of two PIUs. Two DAs, one per ministry, will be opened, with overall FM responsibility and coordination performed by the PIU at the MEDD. In addition, decentralized services of the MEDD and MPEM and experienced firms/NGOs will support implementation on the ground. The MEDD and MPEM confirmed their interest in preparing a joint project to address common issues (for example, smoked seafood value chains and management of coastal and marine zones and resources) and share experience on how to scale up community-based natural resource management initiatives. The Government also requested to maintain technical and fiduciary management autonomy for each of the sectors to ensure flexibility in implementation.
2. **The establishment of a single PSC, for overall strategic guidance, coordination, and oversight of the project.** The committee will meet on a semiannual basis to (a) review the project progress report and validate the AWPB; (b) provide guidance on policy matters and on major project realizations or deliverables; (c) facilitate coordination across agencies and implementation as needed; and (d) support outreach and resource mobilization. Between meetings of the PSC, further interagency coordination will be supported by regular (that is, on a monthly basis) meetings of the project coordinators and Directors at the MEDD and MPEM. The PSC will be co-chaired by the Minister of the Environment and Sustainable Development and the Minister of Fisheries and Maritime Economy or their designee, and the Secretariat will be jointly managed by the two project coordinators. The costs of organizing the committee meetings will be borne in turn by each PIU. The Secretariat of the PSC will (a) organize the committee's meetings including related documentation and (b) provide information on project performance and monitoring to the committee. The PSC must be established within three months following project effectiveness by an interministerial decree and membership will include the following:
   (a) **Ministries and national agencies (in addition to the MEDD and MPEM):** The Ministry of Finance and Budget; Ministry of Economy, Planning, and Cooperation; Operational Office for the Monitoring of the Emerging Senegal Plan; Ministry of Territorial Communities, Development, and Land Use Planning; and Ministry of Petroleum and Energy
   (b) **Interprofessional organizations:** among others, National Interprofessional Council for Artisanal Fisheries of Senegal (*Conseil national interprofessionnel de la pêche artisanale du Sénégal,* CONIPAS), Association of Shipowners and Fisheries Industrialists in Senegal (GAIPES), Employers' Union of Fishmongers and Export Traders of Senegal (*Union patronale des mareyeurs exportateurs du Sénégal*, UPAMES), national network of the GIEs of fishing piers, national network of local fishermen's council, national association of aquaculture value chain in Senegal, and network of community-based fuelwood producers
   (c) **International organizations and NGOs:** one international organization working on conservation and sustainable forest management, one international organization working on sustainable marine resources management, one national NGO working on sustainable use of forest resources, and one national NGO working on fisheries.
3. **The establishment of two TCs, one for each ministry, to facilitate coordination among the various departments and institutions involved in the implementation of each of the sectoral technical components.** These two committees will meet every six months ahead of the meeting of the PSC to validate documents and

agenda items to be discussed during said meeting, and more frequently as needed. Further intra-agency coordination will be managed day-to-day and as relevant by the project directors and coordinators. The TCs will (a) provide technical guidance and oversight in implementing project activities within the purview of each ministry; (b) undertake coordination among the various departments and institutions involved in the implementation of those activities; (c) ensure coordination between project activities and other technical and financial partners initiatives; and (d) assess and recommend technical expertise required to implement project activities. The MEDD TC will be chaired by the MEDD's Director of Cabinet, and the MPEM TC will be chaired by the MPEM's Secretary-General, with their respective PIUs as Secretariats. They must be established within three months following project effectiveness and members will include various directorates and relevant institutions as follows:

(a) **At the MEDD:** DEEC, DPN, DEFCCS, Community Marine Protected Areas Directorate (*Direction des aires marines protégées communautaires*, DAMPC), CGUE, CGQA, and Ecological Monitoring Center (*Centre de suivi écologique, CSE*).

(b) **At the MPEM:** Fisheries Protection and Surveillance Directorate (*Direction de la protection et de la surveillance des pêches*, DPSP), Marine Fisheries Directorate (*Direction des pêches maritimes,* DPM), DITP, Seabed Management and Exploitation Directorate (*Direction de la Gestion et de l'Exploitation des Fonds marins*, DGEFM), ANA, CRODT, as well as heads of regional units of the MPEM or representatives of regional aquaculture offices, as relevant. CONIPAS, GAIPES, and UPAMES will also be represented and other organizations can be invited, as needed.

4. **Two PIUs, one for each ministry,** for (a) overall project management and facilitation of work programs; (b) fiduciary management; (c) supervision of compliance under ESF; and (d) monitoring, evaluation, and project reporting. Each PIU will be staffed according to the following modalities: (a) the secondment of civil servants for project management and (b) the recruitment, on a competitive basis, of PIU staff (the latter modality also being open to civil servants made available by their administration). Project funds cannot be used to pay salaries or top-ups for civil servants. For key positions (that is, coordinator, senior accountant, procurement specialist, environmental specialist, social development specialist, and gender specialist), ToRs, qualification and experience, and selection procedures and contract terms must be acceptable to the Association. In addition, the DEEC and the two PIUs (at the MEDD and MPEM) will sign an Mou, within three months after project effectiveness, to support E&S monitoring, through the mobilization of the CTNE and the DREECs in the project areas. The responsibilities for reporting are clearly assigned and are as follows: (a) activity report, compiled and submitted by the Secretariat, on the basis of contributions by each PIU following a well-defined outline; (b) ESF: each of the two PIUs, as stipulated in the ESCP; and (c) FM (unaudited quarterly financial reports, annual audit reports, and AWPB): the MEDD fiduciary team in charge of consolidating inputs from the two PIUs. Detailed arrangements are as follows:

(a) **The MEDD PIU** will be responsible for planning, implementation, and reporting of activities under Components/Subcomponents 1.1, 1.2.a, 1.3.a, 3, and 4.1, as follows:

(i) **The coordination of the activities of the MEDD's components of the project** will be ensured by the MEDD project coordinator under the supervision of the MEDD's Director of Cabinet.

(ii) **The fiduciary management of the MEDD's components of the project** will be carried out by the existing PIU fiduciary team of WACA and EHPMP hosted by the DEEC, which will be strengthened with the recruitment of an additional accountant (senior accountant) and an additional procurement specialist to cope with the increased level of activity (including overall FM coordination at project level, that is, consolidation and submission of quarterly financial reports, annual audit report, and AWPB). This arrangement will help strengthen project management capacity within the MEDD and retain skilled experts with a growing experience. Contracts and ToR for fiduciary personnel working across several World-Bank financed projects will duly reflect

these cross-support arrangements. The fiduciary team will perform the FM duties and responsibilities for the DA-A account (that is, budget planning, account management, reporting, and auditing), including working in close cooperation with the fiduciary team at the MPEM PIU to facilitate FM coordination at the project level, and will also develop and manage the Procurement Plan for the MEDD activities.

(iii) **M&E of the MEDD's components of the project** will be ensured by an M&E specialist working under the supervision of the MEDD project coordinator. The MEDD M&E specialist is responsible for:

- **Project Results Framework.** In close collaboration with the MPEM M&E specialist, regular reporting of indicators related to the environment and forest in coordination with all relevant MEDD directorates, institutions, and agencies and
- **MEDD M&E system.** In close collaboration with the MEDD staff, development of the MEDD's M&E system, including monitoring system for E&S assessment, environmental emergency, forest and land use, forests products, classified forests, and protected areas.

(iv) **E&S risks management of the MEDD's components of the project** will be supported by an environmental specialist, a social development specialist, and a gender specialist (part time) under the supervision of the MEDD project coordinator. They will develop, and monitor the approval and implementation of, the required E&S instruments. The social development specialist will also be responsible for supporting and monitoring all forest community-based initiatives. The specialists will work in close collaboration with the DEEC and related services for all E&S project activities.

(v) **Other specialists and administrative support staff will be recruited as required** (for example, project communication and technical specialists on environment management and forest management).

(b) **The MPEM PIU** will be responsible for planning, implementation, and reporting of activities under Components/Subcomponents 1.2.b, 1.3.b, 2, and 4.2, as follows:

(i) **Coordination of the activities of the MPEM's components of the project** will be ensured by the MPEM project coordinator under the supervision of the MPEM Secretary-General.

(ii) **Fiduciary management of the MPEM's components of the project** will be ensured by an FM specialist (senior accountant) appointed for the project and responsible for the overall FM duties and responsibilities for the DA-B account (that is, budget planning, account management, reporting, and auditing), including working in close cooperation with the fiduciary team at the MEDD PIU to facilitate FM coordination at the project level. The FM specialist will also work closely with a procurement specialist under the supervision of the MPEM project coordinator and will be in charge of developing and managing the Procurement Plan for MPEM activities.

(iii) **M&E of the MPEM's components of the project** will be ensured by an M&E specialist working under the supervision of the MPEM project coordinator. The MPEM M&E specialist is responsible for:

- **Project Results Framework**. In close collaboration with the MEDD M&E specialist, regular reporting of indicators related to fisheries and aquaculture in coordination with all relevant MPEM's directorates, institutions, and agencies and
- **MPEM M&E system**. In close collaboration with MPEM staff, development of the MPEM's M&E system including fisheries and aquaculture monitoring systems.

(iv) **E&S risks management of the MPEM's components of the project** will be supported by an environmental specialist, a social development specialist, and a gender specialist (part time) under the supervision of the MPEM project coordinator. They will develop, and monitor the

approval and implementation of, the required E&S instruments. The social development specialist will also be responsible for supporting and monitoring all fisheries community-based initiatives. The specialists will work in close collaboration with the DEEC and related services for all E&S project activities.

(v) **Other specialists will be recruited as required** (for example, project communication, technical specialists on community fisheries, and aquaculture management specialists).

5. **Decentralized services of the MEDD and MPEM and experienced firms/NGOs will support implementation on the ground.** Local representatives of the two ministries will in particular assist with monitoring and surveillance of activities and also liaison with local authorities and headquarters. They will benefit from targeted capacity building and equipment to assist them in their mission. In addition, experienced firms/NGOs will be selected for capacity-building and facilitation activities, especially in support of community-based management activities and IGAs.
6. **Capacity building programs and technical assistance will be provided to ministries and related institutions through the mobilization of consulting firms and NGOs** for various activities, including (a) E&S risks management; (b) environmental emergency; (c) air quality monitoring; (d) fisheries and community-based fisheries planning, management, and surveillance; (e) fisheries value chains; (f) aquaculture development; (g) forest and community-based forest planning, management, and surveillance; and (h) protected area management.

Financial Management and Disbursements Arrangements

7. **Budgeting.** The project budgeting process is defined in the financial and administrative manual of the MEDD PIU. The budgeting procedures and deadlines related to the MPEM will also be described in the manual. The consolidated budget would be reviewed and adopted by the PSC before the beginning of each fiscal year. Annual draft budgets would be submitted for IDA's 'no-objection' before adoption and implementation. Any changes in the budget and work plans would receive a World Bank 'no-objection' opinion. The PSC would also (a) discuss and review the quarterly budget execution report and (b) monitor and assess the implementation progress and results of the project.
8. **Accounting.** SYSCOHADA *(Système Comptable Ouest Africain de l'Organisation pour l'harmonisation en Afrique du droit des affaires)* is the accounting system of the West African Economic and Monetary Union applicable in Senegal. Project accounts will be supported with appropriate records and procedures to track commitments and safeguard assets. Consolidated annual financial statements will be prepared by the MEDD PIU in accordance with SYSCOHADA, considering World Bank requirements and specificities related to externally financed investment projects. The accounting software will be upgraded to a web-based version and customized to accommodate book keeping of the project (that is, two accounts). Each ministry will record its transactions and keep its books, and the accounting records will then be consolidated for financial reporting purposes by the financial officer at the MEDD PIU.
9. **Financial reporting.** The MEDD PIU will prepare consolidated quarterly IFRs reflecting the operations of the DAs and submitted to the World Bank, within 45 days after the end of each calendar quarter. The IFR format would comprise the following: (a) report on the sources and use of funds by disbursement category and by component, on a cumulative basis (project-to-date and year-to-date) and for the period, showing budgeted amounts versus actual expenditures, including a variance analysis and (b) forecast of sources and uses of funds. The IFR template has been prepared.
10. **Internal control arrangements.** The FM manual describes the FM and disbursement arrangements, including the internal control mechanism, budgeting process, and assets' safeguards, and clarifies roles and responsibilities of all stakeholders. The FM manual will be the guiding tool where all procedures to be followed regarding FM will be documented to ensure consistency of procedures. The FM officer at the MEDD will be

responsible for ensuring that the project's FM arrangements are adequate and satisfactory throughout the life of the project. The current manual will be updated to include the specificities and new arrangements for this project. The processes and deadlines to be followed by both ministries will be detailed in the manual. The internal inspection within the MEDD and inspection within the MPEM will be strengthened to conduct ex post review of transactions on a quarterly basis, which will reinforce the internal control environment. The scope of the engagement will include both ministries.

11. **External audit.** An addendum will be signed with the current auditor for the two World Bank-financed projects managed by the MEDD (WACA and EHPMP), so that this auditor also conducts the annual audits of the project's financial statements. The auditor would express an opinion on the annual financial statements and perform the audit in compliance with International Standards on Auditing. The auditor would be required to prepare a Management Letter detailing observations and comments, providing recommendations for improvements in the accounting system and internal control environment. The audit report on the annual project financial statements and activities of the DAs would be submitted to the World Bank within six months after the end of each project fiscal year. The financial statements will be consolidated by the financial officer at the MEDD, and the external auditor will audit both ministries.

12. **Disbursements.** Two DAs will be opened at a commercial bank acceptable to the World Bank (see figure 1.1). Their ceilings would be determined in the Disbursement Letter based on the disbursement forecast for the first four months. The accounts would be set up to fund eligible expenditures based on the approved AWPB. Disbursements will comply with specific procedures included in the project financial and administrative manual. Disbursements under the project would be transaction based. In addition to making advances to the DAs, other disbursement methods would be available for use under the project, such as reimbursements, direct payments, and special commitments. Further instructions on disbursement and details on the operations of the withdrawal applications and direct payments would be outlined in the Disbursement Letter.

Figure 1.1. Flow of Funds

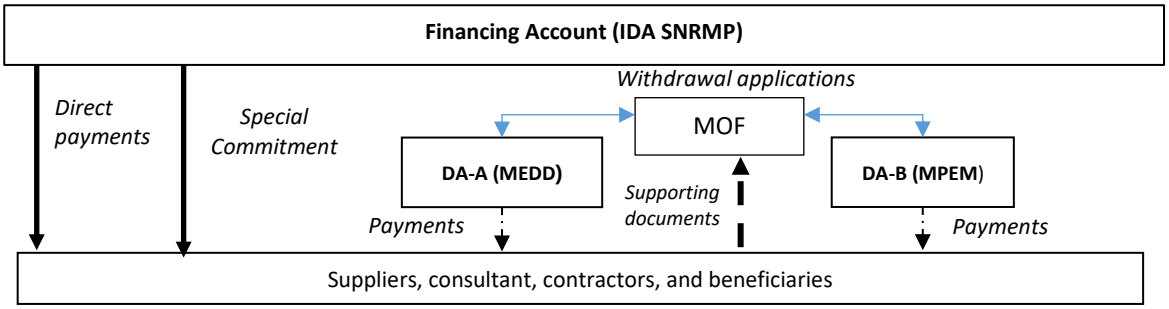


Table 1.1. Disbursement categories

Category	Amount of the Financing Allocated (expressed in EUR)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consulting services, Incremental Operating Costs and Training for the MEDD Respective Part of the Project	45,700,000	100%
(2) Goods, works, non-consulting services, consulting services, Incremental Operating Costs and Training for the MPEM Respective Part of the Project	45,500,000	100%
(3) Refund of Preparation Advance	2,300,000	Amount payable pursuant to Section 2.07 (a) of the General Conditions

TOTAL AMOUNT	93,500,000	

13. **Action plan.** An FM assessment was carried out in February 2022. It concluded that the FM risk is rated Substantial due to the multiple entities involved in the FM of the project and the lack of an internal audit function. However, the FM arrangements of the project will be adequate and satisfy the World Bank's minimum requirements under the World Bank Policy and Directive on IPF, effective in 2021, once all mitigation measures are in place. To ensure readiness for implementation and maintain an adequate FM system in place, the following measures should be taken. .

Table 1.2. FM Action Plan

Action	Timeline	Responsible Entity
Update of the financial and administrative manual	Within 1 month of effectiveness	MEDD PIU
Validation of the action plan for internal inspection capacity building	Within 1 month of effectiveness	MEDD PIU
Recruitment of a senior accountant	Within 2 months of effectiveness	MPEM PIU
Recruitment of a senior accountant	Within 2 months of effectiveness	MEDD PIU
Upgrade of the accounting software to a web-based version	Within 4 months of effectiveness	MEDD PIU
Signing of an MoU with internal inspection at the MPEM	Within 4 months of effectiveness	MPEM PIU
Signing of an addendum with WACA/EHPMP external auditor	Within 4 months of effectiveness	MEDD PIU
Elaborate an internal audit manual of procedures specific to the MPEM	Within 6 months of effectiveness	MPEM

14. **Implementation support plan.** Based on the outcome of the FM risk assessment, the implementation support plan (table 1.3) is proposed. The objective of the implementation support plan is to ensure that the project maintains a satisfactory FM system throughout the project's life.

Table 1.3. Implementation Support Plan

FM Activity	Frequency
Desk Reviews	
IFR review	Quarterly
Audit reports review of the project	Annually
Review of other relevant information such as interim internal control systems reports.	Continuous as they become available
Site Visits	
Review of overall operation of the FM system	Once per year (implementation support mission)
Monitoring of actions taken on issues highlighted in audit reports, auditors' management letters, internal audit, and other reports	As needed
Transaction reviews (if needed)	As needed
Capacity-Building Support	
FM training sessions	As needed during implementation

Procurement Arrangements and Action Plan

15. **Procurement rules and procedures**. The Borrower will carry out procurement for the proposed project in accordance with the World Bank's 'Procurement Regulations for IPF Borrowers' (Procurement Regulations) under the NPF; the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016; and other provisions stipulated in the Financing Agreement. All goods, works, and non-consulting services will be procured in accordance with the requirements set forth or referred to in Section VI: Approved Methods: Goods, Works, and Non-Consulting Services of the Procurement Regulations, the PPSD, and Procurement Plan, approved by the World Bank. The

consulting services will be procured in accordance with the requirements set forth or referred to in Section VII: Approved Selection Methods: Consulting Services of the Procurement Regulations, the PPSD, and Procurement Plan, approved by the World Bank. The Procurement Plan, including its updates, shall include for each contract (a) a brief description of the activities/contracts; (b) selection methods to be applied; (c) cost estimates; (d) time schedules; (e) the World Bank's review requirements; and (f) any other relevant procurement information. The Procurement Plan covering the first 18 months of the project implementation has been prepared and cleared by the World Bank. The Borrower shall use the World Bank's online Systematic Tracking of Exchanges in Procurement (STEP) tool to prepare, clear, and update its Procurement Plan and conduct all procurement transactions.

16. **PPSD.** The Borrower has prepared a PPSD, which describes how procurement activities will support project operations for the achievement of the PDO and deliver value for money. The procurement strategy is linked to the project implementation strategy. It considers institutional arrangements for procurement; roles and responsibilities; thresholds, procurement methods, and prior review; and the requirements for carrying out procurement. It also includes a detailed assessment and description of government capacity and the implementing agency for carrying out procurement and managing contract implementation, within an acceptable governance structure and accountability framework. Other issues to be considered include the behaviors, trends, and capabilities of the market (that is, market analysis) to respond to the Procurement Plan.

17. **Procurement risk assessment and mitigating measures.** A procurement risk assessment was conducted and it considered the following: (a) the project will be executed by two ministries with two PIUs; (b) only the MEDD has an existing PIU in place, with limited procurement capacity; and (c) the main risk is that the PIUs will interact with multiple partners who will be involved in the procurement processes, with a necessity to engage and build minimum understanding of World Bank procurement rules and procedures each time. The overall procurement residual risk, after the mitigation measures, is rated Substantial. Some of the mitigation measures include (a) recruitment of an additional procurement specialist, with qualifications and experience satisfactory to the World Bank, to strengthen the existing MEDD PIU's team; (b) recruitment of a procurement specialist for the MPEM PIU with qualifications and experience satisfactory to the World Bank; (c) preparation of a PIM including procurement procedures; and (d) procurement training and support to the tender committee members on World Bank procurement processes.

18. **Staffing**

    (a) **The MEDD PIU.** The existing procurement team will be maintained, including the senior procurement specialist and the current procurement specialist (on a time-based contract), and an additional procurement specialist, with qualifications and experience satisfactory to the World Bank, will be hired within two months after project effectiveness.

    (b) **The MPEM PIU.** A procurement specialist with qualifications and experience satisfactory to the World Bank will be hired within two months after project effectiveness.

19. **STEP.** The project will use STEP, a planning and tracking system, which will provide data on procurement activities, establish benchmarks, monitor delays, and measure procurement performance. The first 18-month Procurement Plan shall be reviewed and cleared by the World Bank through STEP. This Procurement Plan shall be updated at least annually. All procurement to be carried out under the project shall be included in the Procurement Plan and cleared by the World Bank before its realization.

20. **Operating costs**. Operational costs financed by the project would be incremental expenses, including office supplies, vehicles operation and maintenance costs, maintenance of equipment, communication costs, rental expenses, utilities expenses, consumables, transport and accommodation, per diem, supervision costs, and

salaries of locally contracted support staff. Procurement related to operational costs will be implemented in accordance with procedures specified in the PIM accepted and approved by the World Bank.

21. **Record keeping.** All records pertaining to award of tenders, including bid notifications, bid opening minutes, bid evaluation reports and all correspondence pertaining to bid evaluations, communication sent to/with the World Bank on the process, bid securities, and approval of invitation/evaluation of bids, will be retained by agencies and uploaded in STEP.

22. **Disclosure of procurement information.** The following documents shall be disclosed: Procurement Plan and updates; invitation for bids for goods and works for all contracts; request for Expression of Interest for selection/hiring of consulting services; and contracts awards for goods, works, and non-consulting and consulting services.

23. **Complaint handling.** For procurement-related complaints, the project will follow the procedures prescribed in the Procurement Regulations (paragraphs 3.26 and 3.31). To deal with the complaints from bidders, contractors, suppliers, consultants, and general public at large, a complaint-handling mechanism will be set up and detailed procedures will be prescribed in the procurement section of the procurement manual.

24. **Fiduciary oversight and procurement review by the World Bank**. The World Bank will provide oversight of procurement activities through prior reviews, which will be based on the risk level assessed in April 2022 and will be updated annually. Based on the risk rating, the Borrower will seek the World Bank's prior review for contracts of values detailed in table 1.4. . All contracts not covered under prior review by the World Bank shall be subject to post review during implementation support missions and/or special post review missions, including missions by the consultant hired by the World Bank. In addition, (a) an independent procurement auditor will be recruited to have the procurement activities of the project audited annually (recruitment led by the MEDD PIU with costs shared by both the MEDD and MPEM) and (b) submit the external audit report to the World Bank for its review.

Table 1.4. Prior Review and Procurement Approaches and Methods Thresholds (US$, millions)

Category	Prior Review	Methods Thresholds				
		Open		RFQ	Short List of National Consultants	
		International	National		Consulting Services	Engineering and Construction Supervision
Works	≥ 10	≥ 15	< 15	≤ 0.2	n.a.	n.a.
Goods, IT, and non-consulting services	≥ 2	≥ 1.0	< 1.0	≤ 0.1	n.a.	n.a.
Consultants (Firms)	≥ 1	n.a.	n.a.	n.a.	≥ 0.3	≥ 0.5
Individual consultants	≥ 0.3	n.a.	n.a.	n.a.	n.a.	n.a.

Note: RFQ = Request for quotation.

25. **Contract management capability.** The PIU remains overall responsible for compliance to the agreed procurement procedures and processes and shall monitor the contractual performance including contract management issues, if any.

Table 1.5. Procurement Action Plan

Action	Responsible Entity	Deadline
Elaborate PIM including procurement procedures.	MEDD PIU	One month after effectiveness
Maintain the MEDD PIU procurement team including the senior procurement specialist and the procurement specialist.	MEDD PIU	Two months after effectiveness
Recruit a procurement specialist with qualifications and experience satisfactory to the World Bank.	MEDD PIU	Two months after effectiveness
Recruit a procurement specialist with qualifications and experience satisfactory to the World Bank.	MPEM PIU	Two months after effectiveness
Training for tender committee members and other partners.	PIU with World Bank support	Six months after effectiveness

Implementation Support Plan

26. The implementation support plan will seek to provide continuous assistance to the agencies and other stakeholders implementing the project, particularly on the ground (that is decentralized services of the MEPP and the MPEM and communities). To mitigate against various risks and facilitate smooth project implementation, there is a need for close supervision and support in the early stages of implementation to make any necessary adjustments. Active collaboration and coordination with other development partners would also be key. From this perspective, the ISP includes the following:

    (a) Technical support. A team of sector specialists, with expertise in fisheries management (including community management), coastal infrastructure, natural resource management, forestry, E&S will provide technical support and guidance to the implementation agencies and key stakeholders. The technical team will review and comment on the terms of reference (and other stages of selection, as relevant) and other technical documents. Technical advice will also be provided during implementation support missions.

    (b) Procurement. A procurement specialist will provide guidance to the implementation agencies regarding procurement processes (including regular STEP handover) and will participate in project implementation support missions, post review assessments, and site visits. In addition, the World Bank will review selection processes defined as prior review.

    (c) FM. An FM specialist will provide support to the implementation agencies. The World Bank will supervise the project's FM arrangements by reviewing the quarterly IFRs and the annual audited financial statements. In addition, during implementation support missions, the World Bank will review the FM and disbursement arrangements.

27. One to two additional implementation support missions will be carried out during the first year of implementation to establish, ensure strong intersectoral coordination and project management, and create a strong foundation for the rest of the project lifetime. After the first 18 months, two implementation support and supervision missions, including headquarter and Country Management Unit staff from technical areas, fiduciary staff, and safeguards specialists will be conducted annually. These missions will be carried out with development partners to jointly review the project and ensure adequate coordination of the project with other donor initiatives. Assessments and other mission related documents to be complemented by at least annual reviews of M&E systems, FM, procurement, and safeguards. In addition to the implementation support missions, a mid-term review would be conducted no later than the third year of implementation.

ANNEX 2: Project Description

COUNTRY: Senegal
Senegal: Natural Resources Management Project (P175915)

Component 1: Institutional framework for managing environmental and social risks and Strategic intersectoral collaborations (US$17 million equivalent of which US$15 million to MEDD and US$2 million to MPEM)

1. This component aims to strengthen intersectoral coordination for the management of natural resources and institutional capacities for managing the E&S impacts of projects and programs through three subcomponents: 1.1. strengthening the E&S risk management framework; 1.2. streamlining the management of natural marine, coastal, and forest resources; and 1.3 strengthening citizen engagement for the environment, forestry, and fisheries.

Subcomponent 1.1: Strengthening the E&S risk management framework (US$13 million, MEDD)

2. Senegal has developed a national E&S management system that combines an approval and monitoring system, coordinated by the DEEC. The MEDD also involves line ministries and other stakeholders in the CTNE[68] and has set up decentralized monitoring through the Regional Committees for E&S Monitoring, whose Secretariat is provided by the DREECs. Procedures have been detailed in several sectors[69] and specialized institutions have been created to complement the E&S management system, including the CGUE and CGQA. Nearly 20 years after the adoption of the Environmental Code in 2001,[70] Senegal is committed to modernizing the existing systems and institutions. This subcomponent will support the following:

   (a) **Strengthening the E&S framework (US$2.2 million),** to ensure that key investments follow high E&S standards toward alignment with international good practices and regional harmonization and include climate change considerations in E&S tools (such as ESIAs and ESMPs). There will be a special focus on monitoring ESMP implementation and compliance and strengthening coordination with the CGUE. Activities include the following:
      (i) **Finalizing the Environmental Code regulations and disseminating and raising awareness** among stakeholders, with legal and technical expertise on developing regulations and templates for E&S documents, translation into local languages and edition of regulations, preparation of outreach materials, and awareness workshops.
      (ii) **Building technical capacity in E&S management** of stakeholders involved in E&S management, including the DEEC, decentralized personnel, the project's two PIUs and young professionals (technical assistance, training program on updated E&S system, climate change adaptation and mitigation, diagnostic of the E&S training available in Senegal and drawing proposals for additional resources, and training including online resources).
      (iii) **Building operational capacity in E&S management,** by developing an information and digital monitoring system for ESIAs and ESMPs, the purchase of equipment, and the financing of monitoring operations.

   (b) **Enhancement of environmental monitoring systems - CGUE and CGQA (US$10.8 million).** Activities include the following:

[68] Established by Ministerial Order No 009469 of November 28, 2001.
[69] For instance, the Environmental and Social Procedures Manual for Local Development: http://www.pndl.org/IMG/pdf/08_Manuel_de_Procedures_Environnementales_et_Sociales_DL.pdf.
[70] Act no 20001-01 of January 15, 2001, on the Environmental Code /Decree 2001-282 of April 12, 2001, on implementation of the Code.

(i) **Consolidation of the CGUE,** or 'environmental emergencies', to optimize this prevention and protection mechanism through rapid interventions that address populations' environmental concerns and manage incidents that are likely to have a negative impact on the environment and populations and respond to climate-related emergencies (such as floods and forest fires), which are expected to become more prevalent as climate change intensifies. This is well aligned with the disaster-risk management objective outlined in Senegal's NDC under climate adaptation with increased management of environmental emergencies in the regions. The project's activities will include (i) support for operations of the CGUE central unit and the call center for an 'environmental emergency' (number 1221), (ii) diagnostic of the center to strengthen the organization and response system and preparation of a procedures manual, and (iii) building of the intervention teams' capacities at the central level and in the regions (training, technical and IT equipment, and field operations).

(ii) **Strengthening the CGQA** through network modernization[71] and expansion as well as improved forecast capacities so that it can efficiently respond to its mandate of monitoring and processing data for public information and facilitating decision-making by the authorities. As air quality could deteriorate in future with climate change effects,[72] improving the CGQA forecasting capacity and its communication and alert system will support the population in adapting to climate change, by helping anticipate and take measures to reduce their exposure to air pollution. The project's activities will include (i) rehabilitation and expansion of the network of air quality measurement stations including upgrading five stations in Dakar and Guédiawaye, acquisition of a measuring truck or trailer, and installation of new stations in regions[73] and (ii) building the technical and operational capacity of the CGQA with legal and technical assistance for administrative status upgrade, development of procedures manual (toward the ISO certification), training on air quality data collection and processing, preparation of a national emissions inventory, modeling and forecasting of air quality, information system, dissemination plan of the air quality index, purchase of IT equipment, and software and support operations.

Subcomponent 1.2: Streamlining the management of natural marine, coastal, and forest resources (US$2 million, of which US$1 million to the MEDD and US$1 million to the MPEM)

3. This subcomponent aims to promote a structured approach to natural resource management toward improved resilience, sustainability, and productivity, by addressing two priority intersectoral topics, given the impacts of climate change and other factors on fisheries and forests. The technical assistance mobilized under this component will inform some of the investment activities of Components 2 and 3. Activities include the following:

(a) **Strategic analyses of community-based fisheries management initiatives, zoning, and management of marine and coastal natural resources (IDA US$1 million to the MEDD).** Senegal has strengthened

[71] The air quality monitoring system is now outdated, with a continuous decline in the performance of the measurement network. Five of the six stations were installed in November 2009 and have been operational for more than 10 years now. In 2020, only 23 percent of valid data were recorded.

[72] Air quality could deteriorate due to the increase of the occurrence of more extreme wind events and a shift to drier climates and increasing wind erosion and sand and dust storms. Simulations suggest that global annual dust emissions have increased by 25 to 50 percent over the last century due to a combination of land use and climate changes: https://uneplive.unep.org/redesign/media/docs/assessments/global_assessment_of_sand_and_dust_storms.pdf. https://documents1.worldbank.org/curated/en/483941576489819272/pdf/SAND-AND-DUST-STORMS-IN-THE-MIDDLE-EAST-AND-NORTH-AFRICA-MENA-REGION-SOURCES-COSTS-AND-SOLUTIONS.pdf.

[73] Pre-identified locations for new air-quality equipment include Diamnadio, Yoff, Thiès, Saint-Louis, Djourbel, Kaolack, Kédougou, and Ziguinchor.

community-based fisheries management and sustainable management of fisheries resources with local communities by using several collaboration and planning tools developed by the MPEM[74] and MEDD[75] including artisanal fishing zones and marine and coastal protected areas. In addition, Senegal is firmly committed to working on the marine and coastal area planning with the recent update of the national marine and coastal environmental regulation atlas,[76] and development of a strategy and a national integrated coastal zone management plan is currently under way with the support of WACA. The articulation of the management of artisanal fisheries and marine and coastal natural resources, including mangroves and sea grass beds, will ensure sustainable local regeneration of the halieutic resources supported by ecosystem services (including nurseries and feeding areas). This landscape management approach for sustainable fisheries management will strengthen the resilience of coastal communities by stabilizing local conditions to cope with the impacts of climate change relating to the variability of the abundance of fisheries resources. The following activities planned under the project will support concrete tools for this articulation including joint fisheries and natural resources management planning, spatial planning, and surveillance:

(i) **Harmonization of management and spatial planning systems for sustainability and resilience of artisanal fisheries** through the use of external technical assistance to carry out strategic analyses proposing a harmonization of regulatory and planning tools for the sustainable management of the fishery resource and coastal resilience, in a coordinated effort across various ministerial departments.

(ii) **Strengthening the coordination of surveillance operations** between fishery, protected areas, and merchant shipping by (i) mobilizing expertise to develop a strategy and a joint surveillance plan with, among others, the Fisheries Protection and Surveillance Directorate (DPSP), DPM, DAMPC, DPN, National Agency for Maritime Affairs, and DEFCCS and (ii) organizing regular meetings of a 'Council of the Sea' to coordinate interventions between the various administrations involved in monitoring.

(iii) **Participation in the marine spatial planning process** with (i) the use of technical assistance to support the process over four years and (ii) the organization of regular intersectoral consultation meetings on the subject.

(b) **Increasing the resilience and sustainability of value chains for smoked seafood products (US$1 million to the MPEM).** Some important national sectors are extremely dependent on the use of both forestry and fishery natural resources, such as smoked fish or oysters. These value chains require a sustainable supply of fuel and fish/shellfish. There are significant possibilities for strengthening these sectors and the quality and value of products,[77] and the project will finance (i) strategic studies to strengthen resilience and modernization of these sectors, especially with regard to energy efficiency; improvement of working conditions, fuel supply, including alternative fuels (for example, typha, rice

[74] MPEM: Participation of local communities through community-based management of fishery resources and co-management between the administration and local communities (CLPA) and setting up of different types of artisanal fishing zones (ZPP, Artificial Reef Immersion Zone [*Zone d'immersion des récifs artificiels*, ZIRA], ZER, and ZIP).

[75] MEDD: Co-management of a network of marine protected areas, one of the main objectives of which is the co-management of marine and coastal biodiversity and fisheries for which a National Strategy for Marine Protected Areas in Senegal has been developed in December 2013 (http://www.environnement.gouv.sn/sites/default/files/documentheque/doc%20strategie%20amp_2013_%20%284%29.pdf). A series of business plans for MPAs is being prepared with the support of the Network of Marine Protected Areas in West Africa as part of the project 'Small initiatives and financial mechanisms for the conservation of marine and coastal biodiversity in West Africa - PIMFAO', co-financed by the French Facility for Environment (*Fonds français pour l'environnement, FFEM*) and the MAVA foundation: http://www.rampao.org/IMG/pdf/RAMPAO_TdRs_Plans_affaires_AMP.pdf.

[76] https://doc.terramaris.fr/client/20191015_ATLAS_SN2019.pdf.

[77] In particular, in terms of improving the efficiency of the smoking ovens used, sustainability of fuel supplies, and sanitary conditions of production and the health of workers in the sector.

husk/peanut, and solar), and monitoring systems; and optimization of the added value of the sector along its value chain. These studies will consider the environmental impact of seafood smoking and help identify energy-efficient and smoke-controlled options, with climate mitigation benefits from the reduction in fuelwood consumption from mangroves and forests and therefore avoided deforestation,[78] and also human health and economic benefits and (ii) study tours, mostly targeting professionals, to raise awareness and demonstrate best smoking practices and technologies as well as obtain feedback on potential models, including their adaptability in Senegal's context.

Subcomponent 1.3: Strengthening citizen engagement in relation to environment, climate, fisheries, and forestry (US$2 million, of which US$1 million to the MEDD and US$1 million to the MPEM)

4. Enshrined in the 2016 constitution is the recognition of the citizens' right to a healthy environment, the right to access natural resources, and the responsibility of public authorities to ensure the preservation and restoration of ecological processes and the sustainable management of natural resources.[79] While the Senegalese civil society organizations for the environment and fisheries are vibrant, strengthening the links between public authorities and citizens should make it possible to improve the interventions' efficiency in those sectors.

5. This subcomponent is meant to increase citizen engagement in favor of environmental protection, conservation, climate action, and sustainable management of natural marine and forest resources through awareness-raising and education activities on the value of these natural resources and the services they provide, on climate and environmental degradation and rising environmental risks (for example, pollution), and environmentally friendly solutions. The activities financed by the project include, for the MEDD and MPEM, (a) the development of communication strategies and a project action plan covering on the one hand, the fisheries and aquaculture sector, and on the other hand, climate change, environment, sustainable development, and forestry sectors, and taking into consideration, a community-based management approach to natural resources, the need to reinforce citizen engagement, and climate resilience; these communication tools will include elements specific to the project's achievements, and (b) support for the implementation of the communication plans, particularly by financing awareness campaigns, implementing awareness-raising actions for schoolchildren (for example, beach clean-up), supporting radio stations whose programs deal with the environmental and fisheries management issues and climate change (for example, Radio Environment, La *Voix du Littoral*, and community radio stations), and developing and implementing a training program for journalists with the mobilization of external expertise and organizing dedicated workshops.

[78] Ijjasz-Vasquez, E., J. Chu, J, and B. Prince. 2019. "How Smoking Ovens Can Help Make Wealthier and Healthier Women in Ghana." *World Bank* (blogs), December 23, 2019; Mindjimba, K., I Rosenthal, Y. Diei-Ouadi, K. Bomfeh, and A. Randrianantoandro. 2019. "FAO-Thiaroye Processing Technique: Towards Adopting Improved Fish Smoking Systems in the Context of Benefits, Trade-Offs and Policy Implications from Selected Developing Countries." *FAO Fisheries and Aquaculture Paper* 634. 160 pp. Rome. FAO.

[79] "**Article 25-1** Natural resources belong to the people. They are used to improve his living conditions. The exploitation and management of natural resources must be carried out transparently and in a way that generates economic growth, promotes the well-being of the population in general and is environmentally sustainable. The state and local authorities have an obligation to ensure the preservation of land assets;

Article 25-2 Everyone has the right to a healthy environment. The defense, preservation and improvement of the environment are the responsibility of public authorities. Public authorities have the obligation to preserve and restore essential ecological processes, to provide for the responsible management of species and ecosystems, to preserve the diversity and integrity of the genetic heritage, to require environmental assessment in view of plans, projects or programs, to promote environmental education and ensure the protection of the population within the scope of the development and implementation of projects and programs with significant social and environmental impacts.

Component 2: Resilience and productivity of the fisheries and aquaculture sectors (US$45 million equivalent, MPEM)

6. The fisheries sector plays a key role in food security,[80] improved livelihoods, employment, and economic growth[81] in Senegal. This sector went through great changes over the last decade, with several reforms having been implemented, including (a) a regulatory reform, including the adoption of the Maritime Fisheries Code[82] and the development of the Aquaculture Code; (b) the planning and monitoring of specific national and shared fisheries[83] based on research data[84] and the modernization of the information and data monitoring system for fisheries management; (c) the setting up of issuance and monitoring systems for the fishing licenses; (d) the development of community-based management and co-management of fisheries; (e) the reinforcement of the fight against IUU fishing; (f) the progressive modernization of certain value chains of fishery products; and (g) the importance given to the aquaculture sector in the country's development strategies and planning.

7. Despite this important progress, the fisheries sector is still facing many challenges: (a) more than half of the stocks have been overfished; (b) fish habitats are increasingly degraded, particularly as a result of destructive fishing practices; (c) IUU fishing is still considered to be important with over 50 percent of the catches estimated as unreported; (d) the low value added to the products landed and exported without further processing; and (e) the impact of health, social, and climate crises on the artisanal sector is significant with a drastic drop in fishing and processing activities due to the COVID-19 crisis, an increase in maritime accidents and attempts for social migration, and the impact of climate change on the availability of the resource. The aquaculture sector faces development restrictions in terms of (a) well-trained human resources; (b) support capacities; and (c) investments in promising areas such as the development of aquaculture combined with rice paddies in irrigated areas.

8. This component aims to support Senegal in advancing the reforms that have already been initiated in the fisheries and aquaculture sector through three subcomponents: 2.1. strengthening fisheries management and community-based fisheries management initiatives, 2.2. developing the selected fisheries value chains, and 2.3 supporting aquaculture development.

Subcomponent 2.1: Strengthening fisheries management and community-based fisheries management initiatives (US$17.6 million)

9. This subcomponent should enable stakeholders to build on the achievements from the reform of the fisheries sector and strengthen the functional links between the different pillars of fisheries management (management planning, fishing rights, license/permits, planning of fishing management at the local level, zoning, and monitoring compliance with rules) and scale up community-based fisheries management initiatives. Working across these pillars, the subcomponent will provide important climate adaptation co-benefits, since, as acknowledged in Senegal's Fisheries Adaptation Action Plan,[85] the sustainable management of fish stocks and other marine resources (particularly, controlling harvest) is expected to help them recover and become

[80] The fishing sector is the source of 47 percent of the proteins produced in the country, which corresponds to covering about 70 percent of the protein needs of the population (FAO 2014; Agence Nationale de la Statistique et de la Démographie 2015).
[81] Generation of around 600,000 jobs, or 17 percent of the working population; top export products in 2015 with nearly CFAF 195.6 billion (EUR 2,981,816.4), or 20.87 percent of total exports revenue, and contributing to 3.2 percent of GDP (Agence Nationale de la Statistique et de la Démographie 2015).
[82] Act 2015-18 of July 13, 2015, on the Maritime Fishing Code.
[83] Management plans for cymbium and coastal shrimp (WARFP), octopus and deep-sea shrimp (European Union), sardinella (USAID), and joint Senegal-Mauritania management plans for shared stocks of mullet and croaker (CSRP joint project).
[84] With the support of the CRODT.
[85] The first priority adaptation measure identified in this plan is 'develop and implement fisheries management plans', which is the objective of this subcomponent.

healthier, and thus more resilient to the ongoing impacts of climate change. Other significant climate co-benefits in this subcomponent (full list in annex 4) include improved safety at sea and development as well as implementation of climate-smart co-management plans and income diversification for vulnerable fishing communities. Activities will include the following:

(a) **Strengthening the implementation of fisheries management plans and vessel registration systems and allocation of artisanal fishing permits and industrial fishing licenses (US$3.9 million).** Several fisheries management plans (volute [*Cymbium]*, white shrimp – [*Penaeus notialis],* and octopus [*Octopus]*) have been developed and validated using a participatory approach for sustainable management of the fishery resource by adjusting catch to the potential of fish stock and considering the impacts of fishing on the environment. A reform of the systems for allocating fishing permits and licenses has also been initiated, especially in the artisanal segment, moving from a system focused on the length of canoes to a system linked to fisheries and broken down into functional categories.[86] At the same time, there have been major efforts to control the canoe national fleet to sustain the canoe registration system,[87] the computerization of the registration information system, and the update of the owners' database through census campaigns. Under this project, links between management plan, registrations, zoning systems, and fishing rights allocation process and permits will be strengthened, to move toward a system of territorial use rights. Planned activities are as follows:

- **The development of an allocation process for fishing rights linked to fisheries management plans (octopus, cymbium, and white shrimp) and a territorial use right in managed fishing areas (ZPP, ZIRA, ZIP, ZER, and marine protected area).** To establish spatial access restrictions that allow for a better control of the quantities fished and on the basis of specific permits/licenses, the project will finance (i) a feasibility study for the implementation of territorial use rights and the associated fishing rights allocation process and their link to permits/licenses and (ii) the use of legal expertise to draft the implementing regulations related to territorial use rights and the fishing rights allocation process. Initially, the development of territorial use rights will be piloted, for the artisanal segment, in the areas managed by the project communities.
- **Scientific monitoring, knowledge building, and provision of advice** on the implementation and update of management plans with (i) the cooperation of relevant research institutions such as the CRODT to carry out relevant research programs on target species and (ii) the organization of regular meetings of scientific working groups by fisheries.
- **Capacity building in monitoring the implementation of management plans by the MPEM** for the General Secretariat and the Department of Maritime Fisheries (DPM), which will include (i) use of technical assistance to conduct an institutional diagnostic of the MPEM and the setup of a capacity building program for the agents in charge of the management of the developed fisheries, (ii) the acquisition of technical and IT equipment and vehicles to monitor the fisheries, (iii) financing of monitoring and sampling operations, and (iv) awareness raising among fisheries stakeholders with regard to management plans and their rules.
- **Modernization of the canoe registration system and key professions and personal identification systems** through (i) the acquisition of IT and software equipment for the registration information system and the owners' database; (ii) the use of technical assistance to assess the feasibility of the virtualization of the registration, build capacity of the information system administrator, maintain IT, and raise stakeholders' awareness on the procedures for canoes registration; (iii) manufacturing of registration plates; (iv) organization of a registration

[86] Four categories (coastal demersal fishing, coastal pelagic fishing, shore fishing, and special fishing) and 11 specific options.
[87] Plan approved on July 4, 2016, and updated in April 2021.

campaign; (v) the mobilization of legal expertise to draft implementation regulations for the organization and operation of the key artisanal fishing professions; and (vi) the production of profession cards.

- **Dematerialization of the industrial fishing license allocation system** through the use of technical assistance to develop procedures and a transparent computer system for license application, issuance, and monitoring.
- **Carrying out of studies to strengthen fisheries management** including (i) assessment and update of the sectoral policy declaration and investment framework, (ii) economic aspects of the sector (fisheries and aquaculture satellite accounts, contribution to the national economy, analyzing taxation and subsidies, profitability of fishing units, and supply and demand), and (iii) ecological sustainability of practices and social integration (that is, impact of deep-sea trawling, impact of climate change, update of the fisheries adaptation plan, gender perspective, and integration of international standards on labor law for seafarers in the national regulations).

(b) **Enhancing maritime monitoring, control, surveillance, and information systems for transparency (US$6.6 million).** Monitoring, control, and surveillance capacities have been significantly improved in Senegal with the update of the Themis geolocation system for industrial vessels using a vessel monitoring system (VMS) and an automatic identification system (AIS) the deployment of offshore surveillance patrol vessels enabling targeted surveillance missions. At the same time, advanced processes for collecting, processing, and disseminating information related to fisheries have been developed and the CSRP has set up a regional dashboard. However, due to the lack of harmonization in data collection and processing protocols and the lack of coordination between the different stakeholders involved, it is not yet possible to have sufficiently reliable data and statistics to support political decisions and technical and scientific monitoring of fisheries management plans. Activities will include the following:

- **Reinforcement of the intervention capacities** of the government services in combating IUU fishing with support provided to the DPSP through (i) the acquisition of coastal patrol boats for the surveillance of targeted areas; (ii) the acquisition of technical equipment for conducting the patrols; (iii) financing of land and sea surveillance patrols in the project intervention areas, including joint MPEM-MEDD (DPSP, DPN, and DAMPC) patrols to strengthen collaboration and synergies between services for the surveillance of the project-targeted areas; and (iv) the use of technical assistance to develop and implement a training program on surveillance, monitoring, and evaluation toward implementation of the IUU plan.
- **The use of new technologies** (i) to track industrial fishing activities, with the identification and implementation of technical and IT resources enabling electronic transmission of fishing declarations (electronic logbook) and (ii) for artisanal fisheries monitoring and safety at sea following the pilot initiative to use canoe geolocation equipment to improve the understanding of fishing practices in the project's targeted community management areas, to test electronic registration and support optimization of rescue measures (purchase of geolocation IT and software equipment, technical assistance to identify the equipment and their installation, training for data monitoring and processing, and operational costs). By improving safety at sea (one adaptation area for fisheries in the NDC), this activity delivers adaptation co-benefits by facilitating rescue of crews and ships during adverse weather events, which are expected to become more prevalent with climate change.[88]

[88] This will support the achievement of Objective 4.1 in Senegal's Fisheries Adaptation Action Plan, 'To significantly reduce accidents at sea and loss of life and human lives and property damage'.

- **Construction and equipment of surveillance and control infrastructure** to complement the existing network, including the DPSP coastal surveillance stations, and DPM checkpoints. The strategic locations for the establishment of these infrastructures have been pre-identified based on criteria linked to the monitoring/control needs depending on the level of activities and the density of national coverage (. 2.1). Feasibility studies for the construction and rehabilitation of this coastal infrastructure will be requested to consider climate-smart options (for example, on mitigation [shift to renewable energy sources such as solar] or adaptation [to enhance resilience to coastal erosion and storm surges]), as detailed in annex 4.
- **Improving information systems on fishing and fish farming activities** for transparency and monitoring of these sectors, including (i) design and development of the MPEM's information and M&E system (technical assistance and consultations to develop data collection and processing protocols, statistics dissemination strategy,[89] development of a dashboard on the performance of fisheries under management, and system digitalization); (ii) support for the rollout of the field data collection system (community consultants responsible for field monitoring, purchase of equipment for data collection, and training program on information system for communities, government employees, and scientists); and (iii) use of system data to support international fisheries transparency processes such as the FiTI, ICCAT, or OECD.

(c) **Strengthening and scaling up community fisheries management initiatives (US$7.1 million).** Community-based management initiatives for fishery resources were initiated in 2005, with pilots carried out on the sites of Bétenty, Foundiougne, Ngaparou, and Ouakam, and the establishment of the first ZER and ZIP of Ouakam in 2008. These initiatives were subsequently strengthened and extended, with the fishing communities on the 'Petite-Côte' (Mballing, Mbodiène, Nianing, and Pointe Sarène) getting organized for recovering demersal coastal stocks and rehabilitating habitats through the implementation of management rules and measures compiled in the management plan for the ZPP of the Petite-Côte, created in 2017. The project will help strengthen existing community management initiatives, expand their area of intervention, and support new community management initiatives in pre-identified sites (see pre-identified sites in . 2.1). This will directly support reaching Objective 2.2 of the sector's adaptation action plan 'Promote community-based management in fisheries and protected areas'. Activities will include the following:

- **Management planning** with (i) updating the existing management plans of the Petite-Côte ZPP and Ouakam ZER/ZIP, by considering the extension of the co-management around existing areas and (ii) developing management plans for new co-management initiatives and related ZPPs, also for the areas of Fass Boye on the Grande Côte, Mbour on the Petite Côte, Cap Skirring, and Kafountine in Casamance, and around new reef immersion sites in Yoff and Hann (technical assistance and consultation workshops on development planning process, bioecological baseline conditions, zoning, setting up technical measures for fisheries management, and, as relevant, taking into account climate resilience considerations).
- **Consolidation of regulations** through the use of legal assistance to update and draft legal and regulatory texts allowing the modification of existing community fisheries management zones and the creation of new ZPPs.
- **Supporting communities in co-management initiatives** through (i) technical assistance to raise awareness and support the organization and implementation of a training program for the targeted communities, administrative and FM functions, artisanal fisheries management tools, including development and implementation of management plans, and climate change and

[89] In connection with the communication strategy and plan Cf. 1.3.

possible adaptation options and (ii) the mobilization of community relays in the target areas. Particular attention will be paid to strengthening the role of women within the newly established management committees. The project will request that women represent an active share of these committees, and the technical assistance will seek to build women's skills and capacities so that they can occupy important positions of responsibility.

- **Operationalization of M&E, research, and participatory surveillance** through support for local fishermen's committees (CLPs) and CLPAs, including (i) acquisition of participatory surveillance equipment; (ii) acquisition of canoes for participatory surveillance; and (iii) operational support for research and participatory surveillance and support for the implementation of specific measures, such as the development of an access regime to the octopus fishery or climate change monitoring through bio-indicators.
- **Support for income diversification,** by facilitating IGAs, which will also play an important role in strengthening the resilience of vulnerable fishing communities by diversifying their source of income away from a source under threat. The project will contract experienced associations/NGOs specialized in rural development activities (for example, beekeeping, soapmaking, plastic recycling, firewood nurseries, and aquaculture/mariculture) for the development of projects led by the communities, which will be selected by local selection committees based on pre-determined criteria, considering gender issues and resilience to climate change.
- **Logistical infrastructure in support of community management and fisheries co-management initiatives** with (i) construction and equipment of 'fishermen's houses' in a series of pre-identified sites to facilitate consultations and logistics for community management of resources; (ii) construction and equipment of the headquarters of the CLPA network in Mbour to facilitate experience sharing and structuring of the sector; and (iii) immersion of new artificial reefs in support of community-based management' zoning process (pre-identified sites are presented in . 2.1).

Subcomponent 2.2: Strengthening the value chains of selected fisheries (US$17.4 million)

10. In Senegal, fishery and aquaculture products are essential for food and nutrition (providing nearly 70 percent of animal protein intake), income generation, or livelihood for a large portion of the population. Artisanal fishing and aquaculture constitute one of the important levers in meeting domestic demand for fishery products, especially in rural areas. To achieve this objective, the Sectorial Policy Paper for the Development of Fisheries and Aquaculture has included the enhancement of production among its priorities, through the sustainable development of value chains, restructuring of the fish industry, and establishment of fish processing hubs.

11. This subcomponent will contribute to improving the environmental, economic, and social sustainability of the value chains of selected fishery products through the setup of necessary conditions to improve sanitation and ensure the enhancement of fishery products, particularly facilitating exports and certification/labeling. The project will finance the following:

    (a) **Climate-informed construction and/or restructuring of landing, preservation, and processing infrastructure for fish products (US$14.9 million).** Funding these infrastructures will also provide direct support to the communities engaging in community management of fish resources. Several locations and potential investments have been pre-identified (see . 2.1) and should be confirmed based on the results of the pre-feasibility studies initiated. Feasibility studies for the construction and

rehabilitation of these coastal investments will be requested to consider climate-smart options, both in terms of coastal resilience[90] or climate mitigation.[91] Preidentified infrastructure include:

- The planned construction and equipment of new fishing docks or restructuring of existing docks;[92]
- The proposed modernization of processing units for existing processing sites and the planned construction and equipment of new modern and fuel-efficient smoking units;[93] and
- The planned rehabilitation of existing centers for experimentation and enhancement of fish products and the construction and equipment of a new center.[94]

(b) **Technical assistance to improve the technical and commercial aspects of the value chains (US$1.3 million).** Senegal fisheries value chains have been structured with the creation of GIEs. However, there is still significant room for improvement in value added by developing, and ensuring compliance with, rules, primarily on sanitary aspects and food safety. The project will help finance the following:

- **Capacity building for the communities benefiting from the infrastructure** financed by the project, by using technical assistance for the training of GIEs, who are the sub-concessionaires and managers of targeted fishing wharves and small-scale processing centers, women associations responsible for the modernized smoking units, and managers of the centers for experimentation and promotion of fish products.
- **Support for marketing, labeling, and certification initiatives,** enabling the promotion of specific products, local know-how, and experience and the sustainability of value chains, particularly through (i) the support of sustainable labeling processes (technical assistance to develop specific technical specifications and the drafting of good practices, including sustainability and climate resilience considerations, to support compliance with the abovementioned technical specifications and market these labels). This assistance may support several initiatives already under way, including the 'casamance shrimps', labeling of local products, such as mollusks and crustaceans, from the UNESCO world heritage site of the Saloum Delta or mollusks from the Petite-Côte, selected because of the support for these fisheries within the project and promising value chains and (ii) support to the MSC accreditation process by financing additional studies to the MSC pre-assessments finalized in February 2021[95] or a new pre-assessment for project-targeted species.

(c) **Monitoring and control operations to improve the sanitary quality of the targeted fish products value chains (US$1.2 million).** While the authorities in charge of fisheries have the mandate to

[90] Main climate change impacts are coastal erosion and higher swell and adaptation options (to be confirmed through preparatory studies) include, among other things, moving away from the shoreline and break zone (when possible), laying a cyclopean concrete bed/base under the foundations, raising the foundations, and using bollards and rocks to break tidal wave and swell. Slightly more than one-quarter of the coastline is currently under high or very high erosion risk, but this share could increase to 75 percent by 2080 due to climate change, with a loss of 0.5 to 2 m every year. Source: World Bank. 2013. *Etude économique et spatiale de la vulnérabilité et de l'adaptation des zones côtières aux changements climatiques au Sénégal, Phase 2 – Analyse spatiale de la vulnérabilité aux changements climatiques de la zone côtière du Sénégal* » *ACC-Rapport de synthèse final*, 114 p. Dakar.

[91] Improved fish smoking ovens installed in West Africa can reduce fuel consumption by 50–75 percent (see annex 4 for more information).

[92] Preselected on the basis of the following criteria: presence in the adjacent area of coastal demersals subject to current or planned management or co-management plans, volume of landings, lack of minimum disembarkation conditions and for restructuring absence or lack of conformity of basic services; and degraded infrastructure.

[93] Example of improved smokehouses: http://www.fao.org/3/a-i4174f.pdf and sites preselected on the basis of the following main criteria: preexistence of processing/smoking activities, lack or low level of conformity of basic services, and gender considerations (women or local workers).

[94] Preselected on the basis of the following main criteria: preexistence of artisanal or industrial processing activities, gender considerations (working women), and level of organization of the sector and potential for value addition.

[95] MSC pre-assessments have been completed in February 2021 on the sole, line tuna, and flat sardinella.

monitor and control the quality of fish products value chains, particularly through the DITP, the lack of applicable rules and their dissemination as well as the lack of human, technical, and operational resources does not allow for adequate monitoring and control. The project will help provide the conditions required to ensure the implementation of health standards and appropriate practices with the following activities:

- **Setting health standards and control rules** by (i) mobilizing technical assistance to develop health control plans, develop or improve inspection standards and protocols, and produce guidelines for quality processing units and landing sites; (ii) mobilizing legal expertise to strengthen the regulatory framework for the sanitary quality of fish products; and (iii) disseminating guidelines for fishery products.
- **Operationalizing monitoring and control by the authorities** by providing support to the DITP including vehicles for monitoring/control; IT equipment and software for the management and monitoring of inspections, controls, and certifications; technical equipment including rapid analysis kits and sampling and measuring instruments; training of inspectors; technical assistance to develop and implement a capacity-building program for inspectors and quality managers; development of (bacteriological and chemical) contaminants monitoring plans in processed fishery products in landing/transformation sites, approved units, and supermarkets; and accreditation of the authority in charge of inspection and official accreditation of fishery products intended for export, in accordance with the inspection bodies accreditation standard (ISO 17020).

Subcomponent 2.3: Support to the development of aquaculture (US$10 million)

28. The development of aquaculture in Senegal is a priority for the Government with the implementation of the 'Accelerated Aquaculture Development Project', which is one of the 27 flagship projects included in the PSE and confirmed in the PAP2-AA. The sector is seen as a response to food insecurity and job creation and as a buffer against the current depletion of fish stocks (which can further deteriorate with climate change).[96] Senegal's NDC identifies the development of aquaculture as one main adaptation direction in fisheries, to mitigate the volatility that climate change could impose on marine fisheries and reduce the dependence of communities on natural protein sources from catch fisheries, whose abundance is threatened by climate change. Institutional and regulatory reforms have been undertaken with a view to developing the sector through (a) the creation of the ANA and its decentralization by implementing branches and regional offices and (b) the development of tools for the development of the sector (Aquaculture Code, technical guidelines, a strategic plan for the development of aquaculture, the organization of stakeholders in the aquaculture sector, a guide to good hygiene practices, and an investment model for aquaculture small and medium enterprises). These reforms have led to an increase in the annual production from less than 100 tons before 2010 to more than 1,200 tons in 2015.[97]

29. However, the development of the sector is hampered by the lack of well-trained human resources, support capacities, and investment in strategic sectors. This subcomponent, implemented with the ANA, will support the following activities:

[96] This will directly support reaching Objective 2.4 of the sector's adaptation action plan 'Develop aquaculture in Senegal', with sub-objectives relating to strengthening capacities and developing infrastructure.
[97] https://www.aquanet.com/senegal2*:* 750 tons of Nile tilapia in fresh water and blackchin tilapia in salt water and 450 tons of oysters and mussels for Dakar markets.

(a) **Creation of attractive conditions (US$0.5 million)** with regard to the legal framework and the growth potential of the sector, including identifying geographic areas suitable for development or promising markets:

- **Consolidation, dissemination, and awareness raising on the legal and regulatory framework.** The Aquaculture Code has been approved[98] and must now become effective through a series of application texts and further be widely disseminated. The project will help finance (i) the use of a legal technical assistance to draft the application texts and (ii) its dissemination through the organization of awareness workshops for stakeholders and campaigns for the promotion of aquaculture.
- **The analysis of the sector's potential and economic opportunities for growth,** by mobilizing experts to carry out strategic market studies so that investments in the sector can be shifted towards promising value chains.
- **The identification of areas suitable for aquaculture development and the spatial planning of the sector's development,** to start the preparation of aquaculture development plans with special emphasis on the Petite-Côte region (technical assistance to prepare a diagnostic and identify the areas suitable for aquaculture development, characterize and establish ecological and socioeconomic baseline conditions in those areas, propose plans for the development of aquaculture structures, and analyze potential impacts). This will consider the impacts of climate change to enhance resilience and also maximize mitigation co-benefits.

(b) **Building of climate-informed technical capacities among stakeholders (US$3 million).** The project will finance the following:

- **Development and implementation of a research program on aquaculture in Senegal** with (i) the establishment of a diagnostic and design of a research program and (ii) the funding of targeted research on enhancing food sustainability, genetic improvements, aquaculture zootechnics or disease management, and adaptation and mitigation potentials, according to the research program.
- **Technical and operational capacity building of the ANA teams for the management of the sector,** including acquisition of supervision vehicles and technical and IT equipment, contribution to monitoring operations for the development of aquaculture hubs, and technical assistance for the development and implementation of a capacity-building program on aquaculture and development and operation of aquaculture hubs.
- **Support to the stakeholders involved in the sector and in the development of aquaculture hubs** through (i) the use of technical assistance to develop aquaculture hubs and develop and implement a training program on aquaculture for the producers (including on climate-smart aquaculture) and (ii) support for the structuring of producers through operational support to the national and regional associations of producers.

(c) **Development of aquaculture hubs through the construction or rehabilitation of key infrastructures facilitating the development of activities (US$6.5 million),** including hatcheries/nursery stations and farm schools/training centers. A series of aquaculture sites have been pre-identified and the technical and socioeconomic feasibility studies should confirm the investments that will be carried out under the project. These feasibility studies will incorporate climate considerations and trends, so that the hubs are appropriately placed to mitigate climate risks. The pre-identified sites are distributed over seven administrative regions and are presented in . 2.1.

[98] The Aquaculture Code was adopted by the Council of Ministers on October 20, 2021.

Component 3: Sustainable management of forests and ecosystems (US$32 million equivalent, MEDD)

12. Senegalese forests play a key role in the country's sustainable development, both by being the basis of strategic economic value chains, and thereby contributing to the population's livelihoods, and by providing a set of essential ecosystem services to sustain them. Senegal has been reforming its forestry sector through the following actions: (a) the development of its forestry policy 2005–25[99] and the adoption of a new Forestry Code in 2018;[100] (b) the recognition of the role of the sector in addressing climate change through forest GHG emission reduction commitments in the NDC;[101] (c) commitment to forest community management for fuelwood production; (d) the promotion of the diversification of modern and alternative energy sources and the dissemination of efficient cooking stoves; (e) the protection of natural forests and enhancement of forests; (f) the fight against illegal logging; and (g) reducing forest fires. Although the forestry sector was recognized as a pillar of Senegal's development, and despite the implementation of strategic initiatives, the degradation of the country's forest capital has continued. The country's forest cover is estimated to have been reduced by 131,000 ha between 2001 and 2020, resulting in approximately 24.5 million tCO_2 emissions. Almost all deforestation is linked to shifting cultivation, which is the last step in a cascade of drivers and is most pronounced in the southern and southeastern regions due to the excessive use of fuelwood, the illegal use of forest resources, and forest fires.[102]

13. This component of the project will allow for the implementation of an integrated approach to forest management in the strategic regions of Sédhiou, Kolda, Tambacounda, and Kédougou (which have the highest rates of deforestation and poverty in the country) through the combined implementation of different types of intervention in the sector.

Subcomponent 3.1: Strengthening the institutional and regulatory framework for forest management and monitoring(US$6.4 million)

14. This subcomponent will support regional and national activities for the integration and coordination of the forest management framework through the following activities:

    (a) **Capacity building for coordinating interventions in the forestry sector (US$0.7 million).** By virtue of Senegal's forestry policy 2005–25, a new Forestry Code was adopted in 2018. Its application is however still limited due to a lack of regulations facilitating its implementation, a lack of proper understanding of its provisions by the authorities, and its poor dissemination to stakeholders. The project will support the following:

    - **Implementation of the Forestry Code** through legal and technical assistance to draft technical decrees, (including forest taxes and royalties), translation of the code and regulations into local languages (including, wolof and pulaar), and stakeholder awareness raising (publications and workshops).
    - **Building of the technical capacity of the DEFCCS senior officials** for designing and monitoring the directorate's work programs by mobilizing technical assistance to develop and implement a training program (on Forestry Code, CITES regulations, and operationalization of support systems for forest monitoring, including strengthening MEDD's Mapping, Resource Assessment, and

[99] Senegal forestry policy of 2005–*25* http://www.fao.org/forestry/15132-0a9d7bd3b848771f0d9522338fd799be4.pdf.
[100] Forestry Code 2018–25 of November 12, 2018, and Decree No. 2019-110 Implementing the Forestry Code No. 2018–25 of November 12, 2018.
[101] Senegal NDC, December 2020, http://www.fao.org/forestry/15132-0a9d7bd3b848771f0d9522338fd799be4.pdf.
[102] According to data presented by Global Forest Watch (https://www.globalforestwatch.org/dashboards/country/SEN) Senegal lost 131,000 ha of tree cover (>10 percent) from 2001 to 2020.

Information System Unit [*Cellule cartographie et évaluation des ressources et système d'information,* CERSI]).[103]

- **Building of the operational capacities of the DEFCCS central management** for coordination and monitoring of the field activities by purchasing of field vehicles (two) and IT equipment and new technologies (drones, software, Global Positioning System [GPS], and high-performance computers), especially for the CERSI, and contribution to costs of field missions funding support.

(b) **Improving of forest knowledge and monitoring (US$5.5 million).** Forest knowledge has improved significantly over the past 10 years at the local level through the completion of mapping and forest inventory activities to develop community forest management plans for fuelwood production. However, Senegal needs to develop the required tools to (i) characterize and assess the national forest capital and monitor forest changes and GHG emissions resulting from land use change, deforestation, and forest degradation; (ii) guide its decisions related to forest management; (iii) assess the effectiveness of different forest management models and types of field interventions; (iv) assess ecosystem services and socioeconomic value of forests; and (v) monitor international commitments on forest and climate. The project will support the following:

- **Planning and implementation of a national forest monitoring system** to provide updated and accurate information on forest resources, management, and changes with technical assistance integrating data from national and local inventories, using mapping and remote sensing data, and establishing a coordination framework to ensure the monitoring of changes and trends over time. This system will integrate a measurement, reporting, and verification framework, in accordance with the UNFCCC[104] guidelines, to monitor the NDC commitments in forests.
- **Setting up of a forest product traceability system** to curb illegal logging and achieve the objective of fuelwood and charcoal supply coming systematically from sustainably managed forests, including through product labeling. This system could be extended to forest products and will be developed with external technical assistance.

(c) **Implementation of regional cooperation and coordination mechanisms on illegal timber trade (US$0.2 million).** A high-level dialogue was initiated between Senegal and The Gambia on illegal cross-border logging, which is one of the drivers of cross-border forest degradation. The project will help improve regional cooperation by (i) conducting a regional study on illegal timber trade to help characterize the issue and identify measures to be implemented to stop illegal cross-border timber trafficking and (ii) organizing regional coordination meetings supporting ongoing initiatives, with the participation of other relevant stakeholders (for example, CITES), to monitor the implementation of the recommendations on illegal timber trade.

Subcomponent 3.2: Strengthening Community based forest management, domestic energy sources, and sustainable use of fuelwood (US$11.2 million)

15. The community-based forest management model, for fuelwood production, for other timber and non-timber forest products, or for the protection of natural and cultural heritage, has effectively supported efforts to address the main drivers of deforestation and forest degradation[105] locally in Senegal while offering economic opportunities to communities. The activities implemented in this subcomponent address both climate mitigation and adaptation. The rate of forest loss in community-based managed forests in Senegal is significantly lower than in non-managed areas, which reduces GHG emissions from deforestation and forest

[103] The CERSI is in charge of coordinating the mapping, inventory, and assessment of forest ecosystem resources and services and for editing and validating maps, reports, and inventory protocols.
[104] UNFCCC = United Nations Framework Convention on Climate Change.
[105] Excessive use of fuelwood, forest fires, and illegal logging.

degradation.[106] The results from both PROGEDE I and II clearly show positive impacts in reducing deforestation in community-based managed forest areas. The subcomponent will also provide adaptation co-benefits with an IGA program in targeted classified forests, community-based management forests, and community-based reserves, which will enable income diversification for communities whose activities, such as traditional agriculture, are threatened by climate change. This subcomponent will support the following:

(a) **Strengthening community-based forest management (US$8 million).** The empowerment of local populations and authorities for forest management has been strengthened through the promotion of the community-based approach for sustainable forest management and has led to a restructuring of the fuelwood production sector. Several community-based nature reserves have also been created to protect cultural and natural heritage while providing ecosystem services for local development. Local communities are also involved in the management of some classified forests targeting sustainable fuelwood production. The project will support activities leading to avoid deforestation and associated GHG emissions in targeted areas:

- **Consolidation and extension of community-based sustainable forestry for fuelwood production.** The project will support the monitoring of existing community-based forests established with support of previous projects, including PROGEDE, and the development of new processes for community-based management in pre-identified forests for fuelwood production, in the Tambacounda, Kolda, Sédhiou, and Kédougou regions (see pre-identified forests . 2.1). The project will finance technical assistance to support local governance bodies, forest management processes, capacity building for local fuelwood producers, development of standards for sustainable community-based forest management for fuelwood production, definition of terms for forest resources,[107] monitoring the efficiency of the local forest management funds, and supporting of a transparent system for logging rights.
- **Strengthening of the community-based management for forest capital conservation** in the targeted regions of Tambacounda, Kolda, Sédhiou, and Kédougou, including classified forests, and community nature reserves (see pre-identified forests . 2.1). The project will finance technical assistance to support the development, implementation, and monitoring of simplified management plans (zoning, mapping, and biodiversity inventories),[108] the establishment of governance bodies (including representation of women in leadership positions), and development of management tools.
- **Income diversification with the development of agroforestry and ecological IGAs** to reduce pressure on forest resources. This IGA program will be implemented around targeted forests. This program will primarily target women and youth groups and will be carried out along with sustainable forest management planning. The program will focus on a limited number of activities around structuring-targeted value chains (from production to processing and certification). The project will help finance national NGOs and specialized organizations support

[106] Annual rates of deforestation in PROGEDE I areas before community-based management (2001–08): –0.35 percent and after community-based management (2009–20): –0.07 percent; PROGEDE II areas before community-based management (2001–14): –0.22 percent and after community-based management (2015–20): –0.06 percent; new areas pre-identified for development of community-based forest management (2001–20): –0.23 percent; classified forests (2001–20): –0.09 percent; and Niokolo-Koba National Park (2001–20): –0.11 percent; Analysis using global forest change data: Hansen et al. (2013).

[107] Depending on the status of the area in which a community-based managed forest is established, the practical procedures for recognizing rights for access to the resource are different: (a) in the classified forest estate (Domaine forestier classé), including in classified forests, the signature of 'concession agreements' between the authority and the communities to delegate the management of forest is required and (b) in forest areas outside the classified forest estate (protected forest estate, Domaine forestier protégé), the recognition is done by deliberation of the local authorities and recorded in the cadaster.

[108] In particular, the new classified forests of Boumoune-Samaye, Saré-Bandé, Saré Lally, and Dialacoto.

local communities in the development of IGAs (that is, beekeeping; NTFP chains with potential for commercial development such as Baobab, Soump, Sidème, Rand, Ronier, Kinkeliba, Alom, Néré, Sap, and Tamarin; or the establishment of multipurpose gardens.

(b) **Increasing energy efficiency and the diversification of domestic energy sources (US$3.2 million).** Senegal has engaged several initiatives to reduce the consumption of fuelwood with its partners,[109] by promoting efficient cooking equipment and improved stoves. The use of improved cookstove in Senegal results in a 30 percent reduction in fuelwood consumption compared to traditional cooking.[110] However, the distribution of these stoves must be scaled up, as is reaffirmed in Senegal NDC and fuelwood alternatives developed (bio coal and bio digesters). The project will finance (i) support for the broad distribution of improved cookstoves with technical assistance to identify the bottlenecks preventing the large production and distribution of improved cookstove and support the sector over several years and (ii) support for the development of alternatives to the use of fuelwood by supporting selected NGOs for the development of promising alternatives in the project-targeted areas.

Subcomponent 3.3: Strengthening and valorization of natural forest capital (US$14.4 million)

16. In addition to community-based forest management initiatives, the enhancement of natural forest capital requires interventions of public authorities through the protection of natural forest areas, including protected areas and classified forests, the fight against illegal logging and export of timber, and the fight against forest fires. The MEDD has staff in the field, who should be able to address the challenge of the degradation of the national forest heritage, if their technical and operational capacities are strengthened. This subcomponent should contribute to the following:

(a) **Strengthening of decentralized forest management and the fight against illegal timber trade in the targeted regions (US$9.4 million).** The MEDD has decentralized personnel at the regional (inspections), departmental (sectors), and municipal (brigades) levels, responsible for supporting the implementation of the forestry policy on the ground, including support and supervision of community-based forestry, management of wood production, fight against illegal logging and bush fires, conservation and protection of classified forests, and reforestation activities. However, the technical and operational capacities of these field officials are insufficient to effectively carry out these assignments. The project will support the following activities:

- **Technical capacity building for forestry management** with technical assistance to support the development and implementation of a training program and provide technical support on the Forestry Code; forest management planning; field interventions, including the fight against forest fires, illegal logging, organization of patrols, and use of new technologies and artificial intelligence (camera trap, drones, climate station, and so on); and the widespread use of digital systems for planning, monitoring, and reporting of missions and activities.[111]
- **Building of the operational capacities for forestry management** by strengthening the infrastructures facilitating the work of decentralized staff construction of pilot rangers quarters, purchase of IT and technical equipment (technological equipment, individual field gears, geolocation, vehicles, and motorcycles), acquisition of bushfire fighting vehicle units, provision

[109] Including the Program for the promotion of renewable energy, rural electrification, and sustainable domestic fuel supply (*Programme pour la promotion des énergies renouvelables, de l'électrification rurale et de l'approvisionnement durable en combustibles domestiques*, PERACOD) Project with the support of the German Agency for International Cooperation (*Deutsche Gesellschaft für Internationale Zusammenarbeit*, GIZ) and PROGEDE, along with the World Bank's IDA and the Nordic Development Fund.
[110] Bensch, and Peters (2015).
[111] The SMART-Spatial Monitoring and Reporting Tool is used by officers of the DPN and can be extended to the entire water and forestry teams in the targeted regions. https://smartconservationtools.org/.

of support to field missions and operations, and implementation of forest protection works (development and maintenance of firebreaks and forest demarcation).

(b) **Management and valorization of the Niokolo-Koba National Park (US$5 million).** The protected areas of the targeted regions contribute to the conservation and protection of forest and natural capital, and the continuation of ecosystem services for the local communities. The project will support technical assistance to update the management plan and capacity building for field rangers and DPN, constructing minor infrastructure (bridges, trails, and monitoring stations), providing technical/IT equipment and field vehicles, developing a destination vision and investment plan, and contributing to missions and operations.

Table 2.1. Pre-Identified Project Sites

Project Sites	
Component 2	
2.1b	• Construction and equipment of coastal monitoring stations (DPSP): Cap Skirring and Yoff • Rehabilitation and equipment of coastal monitoring station (DPSP) at Djiffer and Mbour • Construction and equipment of coastal monitoring posts (DPSP): Kafountine and Pointe Sarène • Construction of control posts (DPM): Diogué, Foundiougne, Kafountine, Mbao, Nianing, and Popenguine
2.1c	• Support to existing community-based management initiatives including ZPP Petite Côte, ZER/ZIP Ouakam, Ngaparou, and Soumbédioune to be extended around the sites of Ngaparou and Soumbédioune and the sites of Anse Bernard and Terrou Baye • Development of new community management initiatives include Cap Skirring, Fass Boye, Kafountine, and Mbour
2.1c	• Management planning: Fass Boye, Mbour, Cap Skirring, and Kafountine and around new reef sites (Yoff and Hann)
	• Construction and equipment of 'Fishermen's Houses' in Bassoul, Cap Skirring, Djirnda, Fass Boye, Kafountine, Mbour, Ngor, Niodior, and Yoff. • Establishment of new artificial reefs: Yoff and Hann
2.2a	• New fishing docks in Fass Boye and Cap Skirring and modernization of the Ouakam fishing dock • Modernization of the existing processing units in Kayar and Mballing • Construction and equipment of new modern and fuel-efficient smoking units in Niodior, Diogué, and Kafountine • Rehabilitation of the existing centers for experimentation and enhancement of fish products in Pointe-Sarène (Algae), Missirah (Surimi), and Foundiougne (shrimps) and construction and equipment of a new center in Diamniadio
2.3c	• Development of aquaculture hubs: (a) the medina Cherif aquaculture pond liner in the Kolda region targeting rice-fish farming and Nile tilapia (Oreochromis niloticus); (b) the Guidick cage and aquaculture pond liner and Gabar/Leona cage aquaculture hub in the Louga region targeting Nile tilapia (Oreochromis niloticus), catfish (Clarias gariepinus), and sea bream (Spartus aurata); (c) the pond liner and aquaculture pouches of Mouït in the Saint-Louis region targeting oysters (Crassostrea gasar), catfish (Clarias gariepinus), and Nile tilapia (Oreochromis niloticus); (d)the aquaculture pond liner pole of Ndiéné Lagane and cage/garlands aquaculture hub in Diakhanor in the Fatick region targeting the Nile tilapia (Oreochromis niloticus), oysters (Crassostrea gasar), and the common meager (Argirosumus regius); (e) the floating cage fish farming of Sekoto in the Kédougou region targeting Nile tilapia (Oreochromis niloticus); (f) the aquaculture pond liner of Karoumbou (Goudomp department) in the Sédhiou region targeting Nile tilapia (Oreochromis niloticus); and (g) the aquaculture pond liner of Sousoung in the Thiès region targeting Nile tilapia (Oreochromis niloticus).
Component 3	
3.2a	• Consolidation and extension of community-based forestry for fuelwood production by supporting existing community-based managed forests including the following: (a) PROGEDE I (Bonconto, Kandiator, Koar, Nétéboulou, Saré-Gari, Thiéwal, and Missirah/Kothiary), (b) PROGEDE II (Bousimballo, Boynguel Bamba,

Project Sites	
	Diambaty, Maka, Mballocounda, Ndoga, Niani, Niani-Saloum, Saré-Bodio, Segoucoura, Medina Salam Dinga, Mousdalifa, and Pima Thiour), (c) Wulu Nafa Project (Sakar-Oudoucar, Saré-Bidji, Koussanar, Koulor, and Sita Niaoulé), and (d) PERACOD (Saré-Omar and Darou Salam Thierno); and community (Sinthiou Bocar Aly, and Payar) and developing new community-based managed forests in preidentified areas: five forests in Tambacounda region, six forests in Kolda region, and two forests in Sédhiou region
3.2a and 3.3a	• Support for the management of classified forests in the project intervention area including (a) in the Tambacounda region: Ouli, Paniates, Koussanar, Bala-Est, Bala-Ouest, Botou, Diambour, Goudiry, Gouloumbou, Koumpentoum, Malem-Niani, Panal, Tamba-Nord, Tamba-Sud, Dialacoto, and Sanding Counda; (b) in the Kolda region: Medina Salam Dinga, Bakor, Diatouma, Dabo, Koudora, Kayanga, Anambé, Mahon, Mampaye, Pata, Toutoune, Guimar, Kantora, Boumoune-Samaye, Saré-Bandé, and Saré Lally; and (c) in the Sédhiou region: Bafata, Baghagha, Bari, Diend, Roneraie de Diafilon, Mangaroungou, Sadiala, Yacine, Balmadou, Boudié, Djibabouya, and Badimbour
	• Support for the management of community natural reserves in the project intervention area: (a) Tomboroncoto Bandafassi, Niéméniké, Thiabédji, Dindéfélo, and Oubadji (Kédougou) and (b) Wadiatoulaye and ile du Diable (Kolda)
3.3a	• Strengthening decentralized forest management and the fight against illegal timber trade and forest fires in Tambacounda, Kolda, Kedougou, and Sédhiou
3.3b	• Management and valorization of protected areas: Niokolo-Koba National Park

Table 2.2. Project Costs

Component/Subcomponent	Total	MPEM	MEDD	Consultant	Equipment	Works	Operations Cost	Sub-grants
	100.0	**50.0**	**50.0**	**27.74**	**19.65**	**31.52**	**9.29**	**11.81**
Component 1: Institutional framework for managing E&S risks	**17.0**	**2.0**	**15.0**	**3.92**	**10.55**	**0.00**	**2.06**	**0.48**
1.1 Strengthening the E&S risk management framework	**13.0**	**0.0**	**13.0**	**1.79**	**10.07**	**0.00**	**1.14**	**0.00**
a. E&S framework for project compliance and monitoring	*2.2*	*0.0*	*2.2*	*1.05*	*0.47*	*0.00*	*0.68*	*0.00*
b. Environmental monitoring systems (CGUE & CGQA)	*10.8*	*0.0*	*10.8*	*0.74*	*9.60*	*0.00*	*0.46*	*0.00*
1.2 Streamlining the management of marine, coastal and forest resources	**2.0**	**1.0**	**1.0**	**1.56**	**0.00**	**0.00**	**0.44**	**0.00**
a. Zoning and management models for marine and coastal natural resources management and community-based fisheries initiatives	*1.0*	*0.0*	*1.0*	*0.70*	*0.00*	*0.00*	*0.30*	*0.00*
b. Resilience and sustainability of smoked seafood value chains	1.0	1.0	0.0	0.86	0.00	0.00	0.14	0.00
1.3 Citizen engagement for the environment, climate, forests, and fisheries.	**2.0**	**1.0**	**1.0**	**0.57**	**0.48**	**0.00**	**0.48**	**0.48**
Component 2: Resilience and productivity of the fisheries and aquaculture sectors	**45.0**	**45.0**	**0.0**	**9.60**	**4.59**	**24.70**	**2.98**	**3.13**
2.1 Fisheries management and community-based fisheries management initiatives	**17.6**	**17.6**	**0.0**	**5.10**	**3.70**	**4.33**	**1.86**	**2.61**
a. Fisheries management plans	*3.9*	*3.9*	*0.0*	*2.25*	*0.69*	*0.00*	*0.97*	*0.00*
b. Licensing, permits and fishing rights	*6.6*	*6.6*	*0.0*	*1.46*	*1.96*	*2.58*	*0.60*	*0.00*
c. Monitoring, control, surveillance, and safety at sea	*7.1*	*7.1*	*0.0*	*1.40*	*1.05*	*1.75*	*0.29*	*2.61*
2.2 Strengthening the value chains of selected fisheries	**17.4**	**17.4**	**0.0**	**1.99**	**0.20**	**14.52**	**0.35**	**0.34**
a. Climate-informed infrastructures for artisanal fisheries	*14.9*	*14.9*	*0.0*	*0.38*	*0.00*	*14.52*	*0.00*	*0.00*
b. Technical assistance to strengthen value chains	*1.3*	*1.3*	*0.0*	*0.96*	*0.00*	*0.00*	*0.00*	*0.34*
c. Monitoring and control for sanitary quality	*1.2*	*1.2*	*0.0*	*0.65*	*0.20*	*0.00*	*0.35*	*0.00*
2.3 Aquaculture development	**10.0**	**10.0**	**0.0**	**2.50**	**0.70**	**5.85**	**0.77**	**0.18**
a. Enabling framework for aquaculture attractiveness	*0.5*	*0.5*	*0.0*	*0.50*	*0.00*	*0.00*	*0.00*	*0.00*
b. Stakeholders capacity building	*3.0*	3.0	*0.0*	*1.36*	*0.70*	*0.00*	*0.77*	*0.18*
c. Key infrastructures for aquaculture development and training	*6.5*	*6.5*	*0.0*	*0.65*	*0.00*	*5.85*	*0.00*	*0.00*
Component 3: Sustainable management of forests and ecosystems	**32.0**	**0.0**	**32.0**	**10.89**	**3.93**	**6.82**	**2.17**	**8.20**
3.1 Institutional and legal framework for forest management and monitoring	**6.4**	**0.0**	**6.4**	**5.90**	**0.30**	**0.00**	**0.20**	**0.00**
a. Capacity building for forest management	*0.7*	*0.0*	*0.7*	*0.30*	*0.30*	*0.00*	*0.10*	*0.00*
b. Forests knowledge and monitoring	*5.5*	*0.0*	*5.5*	*5.50*	*0.00*	*0.00*	*0.00*	*0.00*
c. Regional cooperation on illegal timber trade	*0.2*	*0.0*	*0.2*	*0.10*	*0.00*	*0.00*	*0.10*	*0.00*
3.2 Community-based forest management and sustainable domestic energy	**11.2**	**0.0**	**11.2**	**3.00**	**0.00**	**0.00**	**0.00**	**8.20**
a. Community-based forest management	*8.0*	*0.0*	*8.0*	*2.00*	*0.00*	*0.00*	*0.00*	*6.00*
b. Domestic energy efficiency and diversification of energy resources	*3.2*	*0.0*	*3.2*	*1.00*	*0.00*	*0.00*	*0.00*	*2.20*
3.3 Strengthening and alorization of natural forest capital	**14.4**	**0.0**	**14.4**	**1.99**	**3.62**	**6.82**	**1.98**	**0.00**
a. Decentralized forest management and fight against illegal timber trade and fire	*9.4*	*0.0*	*9.4*	*1.04*	*1.96*	*4.60*	*1.80*	*0.00*
b. Management and valorization of protected areas	*5.0*	*0.0*	*5.0*	*0.95*	*1.67*	*2.22*	*0.17*	*0.00*
Component 4: Project management	**6.0**	**3.0**	**3.0**	**3.34**	**0.58**	**0.00**	**2.08**	**0.00**

ANNEX 3: Economic Analysis

COUNTRY: Senegal
Senegal: Natural Resources Management Project (P175915)

1. **Project benefits.** Given its objective of improving the management of natural resources, fish stocks and forests and associated landscapes, the project is expected to yield a wide range of benefits, not all of which can be readily quantifiable. The benefits streams can be broadly grouped into three, interrelated categories, as follows:

   - **Higher ecosystem productivity and related services,** from improved management, reduced pressure, and restoration efforts. These benefits are expected from the project's activities such as development, updating, and monitoring of targeted fisheries development plans (and enhanced monitoring, control, and surveillance) as well as scaling-up of fisheries co-management approach with local communities under Component 2 and community management of fuelwood production forests and integrated management, monitoring, conservation, and enhancement of natural forest capital in classified forests and natural parks under Component 3. They include, among others, higher natural productivity and biomass growth, increased carbon sequestration into biomass and soil, and other regulation services (reduced soil erosion and desertification, air and water quality regulation, and habitats for biodiversity). Experience from the WARFP and PROGEDE II offers a quantifiable illustration: increased fish size at all community sites, participation in co-management under the WARFP and increased sustainable wood fuels production, reduced deforestation, and increased carbon sequestration under PROGEDE II. The analysis will consider the carbon balance, as the direct quantifiable benefits.
   - **Improved livelihood and economic productivity from more productive ecosystems.** These benefits are mostly expected from investments under Components 2 and 3 and include for Component 2, higher value added and job creation from construction and/or rehabilitation of landing and processing infrastructure for fish and marine products, improved income and food security from scaling up fisheries co-management approach with local communities, and job creation and income from aquaculture investments and, for Component 3, income from fuelwood and charcoal production form better managed forests. In addition, IGAs under Components 2 and 3 will contribute to improve the livelihoods of those populations severely affected economically by the sanitary crisis, particularly fishing communities and rural populations. Under PROGEDE II for instance, participating villages/local communities saw their income from forest resources increase four times within five years. The analysis will consider aquaculture, fuelwood production, and IGAs as representative activities to quantify these benefits.
   - **Stronger resilience from increased preparedness to cope with shocks.** All components will contribute through their activities. Component 1 will improve preparedness by strengthening the national E&S management system (for example, in better identifying, assessing, and addressing climate change vulnerability and risks), improving monitoring of a major environmental health hazard (for example, scaling up the ambient air quality measurement network) and response capacity (for example, overhaul of the CGUE), and raising environmental and climate change awareness. Component 2 will support the development of aquaculture, one of the adaptation priorities of the country's NDC, as one option to mitigate the volatility of (and expected decrease in) marine fisheries productivity. Finally, Component 3 will enhance the resilience of local communities in project areas by restoring the health of the ecosystems from which they derive an important part of their livelihood and promoting alternatives to their overexploitation. However, these benefits are not readily quantifiable and will not be considered in the analysis. Empirical evidence shows that they are nonetheless profitable: there

is, on average, a 1.4 cost-benefit from investments in disaster risk reduction and 2.8 for investments with early warnings (as with air quality monitoring).[112]

2. Basic economic production models for the economic and financial analysis were developed to estimate the direct quantifiable benefits of the project, as follows:

   - **Carbon balance** due to net carbon sequestration into better managed forested areas and landscapes. Two variables are taken into consideration: the yearly carbon balance (in tons CO_2), derived from GHG analysis of the project, and the shadow price of carbon.
   - **Income from aquaculture,** with five illustrative models of aquapoles: four basins of 1,000 m² for tilapia breeding, eight basins of 100 m², including four for tilapia and four for clarias, four basins of 450 m² for clarias breeding, four pools of 450 m² including two for Tilapia and two for clarias, and five cages of 100 m^2 each.
   - **IGAs,** with three modalities considered: fisheries, forestry, and alternatives to the use of wood energy (including cookstoves and modern smoking ovens).

3. The financial profitability indicators of these different basic economic production models, such as the NPV and ERR, indicate that these models are profitable. The profitability of these models, however, remains subject to the risk of market price fluctuations, mainly due to due to unorganized marketing channels (despite the efforts made by the project to invest in marketing infrastructure).

4. **Costs.** Economic costs include the three project components. To avoid double counting, certain costs included in the calculation of activity models, particularly IGAs, have not been taken into consideration. As some benefits are not quantifiable, while all costs have been considered, this suggests the findings from the economic analysis are conservative.

5. **Assumptions of the economic analysis.** The economic analysis of this project is based on a number of assumptions that are conservative: shortfalls and profits made by downstream valorization structures are not considered. Likewise, the reduction in transaction costs—due to easier access to certain technical services, information, and technologies—are not considered. The main hypotheses are developed as follows:

   - The economic life span of 20 years (2022 to 2042) was chosen to reflect the useful life span of the main investments made, including 5 years of project implementation and 15 years of capitalization.
   - Economic prices were introduced to correct price/financial cost distortions due to government interventions (taxation, subsidies, financial contingencies, and other transfers) and imperfections in labor, capital, goods, and services markets affected by the project. An SCF of 0.85 was used to reflect the existing distortions and convert financial prices into economic prices. This SCF corresponds to the wholesale price of the supported products, net of transfers between agents concerned by the project, considering that the financial prices include at least the value added tax. The assumptions used for the estimation of the SCF have been relaxed to assess the robustness of the project to variations of the SCF.
   - An aggregation of benefits was made from the production models into economic benefits and a zero residual value was assumed for the project investments.
   - Recurrent expenditure would be borne by the Government, professional organizations, beneficiary communities, the private sector, and direct beneficiaries for the upkeep and maintenance of

[112] World Bank. 2021. *Investment in Disaster Risk Management in Europe Makes Economic Sense.* Washington, DC: World Bank.

infrastructure. Also, the annual recurrent costs were carried over the economic life of the project, with 30 percent of these costs from Year 5 (2026) to Year 20 of the project (2041).

- The OCC retained is 12 percent similar to other projects financed by the World Bank in the region. This rate reflects the remoteness of the project area and its partial integration into the markets of capital, goods, and services. The OCC rate is relatively high but remains lower than the rate corresponding to the current average interest rate applied to loans granted by commercial banks to economic operators in Senegal.

6. **Economic profitability of the SNRMP.** Based on the above assumptions, the ERR of the project is 77.9 percent (. 3.1). The economic NPV is positive (US$206.2 million) and the benefit-cost ratio is 4.3, that is, greater than unity. . These three efficiency indicators of the SNRMP are especially satisfactory because part of the benefits could not be quantified.

Table 3.1. Summary of the Financial and Economic Analysis (US$, millions)

	2022	2023	2024	2025	2026	2027
Total benefits	**2,487,413**	**16,906,409**	**23,877,013**	**30,901,226**	**38,391,812**	**44,854,721**
Carbon balance	**5,273,617**	**10,788,774**	**16,666,240**	**22,704,733**	**28,783,483**	**35,264,799**
Aquaculture	**2,958,313**	**3,148,145**	**4,265,781**	**5,273,774**	**6,305,857**	**6,305,857**
IGA	**(470,900)**	**2,969,490**	**2,944,991**	**2,922,719**	**3,302,472**	**3,284,065**
of which: Fisheries		*480,000*	*480,000*	*480,000*	*560,000*	*560,000*
Forestry		*1,420,000*	*1,420,000*	*1,420,000*	*1,740,000*	*1,740,000*
Efficient wood energy	*(470,900)*	*1,069,490*	*1,044,991*	*1,022,719*	*1,002,472*	*984,065*
Total costs	**18,410,772**	**22,429,114**	**21,077,444**	**9,794,261**	**4,274,361**	**1,282,308**
Net benefits	**(10,649,741)**	**(5,522,706)**	**2,799,568**	**21,106,965**	**34,117,451**	**43,572,413**
NPV (US$)	**206,153,698**					
ERR (%)	**77.9**					
Cost-benefit ratio	**4.3**					

7. **Sensitivity analysis.** The sensitivity analysis of the project's economic profitability relates to increases/decreases in costs, increases/decreases in benefits, and delays in achieving costs/benefits (. 3.2.). The sensitivity to the OCC, SCF, and the price of carbon is discussed in paragraphs 8 and 9 below. The ERR calculations show that an increase in benefits or a decrease in costs logically leads to a higher ERR. The project would also remain economically profitable to a halving of benefits: the ERR decreases from 67 to 32 percent if benefits decrease by 10 to 50 percent. Likewise, the project would remain economically profitable even with a nearly doubling of costs: a cost increase of 80 percent (while having constant profits) would leave the ERR at 35 percent. A simultaneous increase in costs of 10 to 70 percent associated with a 10 percent decrease in benefits leads to an ERR greater than 30 percent. The same is true for a 20 percent reduction in benefits associated with a 60 percent increase in costs. A one-, two-, and three-year delay in achieving the overall benefits of the project would always yield an ERR greater than the OCC, at 29 percent with a three-year delay.

8. The economic viability of the SNRMP is robust to changes in the OCC (Table 3.3). The NPV is responsive to fluctuations in the OCC: it decreases four times (from US$430 million to US$101 million) as the OCC increases four times (from 5 to 20 percent). The analysis also demonstrates the robustness of the project and of its profitability indicators (ERR, NPV, and cost-benefit ratio) to variations in the SCF, as shown in Table 3.3. The analysis explores fluctuation around the central value of the SCF (0.85), between 1.0 and 0.5, and in all cases the NPV remains positive, the cost-benefit ratio greater than unity, and the IRR above the OCC (12 percent).

9. The price of carbon has the largest influence on the project's viability but even for low values, the project remains profitable. The analysis without the benefits of carbon sequestration (or equivalently, with a zero carbon price) shows that the ERR decrease drastically from 77.9 to 10.9 percent. The sensitivity analysis for the price of carbon was undertaken using a high and a low carbon price, starting at US$92 and US$46 per tCO_2, respectively (or US$66 per tCO_2 in the central case) and consumer price index adjusted (Table 3.4.). The analysis shows that halving carbon price nearly halves the NPV (from US$288.6 to US$142.8 million), but the ERR and cost-benefit ratio remain robust, that is, above the OCC and unity, respectively. In all cases, the high and low carbon prices depict a profitable project: the ERR greater than the OCC, positive NPV, and a cost-benefit ratio greater than unity.

Table 3.2. Sensitivity Analysis to Changes in Costs and Benefits of the Project

Benefit Decrease			Cost Increase			Benefit Decrease and Cost Increase			Delay in achieving Benefits		
Benefit Change	NPV (US$, millions)	ERR (%)	Cost Change (%)	NPV (US$, millions)	ERR (%)	Benefit/Cost Change	NPV (US$, millions)	ERR (%)	Delay (years)	NPV (US$, millions)	ERR (%)
–10%	179.246	67	10	199.861	68	–10% B + 10% C	172.953	58	1	171.970	46
–20%	152.338	57	20	193.568	60	–10% B + 40% C	154.075	43	2	141.538	35
–30%	125.430	48	30	187.276	54	–10% B + 70% C	135.197	34	3	114.479	29
–40%	98.522	39	40	180.983	49	–20% B + 10% C	146.045	50			
–50%	71.614	32	50	174.690	45	–20% B + 40% C	127.167	37			
			80	153.295	35	–20% B + 60% C	114.582	32			

Table 3.3. Sensitivity Analysis to Changes in the OCC and SCF

Changes in the OCC					
OCC (%)	20	15	12	10	5
NPV (US$, millions)	101.163	155.735	206.153	251.177	429.551
Cost-benefit ratio	4.3				
ERR (%)	77.9				
Changes in SCF					
SCF	1.0	0.9	0.85	0.8	0.5
NPV (US$, millions)	195.049	202.452	206.154	209.855	232.065
ERR (%)	61.6	71.5	77.9	85.7	243.2
Cost-benefit ratio	3.63	4.04	4.28	4.54	7.27

Table 3.4. Sensitivity Analysis for the Price of Carbon

	Low Price	High Price
NPV (US$, millions)	142.758	288.581
ERR (%)	55.6	117.5
Cost-benefit ratio	3.27	5.59

ANNEX 4: Climate Vulnerability, Related Actions, and Co-Benefits

COUNTRY: Senegal
Senegal: Natural Resources Management Project (P175915)

1. While Senegal contributes only marginally to global CO_2 emissions (less than 0.03 percent),[113] it is the 36th most vulnerable country in the world to the impacts of climate change.[114] Rising temperatures, changing precipitation patterns, more prevalent drought, sea level rise, and coastal erosion are already negatively affecting a large portion of the country's population: about 60 percent live in the coastal zone,[115] which is frequently exposed to floods, and about 70 percent is employed in the agriculture sector,[116] which is primarily rain-fed.

2. In a scenario of a 3°C temperature increase, Senegal's GDP is expected to decrease by 1.27 percent by 2030 and 3.91 percent by 2050.[117] The number of people in extreme poverty could double as early as 2030, due to food price and production shocks as well as human health impacts. Many sectors that are critical for growth are also vulnerable to climate change, notably agriculture (including livestock, fisheries, and aquaculture), energy, and tourism, as also highlighted by the *Plan Senegal Emergent* and the most recent PAP2-AA. The PAP2-AA includes climate measures, analyzes their macroeconomic impact, and concludes that Senegal can pursue a green and resilient recovery from the pandemic that boosts growth, generates jobs, and alleviates poverty. This annex briefly describes Senegal's main climate vulnerabilities and details how the SNRMP will contribute to addressing those climate vulnerabilities and boosting mitigation, especially in support of the country's NDC.

3. Climate projections for Senegal[118] show significant anticipated changes in temperature and precipitation that are expected to affect production systems and people's livelihoods, including

   (a) **Increase in mean annual temperatures,** by 1.1 to 3.1°C by the 2060s, and 1.7 to 4.9°C by the 2090s, with projected rates of warming faster inland than over coastal areas;

   (b) **Substantial changes in extreme temperatures,** with an increase in the frequency of days and nights that are considered 'hot' in the current climate (more pronounced in the south and east of the country) and a decrease in the frequency of days and nights that are considered 'cold'; and

   (c) **A wide range of potential changes in the mean annual rainfall** averaged over the country, from –41 to +48 percent by the 2090s with a higher likelihood that a greater proportion of precipitation will occur in heavy rainfall events.

4. The climate vulnerabilities of Senegal include the following:

   (a) **Sea level rise and increased intensity of storm surges** are known to lead to coastal risks, affecting livelihoods, settlements, and economic activities in Senegal. Sea level rise is exacerbated by the country's geology (including sediment deficits, natural instability of slopes, and surface runoff) and threatens 74 percent of households living in coastal areas. Sea level rise and storm surges are also leading to saltwater intrusion into agricultural lands, especially in the Saloum-Delta.

[113] In 2018, Senegal emitted 9,860 kt of CO_2 per year compared to worldwide emissions of 34,041,046 kt (World Bank Development Indicators).
[114] According to the Notre Dame Global Adaptation Initiative Country Index.
[115] https://www.wacaprogram.org/country/senegal.
[116] https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/SENEGAL_CSA_Profile.pdf.
[117] World Bank. 2020. *The Next Generation Africa Climate Business Plan: Ramping Up Development-Centered Climate Action*.
[118] Predictions and vulnerability data from the World Bank climate knowledge portal: https://climateknowledgeportal.worldbank.org/country/senegal.

(b) **Coastal erosion will accelerate dramatically.** Slightly more than one-quarter of the coastline is currently under high or very high erosion risk, but this share could increase to 75 percent by 2080 due to climate change, with a loss of 0.5 to 2 m every year.[119]

(c) **Floods are frequent natural disasters in Senegal** and are the result of major river overflows due to heavy rains (Senegal and The Gambia rivers). Urban and rural areas are vulnerable, especially areas in and around Dakar, Saint-Louis, Matam, Kaolack, Thies, Diourbel, Kolda, Kaffrine, and Tambacounda. Flood impacts are amplified by poor drainage and lack of urban planning;

(d) **Droughts are concentrated in the north and center of the country** (arid and semiarid Sahelian regions). Droughts are affecting more people than floods per event.

5. Project interventions will promote climate resilience, through institutional management and awareness raising, incorporating climate issues, management of fisheries that will both build up resilience to climate impacts (including through aquaculture development, as a buffer against impacts on marine fisheries) and provide fishing communities with additional resilience to climate change through economic diversification, and forest and land management, also contributing to both resilience and mitigation. With respect to fisheries and forested landscapes, as the two core sectors of intervention for the project, the following impacts from climate change are expected:

(a) The fisheries sector is likely to be adversely affected by climate change, compounding the multiple pressures already experienced by fish stocks and the marine environment and leading to severe socioeconomic consequences. Depletion and migration of fish stocks, increased accidents at sea, and destruction of equipment and infrastructure related to fishing activities will lead to severe socioeconomic consequences such as the impoverishment of fishing communities and a rise in migrations. Under some scenarios, the maximum catch potential in Senegal could decrease by up to 19 percent by 2050 and 36 percent by the end of the century.[120] To cope with these impacts, Senegal's National Fisheries Adaptation Plan identifies the following adaptation actions, which are also echoed in the NDC: sustainably manage fisheries resources and restore/protect marine habitats, improve the safety of fishing communities and the resilience of coastal infrastructure, and develop sustainable aquaculture, which the project will address.

(b) As for biodiversity and forests, the NDC highlights the risks of ecosystem fragmentation and habitat loss, more prevalent wildfires, and the regression of iconic ecosystems such as the Niayes or the gallery forests (including in eastern Senegal). The NDC further identifies two major adaptation options against these impacts: sustainable landscape management and promotion of integrated production systems, including agroforestry through community forestry approaches and support to protected area management, and strengthening of the knowledge base on biological diversity through baseline studies for forest planning, which the project will also address.

6. Most of the activities of the project's Components 1, 2, and 3 are directly or indirectly supporting climate adaptation and/or mitigation efforts (see table 4.1 for a summary of funding in relation to climate action).

7. **With regard to climate change mitigation,** the greatest gains are expected to come from land use interventions (Component 3) including reducing deforestation and forest degradation from (a) conservation of natural forest capital in classified forests and protected areas; (b) sustainable forest management of

[119] World Bank. 2013. *Etude économique et spatiale de la vulnérabilité et de l'adaptation des zones côtières aux changements climatiques au Sénégal, Phase 2 - Analyse spatiale de la vulnérabilité aux changements climatiques de la zone côtière du Sénégal* » *ACC*-Rapport de synthèse final, 114 p. Dakar.

[120] World Bank. 2019. *Climate Change and Marine Fisheries in Africa: Assessing Vulnerability and Strengthening Adaptation Capacity*. Washington, DC: World Bank.

community-based managed forests for fuelwood production; (c) reduced fuelwood consumption due to increased use of improved cookstoves and diversification of domestic energy; (d) promotion of alternative, less forest-degrading activities (for example, agroforestry and plantation); and (e) reduced illegal timber trade and bush fires in key forested regions. The other two components will also contribute to climate change mitigation through (a) inclusion of climate change considerations in E&S assessment and monitoring processes with a possible impact on the reduction of GHG emissions in key national investments (C1); (b) reduction in GHG emissions due to the reduction in the use of firewood from forests and mangroves with the modernization of smoked fish and seafood value chains, including improvement in energy efficiency and use of alternative fuels (C1 and C2); and (c) increase in fishing efficiency due to better fisheries planning, monitoring, and surveillance and hence reduction in fuel consumption (C2). This is well aligned with the mitigation priority areas of the NDC, which focus on energy (domestic fuels: accelerate diffusion of improved cookstoves and promote biochar and biodigesters) and forests (reduce prevalence of fires and slow down forest resource degradation through protection, restoration, and plantation).

8. **With regard to climate change adaptation,** all three technical components feature relevant activities including (a) climate change considerations in E&S tools and build capacity on climate impacts and resilience options to mainstream adaptation into investments; (b) strengthening of climate emergency response capacity with the CGUE (C1); (c) enhancing of citizen preparedness to increased air pollution and higher frequency of sand and dust storms due to climate change with CGQA (C1); (d) support for the sustainable management of coastal and marine resources through landscape approaches to cope with climate change effects on variability of halieutic resource (C1 and 2); (e) awareness-raising campaigns on climate change trends, effects, and adaptation (and mitigation) solutions (C1); (f) addressing of increased fishing canoe accidents caused by extreme weather events with geolocation technologies supporting rescue (C2); (g) construction, rehabilitation, and upgrading of climate-resilient infrastructures for fisheries and forest management (building design for lower energy consumptions, use of building materials with low embedded GHG emissions, construction of building structures for high energy efficiency, and addition of on-site renewable energy sources) (C2 and 3); (h) increased fisheries products value and aquaculture production reducing communities' dependence on natural protein sources whose abundance is threatened by climate change (C2); (i) promotion of IGAs in targeted areas reducing the communities' dependence on natural resources affected by climate change (C2 and 3); and (j) aquaculture development as a buffer to mitigate the volatility that climate change could impose on marine fisheries.

9. These interventions are well aligned with the NDC's adaptation priorities, which are focused on 'strengthening the resilience of ecosystems and productive activities''. With regard to fisheries, the NDC plans for actions such as (a) sustainable management of fisheries resources; (b) improved management effectiveness of marine protected areas; (c) development of sustainable aquaculture; and (d) improved safety of fishing communities and activities and make fisheries-related infrastructure resilient For landscape and biodiversity management, the NDC plans for sustainable landscape management and promotion of integrated production systems including agroforestry through community forestry approaches and support to protected area management and strengthening the knowledge base on biological diversity through baseline studies for forest planning.

10. Some of the mitigation targets are captured in the Results Framework including the area of forests under sustainable management plans (PDO) and the number of improved cookstove distributed (IR3.d). Net GHG emissions have been assessed as part of project preparation and will be monitored at the MTR and the ICR stages.

Table 4. 1. Mapping of Project Activities and Related Funding to Climate Co-Benefits

Project Components	IDA Financing (US$, millions Total)
Total Project IDA	**100**
Component 1: Institutional framework for managing environmental and social risks and intersectoral collaboration	17
1.1 Strengthening the E&S risk management framework	13
Mitigation co-benefits: The project is contributing to mitigation since this subcomponent is supporting the national E&S management system ensuring that key investments follow high ESS and include climate change considerations in E&S tools (for example, ESIAs and ESMPs). Climate-informed E&S tools can help make investments resilient and low-carbon. In addition, the project will provide capacity building to enhance awareness of climate change impacts and resilience options as well as mitigation solutions for individuals preparing, implementing, or monitoring these E&S tools. **Adaptation co-benefits.** The project is contributing to adaptation since this subcomponent is supporting (a) **The CGUE** that will facilitate the feedback of information from local populations on environmental emergencies related to climate change with a toll-free number and strengthen authority's intervention capacities to environmental emergencies related to climate change (including monitoring of climate-related emergencies, such as floods or forest fires) and (b) **The CGQA** since the center will modernize and extend the air quality measurement network (to cover more than 50 percent of the population) and improve its forecasting capacity and its communication and alert system. This will allow to inform populations on time so that they can anticipate and take measures to reduce their exposure. Air quality could deteriorate in the future with climate change effects including the occurrence of more extreme wind events and a shift to drier climates and increasing wind erosion and sand and dust storms.[121]	
1.2 Streamlining the management of marine, coastal, and forest resources	2
Mitigation co-benefits. The project is contributing to mitigation since this subcomponent is supporting the modernization of smoked fishery value chains including improvement of energy efficiency and alternative fuel allowing a reduction in GHG emissions due to the reduction in the use of firewood from forests and mangroves.[122] **Adaptation co-benefits.** The project is contributing to adaptation since this subcomponent is supporting the development of a joint marine and coastal area management and surveillance strategy and contributing to the sustainable management of coastal and marine resources through a landscape approach facilitating local halieutic resource regeneration to cope with global climate change effects on variability of the abundance of halieutic resource.	
1.3. Strengthening citizen engagement in relation to environment, climate, fisheries, and forestry	2
Mitigation co-benefits. The project is contributing to mitigation since this subcomponent is supporting civil society and local communities' awareness raising on the benefits (and solutions toward) of sustainable use of natural capital, including forests, mangroves, and marine resources, and mitigation alternatives to use of fuelwood, which will result in reducing GHG emissions from deforestation and forest degradation and artisanal fisheries efficiency. **Adaptation co-benefits.** The project is contributing to adaptation since this subcomponent will finance awareness-raising campaigns including on climate changes trends and impacts and solutions.	
Component 2: Resilience and productivity of the fisheries and aquaculture sectors	45
2.1. Strengthening fisheries management and community-based fisheries management initiatives.	17.6
Mitigation co-benefits: The project is contributing to mitigation since this subcomponent is supporting artisanal fisheries planning, monitoring, and surveillance, which should allow a rationalization of artisanal fishing, leading to a stabilization of the number of canoes and improvements in fuel-efficiency of fishing (C2.1.1. and 2.,3.). Other mitigation co-benefits are expected from efficiency improvements/shift to renewable energy sources (for example, solar) in the	

[121] Simulations suggest that global annual dust emissions have increased by 25 to 50 percent over the last century due to a combination of land use and climate changes.
https://uneplive.unep.org/redesign/media/docs/assessments/global_assessment_of_sand_and_dust_storms.pdf.
https://documents1.worldbank.org/curated/en/483941576489819272/pdf/SAND-AND-DUST-STORMS-IN-THE-MIDDLE-EAST-AND-NORTH-AFRICA-MENA-REGION-SOURCES-COSTS-AND-SOLUTIONS.pdf.

[122] Ijjasz-Vasquez, Chu, and Prince (2019); Mindjimba et al. (2019).

Project Components	IDA Financing (US$, millions Total)
construction/rehabilitation of small infrastructure for fisheries monitoring and community-based management (C2.1.and 3.6.). **Adaptation co-benefits.** The project is contributing to adaptation since this subcomponent is supporting the following: (a) The sustainable management of fish stocks and marine resources (that is, development/update of management plans, alignment of licensing systems with these plans, control of canoe registration, and strengthening of control and surveillance in both artisanal and fishing segments) - C2.1.1. and 2.3. Better managing harvesting of fish stocks and marine resources will help them recover and become healthier and thus more resilient. (b) The use of new technologies for geolocating artisanal fishing vessels for monitoring and safety at sea, thereby facilitating rescue in response to the increasing number of accidents at sea due to the impact of climate change on the frequency and intensity of weather events - C2.1.3. (c) Building and rehabilitation of climate-resilient infrastructures for fisheries management including for fisheries monitoring and community-based management - C2.1.3. Main impacts are coastal erosion and higher swell and adaptation options (to be confirmed through preparatory studies) including moving away from the shoreline and break zone (when possible), laying a cyclopean concrete bed/base under the foundations, raising the foundations, and using bollards and rocks to break tidal wave and swell. (d) Strengthening knowledge on the impact of climate change on fisheries (C2.1.5.), which could inform future planning and management of the sector. (e) Developing and implementing climate-smart co-management plans and introducing income diversification activities (C2.1.6.).	
2.2. Strengthening of the value chains of selected fisheries	17.4
Mitigation co-benefits. The project is contributing to mitigation since this subcomponent is supporting the development of efficient processing units for smoked fish products that will result in reducing GHG emissions from deforestation and forest degradation for fuelwood production - C2.2.1. Improved fish smoking ovens installed in West Africa can reduce fuel consumption by 50–75 percent.[123] **Adaptation co-benefits.** The project is contributing to adaptation since this subcomponent is supporting the following: (a) Building and rehabilitation of climate-resilient infrastructures for fisheries landing and processing - C2.2.1. Main impacts are coastal erosion and higher swell and adaptation options (to be confirmed through preparatory studies) including moving away from the shoreline and break zone (when possible), laying a cyclopean concrete bed/base under the foundations, raising the foundations, and using bollards and rocks to break tidal wave and swell. (b) Strengthening selected value chains of fish products, increasing the added value of these products, and helping maintain livelihoods in a context of threat to resource fish abundance due to climate change.	
2.3. Supporting the development of aquaculture	10
Adaptation co-benefits. The project is contributing to adaptation since this entire subcomponent will support, through both investments and technical assistance, aquaculture development as a buffer to mitigate the volatility that climate change could impose on marine fisheries and reduce the dependence of communities on natural protein sources from catch fisheries, whose abundance is threatened by climate change. In addition, the subcomponent will support climate-informed strategic studies (for example, zoning) and capacity building and will ensure that the siting and design of the aquaculture hubs is climate informed.	
Component 3: Sustainable management of forests and ecosystems	32
3.1. Strengthening of the institutional and regulatory framework for forest management and monitoring and coordination systems.	6.4
Mitigation co-benefits. The project is contributing to mitigation since this subcomponent is supporting (a) Capacity building to monitor forests (including the impacts of climate change on vegetation growth and disturbances), track forest products, and strengthen knowledge to facilitate decision-making and interventions to maintain and strengthen the country's forest capital and avoid GHG emissions from lack of sustainable forest management and	

[123] Ijjasz-Vasquez, Chu, and Prince (2019); Mindjimba et al. (2019).

Project Components	IDA Financing (US$, millions Total)
(b) Regional coordination to fight against illegal timber trade and avoid related GHG emissions.	
3.2. Community management of forests, domestic energy sources and sustainable use of wood energy	11.2
Mitigation co-benefits. The project is contributing to mitigation since this subcomponent is financing the following: (a) The development of community-based forest sustainable management that will result in reducing GHG emissions from deforestation and forest degradation for fuelwood production and the development of standards for sustainable community-based forest management for fuelwood production. The analysis carried out for project GHG accounting has demonstrated that community-based forest management leads to a reduction in the rate of forest loss compared to unmanaged areas. The project will support the reduction in forest loss rates in both existing community forests and currently unmanaged areas, in which new community forests will be created. (b) The diversification of household energy sources and increased the use of energy efficient cookstoves will result in avoided deforestation and reduction of forest degradation for fuelwood production. The use of improved cookstove in Senegal results in a 30 percent reduction in fuelwood consumption compared to traditional cooking.[124] **Adaptation co-benefits.** The project is contributing to adaptation since this subcomponent is supporting the development of an IGA program in the buffer area of targeted classified forest, community-based management forest, and community-based reserves, which will enable income diversification for communities whose activities such as traditional agriculture are threatened by climate change.	
3.3. Maintenance, strengthening and enhancement of natural forest capital	14.4
Mitigation co-benefits. The project is contributing to mitigation since this subcomponent is financing protected area management, fight against illegal timber trade, and fight against forest and bush fires in four of the most forested regions of Senegal, which will result in reducing GHG emissions from deforestation and forest degradation.	
Component 4: Project management	6
Adaptation and mitigation co-benefits. The project is contributing to mitigation and adaptation since this subcomponent is supporting the MEDD's capacity building for the management of natural capital and climate change.	

[124] Bensch, and Peters (2015).

ANNEX 5: Additional Details Related to the Monitoring and Evaluation Plan

COUNTRY: Senegal
Senegal: Natural Resources Management Project (P175915)

1. Several project results indicators require a detailed description of their content to establish of a robust M&E system from the initiation of the project. This annex provides key additional details for selected indicators.

2. **PDO 1: Forest area brought under management plans (ha).** This indicator includes production and protection of forests as well as other forests under sustainable management for which management plans have been prepared and endorsed and are under implementation including the following:

   (a) **Community-based managed forest.** This sub-indicator will monitor the level of development of community-based forests management for sustainable fuelwood production in the four targeted regions (Tambacounda, Kolda, Kedougou, and Sédhiou) including maintaining or renewal of management plans in the existing community-based forests and new management plans in the new preidentified forest to develop community-based sustainable fuelwood production.

   - In 2022, all existing community-based forests established for fuelwood production have a validated management plan developed (909,628 ha) including (i) Bonconto (18,885 ha), Kandiator (54,471 ha), Koar (70,499 ha), Nétéboulou (11,035 ha), Saré-Gari (10,420 ha), Thiéwal (45,000 ha), Missirah/Kothiary (62,859 ha) (PROGEDE I); (ii) Bousimballo (27,621 ha), Boynguel Bamba (25,715 ha), Diambaty (20,499 ha), Maka (54,202 ha), Mballocounda (26,518 ha), Ndoga (44,295 ha), Niani (44,758 ha), Niani-Saloum (41,821 ha), Saré-Bodio (23,356 ha), Segoucoura (58,498 ha), Medina Salam Dinga (26,895 ha), Mousdalifa (8,584 ha), Pima Thiour (10,402 ha) (PROGEDE II); (iii) Sakar-Oudoucar (14,000 ha), Saré-Bidji (19,807 ha), Koussanar (36,818 ha), Koulor (38,623 ha), Sita Niaoulé (18,659 ha) (Wulu Nafa Project); (iv) Saré-Omar (696 ha) and Darou Salam Thierno (2,290 ha) (PERACOD); and (v) Sinthiou Bocar Aly (38,490 ha) and Payar (53,912 ha).
   - In 2027, it is expected that all existing community-based forests with a management plan in 2022 will still have a validated management plan and that 13 new community-based forest will have a management plan (1,388,876 ha) including (i) in Kolda six forests (135,083 ha): Kolda 1 (17,768 ha), Kolda 2 (15,565 ha), Kolda 3 (22,400 ha), Kolda 4 (13,863 ha), Kolda 5 (36,545 ha), and Kolda 6 (28,942 ha); (ii) in Sédhiou: two forests (77,555 ha): Sédhiou 1 (37,819 ha) and Sédhiou 2 (39,736 ha); and (iii) in Tambacounda five forests (145,390 ha): Tambacounda 1 (49,373 ha), Tambacounda 2 (22,224 ha), Tambacounda 3 (30,844 ha), Tambacounda 4 (26,540 ha), and Tambacounda 5 (16,409 ha).

   (b) **Classified forests.** This sub-indicator will monitor the level of management of classified forests in the four targeted regions (Tambacounda, Kolda, Kedougou, and Sédhiou) including maintaining or renewal of existing management plans and new management plans for 46 classified forests.

   - In 2022, 11 classified forests have validated management plans (225,463 ha): Ouli (12,582 ha), Paniates (40,333 ha), Bakor (17,778 ha), Mahon (3,869 ha), Gouloumbou (17,860 ha), Tamba-Nord (76,488 ha), Boudié (12,862 ha), Mballocounda Sissao (8,915 ha), Dankou (3,500 ha), Maka Yop (30,600 ha), and Malem Delby (12,000 ha).
   - In 2027, it is expected that the 11 classified forests with a management plan will still have a validated management plan and that all the 35 remaining classified forest will have a new management plan developed (933,821 ha): Yacine (11,481 ha), Panal (108,327 ha), Bala-Est

(19,803 ha), Bala-Ouest (20,833 ha), Botou (9,479 ha), Goudiry (30,126 ha), Tamba-Sud (12,056 ha), Koumpentoum (10,092 ha), Diendé (1,317 ha), Roneraie de Diafilon (1,163 ha), Malem-Niani (46,538 ha), Kantora (22,135 ha), Koudora (6,974 ha), Pata (67,366 ha), Toutoune (2,581 ha), Balmadou (21,174 ha), Bari (17,256 ha), Dabo (12,602 ha), Diatouma (3,917 ha), Bafata (4,198 ha), Mangaroungou (631 ha), Sadiala (12,025 ha), Guimar (52,810 ha), l'Anambé (3,299 ha), Djibabouya (345 ha), Diambour (136,202 ha), Saré-Bandé (4,016 ha), Saré-Lally (2,339 ha), Badimbour (10,488 ha), Dialocoto (27,280 ha), Sanding-Counda (2,030 ha), Kayanga (13,480 ha), Mampaye (8,537 ha), Baghagha (270 ha), and Boumoune-Samaye (5,188 ha).

(c) **Protected areas.** This sub-indicator will monitor the level of management of protected areas in the four targeted regions (Tambacounda, Kolda, Kedougou, and Sédhiou) including maintaining or renewal of existing management plans and new management plans:

- In 2021, the Niokolo-Koba National Park has a management plan for 2019–23[125] (844,461 ha) and community natural reserve Niéméniké (39,522 ha), Thiabédji (27,757 ha), and Oubadji (197,000 ha).
- In 2027, it is expected that the Niokolo-Koba National Park will have an updated management plan and that all community -based managed reserves will have a validated management plan including Tomboronco Banfassi (31,851 ha), Niéméniké (39,522 ha), Thiabédji (27,757 ha), Dindéfélo (13,000 ha), Oubadji (197,000 ha), and Ile du Diable (18 ha).

3. **PDO2: Targeted artisanal fishing areas brought under territorial use right regimes for fishing monitored by geolocation system (Number):** This indicator relates to the development and the implementation of local community-based management plans, including (a) update of existing local management plans and area extension (Petite-Côte [1], Ouakam [1], and buffer sites [2]); (b) development of four new local management plans (Fass-Boye, Mbour, Cap-Skirring, and Kafountine), and (c) development of two artificial reef area management plans in Hann and Yoff.

4. **PDO3. Income generating activity program implemented in targeted forest areas (Percentage)**: This indicator tracks the share of targeted areas benefiting from the IGA program as follows:

   (a) **46 classified forests**. (i) in Tambacounda region (Ouli, Paniates, Koussanar, Bala-Est, Bala-Ouest, Botou, Diambour, Goudiry, Gouloumbou, Koumpentoum, Malem-Niani, Panal, Tamba-Nord, Tamba-Sud, Dialocoto, and Sanding-Counda); (ii) in Kolda region (Bakor, Boumoune-Samaye, Dabo, Diatouma, Guimara, Kantora, Kayanga, Koudora, Anambe, Mahon, Mampaye, Medina Salam Dinga, Pata, Saré-Bandé, Saré-Bidji, Saré-Lally, Saré-Omar, and Toutoune,); and (iii) in Sédhiou region (Badimbour, Bafata, Baghangha, Balmadou, Bari, Boudhié, Diendé, Djiabouya, Mangaroungou, Roneraie de Diafilon, Yacine, and Sadiala)

   (b) **13 new community forest for fuelwood production**. 6 in Kolda region, 2 in Sédhiou region, and 5 in Tambacounda region

   (c) **6 natural community reserves.** (i) in Kedougou (Tomboronco Banfassi, Niéméniké, Thiabédji, Dindéfélo, and Oubadji) and (ii) in Sedhiou (Ile du Diable).

5. **Sub-indicator 3e: Female-led enterprises certified in forest product schemes.** This indicator will monitor the number of female-led enterprises certified in forest product scheme through the IGA program support. It is expected that in 2027, at least one female-led enterprise per area targeted by the IGA program will be certified in forest product scheme.

[125] MEDD-DPN/Sénégal, *Plan d'Aménagement et de Gestion du Parc National du Niokolo-Koba et de sa périphérie* (2019–2023) 286 p.

6. **PDO4: Share of fisheries products landed and transformed according to improved practices at project-supported sites (Percentage).** This indicator relates to improvement in the quality of fisheries landings and transformation of seafood. It will track to what extent the handling and transformation of seafood products at project sites comply with hygiene and sanitation standards of the Codex Alimentarius and the provisions of the Fisheries Code. The calculation of this indicator will be the proportion of products landed or transformed using the new conservation or processing infrastructures according to the standards established on all the products landed or transformed at the selected sites: (a) preselected landing sites: Fass Boye, Cap Skirring, and Ouakam and (b) preselected processed sites: Kayar, Mballing, Niodior, Diogué, and Kafountine.

7. **PDO5. Aquaculture production (tons/year).** This indicator measures the total aquaculture production in Senegal including in the eight aquaculture hubs poles to be set up by the project with an average of 500 tons per year per pole. The preidentified targeted aquaculture poles are (a) Medina Chérif (Kolda region), (b) Guidick and Gabar (Louga region), (c) Mouit (Saint-Louis region), (d) Ndiéné Lagane and Diakhanor (Fatick region), (e) Sekoto (Kedougou region), (f) Karoumbou (Sedhiou region), and (g) Ndioudiouf Mbafaye (Thies region).

8. **IR2a. Modernization of licensing/permit, registration, monitoring and control systems:** This indicator will monitor the modernization of licensing/permit, registration, monitoring and control systems in the artisanal and industrial fisheries sectors through a scoring related to six criteria rated each one from 0 pt to 3 pt described in the breakdown of sub-indicators:
    - **(i)a. Generalization of canoe registration:** This criterion will follow the generalization of the canoe registration process based on a three-point score: 0 = the database of active fishing canoes is not available, 1 = the database of active fishing canoes is available and regularly updated, 2 = 50 percent of fishing canoes identified in the database have an official registration (*immatriculation*), and 3 = 90 percent of fishing canoes identified in the database have an official registration (*immatriculation*).
    - **(i)b. Publication of fishing licenses to industrial vessels fishing in Senegalese waters (Senegalese and foreigners):** This criterion will monitor industrial fisheries licenses publication process based on a three-point score: 0 = The industrial fishing vessel database does not exist; 1 = The industrial fishing vessel database exists but is not published; 2 = The industrial fishing vessel database is published but is not regularly updated; and 3 = The industrial fishing vessel database is published and regularly updated.
    - **(ii)a. Establishment of an artisanal fishing permit system linked to management plan.** This criterion will monitor the process of establishing an artisanal fishing permit system linked to management plans based on a three-point score: 0 = The artisanal permit system is linked to the length of the canoes; 1 = The artisanal fisheries permit system liked to fisheries management plans is designed in detail; 2 = The artisanal fisheries permit system linked to fisheries management plans is piloted in three fisheries; and 3 = The artisanal fisheries permit system linked to fisheries management plans is adopted in three fisheries.
    - **(ii)b. Industrial licenses are linked to fisheries management plans**. This criterion will monitor the links between licensing system and fisheries management plans with a three-point score: 0 = Industrial fishing licenses are not tied to specific fishery management plans; 1 = Industrial fishing licenses are linked to one or more identified fisheries management plans; 2 = Industrial fishing licenses are linked to one or more identified fisheries management plans and stipulate quotas per fishery; and 3 = Industrial fishing licenses are linked to one or more identified fisheries management plans and stipulate quotas per fishery, which are checked annually for licenses renewal.
    - **(iii)a. The use of canoe geolocation systems has been generalized in the targeted areas.** This criterion will monitor the generalization of the canoe geolocation in targeted area with a three-point score: 0

= The geolocation system was tested on a few canoes during a test phase; 1 = 50 percent of canoes with permits in the ZIRA/ZPP (Hann, Yoff, Mbour, Kafountine, Cap Skirring, Fass Boye, Ouakam, Soumbédioune, and Ngaparou) are equipped with a geolocation kit; 2 = 70 percent of canoes with permits in the ZIRA/ZPP (Hann, Yoff, Mbour, Kafountine, Cap Skirring, Fass Boye, Ouakam, Soumbédioune, and Ngaparou) are equipped with a geolocation kit; and 3 = 70 percent of canoes with permits in the ZIRA/ZPP (Hann, Yoff, Mbour, Kafountine, Cap Skirring, Fass Boye, Ouakam, Soumbédioune, and Ngaparou) are equipped with a geolocation kit and geographical analyzes on spatial behavior and fishing areas are carried out annually.

- **(iii)b. All industrial fishing vessels fishing in Senegalese waters are monitored by AIS and/or VMS.** This criterion will monitor the industrial fishing vessels tracking system process with a three-point score: 0 = Industrial vessels with licenses are not tracked by geolocation; 1 = All industrial licensed fishing vessels have onboard AIS and/or VMS; 2 = Industrial licensed fishing vessels are monitored 24/7 by AIS and/or VMS and 3 = Industrial licensed fishing vessels are monitored 24/7 by AIS and/or VMS and geographical analyzes on spatial behavior and fishing areas are carried out annually
- **(iv)a. Artisanal fishing is controlled.** This criterion will monitor control from authorities on artisanal fisheries with a three-point score: 0 = No canoe is inspected annually; 1 = 20 percent of canoes are inspected annually; 2 = 40 percent of canoes are inspected annually; and 3 = 60 percent of canoes are inspected annually.
- **(iv)b. Industrial fishing is physically controlled.** This criterion will monitor the physical control of industrial fishing vessels with a three-point score: 0 = No vessel is inspected annually; 1 = 50 percent of vessel are inspected annually; 2 = 70 percent of vessel are inspected annually; and 3 = 90 percent of vessel are inspected annually.

9. **IR2b. Reliable key fisheries management data published online regularly (Number/Score).** This indicator will monitor the transparency of the fisheries sector with five types of data to be published annually on the MPEM website including data on industrial licenses and number, artisanal fishing permits database, number of inspections, number of infractions, and amount of infraction transactions.

10. **IR2c. Representation of all relevant local stakeholders groups in community-based fisheries management planning processes.** This indicator will monitor citizen and stakeholders' engagement in the local planning of fisheries management. Key local pre-identified stakeholders' groups are groups of fishermen, groups of fishmongers, groups of women processors, groups of stakeholders in related activities (hoteliers, ice vendors, carpenters, outboard mechanics, porters, scalyers, and fuel vendors), NGOs, and religious authorities.
    - **Calculation method.** Number of people consulted in the groups / total number of people in the groups
    - **Hypothesis.** if a group is represented, all the people who compose it are considered to be consulted and a baseline situation will be carried out during the first year to (a) precisely identify the groups and (b) specify the composition of these groups (number, gender).

11. **IR3b. Forest areas under active community-based management that include women in leadership positions including President, Secretary General or Treasurer's groups.** This indicator will monitor the active involvement of women's groups in the management of community-based forest for fuelwood production in the targeted region) in the following:

    (a) **29 existing community-based forests.** (i) Bonconto, Kandiator, Koar, Nétéboulou, Saré-Gari, Thiéwal, and Missirah/Kothiary (PROGEDE I); (ii) Bousimballo, Boynguel Bamba, Diambaty, Maka, Mballocounda, Ndoga, Niani, Niani-Saloum, Saré-Bodio, Segoucoura, Medina Salam Dinga, Mousdalifa, and Pima Thiour (PROGEDE II); (iii) Sakar-Oudoucar, Saré-Bidji, Koussanar, Koulor, and Sita

Niaoulé (Wulu Nafa Project); (iv) Saré-Omar and Darou Salam Thierno (PERACOD); and (v) Sinthiou Bocar Aly and Payar;

(b) 13 new community-based forest to be created (pre-identified).

12. **IR3c. Jobs created in new community-based managed forest for fuelwood production.** This indicator will monitor jobs created in new community-based managed forests for fuelwood production. It is estimated that 189 jobs will be created per new community-based managed forest (150 producers, 30 alternates, three monitors, and six members of the forest management board) and that 13 new community-based managed forests will be created (6 in Kolda, 2 in Sédhiou, and 5 in Tambacounda).

13. **IR3d. Improved cookstoves distributed**. This indicator will monitor the dissemination of the use of improved stoves with project support. It supports the NDC Results Framework as dissemination of improved cookstove is an indicator of the 2020 NDC: unconditional commitment is 800,000 per year and conditional commitment is 1,500,000 per year.

14. **IR3e. Annual man/days of forest surveillance and control missions carried out in the target sites.** This indicator measures the effectiveness of the carrying out of control and surveillance missions by the MEDD agents in the field for the protection of forests and protected areas in the targeted areas:

    (a) **Annual man/days of surveillance missions carried out in the Niokolo-Koba National Park.** (i) in 2021, the number of annual man/days of patrol estimated is 120 rangers × 5days of patrol per month × 12 month = 7,200 and (ii) in 2026, the number of annual man/days of patrol estimated will be 120 rangers × 15 days of patrol per month × 12 months = 21,600

    (b) **Annual man/days of surveillance and control missions carried out in the targeted regions.** This indicator measures the effectiveness of the carrying out of control and surveillance missions by the MEDD agents in the field for the protection of forests and protected areas in the targeted areas: (i) in 2021, the number of annual man/days of patrol estimated is 252 rangers × 5days of patrol per month × 12 months = 15,120 and (ii) in 2026, the number of annual man/day of patrol estimated will be 252 rangers × 15 days of patrol per month × 12 months = 45,360.

15. **IR3f. Management effectiveness of the Niokolo-Koba National Park**. This indicator will monitor the management effectiveness of the Niokolo-Koba National Park according to the score of the Integrated Management Effectiveness Tool (IMET): (i) in 2016, the management effectiveness of the Niokolo-Koba National Park has a score of 334.5 combining all criteria (Context: 28; Planning: 49; Inputs: 58.1; Process: 57.9; Results: 76.4; Effects and Impacts: 65.1) and (ii) in 2027, it is expected that the IMET score will reach 410 (Context: 60; Planning: 70; Inputs: 70; Process: 60; Results: 80; Effects and Impacts: 70).