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Report No: ICR00168

IMPLEMENTATION COMPLETION AND RESULTS REPORT

(Credit 6204-ML and Grant D281-ML)

ON A

CREDIT

FROM THE INTERNATIONAL DEVELOPMENT ASSOCIATION

IN THE AMOUNT OF EURO 11.2 MILLION
(US$ 13.9 MILLION EQUIVALENT)

AND A

GRANT

FROM THE INTERNATIONAL DEVELOPMENT ASSOCIATION

IN THE AMOUNT OF SDR 9.6 MILLION
(US$ 13.9 MILLION EQUIVALENT)

TO THE

Republic of Mali

FOR THE

Economic & Environmental Rehabilitation of the Niger River Project

January 8, 2025

Environment, Natural Resources & the Blue Economy
Western And Central Africa

CURRENCY EQUIVALENTS

(Exchange Rate Effective June 30, 2024)

Currency Unit =	West African CFA Franc (XOF)
XOF611.89 =	US$1
US$1.315 =	SDR1

FISCAL YEAR
January 1 - December 31

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ABBREVIATIONS AND ACRONYMS

ABFN	The Niger River Basin Agency (*Agence de Bassin du Fleuve Niger)*
AEDD	Agency for the Environment and Sustainable Development
AM	Aide Memoire
CBA	Cost-Benefit Analysis
CEA	Cost-Effectiveness Analysis
CERC	Contingent Emergency Response Component
COMANAF	Compagnie Malienne de Navigation Fluviale
COMANAV	Compagnie Malienne de Navigation
COP	Conference of the Parties
CPF	Country Partnership Framework
CRIP	Climate Resilience Investment Plan
CREDD	Strategic Framework for Economic Recovery and Sustainable Development
CSCRP	Strategic Framework for Growth and Poverty Reduction in Mali
CTCSP	Technical Project Coordination and Monitoring Committee (*Comité Technique de Coordination et de Suivi du Projet*)
DO	Development Objective
ESMF	Environmental and Social Management Framework
FA	Financial Agreement
FCV	Fragile, conflict-affected and vulnerable
FM	Financial Management
GBV	Gender-based Violence
GDP	Gross Domestic Product
GEMS	Global-Enabling Initiative for Monitoring and Supervision
GGW	Great Green Wall
GoM	Government of Mali
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
Ha	Hectares
ICR	Implementation Completion and Results Report
IDA	International Development Association
IGA	Income Generating Activity
IP	Implementation Progress
IRI	Intermediate Results Indicator
IRM/OM	Immediate Response Mechanism Operational Manual
ISR	Implementation Status and Results (Report)

m3	Cubic Meters
M&E	Monitoring & Evaluation
MTR	Mid-Term Review
MU	Moderately Unsatisfactory
NGO	Non-Governmental Organization
NID	Niger Inner Delta
OI	Outcome Indicator
OP/BP	Operating Policy / Bank Policy
PAD	Project Appraisal Document
PDO	Project Development Objective
PMU	Project Management Unit
PPA	Project Preparation Advance
PREEFN	Economic and Environmental Rehabilitation of the Niger River
RF	Results Framework
RPF	Resettlement Policy Framework
SDR	Special Drawing Rights
ToC	Theory of Change
US$	United States Dollars
WORLD BANK	World Bank
XOF	West African Franc

TABLE OF CONTENTS

DATA SHEET i

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES 1

II. OUTCOME 6

III. KEY FACTORS AFFECTED IMPLEMENTATION AND OUTCOME 14

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME 16

V. LESSONS AND RECOMMENDATIONS 20

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS 22

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION 33

ANNEX 3. PROJECT COST BY COMPONENT 35

ANNEX 4. EFFICIENCY ANALYSIS 36

ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS 40

ANNEX 6. SUPPORTING DOCUMENTS 41

ANNEX 7. CHANGES TO OUTCOME INDICATORS 42

ANNEX 8. SUMMARY OF BENEFICIARY SATISFACTION SURVEY 43

DATA SHEET

BASIC DATA

Product Information

Operation ID	Operation Name
P151909	Mali - Economic & Environmental Rehabilitation of the Niger River
Product	Operation Short Name
Investment Project Financing (IPF)	Econ. & Env. Rehab. of Niger River
Operation Status	Approval Fiscal Year
Closed	2018
Original EA Category	Current EA Category
Full Assessment (A) (Approval package - 19 Mar 2020)	Full Assessment (A) (Restructuring Data Sheet - 19 Jan 2022)

CLIENTS

Borrower/Recipient	Implementing Agency
Republic of Mali	Agence de Bassin du Fleuve Niger

DEVELOPMENT OBJECTIVE

Original Development Objective (Approved as part of Approval Package on 19-Mar-2020)

The objectives of the Project are to demonstrate the effectiveness of navigation and port service improvement measures, and demonstrate the feasibility of environmental restoration and livelihood improvement activities at targeted sites in the Niger Inner Delta (NID), and, in the event of an Eligible Crisis or Emergency, improve the Recipient's capacity to respond promptly and effectively to such Eligible Crisis or Emergency.

FINANCING

Financing Source	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing	27,800,000.00	27,800,000.00	25,302,729.44
IDA-62040	13,900,000.00	13,900,000.00	12,265,976.64
IDA-D2810	13,900,000.00	13,900,000.00	13,036,752.80
Total	**27,800,000.00**	**27,800,000.00**	**25,302,729.44**

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Type	Amount Disbursed (US$M)	Key Revisions
18-Sep-2019	Portal	3.30	• Reallocations
02-Mar-2021	Portal	6.55	• Reallocations
19-Jan-2022	Portal	11.24	• Components • Results • Risks • Loan Closing Date Extension • Implementation Schedule

KEY DATES

Key Events	Planned Date	Actual Date
Concept Review	25-Nov-2014	11-Dec-2014
Decision Review	27-Oct-2016	27-Oct-2016
Authorize Negotiations	17-Apr-2017	28-Apr-2017
Approval	16-Mar-2018	16-Mar-2018
Signing	19-Mar-2015	29-Mar-2018
Effectiveness	19-Mar-2015	17-Sep-2018
ICR/NCO	29-Dec-2024	--
Restructuring Sequence.01	Not Applicable	18-Sep-2019
Restructuring Sequence.02	Not Applicable	02-Mar-2021
Restructuring Sequence.03	Not Applicable	19-Jan-2022
Mid-Term Review No. 01	16-Jul-2021	11-Oct-2021

Operation Closing/Cancellation	30-Jun-2024	30-Jun-2024

RATINGS SUMMARY

Outcome	Bank Performance	M&E Quality
Moderately Satisfactory	Moderately Satisfactory	

ISR RATINGS

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	23-Jun-2018	Satisfactory	Satisfactory	0.00
02	23-Dec-2018	Satisfactory	Moderately Satisfactory	0.00
03	06-Jul-2019	Moderately Satisfactory	Moderately Satisfactory	3.30
04	22-Nov-2019	Moderately Satisfactory	Moderately Satisfactory	3.40
05	21-Apr-2020	Moderately Satisfactory	Moderately Satisfactory	4.67
06	30-Oct-2020	Moderately Satisfactory	Moderately Satisfactory	5.70
07	14-Dec-2020	Moderately Satisfactory	Moderately Satisfactory	5.70
08	07-Jun-2021	Moderately Satisfactory	Moderately Satisfactory	9.67
09	15-Nov-2021	Moderately Satisfactory	Moderately Satisfactory	10.97
10	03-Jun-2022	Moderately Satisfactory	Satisfactory	12.01
11	06-Dec-2022	Moderately Satisfactory	Satisfactory	14.19
12	09-Jun-2023	Moderately Satisfactory	Moderately Satisfactory	16.62
13	12-Dec-2023	Moderately Satisfactory	Moderately Satisfactory	19.29
14	25-Jun-2024	Moderately Satisfactory	Moderately Satisfactory	25.06

SECTORS AND THEMES

Sectors

Major Sector	Sector	%	Adaptation Co-benefits (%)	Mitigation Co-benefits (%)

FY17 - Transportation	FY17 - Ports/Waterways	39	39	18
	FY17 - Public Administration - Transportation	18	44	9
FY17 - Water, Sanitation and Waste Management	FY17 - Other Water Supply, Sanitation and Waste Management	43	51	3

Themes

Major Theme	Theme (Level 2)	Theme (Level 3)	%
FY17 - Environment and Natural Resource Management	FY17 - Climate change	FY17 - Adaptation	45
		FY17 - Mitigation	10
	FY17 - Renewable Natural Resources Asset Management	FY17 - Biodiversity	61
	FY17 - Water Resource Management	FY17 - Water Institutions, Policies and Reform	72
FY17 - Human Development and Gender	FY17 - Gender		22
FY17 - Urban and Rural Development	FY17 - Disaster Risk Management	FY17 - Flood and Drought Risk Management	74
	FY17 - Rural Development	FY17 - Rural Infrastructure and service delivery	36

*Please note that there is a glitch under the Rating Summary section where M&E Quality is rated Substantial.

ADM STAFF

Role	At Approval	At ICR
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Global Director		Valerie Hickey
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ICR Main Contributor	Sanne Agnete Tikjøb	

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

1. **On the edge of the Sahara Desert lies one of the world's most productive wetlands, the inland delta of the Niger River.** The Niger Inner Delta (NID), the largest wetland in West Africa, is a vast expanse of lakes, channels, and marshes that floods seasonally from September to January, enabling boat navigation. As the waters recede, fertile grounds emerge for farming crops like rice and millet, while pastoralists graze their herds on rich grasses. By May, the wetlands dry up, transforming into scrubby woodlands, pastures, and desert.

2. **The NID supports 2 million people and is a vital environmental and economic resource for Mali.** However, it remains one of the nation's poorest regions, with 44–61% of its population living in poverty and relying on natural resources. Water scarcity has increased dependence on the Niger River, while climate variability, demographic shifts, and security challenges threaten its ecosystem, home to diverse wildlife. Erosion, sedimentation, and obstructed channels during floods continue to hinder livelihoods, with limited dredging proving insufficient.

3. **There was a need for reforming and strengthening the institutional framework governing the Niger River resources.** The Niger River Basin Agency (ABFN), established in 2002 to protect the Niger River and improve water resource management, faced significant challenges due to fragmented governance and overlapping mandates among key sectors such as water, environment, rural development, and transportation. Customary management systems, though historically significant, became less effective under increasing population pressures and resource scarcity. Meanwhile, formal institutions struggled with inadequate data, weak enforcement mechanisms, and insufficient funding. This lack of a cohesive framework to balance competing interests and coordinate actions undermined the sustainable management of the river's resources and the development of surrounding communities, creating conflicts over priorities and resource use.

4. **The project offered a program of investments to strengthen the capacity of ABFN, reduce major navigational choke points, increase access to markets for local communities, and strengthen the institutional framework – in line with the regional 2015 Niger Basin Climate Resilience Investment Plan (CRIP).** The project sought to increase navigability in the central section of the NID, improve services at critical river ports, and strengthen the institutional framework to ensure the operation and maintenance of the navigation channels. It also aimed to restore the environment by developing channels and ponds and encouraging agricultural productivity through socio-economic micro-projects. For the Government of Mali (GoM), the Economic & Environmental Rehabilitation of the Niger River Project (PREEFN) formed an integral part of the Niger Basin CRIP in recognition of the effect of climate change on the Sahel in general and in Mali in particular.

5. **At the time of appraisal, fluvial transport had been losing importance to road transport and was not a pronounced development objective for the GoM, though it offered potential as a means for economic activity.** The development of the road network had severely affected the competitiveness of fluvial transport on the Niger River as traffic had gradually shifted from river to road. Yet, fluvial transport offered a cost-effective means of transport and access to markets, where roads did not reach or were not always passable. In the conflict-afflicted regions of Segou and Mopti, river transport offered a safer alternative to road transport, though the situation was volatile. With investments, the river could play an important role in the long-haul movement of people and commodities.

6. **Planned activities under component 2 were aligned with strategic priorities in key sector policies**. The port and channel infrastructure built as part of Component 2 contributed to Strategic Direction 4 (SD4) - Developing investment in the agricultural sector" of the 2013 *Agricultural Development Policy*. The first axis of SD4 aimed to improve investments in hydro-agricultural facilities (such as the development of rice-growing sills and market gardens in the Talagneini dykes), while the third axis aimed to increase investment in agro-industrial processing,

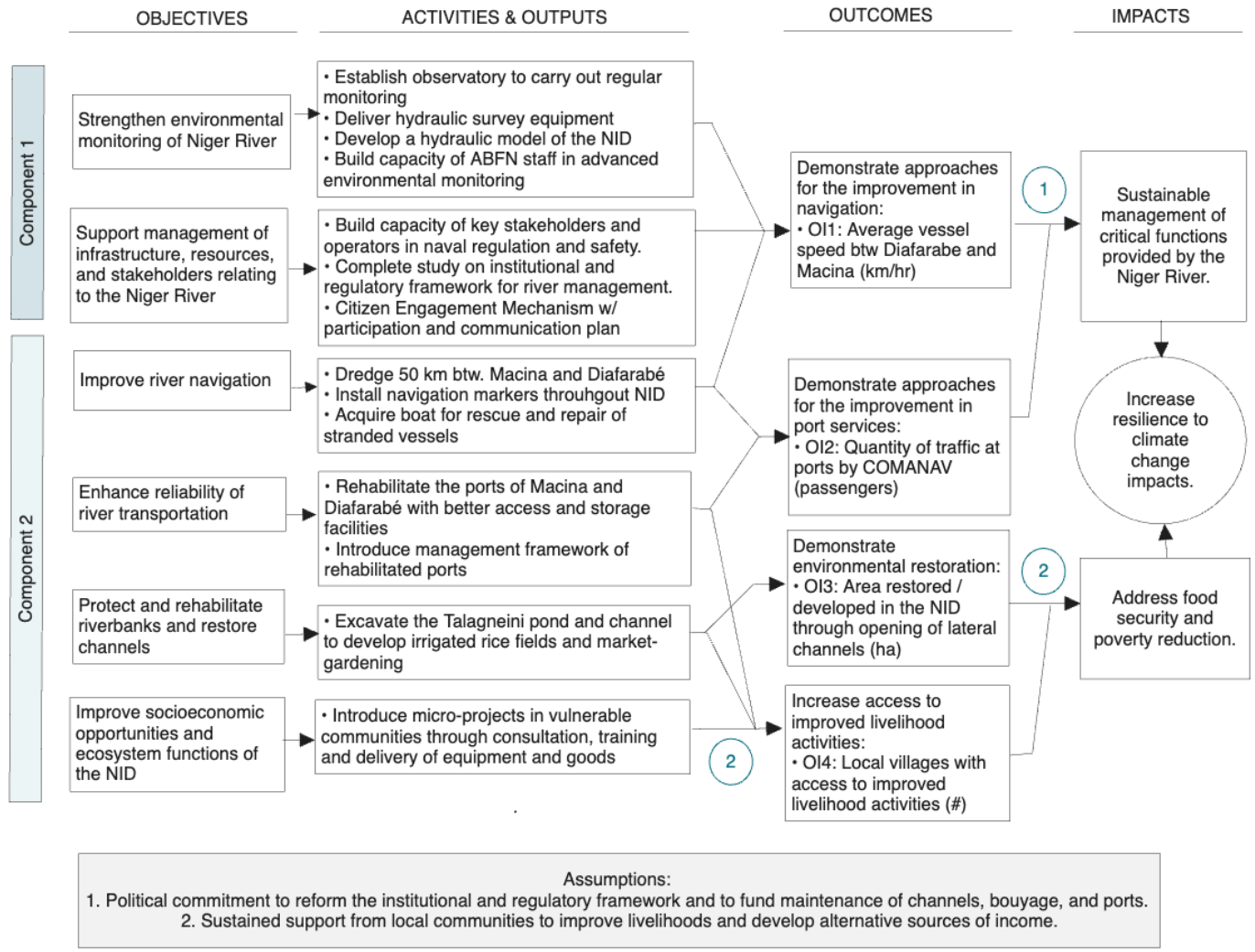
storage, and marketing infrastructures (such as the rehabilitated port facilities). The development of ponds as part of component 2 fit well with Strategic Axis 1 “Management of Malian fisheries and the development of aquaculture in all its forms” of the *Fisheries and Aquaculture Policy*, while the provision of fishing and fish processing equipment was in line with Strategic Axis 2 "Valorization of national production of fisheries and aquaculture products."

7. **The project aligned with the Mali Country Partnership Framework (CPF) FY16–19 and key World Bank strategic priorities.** PREEFN contributed to the focus areas of the CPF FY16–19 by: (a) improving governance; (b) creating economic opportunities, particularly in the agriculture sector, and improving basic services through sustainable infrastructure and connectivity; and (c) building resilience. Further, the project supported the Sahel Regional Initiative and other regional approaches that addressed collective challenges and transformational opportunities. Finally, it was part of the Niger Basin CRIP presented at the COP21 in Paris in December 2015, which itself was an integral part of the World Bank’s Africa Climate Business Plan.

Theory of Change (Results Chain)

8. At the time of appraisal, a theory of change (TOC) was not developed. For this ICR, a TOC (Figure 1) was prepared based on the project description in the Project Appraisal Document (PAD).

FIGURE 1: THEORY OF CHANGE



Project Development Objectives (PDOs)

9. **The project development objectives, as stated in the Financing Agreement (FA)**, are "*to demonstrate approaches for the improvement in navigation and port services, demonstrate environmental restoration and increase access to improved livelihood activities at targeted sites in the Niger Inner Delta (NID), and, in the event of an Eligible Crisis or Emergency, improve the Recipient's capacity to respond promptly and effectively to such Eligible Crisis or Emergency.*"

10. **The PDO in the PAD is worded slightly differently, but it does not substantially alter the intended outcomes implicit in the PDO or Theory of Change:** To demonstrate the effectiveness of navigation and port service improvement measures and demonstrate the feasibility of environmental restoration and livelihood improvement activities at targeted sites in the Niger Inner Delta (NID), and, in the event of an Eligible Crisis or Emergency, improve the Recipient's capacity to respond promptly and effectively to such Eligible Crisis or Emergency.

Key Expected Outcomes and Outcome Indicators

11. The compounded PDO had five separate outcomes, four of which were paired to an outcome indicator.

TABLE 1: EXPECTED OUTCOMES AND OUTCOME INDICATORS AT THE APPRAISAL STAGE

Expected outcomes	Outcome indicators
Outcome 1: Demonstrate approaches for the improvement in navigation	Average vessel speed between Diafarbé and Macina (km/hr)
Outcome 2: Demonstrate approaches for the improvement in port services	Quantity of traffic at ports by COMANAV[1] (passengers)
Outcome 3: Demonstrate environmental restoration	Area restored/developed in the NID through opening of lateral channels (ha)
Outcome 4: Increase access to improved livelihood activities at targeted sites in the Niger Inner Delta (NID)	Local villages with access to improved livelihood activities (#)
Outcome 5: Improve the Recipient's capacity to respond promptly and effectively to an Eligible Crisis or Emergency, in the event of an Eligible Crisis or Emergency.	No indicator was paired to this outcome.

Components

12. Table 2 provides a summary of the components and financing allocations at appraisal.

TABLE 2: COMPONENTS

Component 1: Strengthening the Strategic Management of the Niger River Resources
Financial allocation: Proposed: US$11 million - Revised: US$10.64 million - Actual: US$10.8 million
Description: This component will strengthen the monitoring of the ecological functions of the river, particularly in the biodiversity-rich area of the NID, through the establishment of an observatory to monitor the ecological functions of the Niger River, as well as through a review of the institutional and regulatory framework for the strategic management and sustainability of the river. Furthermore, activities include the design of a functional hydrological model for the NID, a study of potential infrastructure needs to improve the economic and ecological functions of the NID, and a robust communication and public participation plan and citizen engagement program. Finally, technical assistance will be provided to different stakeholders involved in the management of Niger River resources.
Component 2: Enhancing the Viability of Socioeconomic Activities Contributing to Climate Change Resilience
Financial allocation: Proposed: US$11.8 million - Revised US$11.48 million - Actual: US$11.2 million
Description: This component aims to improve the socioeconomic conditions of the population living in the targeted communes and villages by promoting mutually reinforcing investments: improving navigability and, thus, the flow of goods

[1] The national shipping company COMANAV (*Compagnie Malienne de Navigation*) became COMANAF *(Compagnie Malienne de Navigation Fluviale)* in July 2023 in a quick reform, which expanded their mandate. See section III.B.a for further details.

and people and improving access to markets in an environmentally sustainable and socially responsible way. Activities are organized under four sub-components related to (i) improving river transportation in the NID through targeted dredging and maintenance of navigation channels, (ii) enhancing the reliability of river transportation through construction/rehabilitation and maintenance of river docking piers infrastructure, (iii) improving socioeconomic opportunities and ecosystem functions of the NID, and (iv) protection and rehabilitation of riverbanks and channels.
Component 3: Project Management
Financial allocation: Proposed: US$5 million - Revised: US$5.68 million - Actual: US$5.8 million
Description: This component will support project planning, monitoring, and implementation. It will finance the operational costs related to the implementation of the project components, including third-party monitoring and/or execution if required. The component costs also include refinancing the project preparation advance (PPA) and the costs associated with additional security provisions on site. The provisions for security arrangements involving third-party monitoring and implementation, among others, significantly increased the overall costs for project management.
Component 4: Contingent Emergency Response
Financial allocation: Proposed: US$0 million - Actual: US$0 million
Description: The Contingent Emergency Response Component (CERC) will be available should the need arise to redirect project resources to finance emergency response activities and to address crisis and emergency needs. If this component is utilized, the project will be restructured to allocate financing, revise the PDO and indicators as needed, and detail implementation arrangements. An Immediate Response Mechanism Operational Manual (IRM/OM) will be prepared separately and approved by the World Bank.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

Revised PDOs and Outcome Targets

13. The project development objectives and related outcome targets did not change.

Revised PDO Indicators

14. The outcome indicators (OI) were revised in a level two restructuring approved in January 2022 (see Table 14 in Annex 7 for details and rationale of changes):
    - OI1: Dropped *´Average vessel speed between Diafarbé and Macina (km/h)´* and replaced with *`Travel time of COMANAV vessels from Macina to Diafarabé (hours)`*
    - OI2: Revised *´Quantity of traffic at ports by COMANAV (passengers/year)´* to *´Quantity of traffic at the Macina and Diafarabé ports by river carriers (passengers/year)´* and adjusted the target.
    - OI3: Increased the target for *´Area restored / developed in the NID´* from 50 hectares to 200 hectares.
    - OI4: Dropped *´Local villages with access to improved livelihood activities (#)´* and replaced with *´People with increased benefits from the project's socio-economic investments (#)´.*

Revised Components

15. The components were not revised, but the financial allocation between components were adjusted in January 2022 (see Table 2 above).

Other Changes

16. **First level-2 restructuring approved in September 2019:**
    - Reallocation of funds between disbursement categories of IDA Credit 62040 to enable the repayment of the PPA.
17. **Second level-2 restructuring approved in February 2021:**
    - Reallocation of funds between disbursement categories of IDA Credit 62040 for the same purpose given that there was still a shortfall to repay the PPAs.

18. **Third level-2 restructuring approved in January 2022:**

- Extension of the project closing date from September 15, 2023, to June 30, 2024 (nine months).
- Adjustment of project components costs.

Rationale for Changes and Their Implication on the Original Theory of Change

19. **Reduced project scope prior to approval.** The project was originally designed at a larger scale with a US$50 million investment covering the entire NID from Macina to Akka. The project scale was reduced shortly before approval due to the evolving security context, which complicated the implementation of project activities in some areas. It was decided to limit the number of planned civil works and scale-back the socio-economic investments under component 2. While prefeasibility studies covered the dredging of 19 sandbars, the construction and rehabilitation of six ports, and the opening of eight irrigation channels with a length of 26 kilometers, the investments financed were reduced to the dredging of 7 sandbars, the construction and rehabilitation of two ports, and the opening of a single channel with a length of 4.5 kilometers. Meanwhile, financing for income-generating micro-projects was downscaled from US$11 million to US$1 million. Overall, this changed the nature of the project to a demonstration phase with the intent to scale-up activities depending on the evolving security situation on the ground.

20. **Revisions to the Results Framework (RF).** The RF was not adjusted in a timely manner prior to approval and thus contained some indicators that were not applicable to the reduced scale. This was corrected in the restructuring, which did not reduce the project's ambition but rather reformulated indicators to be more appropriate for the project's actual scope and scale while increasing the target values of certain indicators. The detailed changes and rationale is presented in Annex 7.

21. **Reallocation between disbursement categories.** Reallocation of funds from Category 1 to Category 2 of IDA Credit 62040 was needed due to a shortfall in the amount allocated to Category 2 for the repayment of the project preparation advances. The shortfall was an effect of a system constraint, which did not allow a Category to overdraw under the Preparatory Advance Refinancing Category, despite Bank policy authorizing an overdraw of up to 15 percent. The restructuring was Bank-led and the Borrower did not receive an official request. The second reallocation was due to a mistake in the exchange rate calculation when assessing the funds needed for the repayment. The project preparation advances were fully repaid after the second restructuring.

22. **Adjustment of project components costs.** During implementation, the project registered savings in several activities relative to their initial budget. Budget contingencies initially allocated for some components did not need to be used in their entirety. Two activities were cancelled at mid-term, which were not a priority at the time, and did not impact the achievement of the PDO or the project's results indicators. As shown in **Error! Reference source not found.Error! Reference source not found.** above, the savings were reallocated to Component 3 Project management to: (a) adjust for the fact that the project's initial budget did not consider certain personnel in the configuration of the Project Management Unit (PMU), such as specialists in social development, gender-based violence (GBV), and communications; (b) adjust for the acquisition of vehicles and motorcycles needed for field missions, not considered in the initial budget; and (c) consider the operational costs of the project's proposed 9-month extension.

23. **Extension of project closing date.** The project closing date was extended by nine months to ensure the finalization of two major works, which were considerably delayed, and which represented a quarter of project financing: (a) the dredging on the Macina-Diafarabé section of the river; and (b) the development of the Talagneini pond and channel. Several factors caused the delays, but they were principally related to an update of the technical documents due to the complexity of the work and the inadequate scope of the feasibility studies prepared at preparation. The final completion of the works was expected in December 2023 and April 2024, respectively, which necessitated a nine-month extension of the project closing date.

24. **Implications on the original TOC.** The changes discussed above did not significantly impact the original TOC. Revisions to the RF clarified some indicators which did not apply to the downscaled project design and made other indicators more ambitious. Therefore, a split evaluation will not be conducted to assess project outcomes.

II. OUTCOME

A. RELEVANCE OF PDO

Rating: Substantial

Assessment of Relevance of PDOs and Rating

25. **The project has stayed substantially relevant to Mali's national development priorities outlined in the five-year Strategic Framework for Economic Recovery and Sustainable Development (CREDD) for 2019-2023.** After one of the most serious crises in Mali's modern history (see also Section III.B.c), which had a profound impact on the economic and social dynamics of the country, the CREDD is understandably focused on strengthening governance, security, and inclusive development. The relevance of PREEFN's approach is underscored through strategic axis 4: Protecting the environment and building resilience to climate change.

26. **The project is aligned with the objectives of the CPF 2020-2024.** The project underpins Focus Area 1 on 'Improving Governance' by fostering citizen's engagement, Focus Area 2 on 'Creating Economic Opportunities' by improving the productive capacity and market integration of farmers and pastoralists and supporting agriculture diversification, and Focus Area 3 on 'Building Resilience' by improving risks management mechanisms for the poor and vulnerable to absorb climate shocks. Furthermore, the project is aligned with the 2022 Systematic Country Diagnostic focused on productivity, sustainability, food security, and climate change adaptation. Finally, the project supports the Mali Country Engagement Note for FY24-25 as well as the Mali Prevention and Resilience Allocation. The new CPF for 2024-2026 is still under development at the time of this ICR.

27. **The project has also stayed relevant to the World Bank's evolving corporate agenda and is aligned with new strategic initiatives.** The project is aligned with the new World Bank Evolution Roadmap and its mission of ending extreme poverty and boosting prosperity on a livable planet through an enhanced environment for increased resilience. It supports the recent Green Resilient and Inclusive Development agenda and is consistent with the Climate Change Action Plan 2021–2025. In addition, PREEFN corresponds with the World Bank's priorities for Western and Central Africa Region (2021–2025), which includes investing in public goods in rural areas, where the majority (82 percent) of the poor live, developing value chains to link rural and urban markets. Furthermore, investments in climate change resilience will advance two key World Bank commitments in the region: The Great Green Wall initiative and the Next Generation Africa Climate Business Plan (2020). The project responds to the Global Crisis Response Framework: In particular, the pillars 'Responding to Food Insecurity' and 'Strengthening Resilience' through its Component 2 focus on improving local livelihoods and their resilience to climate impacts. Finally, the project supports the strategic objective of the new World Bank Gender Strategy (FY24–30), especially the focus on *Expanding and Enabling Economic Opportunities* and related Outcome 4 'Expand ownership and use of economic assets' and Outcome 5 'Expand access to and use of services that enable economic participation'.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Rating: Substantial

Assessment of Achievement of Each Objective/Outcome

28. **Project achievements are assessed against each outcome included in the compounded PDO**. Outcome 5 *Improve the Recipient's capacity to respond promptly and effectively to such Eligible Crisis or Emergency, in the event of an Eligible Crisis or Emergency* does not form part of the assessment as there was no such relevant event during the life of the project. The data for assessing project outcomes is drawn from the M&E system, the Final Beneficiary Survey, and other end-of-project assessments to inform the RF's key indicators. The section is further informed by the Borrower's Project Completion Report, the latest ISR, and information requested from the PMU.

Outcome 1: Demonstrate approaches for the improvement in navigation

29. **The project has successfully demonstrated approaches to improve navigation on a 50-kilometer stretch on the Niger River between Macina and Diafarabé as evident in a two-hour reduction in travel time each way.** This was achieved by (i) strengthening environmental monitoring, (ii) building stakeholder capacity for improved management of river transport, and (iii) completing physical works and installations. However, a critically important study on the institutional framework for managing waterway navigation and maintenance of channels, bouyage, and ports was not completed before closing, putting the sustainability of project achievements at risk.

- *First, the project made significant strides in strengthening environmental monitoring, regulatory capacity, and physical infrastructure for Niger River management.* A spatial data observatory within ABFN was established to monitor sedimentation, shifting sandbanks, and climatic vulnerability. Equipped with a hydrographic boat, ABFN conducted bathymetric and topographic surveys and developed a hydraulic model to analyze water flow and maintain navigable channels, supporting annual dredging decisions.
- *Second, the project significantly enhanced the capacity of stakeholders managing river transport by addressing both regulatory and operational needs.* This included preparing 16 interministerial decrees to implement the 2017 River Navigation Code, with six approved by the project's close. The decrees aim to formalize the certification and licensing of small boats, which account for over 90% of river transport, a critical step toward properly enforcing the Code. Training programs were provided to various groups, including to the crew of the new national shipping company, COMANAF, boat operators, shipbuilders, port managers, and government officials, focusing on naval regulations, safety standards, and improved operational practices. Additionally, shipyards benefited from international partnerships and symposiums introducing new, sustainable materials to reduce reliance on wood, enhance safety, and improve passenger comfort, paving the way for more efficient and environmentally friendly river transport.
- *Third, the project completed physical works and installations, improving safe and timely navigation for river transport and reducing boat groundings.* Sandy sills, which present a risk to safe and smooth navigation, were removed by dredging over half a million cubic meters of sedimentation from the bottom of the river. The buoyage system covering the entire delta was updated by installing 27 floating markers and four fixed beacons. Together, these actions have considerably reduced boat groundings on the stretch between Macina and Diafarabé as the boats can rotate with less risk of running aground.





FIGURE 2: DREDGING AND BOUYAGE INSTALLATION

30. **The demonstrated effect of the above approaches has resulted in a two-hour reduction in travel time by boat between Ké Macina and Diafarabé** (OI1 *Travel time of COMANAV vessels from Macina to Diafarabé* achieved). The small-boat segment of pinnaces and canoes has gained over two hours in saved travel time on each leg of the circuit, downstream and upstream (Table 3). This means that each boat can make additional daily trips based on demand, thereby facilitating increased movement of people and goods and enabling additional economic activity. Due to the security situation, COMANAF vessels have been out of operation since September 2023 following a fatal attack on one of their boats.[2] However, the final assessment estimates that COMANAF vessels, once they resume operation, will also be saving two-hours in travel time on each trip (see OI1 in the RF, Annex 1).

TABLE 3: TRAVEL TIME BY PINNACES BETWEEN KÉ MACINA AND DIAFARABÉ

Travel by pinnaces	2021	2024	Time Saving
Macina-Diafarabé (downstream)	4h 52mn	2h 30mn	2h 22mn
Diafarabé-Macina (upstream)	7h 02mn	5h 00mn	2h 18mn

Source: Final Joint ABFN / COMANAF Assessment of River Transport Data on the Ké Macina-Diafarabé section.

31. **Institutional reform for sustainable maintenance of channels, buoyage, and ports remains outstanding at project closing.** A study on the institutional framework for the management of waterway navigation and maintenance of channels, buoyage, and ports was not completed as planned. The study was intended as the basis of reform of both the transport sub-sector by way of launching the process for pinnaces and canoes to acquire commercial licenses of operation, as well as of COMANAF to clarify the technical and financial resources that the agency will need to fully assume its new role as manager of channels, buoyage, and ports. While the project has laid the foundation for further changes in the sector and supported the establishment of management arrangements for the financed infrastructures, some project achievements may be at risk of not being sustained in the long-term in the absence of greater clarity on the institutional management framework.

TABLE 4: INDICATORS RELEVANT TO THE DEMONSTRATION OF APPROACHES FOR THE IMPROVEMENT IN NAVIGATION

#	Indicator	Target	Actual	% Achieved
OI 1	Travel time of COMANAV vessels from Macina to Diafarabé (hours)	6	6	100%
IRI 1	Ecological Information reports made available by the Niger River Observatory (#)	2	2	100%
IRI 3	Channel markers installed between Ke-Macina and Akka (#)	27	31	115%
IRI 4	Volume of dredged material (m3)	1,300,000[3]	523,597	37%

Outcome 2: Demonstrate approaches for the improvement in port services

32. **The project has demonstrated successful approaches to improve the services at the ports of Ké Macina and Diafarabé, as evident by a substantial increase in traffic.** The ports of Ké Macina and Diafarabé have been rehabilitated based on the needs identified by local community members. Physical improvements involve: (i) reinforcement of the embankments in gabionage; (ii) rehabilitation of the docking ramps to facilitate easier berthing of boats and access for people and goods; (iii) renovation of the access road between the town of Macina and the port in Ké Macina; (iv) installation of solar-powered street lighting along the access road and at the ports; and (v) the construction of new storage facilities for use by local merchants. In the final beneficiary survey, 95 percent reported that they were satisfied with the general quality of the renovated ports.

[2] Nsaibia, Héni. 2023. "Fact Sheet: Attacks on Civilians Spike in Mali as Security Deteriorates Across the Sahel." ACLED, September 21, 2023. https://acleddata.com/2023/09/21/fact-sheet-attacks-on-civilians-spike-in-mali-as-security-deteriorates-across-the-sahel/ .

[3] It should be noted that this target was revised upwards from 600,000 m3 at MTR based on information available at the time, but then the actual achieved result was lower because of increased unit costs due to inflation because of the crisis.



FIGURE 3: KE MACINA BEFORE AND AFTER REHABILITATION

33. **The demonstrated effect of the above improvements in both navigation and port services has resulted in a 28 percent increase in port traffic between Ké Macina and Diafarabé** (OI2 *Quantity of traffic at the Macina and Diafarabé ports by river carriers:* 112 percent achieved). Between 2021 and 2023, yearly traffic between Ké Macina and Diafarabé increased by over 8,800 passengers. The increase was realized by the small-boat segment, whose operations respond more quickly to changes in demand.

TABLE 5: TRAFFIC AT PORT KÉ MACINA AND DIAFARABÉ BY RIVER CARRIERS

Traffic (No. of passenger trips)	2018	2021	2022	2023
COMANAV/F	1,000	2 000	2 171	2 007
Pinnaces and canoes		28 800	33 936	37 632
Total		30 800	36 107	39 639

Source: COMANAV registry and 2024 navigation campaign.

34. **Local communities report increased economic activity because of the improved port services and increased traffic.** The renovated ports of Ké Macina and Diafarabé have become the main hubs for economic activities and commercial trade in the area. According to the final beneficiary survey, 90 percent of port users report increased income due to the rehabilitated ports. In comparison, 85 percent of those interviewed felt that the renovated ports have opened up employment opportunities and led to new economic activities.

35. **Management arrangements for port maintenance remain to be clarified.** The project made various tools available to port managers to enable monitoring of traffic, the state of infrastructures, and finances. However, further progress is needed to uncover institutional gaps and overlaps and clarify costs and responsibility for maintaining critical port infrastructure. The institutional study discussed under Outcome 1 was aiming to support this process.

TABLE 6: INDICATORS RELEVANT TO THE DEMONSTRATION OF APPROACHES FOR THE IMPROVEMENT IN PORT SERVICES

#	Indicator	Target	Actual	% Achieved
OI 2	Quantity of traffic at the Macina and Diafarabé ports by river carriers (#)	13,800	39,639	Achieved (see RF)
IRI 5	Ports/quays rehabilitated or built in good condition (Diafarabé and Macina) (#)	2	2	100%
IRI 2	Management plans in place for each new or rehabilitated port (#)	2	0	0%

Outcome 3: Demonstrate environmental restoration

36. **The project has partially demonstrated a successful approach to restoring the environment, but the prevailing security situation prevented the completion of civil works and the full attainment of outcome 3** (OI3 *Area restored/developed in the NID (ha)* 56 percent achieved). A total of 112 hectares of land have been restored through establishing market gardens in the perimeter of Talagnieni pond (6.5 hectares) and through community

micro-projects focused on market gardening and arboriculture (105.5 hectares). The project also sought to open a 4.5-kilometer channel flowing from the Talagnieni pond for use in irrigated agriculture. The channel had been obstructed due to lower flood heights and changes in flooding regimes caused by climate change and increased competition over water usage. The excavation work, which is 80 percent complete, was prematurely terminated in June 2023 due to the increased security threat. If completed, the channel can serve to irrigate rice fields and nourish local communities, but no such plans have been proposed by project closing.

TABLE 7: INDICATORS RELEVANT TO THE DEMONSTRATION OF ENVIRONMENTAL RESTORATION

#	Indicator	Target	Actual	% Achieved
OI 3	Area restored/developed in the NID (ha)	200	112	56%

Outcome 4: Increase access to improved livelihood activities

37. **The project has increased access to improved livelihood activities for 1,652 people, of which 80 percent report having generated a profit from successful micro-projects.** Based on consultations with local stakeholders, the project implemented 109 micro-projects in five local communities of Macina, Kolongo, Kokry, Diafarabé, and Dioro. In total, 1,652 people directly benefited from income-generating activities through: (i) the development of 105.5 hectares of market gardening and arboriculture perimeters (orange, jujube, mango, among others); (ii) the establishment of 55 fattening centers with 910 heads of cattle or sheep; (iii) the establishment of 5 fish farms with 29,700 fry for production; (iv) the establishment of 19 poultry farms with 4,050 chicks for breeding, as well as a few other activities, such as processing and marketing of non-timber forest products, beekeeping, and handicrafts.



FIGURE 4: INAUGURATION OF NEW PORT FACILITIES AND FISH FARMING IGA

38. **Table 9 in Annex 1.B shows a breakdown of Income-Generating Activities (IGA) by type of activity and participants.** Notably, 95 percent of participants were organized as associations, cooperatives or small- and medium-sized enterprises, and women's groups accounted for 70 percent. Less than five percent of **beneficiaries** were individual entrepreneurs, which may be due to the co-payment requirement. The co-payment ensured ownership of investments among beneficiaries and was set aside to support the operation and maintenance of the investments. The number of micro-projects was overachieved due to demand for smaller projects than initially anticipated, allowing for additional micro-projects to be financed.

39. **Findings from the final beneficiary survey show** that 78 percent of beneficiaries are satisfied with the **composition** of the kits or goods supplied, and 80 percent of beneficiaries report making a profit from their microproject. Those who did not experience an income increase include fatteners and arboriculturists, who have yet to commercialize their products at the timing of project closing, given the production cycle.

TABLE 8: INDICATORS RELEVANT TO INCREASING ACCESS TO IMPROVED LIVELIHOOD ACTIVITIES

#	Indicator	Target	Actual	% Achieved
OI 4	People with increased benefits from the project's socio-economic investments (#)	2,300	2,161	94%

IRI 2	Number of micro-projects completed (#)	50	109	218%

40. **At completion, a total of 2,161 direct beneficiaries have benefited economically from project activities** (OI 4 *People with increased benefits from the project's socio-economic investments:* 94 percent achieved). This includes 1,652 people engaged in micro-projects, 88 river carriers, and 421 economic operators at the renovated ports of Ké Macina and Diafarabé. See video on beneficiary testimonials.

Justification of Overall Efficacy Rating

41. **Project efficacy is rated substantial.** The project demonstrated important achievements for the environmental protection and economic development of the Niger River, in a difficult security context, in particular: (i) the improvement of navigation conditions through investments, policy reforms, and capacity building; (ii) the improvement of port services and associated stimulation of the local economy; (iii) the restoration of the environment and the improvement of livelihoods of local populations in insecure areas; and (iv) the strengthening of the Niger River Basin Agency (ABFN) to monitor the river's resources and its threats particularly, sedimentation, the movement of sandbars, and climate vulnerability. There were a few shortcomings related to the institutional arrangements for securing sustained funding for maintaining works and achieving navigability going forward. See Section IV for a discussion on the sustainability of project outcomes and investments covered under MLRP.

C. EFFICIENCY

Rating: Substantial

Assessment of Efficiency and Rating

42. **Project efficiency is as expected for the sector in the prevailing country context.** Efficiency is assessed based on two criteria: economic analysis and implementation efficiency.

Economic analysis

43. **At appraisal, a base case CBA was conducted using a 6 percent discount rate and a 20-year time horizon.** It considered the following costs: direct investments and annual operation and maintenance costs, and benefits: increased financial revenues for boat operators from transporting a higher number of passengers and improved income from agriculture, fishery, and tree planting. The analysis generated a NPV of US$25.9 million, an ERR of 15 percent, and a BCR of 1.5. It should be noted that the CBA focused on the project's original scope, which included improving navigability on a much longer stretch[4] of the Niger River (compared to the actual length between Ké Macina and Diafarabé), rehabilitating six ports (compared to the actual two), and a significantly higher project cost (US$50 million compared to the US$27.8 million approved). For this reason, the economic results at appraisal are not directly comparable with those obtained at completion.

44. **At completion, a CBA is carried out based on the same time horizon and a discount rate used at appraisal.** The analysis considered the costs related to the direct investments, annual operation and maintenance, and the beneficiaries' contributions to micro-projects. It also included: i) benefits from improved river transportation and port rehabilitation (e.g., time and cost savings for passengers, improved commercialization of goods, re-use of dredged material, and avoided groundings and repair costs); ii) benefits from micro-projects, namely net income reported by beneficiaries; and iii) benefits from irrigated areas, in terms of net returns from vegetable gardens. Overall, the ex-post results show that the project was economically attractive, with an NPV of US$8.5 million, an ERR of 13 percent, and a BCR of 1.5 (Annex 4). The results are comparable with those of other water transport projects, which showed

[4] It covered the segments Koulikoro-Mopti, Mopti-Timbuktu, Timbuktu-Gao.

similar ERRs, ranging from 9 percent in China[5] to 14 percent in Bangladesh[6]. A sensitivity analysis shows that the project remains attractive even for increased annual operation and maintenance costs related to dredging and decreased quantities transported by boats between Ké Macina and Diafarabé (Table).

TABLE 10: COST-BENEFIT ANALYSIS RESULTS

	BCR	IRR
Base analysis (6% discount rate, 20-year time horizon)	**1.5**	**13%**
Increase in O&M related to dredging (from 1% to 25%)	1.0	6%
Decrease in additional quantities transported (by 40%)	1.0	7%

45. **It is important to note that the above results depend on the physical investments being maintained.** In this light, the project has initiated an analysis of the institutional arrangements and costs required to maintain these investments, which is anticipated to be completed by the new World Bank-financed operation, the Mali Landscape Restoration Project (MLRP - P177041). This is an important consideration since these costs may increase over time.

Aspects of design and implementation

46. **Aspects of project design and implementation negatively affected project efficiency in a moderate way.** As discussed under Section III, several issues affected the implementation schedule and attainment of outcomes: (i) downscaling of the project scope initially compromised the alignment with the original results framework, leading to restructuring, but also served the project well in terms of ensuring a better size and fit for the country context; (ii) inadequate feasibility studies and procurement delays, due to canceled contracts, caused significant implementation delays, and (iii) the lack of a clear national strategy and consistent high-level support for river transport, as well as shifting political priorities from the GoM undermined institutional coordination and initiatives for reform.

47. **There were also points that increased project efficiency.** These include: (i) the initially ambitious objectives were scaled back, and the project became more of a pilot phase with demonstration goals rather than the broader, transformative objectives set at the outset, (ii) adaptive project management, mobilization of local communities and the use of digital tools to monitor and evaluate progress and outcomes, (iii) low staff turn-over at both the PMU and the World Bank team level, and (iv) the extension of the closing date, which allowed the project to substantially achieve intended project outcomes.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

48. **The overall outcome rating is Moderately Satisfactory.** This is justified by a substantial rating of project relevance, a substantial rating of project efficacy, and a substantial rating of project efficiency.

E. OTHER OUTCOMES AND IMPACTS

Gender

49. **The project design accounted for the traditional labor separation between genders in the NID**. It used a participatory approach to consult women, including specific activities to address their needs, and involved women groups in ongoing community monitoring. The project installed separate bathrooms to renovate the ports, where much of the economic activity is dominated by women involved in fish processing. For the IGA component, it delivered equipment and training to develop new income streams from irrigated market gardening and fattening of sheep and goats, both activities that women in the NID traditionally carry out. Of the 2,161 people who have benefited from

[5] China Hubei Inland Waterway Improvement Project, P158717, ICR.
[6] Bangladesh regional waterway transport project 1, P154511, PAD.

PREEFN interventions to generate additional income, 1,484 were women (69 percent compared to a target of 55 percent). As such, the project contributed to increasing women's assets and income-earning potential through meaningful participation in key project activities.

50. **The PMU included a social development specialist and a GBV specialist, with a focus on gender and vulnerable groups.** The project manual included a description of the approach for monitoring GBV cases. To support GBV monitoring, the project engaged two local Non-Governmental Organizations (NGOs). This enabled the project to organize community awareness-raising sessions, implement the celebration of various campaigns (March 8, International Day of the Girl and the 16 Days of Activism), train local communities on gender-based violence, abuse and harassment, and organize radio broadcasts and other public communication to raise awareness.

Institutional Strengthening

51. **The project strengthened ABFN's capacity to monitor the impact of climate change in the NID.** The newly established spatial data observatory within ABFN is a significant, long-term capacity enhancement. The observatory enables the agency to collect and analyze regular data on a wide range of social, economic, environmental, and climatic factors across the NID. By improving data collection and monitoring, ABFN can better assess and respond to the impacts of climate variability on the river's resources. This new capacity directly supports Mali's role in the Niger Basin Climate Resilience Investment Plan, which aims to enhance climate resilience across the basin through improved data, forecasting, and integrated resource management. The strengthened ability of ABFN to monitor and predict climate-related changes in the Niger River system is a key step toward more effective, regionally coordinated climate resilience strategies.

52. **The project has had a notable impact on the Ministry of Transport, particularly through capacity-building initiatives focused on implementing and applying the navigation code, a key instrument for managing river-based transport.** In addition to strengthening the regulatory framework for guiding the implementation of the navigation code, training sessions were conducted to enhance the MoT's ability to enforce and regulate the safe and efficient movement of goods and people along the Niger River. By strengthening the ministry's understanding of the navigation code, officials are now better equipped to monitor compliance, ensure safety standards, manage river traffic more efficiently, and consider environmental issues in transport planning.

Poverty Reduction and Shared Prosperity

53. **Micro-projects under the PREEFN project have had a notable economic impact on local communities, with significant improvements in income generation and resilience.** The findings from the February 2023 monitoring report on the first of three rounds of financing highlight both the successes and challenges faced by beneficiaries. For example, one aviculturist experienced fluctuating revenue across three poultry cycles but emphasized the value of learning and adaptation. While sales decreased over time, from XOF667,000 in the first cycle to XOF298,000 in the third, the experience reflects the resilience and knowledge gained to optimize future projects. Another aviculturist exhibited impressive growth, with a significant increase in revenue over four poultry cycles - from XOF791,000 in the first cycle to XOF1,704,000 in the fourth cycle - showing both the financial benefits of the project and the scalability of agricultural micro-projects. One association began soap production with a focus on quality and market pricing. Despite challenges, including the loss of some inventory, the association managed to generate a consistent income stream, reaching XOF158,825 in the first transformation and XOF105,975 in the second. Participants in other sectors, like pisciculture and cattle fattening, experienced steady progress even though some beneficiaries are only starting to see a profit from their investments.

54. **Project objectives addressed key poverty challenges in the NID.** Poverty is high in Mali, with 45 percent of people living below the national poverty line in 2021. The household consumer price index increased by 9.7 percent in 2022, and even more so for food and transport because of weak domestic food production and a rise in global food

and energy prices (Poverty and Equity Brief, World Bank, 2023). Low agricultural growth and high food inflation is expected to have affected the relative income of the poorest households especially hard, leading to an increase in inequality, as measured by the Gini index, of nearly one point during the 2019-2022 period to reach 34 in 2022. While there has been no study on the impact of project activities and outcomes on poverty, inequality, and economic resilience in the local beneficiary communities, the project directly addressed the challenges at the local level related to developing economic opportunities, sources of nutrition, and reliable transportation.

III. KEY FACTORS AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

55. **The security situation in the delta had been deteriorating during the time of preparation, and several late revisions were taken to address the corresponding project risk (rated high at appraisal), some of which would later impact the implementation schedule and require restructuring.** It was agreed to reduce project cost to 55 percent of the original scope and start activities in less‐affected river areas and with locally available technologies. This essentially altered the operation to a pilot phase with a demonstration objective. The project also made contingencies to implement third-party implementation support and monitoring. These actions helped mitigate the security risks facing the project and served the project well in setting more realistic outcome targets. However, the internal theory of change was somewhat compromised in the process as the revised development objective and trimmed-down activities were no longer properly aligned with the results framework. The lack of attention to revising the RF set the project on a path towards restructuring.

56. **One of the key risks identified during preparation was the lack of synergy between institutional stakeholders and the inexistence of a well-developed sector strategy to improve river transport.** The project took care to involve a broad array of administrative and operational partners and planned to prepare a study on the institutional and regulatory reforms needed to strengthen collaboration. However, there were no obvious relevant actions to be taken to mitigate the absence of a targeted political or strategic framework for improving fluvial transport. As a result, the project was subject to the GoMs shifting commitment to the sector throughout implementation.

57. **The technical design was complex and mitigating actions taken during preparation were insufficient to prevent implementation delay.** The design of substantial civil works to be implemented in a high-risk security environment was challenging and rated Substantial in preparation. To mitigate this risk, including the risk of overdesigning the scope of works without clear economic and ecological justification, the project prepared feasibility studies using a project preparation advance. However, once the works contract was in place, it became clear that the quality of the studies was inadequate to execute the intended dredging in the NID. In response, the contractor proceeded to prepare an "Execution Study," which saw a doubling of the target for intermediate indicator 4: Volume of dredged material (m3). Subsequently, inflation rose after two military coups (see Section III.C), and the contractor could not furnish the necessary equipment and funds to initiate the work. The contract was canceled, and the ensuing procurement delay eventually caused an extension of the closing date.

58. **Combined, the above issues affected overall project implementation readiness** and must be considered responsible for the subsequent implementation delay and restructuring.

B. KEY FACTORS DURING IMPLEMENTATION

a) Factors subject to the control of the government and/or implementing entities

59. **The PMU, once established, delivered dedicated and qualified project management.** The PMU and Steering Committee took nine months to establish after effectiveness was declared in September 2018 and were only fully operational by June 2019. The staff was technically proficient, providing sound follow-up between missions, and the team generally benefited from little turn-over. The team used different M&E tools to overcome challenges on the ground and, in a few instances, arranged for virtual visits by the World Bank team to the project sites - enabling the exchange of technical expertise from specialists with international experience. The PMU worked to save on costs related to vehicles and motorcycles, and the GoM mobilized US$522,000 from the national budget in a show of commitment even though the project did not call for counterpart funds. The savings and additional funds were used to rationalize project management costs on IDA resources.

60. **The GoM lacked political commitment to develop waterway navigation.** Without a political or strategic framework to guide public policy on the development of river transport and waterway navigation, the GoM shifted its commitment with the emergence of other more present priorities. While understandable given the volatile context in which the project was implemented (see point (c) below), it negatively affected the completion of a planned study on the institutional and regulatory framework to strengthen waterway navigation. The study, which was a critical element of sustainability in the project design to ensure the continued management and maintenance of channels, buoyage, and ports, would have clarified the roles and responsibilities of different stakeholders, articulated organizational priorities, and identified the financial resources needed to develop a financially sustainable model.

61. **Reform of the COMANAF (previously COMANAV) came suddenly and preempted the planned study on the institutional and regulatory framework for river transport.** In July 2023, the GoM quickly reformed the existing COMANAV and introduced a new set of laws governing the new national shipping company, COMANAF. In a broad expansion of their mandate, COMANAF was now in charge of public transport by boat and maintenance of ports, channels, and the buoyage system. However, this happened without a sustainable funding mechanism and clarification of institutional roles and responsibilities. It remains unclear how COMANAF will be empowered to fulfill its mandate.

b) Factors subject to the control of the World Bank

62. **Task team leadership (TTL) changed twice within the first two years of implementation, but since then, the project has benefited from a stable Task team based in the region.** There was the early rotation of three TTLs from approval in March 2018 through the fall of 2019, the same period during which the PMU was being established with delay. Since then, the project has benefitted from the proximity of a single TTL based in Ouagadougou, Burkina Faso, which helped to ensure timely and adequate implementation support through 14 missions. The team took care to deliver virtual support when faced with obstacles presented by the global health crisis and high security risks.

63. **The mid-term review (MTR) positively affected project outcomes by embracing the need for restructuring and planting the seeds for a follow-on project.** Following the project's MTR, the RF was revised to make the necessary adjustments to reflect the project's actual approved scope. By waiting until the MTR to restructure the RF, the turbulent period marked by two political coups had quieted down, and the revisions were better informed by actual implementation progress. Discussions around a potential next-phase operation began at MTR and continued at completion. Meanwhile, the new MLRP operation has picked up some initial investments planned under PREEFN but dropped as part of the downscaling. This specifically relates to key civil works on the river further downstream toward Akka, support to the river observatory established under PREEFN, and ongoing institutional capacity strengthening at ministries and agencies to continue the dialogue on the need for reform of how the Niger River is managed.

64. **During periods when disbursements were suspended due to OP 7.30 (see below under III.B.c), the Task team proactively recommended a path forward for project implementation.** The team recommended that the PMU refocus on activities that could be covered using the resources in its transaction account for recurrent operating

expenses and implementing micro-projects benefitting local populations. The implementation of civil works contracts was postponed until the suspension was lifted due to insufficient resources.

65. **The Task team ensured adequate transition arrangements by making specific recommendations to the Borrower on several critical activities.** During the post-project phase, the Task team made several recommendations, highlighted in the Aide Memoires: (i) guidelines to support the application of the navigation code, (ii) running the hydraulic model every year following bathymetric surveys to estimate maintenance needs and the funds required to plan yearly dredging, and (iii) inspecting all buoys and their moorings after each flood and equipping the ABFN to repair them as needed.

c) Factors beyond the control of the government and/or implementing entities

66. **The project was implemented in a highly volatile context affected by a global pandemic, two political coups and growing insecurity in the project areas.** Given the operational context, the achievements to date are commendable.

67. **Covid-19 affected the project through increased prices for building material and works.** The project areas were remote and were not subjected to heavy sanitary restrictions. However, growing inflation, which likely ensued in part from global supply chain interruptions and in part from the disruptions caused by two political coups, affected the contract to dredge the Niger River under Component 2.

68. **Two consecutive military coups in August 2020 and May 2021 triggered World Bank OP 7.30: "Dealing with de-facto government."** This effectively suspended the entire portfolio in Mali, during which time, no disbursements were made for the periods of 3 months and 5 months, respectively. The suspensions seriously delayed the PREEFN procurement process and the execution of certain contracts. Mali has since been in a state of political transition, but the de-facto government has recognized the country's past international obligations and ensured the continued implementation of the PREEFN Project. Elections are planned for early 2025.

69. **The escalating threat of attacks by non-state actors severely impacted project implementation and outcomes.** From preparation to completion, the high-security risk environment altered the course of the project. In preparation, safety concerns caused the project design to be revised. During implementation, the rising threat-level affected the attainment of project outcomes. First, the contractor for the excavation of the Talagnieni channel terminated the contract early, and consequently, the project did not achieve the land restoration target linked to the third outcome. Second, a fatal attack[7] on a COMANAV vessel in September 2023 led to the closure of regular public transport ever since, which affected the measurement of OI1 Travel time of COMANAV vessels and OI2 Traffic at ports.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

Rating: Substantial

M&E Design

70. **No theory of change was prepared at the design stage, but overall, there was a strong internal logic linking activities to outcomes.** However, when the project was scaled down, this logic was somewhat compromised as the scale of investments no longer commanded the same level of impact. As a demonstration project, larger-scale and

[7] Nsaibia, Héni. 2023. "Fact Sheet: Attacks on Civilians Spike in Mali as Security Deteriorates Across the Sahel." ACLED, September 21, 2023. https://acleddata.com/2023/09/21/fact-sheet-attacks-on-civilians-spike-in-mali-as-security-deteriorates-across-the-sahel/ .

longer-term transformational impacts were expected under a scale-up project. The project development objectives remained relevant over time.

71. **The original outcome indicators were not SMART[8], but astute revisions strengthened the ability to assess project outcomes (**Error! Reference source not found.**).** Basic assumptions for some outcome indicators were not adequately uncovered in the preparation phase, such as the maximum speed of COMANAV vessels and the local population's preference for traveling by pinnaces and canoes (not specific, achievable, nor realistic). The RF was not adjusted to the approved reduced project scope, such as OI4 and intermediate indicators related to opening just one channel instead of four (not specific nor measurable). Consequently, all four outcome indicators needed restructuring in January 2022. By replacing two outcome indicators and revising two others, the RF has proved effective in tracking progress toward project outcomes (see **Error! Reference source not found.** and Annex 1 for a discussion of each indicator). Regarding the revision of intermediate indicator 4: Volume of dredged material (m3), the target more than doubled based on the contractor's own estimate. At the time of the MTR, there were enough funds to cover the cost of dredge additional volume. However, subsequently, prices increased due to inflation in the aftermath of the coup and the pandemic, making the target unachievable. The final value achieved was close to the original target.

M&E Implementation

72. **Implementation delays in completing M&E set-up and arrangements affected the sequencing of activities for a proper M&E framework.** M&E implementation arrangements were only vaguely defined at appraisal, contrary to the conditions of effectiveness in the FA. A delay in implementing the baseline study to inform project indicators meant that the M&E manual also could not be completed in a timely manner. Meanwhile, concerns were growing about the relevance of certain indicators and their ability to be measured, leading to the restructuring of the RF. Some of the baseline figures needed further adjustment to align with the new indicators.

73. **M&E data were collected and analyzed in a methodologically sound manner.** The Technical Project Coordination and Monitoring Committee (Comité Technique de Coordination et de Suivi du Projet, CTCSP), established within the ABFN, provided technical implementation support, reviewed annual work plans and budgets, and ensured compliance with project objectives, outputs, and outcomes.

74. **In the fragile, conflict-affected and vulnerable (FCV) implementation context of Northern rural Mali, the PMU relied heavily on surveyors and a community monitoring mechanism to act as relays.** With the PMU located in Bamako, the CTCSP utilized several tools to undertake regular monitoring of project activities and surveys to assess project progress. The KoboToolbox platform captured digitized questionnaires and recorded sound, video, and GPS coordinates from focus groups and individual interviews organized to collect qualitative data. PREEFN also used the remote monitoring approach Global-Enabling initiative for Monitoring and Supervision (GEMS) for data collection, processing and analysis, including for monitoring of social safeguards issues, such as GBV.

75. **At project closing, the PMU prepared several surveys to assess project performance and the attainment of outcomes.** In addition to a survey of beneficiaries' level of satisfaction with project activities, the PMU organized joint missions to collect data and inform the RF. River transport data were collected through focus group discussions and key informant interviews over three sailing seasons to assess progress towards OI1 and estimate the achievement of OI2, which could not be measured due to safety concerns.

M&E Utilization

76. **M&E data collection was central to the overall project design, and the collection of M&E data has served multiple purposes.** At the community level, the use of GEMS and the community monitoring mechanism enhanced fieldwork oversight, strengthened beneficiary ownership of project outcomes, and built trust between local

[8] Specific, Measurable, Achievable, Realistic, and Time-Bound.

populations and authorities, as noted in PMU reports and beneficiary surveys. At the project level, the PMU leveraged M&E data for management, progress reporting, and preparing mid-term and completion reports. These insights, along with findings from World Bank missions, guided the restructuring in January 2022. Nationally, data collected by the Observatory supports navigability improvements, drought and flood resilience warnings, and feeds dashboards with sectoral data to benefit stakeholders managing NID resources. Additionally, M&E data was used to create communication materials for a wider audience on the project's progress.

Justification of Overall Rating of Quality of M&E

77. **The M&E system, as designed and implemented, was generally sufficient to assess the achievement of the objectives and test the links in the results chain.** There were moderate weaknesses in the M&E system, mainly relating to the reduced project scope at appraisal and its impact on the TOC, the original weak design of the RF, and the vague M&E implementation arrangements at project preparation. While there was a significant implementation delay in establishing a solid M&E framework, most issues were satisfactorily addressed through the restructuring, which strengthened the RF. Considering the challenging implementation context with significant security threats impeding regular M&E, the shortcomings were reasonably addressed through relay partners, joint missions, and the application of innovative tools like GEMS, community monitoring, and beneficiary satisfaction surveys, as detailed above.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

78. **The project complied with environmental and social safeguards.** The project was rated "Category A" (full assessment) and triggered the following safeguards policies: OP 4.01 Environmental Assessment, OP 4.04 Natural Habitats, OP 4.09 Pest Management, OP 4.37 Safety of Dams, OP 4.11 Physical Cultural Resources, OP 4.12 Involuntary Resettlement, and OP 7.50 Projects on International Waterways. The notification requirement concerning OP 7.50 was handled through the Niger Basin Authority in accordance with their mandate stipulated in the Water Charter of the Niger River, linking all nine riparian countries. No objections were received during the notification period.

79. **Key safeguards instruments were timely prepared and disclosed prior to appraisal.** The project prepared (i) an Environmental and Social Management Framework (ESMF) to identify the risks related to dredging, rehabilitation of river piers, and riverbank strengthening, and a Resettlement Policy Framework (RPF) for the infrastructure component of the project. Both instruments included the main mitigating, monitoring, and capacity-building measures to be embedded in the project design and factored into the project cost. They were approved and disclosed before appraisal on the World Bank website and distributed to relevant stakeholders at the local level.

80. **Safeguards implementation was rated satisfactory throughout implementation.** Additional instruments were prepared before works were authorized to begin. Two Resettlement Action Plans were developed for the works on the ports, which enabled a total of 280 Project Affected Persons to be properly compensated. An audit of the implementation process was carried out, and all audit recommendations were complied with. Site-specific Environmental and Social Impact Assessments were duly prepared along with Environment and Social Management Plans, which were publicly consulted and validated before the start of physical works. For the proposed income-generating activities, all 196 micro-projects were screened and validated by the National Directorate for Sanitation, Control of Pollution, and Harmful Substances (*Direction Nationale de l'Assainissement, du Contrôle des Pollutions et des Nuisances*) and the World Bank.

81. **Grievance Redress Committees (GRM) were established and operational in each of the five project sites.** Of the 318 project-related complaints recorded, all were resolved at closing. Another 38 non-project-related complaints were recorded and redirected in accordance with project guidelines. Local communities were informed of the GRM through a series of radio shows and during different consultation events. The GRMs were accessible through various

means (written, oral, SMS, e-mail) and channels (GRM committees, local authorities, local focal points, PMU). Local NGOs were retained to handle gender-based violence grievances. At completion, no project-related complaints related to sexual exploitation, abuse, or harassment had been recorded. Starting in August 2020, the PMU produced quarterly GRM reports as part of their regular progress reporting. See video on the implementation of GRM.

82. **The PMU's fiduciary performance gradually improved and was rated in the satisfactory range throughout implementation.** The internal audit function operated satisfactorily, and quarterly financial reports and external audit reports were submitted on time and of acceptable quality. The external auditor issued a qualified opinion on the project's annual financial statements for the year 2022 (see paragraph below) but also noted the continuous implementation of previous recommendations. The Bank Task team supported the capacity building of the PMU to facilitate the use of STEP in the procurement process.

83. **The project encountered some difficulties and instances of non-compliance related to procurement**. In particular, the PMU encountered difficulties in managing the contract for dredging work on the Macina-Diafarabé section due to the company's inability to raise capital needed to fund the start-up of works. The contract was eventually terminated in June 2023 to the company's detriment, but a repayment of an advance is still pending at project closing. Other issues raised in the audit report include an instance of mis-procurement for recruiting an individual consultant, non-compliance of per diem rates with decree No. 0001/2016 on travel and mission allowances, and inadequate justification of certain fuel expenses. Out of a forecast of 140 contracts worth 13,728,579,537 FCFA, the project was able to commit 109 contracts for a total of 9,737,400,537 FCFA by June 30, 2024.

C. BANK PERFORMANCE

Rating: Moderately Satisfactory

Quality at Entry

84. **The project was under preparation since 2014 and was fundamentally well prepared.** Adding to the long preparation phase were the initial feasibility studies financed by the preparation advance as well as a pause before downscaling and final approval of the project. The strategic approach and considerations for stakeholders, implementation arrangements, safeguards, gender, and risk mitigation measures were well-targeted overall.

85. **Late changes to the project cost and design impacted quality at entry.** When the financial envelope was reduced, the adjustments made to the project design came so late in the preparation phase that the PAD reflects both the original and the revised scope. In part, the downscaling ensured a better fit between the size and scope of the project and the high-risk security implementation context. In part, the project would have benefited from a more careful revision of the project document, including the proper alignment of the RF with the revised objectives and planned sequencing of activities. Overall, the late revisions likely lowered implementation readiness and caused delays, but they also helped shape more realistic activities to support attaining intended objectives.

86. **The technical documentation prepared at appraisal related to dredging of the river and excavation of the channel was inadequate to execute planned works and several studies had to be re-done.** The need for new technical documents and related safeguards instruments, coupled with long procurement lead times and the World Bank's double review of safeguards instruments, significantly impacted the implementation schedule and required an extension of the closing date.

Quality of Supervision

87. **The World Bank team provided satisfactory quality of supervision through regular biannual missions with a dedicated team of specialists.** With geographic proximity, the World Bank Task team supported the PMU in implementing the project with technical expertise from international consultants and training and capacity building

in financial management and safeguards. The Task team reported on project performance with candor, which helped to proactively identify and resolve challenges in achieving development outcomes.

88. **The World Bank Task team stayed focused on the development impact of the project**. This is evident in the detailed revision of the RF, which enabled a substantial achievement of project outcomes; proactively charting a path forward for project implementation during the disbursement pause triggered by OP 7.30, and in amending the study on institutional and regulatory framework for transport on the Niger River to ensure its continued relevance for the newly established COMANAF.

89. **At closing, the project supported adequate transition arrangements** by making recommendations for the post-project phase and supporting follow-up activities under the new MLRP project.

Justification of Overall Rating of Bank Performance

90. **Overall, Bank performance is rated Moderately Satisfactory.** This is justified by: (i) a moderately satisfactory quality at entry with moderate shortcomings in the alignment with the RF and preparation of technical feasibility studies, and (ii) the satisfactory quality of supervision. Above all, it should be noted that the project was considered a high-risk project at appraisal and that the World Bank task team delivered the project to the Board when the opportunity was there and supported the PMU in delivering the results.

D. RISK TO DEVELOPMENT OUTCOME

91. **The key risk to development outcomes lies in inadequate reforms, such as the lack of a financial mechanism for royalty collection and unclear division of roles between central and local authorities, which threaten the project's long-term sustainability.** Institutional reforms are critical for managing ports and maintaining navigable channels. An amended institutional and regulatory framework study underway at project closing will estimate resources needed for channel and port maintenance and explore decentralizing port management under Decree n°2018-0705/P-RM. It will also guide toll-setting to cover maintenance costs, leveraging advances in hydrography and hydraulic modeling. Additionally, a draft text to establish a financial mechanism for managing the Niger River is under review by the Prime Minister's office.

92. **Achievements are being consolidated under the new MLRP project, which is financing some of the activities dropped during the preparation of PREEFN.** By continuing and scaling investment in other parts of the NID, the MLRP is helping to sustain and enhance some of the outcomes achieved by PREEFN. Where the earlier project contributed to enhancing the capacity of national and regional institutions in managing the resources of the Niger River and implementing restoration activities along the banks, the new project expands this approach by further bolstering institutional frameworks at the communal level to support climate-smart landscape restoration. Specifically, the dialogue around institutional strengthening and the need for reform continues under the MLRP, which is critical to support long-term governance, resilience, and sustainable resource management of the river.

V. LESSONS AND RECOMMENDATIONS

93. **A robust and well-conducted preparation phase is critical to advance implementation readiness and avoid challenges.** The project benefited from a Project Preparation Advance to facilitate early project planning. However, the inadequacy of the initial feasibility studies led to the need for new studies during implementation, causing delays and increased costs. Furthermore, insufficient alignment between the project's scope, objectives, and results framework created challenges in measuring progress and achieving desired outcomes. The project's experience underscores the necessity of thorough, well-defined preparatory work and ensuring that the project design is both

comprehensive and aligned with its objectives from the outset to avoid costly revisions and ensure smoother implementation.

94. **Mobilization of local communities, third-party relay, and use of innovative digital tools are key elements for successful implementation and monitoring of projects in a high-risk security context.** The project has demonstrated that by coupling a community and third-party monitoring mechanism with next-generation tools such as GEMS, it strengthened local engagement around project objectives and monitored regular progress toward planned outputs. Conducted by local village leaders and civil society organizations, the project was implemented with support from a network of locally embedded enumerators using smartphones and software apps. Together, they closely monitored civil works, income-generating activities, and beneficiaries' satisfaction with project implementation, regularly collecting and reporting data to the PMU. This lesson is relevant for other projects in the region implemented in an FCV context, where the World Bank task team and the PMU have a limited presence. The model can readily be replicated in communities with strong local organizations and international NGOs, who can take on the responsibility of relaying information between development partners on the ground and the PMU.

95. **Adaptive management is critical to address and sustain the dialogue around institutional reform and strengthening in the absence of clear political priorities and sector strategies.** At project-start, there was a lack of synergy between the implementing agencies, and no clear strategic priorities were defined for the sector. Despite identifying these risks during preparation, the lack of alignment and coordination among key stakeholders and the absence of a well-developed sector strategy hampered project achievements and may hinder the project's long-term sustainability. Recognizing that the challenges posed by the volatile political environment made it difficult to achieve consensus and ensure stability in institutional relationships, the need for adaptive management became even more critical to stay engaged with the client and help define the agenda. This highlights the need for flexible, adaptive planning and stakeholder engagement strategies that can accommodate political complexities while still prioritizing the creation of strong, coordinated frameworks to support the project's objectives.

96. **The collaboration between the transport and environment teams significantly enhanced the project's impact on river navigation.** The project strengthened the capacity of ABFN to monitor climate change impacts, which directly supported the Niger Basin Climate Resilience Investment Plan. This integration of environmental monitoring with transport planning ensured that navigation routes were optimized for both efficiency and sustainability. The World Bank teams from both the transport and environment sectors worked together to help the project better integrate both aspects, ensuring that environmental sustainability was considered in transport planning and that transport improvements supported environmental goals. This comprehensive approach not only achieved immediate project goals but also laid the groundwork for long-term sustainable development and resilience in the region.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS FRAMEWORK

PDO Indicators by Outcomes

To demonstrate the effectiveness of navigation and port service improvement measures.								
Indicator Name	Baseline		Closing Period (Original)		Closing Period (Current)		Actual Achieved at Completion	
	Result	Month/Year	Result	Month/Year	Result	Month/Year	Result	Month/Year
Quantity of traffic at the Macina and Diafarabé ports by river carriers (passengers) (Number)	12,000.00	Mar/2021	13,800.00	Jun/2024	13,800.00	Jun/2024	39,639.00	Jun/2024
	Comments on achieving targets		Target achieved. The indicator was revised in January 2022 from 'Quantity of traffic at ports by COMANAV' to 'Quantity of traffic at the Macina and Diafarabé ports by river carriers' to delimit the stretch that benefited from project investments and to take into account the main types of transportation of pinnaces and canoes (COMANAV vessels only accounted for 10 percent of passenger trips annually between Macina and Diafarabé). The baseline value for pinnaces and canoes was erroneously estimated at 10,000 passengers/year, which together with 2,000 COMANAV passengers/year made for a baseline value of 12,000 passengers/year. For the purpose of the ICR, the target is defined as a 15 increase over the baseline, i.e. 35,512 trips. In 2023, the actual number of passengers travelling between Macina and Diafarabé in 2023 is 39,639, an increase in passenger trips of 28 percent over the baseline. Source of verification: COMANAV registry and 2023/2024 navigation campaign.					
Travel time of COMANAV vessels from Macina to Diafarabe (Hours)	8.00	Mar/2021	6.00	Jun/2024	6.00	Jun/2024	6	Jun/2024
	Comments on achieving targets		Target achieved. Introduced in Jan 2022 to replace original OI1. The indicator measures the time it takes for a COMANAV vessel to travel on the Ké Macina-Diafarabé section. The baseline was 8 hours in 2018 with a target value of 6 hours at project closing, or a 25 percent reduction. At completion, it is estimated that the reduction in travel time for COMANAF vessels has been achieved based on rehabilitation work on the Macina and Diafarabé ports, dreding of critical sills, installation of navigation markers and beacons, and the achieved reduction in travel time for pinnaces and canoes (Table 5). COMANAF vessels have yet to resume operation following an attack on the "Timbuktu" boat on September 07, 2023. For pinnaces and canoes, the time saving from upstream to downstream (downhill) is 2 hours 22 minutes and from downstream to upstream (uphill) is 2hr 18 mins. Source of verification: Final Joint ABFN/COMANAF Assessment of River Transport Data on the Ké Macina-Diafarabé section, Oct 24.					
To demonstrate the feasibility of environmental restoration and livelihood improvement activities.								

Indicator Name	Baseline		Closing Period (Original)		Closing Period (Current)		Actual Achieved at Completion	
	Result	Month/Year	Result	Month/Year	Result	Month/Year	Result	Month/Year
Area restored/developed in the NID (Hectare(Ha))	0.00	Mar/2018	200.00	Jun/2024	200.00	Jun/2024	112	Jun/2024
	Comments on achieving targets		Original target 223 percent achieved and revised target 56 percent achieved. The indicator was defined as the area regenerated through cleared channels. The target value was revised upwards in january 2022 based on a feasibility study and the inclusion of areas restored and developed by the local population through income-generating micro-projects. At completion, a total of 111.65 hectares of land has been restored and/or developed through income-generating micro-projects and six hectares established for market gardening. An additional 100 hectares of rice-growing fields have not yet been realized because works related to the Talagneini channel and pond in Kolongo commune is incomplete (completion rate of 87 percent and 79 percent, respectively) at project closing due to the prevailing security situation. Source of verification: Control and Monitoring of Work to Surface the Talagneini Channel, July 2024.					
People with increased benefits from the project's socio-economic investments (Number)	0.00	Mar/2018	2,300.00	Jun/2024	2,300.00	Jun/2024	2,161	Jun/2024
	Comments on achieving targets		Target 94 percent achieved. Introduced in January 2022 to replace original OI4. The indicator measures the population benefiting from the project activities, with an emphasis on activities that contribute to employment, including beneficiaries of income-generating micro-projects. At completion, a total of 2,161 direct beneficiaries have benefited economically from project activities. This includes 1,652 people engaged in micro-projects, 88 river carriers, and 421 economic operators at the renovated docks of Macina and Diafarabé. Source of verfication: Final Beneficiary Survey.					

Intermediate Indicators by Components

Strengthening the Strategic Management of the Niger River Resources								
Indicator Name	Baseline		Closing Period (Original)		Closing Period (Current)		Actual Achieved at Completion	
	Result	Month/Year	Result	Month/Year	Result	Month/Year	Result	Month/Year
Ecological Information reports made available by the Niger River Observatory (Number)	0.00	Mar/2018	2.00	Jun/2024	2.00	Jun/2024	2	Jun/2024
	Comments on achieving targets		Target achieved. The indicator tracked the production of semi-annual ecological monitoring reports by a newly established Observatory, financed by the project. At completion, the Observatory has produced the first two semi-annual monitoring reports using the Spatial Data Infrastructure (SDI) equipped with advanced technologies to store, structure, enhance and disseminate spatial and spatially-oriented data on the state of the river, including changes in the environment and economic and social activities in Mali's Niger River basin.					
Enhancing Viability of Socio-Economic Activities Contributing to Climate Change Resilience								

Indicator Name	Baseline		Closing Period (Original)		Closing Period (Current)		Actual Achieved at Completion	
	Result	Month/Year	Result	Month/Year	Result	Month/Year	Result	Month/Year
Management plans in place for each new or rehabilitated port (Diafarabé and Macina) (Number)	0.00	Mar/2018	2.00	Jun/2024	2.00	Jun/2024	0.00	Jun/2024
	Comments on achieving targets		Target partly achieved. The indicator tracked if management plans were developed and implemented at each of the two ports rehabilitated as part of the project. At completion, the governance and the sustainable management system for docks/ports in Mali remains to be operationalized. However, management tools have been made available to current port managers to monitor traffic, the state of infrastructures, and finances. On this basis, the manager is equipped to act according to his means and, if necessary, requests help from institutional actors.					
Channel markers installed between Ke-Macina and Akka (Number)	0.00	Mar/2018	27.00	Jun/2024	27.00	Jun/2024	31.00	Jun/2024
	Comments on achieving targets		Target 115 percent achieved. The indicator tracked the number of channel markers installed between Ke-Macina and Akka, covering the entire NID. At completion, a total of 31 markers had been installed of which 27 are floating marks and an additional four illuminated beacons had been requested to further facilitate river navigation. The work involved: i) the manufacture of spherical floating beacons with a diameter 1.5 meters constructed from latticework, including a ring for attaching the chain; ii) manufacture, transport and installation of solid concrete dosed at 350 kg/m3 with the addition of skhalite; iii) supply and installation of galvanized steel chains, and iv) supply and installation of galvanized steel shackles. Source of verification: PMU.					
Volume of dredged material (Cubic Meter(m3))	0.00	Mar/2018	1,300,000.00	Jun/2024	1,300,000.00	Jun/2024	523,597	Jun/2024
	Comments on achieving targets		Original target 87 percent achieved and revised target 37 percent achieved. The indicator was designed to track the number of cubic meters of material dredged between Macina and Diafarabé. The target value was revised upwards in the Januray 2022 restructuring from 600,000 km3 to 1,300,000 km2 based on the contractor's own estimates in an Execution Study. At completion, the volume dredged was 523,597 m3 based on the Completion Report prepared in July 2024 for works carried out between May 29, 2024 and June 6, 2024. Source of verification: Control and Monitoring of Work to Surface the Talagneini Channel, July 2024.					
Ports/quays rehabilitated or built in good condition (Diafarabé and Macina) (Number)	0.00	Mar/2018	2.00	Jun/2024	2.00	Jun/2024	2.00	Jun/2024
	Comments on achieving targets		Target achieved. The indicator tracked the rehabilitation planned for the ports of Macina and Diafarabé. At completion, works to rehabiliate the ports of Macina and Diafarabe had reinforced the embankments, rehabilitated the access road, installed solar-powered street lamps, and rehabilitated the lateral berthing ramps. Source of verification: PMU.					
Share of communities in targeted areas covered participating in community monitoring mechanism (Percentage)	0.00	Mar/2018	80.00	Jun/2024	80.00	Jun/2024	100.00	Jun/2024
	Comments on achieving targets		Target 125 percent achieved. At completion, all five municipalities where the project intervene fully participate in the mechanism. Source of verification: PMU.					
	0.00	Mar/2018	50.00	Jun/2024	50.00	Jun/2024	109	Jun/2024

Number of micro-projects completed (Number)	Comments on achieving targets	Target 218 percent achieved. The indicator was introduced in January 2022 to account for the income-generating activities carried out by groups and individuals from selected villages in the NID. It was not considered in the initial RF because the activity was drastically reduced before appraisal. The target value was estimated on the basis of the maximum financing of USD20,000 per micro-project and available project resources. During implementation, the average funding requested per micro-project was lower than anticipated, which made it possible to finance more micro-projects. At completion, a total of 109 micro-projects had been financed and implemented.

N.B. Please note that the Baseline, Closing Period (Original) and Closing Period (Current) values cannot be modified in the system and there are some errors that should be noted for the following indicators:

- Under PDO Indicators, the indicator entitled 'Quantity of traffic at the Macina and Diafarabé ports by river carriers': the Closing Period (Original) should be 10,000 and the Month/Year should Sep/2023.
- Under PDO Indicators, the indicator entitled 'Area restored/developed in the NID': the Closing Period (Original) should be 50 and the Month/Year should be Sep/2023.
- Under PDO Indicators, the indicator entitled "People with increased benefits from the project's socio-economic investments': (i) the Closing Period (Current) should be 2,300 and the Month/Year should be Jun/2024; (ii) the Closing Period (Original) should not be applicable.
- Under Intermediary Indicators, the indicator entitled 'Ecological Information reports made available by the Niger River Observatory': the Closing Period (Original) Month/Year should be Sep/2023.
- Under Intermediary Indicators, the indicator entitled 'Management plans in place for each new or rehabilitated port (Diafarabé and Macina)': the Closing Period (Original) Month/Year should be Sep/2023.
- Under Intermediary Indicators, the indicator entitled 'Channel markers installed between Ke-Macina and Akka': the Closing Period (Original) Month/Year should be Sep/2023.
- Under Intermediary Indicators, the indicator entitled 'Volume of dredged material': (i) the Closing Period (Original) should be 600,000 and Month/Year should be Sep/2023.
- Under Intermediary Indicators, the indicator entitled 'Ports/quays rehabilitated or built in good condition (Diafarabé and Macina)': the Closing Period (Original) Month/Year should be Sep/2023.
- Under Intermediary Indicators, the indicator entitled 'Share of communities in targeted areas covered participating in community monitoring mechanism': the Closing Period (Original) Month/Year should be Sep/2023.
- Under Intermediary Indicators, the indicator entitled 'Share of communities in targeted areas covered participating in community monitoring mechanism': (i) the Baseline Month/Year should be Mar/2021, (ii) the Closing Period (Original) should not be applicable, (iii) the Closing Period (Current) should be 200 and Month/Year should be Sep/2024.

B. KEY OUTPUTS

Outcome 1: Demonstrate approaches for the improvement in navigation	
PDO Indicators	• Travel time of COMANAV vessels from Macina to Diafarabe (hours)
Intermediate Indicators	• Ecological Information reports made available by the Niger River Observatory (#) • Channel markers installed between Ke-Macina and Akka (#) • Volume of dredged material (m3)
Key Outputs (linked to the achievement of the PDO Outcome)	**COMPONENT 1: Strengthening the Strategic Management and Monitoring of Niger River Resources** <u>Subcomponent 1.1: Strengthening environmental monitoring of the Niger River</u> *Observatory:* - Observatory operationalised with staff recruited and internet, local area network, computer equipment and software installed in the ABFN offices. - On-going data collection on 25 monitoring indicators, including channel characteristics, channel traffic, bank management and dredging monitoring. - Published two biannual ecological information reports, which are publicly available. *Capacity-building of ABFN staff:* - Trained ABFN staff in usign advanced monitoring tools, including the functionalities of bathymetric and topographic surveying equipment and realted hydraulic model (see below under sub-component 2.1). - Organized study tours, knowledge exchanges, and participation in international conference, such as the 9th World Water Forum held in Dakar, Senegal in March 2022 and the 28th Conference of Parties (COP28) held in Dubai in 2023. <u>Subcomponent 1.2: Supporting strategic management of infrastructure, resources, and stakeholders in the NID</u> *Institutional and regulatory framework for river management:* - Drafted 16 interministerial decrees to supplement the River Navigation Code for its proper application, finalized by 2022:

- Six decrees have been approved by the Government: (i) boat registration; (ii) assistance and rescue; (iii) fines; (iv) visual signalling; (v) sound signalling; and (vi) requirements for pirogues.
- Another ten are still awaiting conversion into interministerial decisions, given that they do not properly fall within the scope of the law that created the Code or its implementing decree: (i) protection of the environment; (ii) crew and conduct; (iii) dangerous goods; (iv) public transport of goods; (v) certificate of seaworthiness; (vi) safety requirements; (vii) tonnage and draught marks;(viii) navigation inspection; (ix) rules of the road and parking; and (x) contracts of carriage.
- Training of the technical experts to certify and register boats to the standard of the Navigation Code can only take place once the Code has been fully adopted.

Capacity of key stakeholders involved in transportation on the Niger River:
- Developed 2020-2023 action plan for the General Directorate of Transport.
- Completed training courses in naval regulations and safety to government officials (including COMANAF, GDT, civil protection, gendarmerie), COMANAF crews, quay managers and private-sector players (pinassiers and pinasse builders).
- Organized international symposium on shipbuilding in Mali in May 2023 with the particiation of shipbuilders from other countries to exchange knowledge and develop new partnerships. The symposium recommended the introduction of new building materials, such as fiber to reduce pressure on wood and produce environmentally-friendly boats and pinasses. A follow-up committee have developed an action plan over the resolutions reached and training is under preparation at project closing.
- Acquired boat grounding rescue and recovery equipment for COMANAF to operate in emergencies when boats run aground and trained COMANAF maintenance teams.
- Certificate and degree training programs in line with international standards have been set up in liaison with the Ministries of National Education, National Entrepreneurship, Employment and Vocational Training, as well as the Ministry of Higher Education. The programs include:
    - Vocational Baccalaureate (*Le bac professionnel, BAC Pro*)
    - Technical Universtiy Diploma (*Diplôme Universitaire de Technologie, DUT*)
    - Advanced Technician's Certificate (Brevet de Technicien Supérieur, BTS)

Communication plan for awareness-raising and protection of the Niger River:
- Implemented awareness-raising among communities along the Niger River to safeguard the river.

	- Published documentary magazine on the boat grounding rescue and recovery equipment acquired by COMANAF. - Completed a film capitalizing on development actions benefiting communities along the Niger River in a context of insecurity. **COMPONENT 2: Enhancing Viability of Socio-Economic Activities Contributing to Climate Change Resilience** <u>Subcomponent 2.1: Improving river transportation in the NID through targeted dredging and maintenance of navigation channels</u> *Technical studies and models:* - Acquired hydrographic boat equipped with survey instruments to determine underwater topography in order to produce high-precision charts. - Completed studies on bathymetry and topography to map elevation of landforms above and below sea level to determine the depth of the river and the state of the ground during flood, ebb and low-water periods (recommended to be carried out annuallly). - Developed a hydraulic model to simulate and analyze the behavior of water flow, level and velocity in the Niger River to inform decision-making on navigation. *Dredging work on the Macina-Diafarabé section:* - Removed sandy sills in the Niger river on the 50 km section between Macina and Diafarabé by completing major dredging work (523,597 cubic meters). *Installation of marker beacons:* - Installed 27 floating markers and four illuminated beacons covering the entire NID (400 km).
Outcome 2: Demonstrate approaches for the improvement in port services	
PDO Indicators	• Quantity of traffic at the Macina and Diafarabé ports by river carriers (passengers)
Intermediate Indicators	• Ports/quays rehabilitated or built in good condition (Diafarabé and Macina) (#)

	• Management plans in place for each new or rehabilitated port (#)
Key Outputs (linked to the achievement of the PDO Outcome)	**COMPONENT 2: Enhancing Viability of Socio-Economic Activities Contributing to Climate Change Resilience** <u>Subcomponent 2.2: Enhancing the reliability of river transportation through construction / rehabilitation and maintenance of river docking piers infrastructure</u> *Rehabilitation of the Macina and Diafarabé Ports:* - Reinforced the embankments by (i) lining the embankment with reinforced concrete, (ii) installing 40mm PVC drainage system (barbacane), (iii) anchoring spades upstream and downstream of the embankment, (iv) installing erosion protection with loose riprap at the foot of the embankment, and (v) installing additional gabions to consolidate stability. - Rehabilitated the side docking ramps. - Installation of 20 solar-powered street lamps to light the ports and access road to Macina. - Rehabilitated the access road from Macina port to the main road. - Vendor storage stalls. - Included inspection, upkeep and maintenance of the ports for a one-year period. - Carried out technical audit of rehabilitation work on the Diafarabé and Ké-Macina ports. *Management of the Ports:* - Institutional Study to cover (i) the reform of COMANAV, (ii) the creation of the Agence d'Entretien des Voies Navigables du Mali, and (iii) the reorganization of river transporters and builders. - Completed feasibility studies and environmental and social impact assessments for (i) rehabilitation of the river intake channel at the Konna fishing port and (ii) development of the Mopti embankments and quay, to financed by the next-phase project.
Outcome 3: Demonstrate environmental restoration	
PDO Indicators	- Area restored/developed in the NID
Intermediate Indicators	

Key Outputs (linked to the achievement of the PDO Outcome)	**COMPONENT 2: Enhancing Viability of Socio-Economic Activities Contributing to Climate Change Resilience** *Subcomponent 2.4: Protection and rehabilitation of riverbanks and restoration of channels* *Development of the Talagneini pond and channel:* - Completed development of two market gardening perimeters. - Excavation of the pond and development of an inlet channel (85 percent complete). Suspended in June 2023 due to flood. - Development of rice-growing sill, downstream sill and dykes (72 percent complete). Suspended in June 2023 due to flood. - Technical audit of the Talagneini pond and channel development works.
Outcome 4: Increase access to improved livelihood activities at targeted sites in the Niger Inner Delta (NID)	
PDO Indicators	- People with increased benefits from the project's socio-economic investments
Intermediate indicators	- Share of communities in targeted areas covered participating in community monitoring mechanism (%) - Number of micro-projects completed (#)
Key Outputs (linked to the achievement of the PDO Outcome)	**COMPONENT 2: Enhancing Viability of Socio-Economic Activities Contributing to Climate Change Resilience** <u>Subcomponent 2.3: Improving socioeconomic opportunities and ecosystem functions of the NID</u> **TABLE 9: INCOME-GENERATING ACTIVITIES**

Type of activity	# of activities	Individual participants		Participants in groups		Total participants	Contribution personnelle (FCFA)	Financement PREEFN (FCFA)	Montant total alloué (FCFA)
		Female	Male	Female	Male				
Sheep fattening	1			30		30	169 900	3 228 100	3 398 000
	11	1	6	135	17	159	1 989 750	29 492 750	31 482 500
	11	2	9			11	1 584 000	14 256 000	15 840 000
Sub-Total	**23**	**3**	**15**	**165**	**17**	**200**	**3 743 650**	**46 976 850**	**50 720 500**
Beef fattening	18		7	223	107	337	5 312 000	87 278 000	92 590 000
	3			49	69	118	1 135 650	21 577 350	22 713 000
	11	2	3	30	89	124	3 270 000	53 430 000	56 700 000
Sub-Total	**32**	**2**	**10**	**302**	**265**	**579**	**9 717 650**	**162 285 350**	**172 003 000**
Arboriculture	3	1	2			3	405 800	3 652 200	4 058 000
	7		6		8	14	1 361 228	15 528 323	16 889 550
	5		4	12	19	35	1 104 400	13 169 600	14 274 000
Sub-Total	**15**	**1**	**12**	**12**	**27**	**52**	**2 871 428**	**32 350 123**	**35 221 550**
Poultry	5	2	3			5	842 100	7 578 900	8 421 000
	8	1	6	25		32	1 758 865	20 165 185	21 924 050
	6	1	5			6	1 145 960	10 313 640	11 459 600
Sub-Total	**19**	**4**	**14**	**25**		**43**	**3 746 925**	**38 057 725**	**41 804 650**
Market gardening	2			56	23	79	796 500	15 133 500	15 930 000
	5			159	18	177	2 122 975	40 336 525	42 459 500
	5			301	44	345	1 978 500	37 591 500	39 570 000
Sub-Total	**12**			**516**	**85**	**601**	**4 897 975**	**93 061 525**	**97 959 500**
Fish farming	2			126	10	136	934 050	17 746 950	18 681 000
	2		1	7	13	21	615 000	9 735 000	10 350 000
	1		1			1	194 000	1 746 000	1 940 000
Sub-Total	**5**		**2**	**133**	**23**	**158**	**1 743 050**	**29 227 950**	**30 971 000**
Beekeeping	1		1			1	125 500	1 129 500	1 255 000
Crafts	1		1			1	192 000	1 728 000	1 920 000
NTFP	1			17		17	195 913	3 722 338	3 918 250
Sub-Total	**3**		**2**	**17**		**19**	**513 413**	**6 579 838**	**7 093 250**
TOTAL	**109**	**10**	**55**	**1170**	**417**	**1652**	**27 234 090**	**408 539 360**	**435 773 450**

Outcome 5: Improve the Recipient's capacity to respond promptly and effectively to an Eligible Crisis or Emergency, in the event of an Eligible Crisis or Emergency

PDO Indicators	n/a
Intermediate indicators	n/a
Key Outputs	n/a

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Mirko Ivo Serkovic	Team Leader
Rima Aloulou	Team Leader
Ndri Marina Assoumou	Financial Management Specialist
Tahirou Kalam	Financial Management Specialist
Ibrah Rahamane Sanoussi	Procurement Specialist
Mamadou Sangare	Procurement Specialist
Boubacar Diallo	Procurement Specialist
Mohamed Youba Sokona	Environmental Specialist
Tolidji Blaise Donou	Environmental Specialist
Taoufiq Bennouna	Environmental Specialist
Mahamadou Ahmadou Maiga	Social Specialist
Christophe Bertrand Messina	Social Specialist
Angele Compaore Ouattara	Procurement Team
Aoua Toure Sow	Procurement Team
Aissata Diop Diallo	Procurement Team
Fatoumata Diourte Berthe	Procurement Team
Nikolai Alexei Sviedrys Wittich	Procurement Team
Nelly Gwenaelle Bachelot	Team Member
Amadou Ba	Team Member
Yasmina Oodally	Team Member
Lelia Croitoru	Team Member
Sanne Agnete Tikjoeb	Team Member
Najat Yamouri	Team Member
Gnouga Pascal Ilboudo	Team Member
Anders Jensen	Team Member

B. STAFF TIME & COST

Stage of Project Cycle	Staff Time & Cost	
	No. of Staff Weeks	US$ (including travel and consultant costs)
Preparation		
FY15	32.640	231,229.61
FY16	17.154	120,468.38
FY17	41.226	218,775.31
FY18	13.995	77,474.81
FY19	2.658	13,851.68
Total	107.67	661,799.79
Supervision/ICR		
FY19	7.905	55,976.20
FY20	15.935	128,720.54
FY21	13.982	118,424.41
FY22	18.478	161,168.99
FY23	30.679	200,505.98
FY24	19.101	199,882.45
FY25	5.180	50,216.77
Total	111.26	914,895.34

ANNEX 3. PROJECT COST BY COMPONENT

Component	Amount at Project Approval (US$M)	Revised Amount (US$M)	Actual at Project Closing (US$M)
Component 1: Strengthening the Strategic Management of the Niger River Resources	11.0	10.6	10.8
Component 2: Enhancing Viability of Socio-Economic Activities Contributing to Climate Change Resilience	11.8	11.5	11.2
Component 3: Project management	5.0	5.7	5.8
Component 4: Contingent Emergency Response	0.0	0.0	0.0
TOTAL	**27.8**	**27.8**	**27.8**

[1] Including USD3 million from Project Preparation Advance.
[2] Including USD0.5 million from Project Preparation Advance.

ANNEX 4. EFFICIENCY ANALYSIS

This annex provides a description of the project benefits, details of the ex-post economic CBA of the project activities, and financial considerations.

A. Project benefits

The project generated several types of benefits, including:

- *Local benefits*, e.g., enhanced local economies of Macina and Diafarabé communes as a result of better transportation of people and goods along the Niger River; decreased risk of boat accidents and savings from avoided repair costs of boats as a result of channel marking and dredging; and higher incomes from micro-projects (109) and vegetable gardens (6 ha).

- *National benefits*. These include ecosystem services, such as reduced erosion and sedimentation, which increase river flow and bolster food security. In addition, by enhancing water transit between villages, the project helped to lessen the impacts of climate change on river communities (e.g., rapid evacuation in case of exacerbated floods).

- *Global benefits*. As part of micro-projects, the project also produced benefits of global relevance, such as carbon sequestration through agricultural techniques, such as arboriculture.

B. Economic analysis

A CBA of all project activities is conducted below, using a 20-year time horizon – the lifetime of many project investments[9] – and a discount rate of 6 percent[10]. While the project generates a wide range of benefits, only some of them could be estimated in monetary terms, and the remaining are briefly described qualitatively.

Costs. These include: direct investments in strengthening the strategic management of the Niger river, in enhancing the viability of socio-economic activities (dredging, installing channel markers, micro-projects, bank rehabilitation) and project management costs; and annual costs, e.g., operation and maintenance of all project investments after the end of the project (e.g., physical rehabilitation works, micro-projects, agricultural areas) and beneficiary contributions to micro-projects. Overall, the present value of these costs is estimated at about ***US$18.8 million*** (Table 1).

Benefits. Several types of benefits were estimated:

1. *Benefits from improved river transportation and port rehabilitation*. The investments in dredging, channel marking, and port rehabilitation made it possible to identify shorter and safer boat itineraries along the Niger river. This resulted in benefits for passengers (time and cost savings), for the local economies (improved commercialization due to water transport and re-use of dredged material), and for boat operators (reduced groundings). The paragraphs below describe the estimation of these benefits:

    - *Time and cost savings for passengers.* The project investments resulted in: 1) time savings of about 2 hours per trip, for the *existing* passengers of COMANAV boats (1,000/year) and of pinasses (28,880/year) -- namely

[9] such as the rehabilitation of the ports, banks, and docking ramps.
[10] World Bank. 2016. *Discounting Costs and Benefits in Economic Analysis of World Bank Projects*. Washington DC: World Bank.

those that would have taken these boats also in the absence of the project. The economic value of time savings is estimated at US$0.5 per hour, based on the country's GDP per capita and number of working hours[11]; 2) cost savings for the *additional* passengers of COMANAV boats (which increased from 0 in 2018 to 1,007 in 2024 and constant afterwards) and of pinasses (which increased from 0 in 2018 to 8,752 in 2024 and constant afterwards) who switched from road to water transport as a result of the project. The cost savings, estimated based on the travel cost difference between the transport alternative without project (road) and with project (water), attain US$4 per passenger who switched from road transport to COMANAV boats and US$5/passenger who switched from road transport to pinasses[12]. Using the above information, the time and cost savings for both the existing and additional passengers are estimated to vary from 0 in 2018 to US$84,700 in 2024, and constant afterwards. Using a 6 percent discount rate and 20-year time horizon, the present value of this benefit is US$0.8 million (a).

- *Improved commercialization due to enhanced water transport*. The dredging, channel marking, and port rehabilitation facilitated more frequent boat trips per year, which resulted in an annual increase in the quantity of goods transported by boats and commercialized in Ke Macina and Diafarabe. Based on data from the PMU, the increase ranged from 0 in 2021 to 2,847t in 2024 on COMANAV boats and from 0 in 2021 to 14,280 t in 2024 on pinasses.[13] Most of these goods are food products, such as fresh fish, rice, millet, oil, and flour. Based on the local price of these goods, the total value of the additional products transported is estimated at about US$41.9 million per year[14] (2024 and afterward). The exact contribution of the project to this value is not known. However, data from other countries of the region indicate that the added value of local transport is about 7–12 percent of the total value of goods.[15] Applying the lower bound estimate (7 percent) to the total value of the additional quantities transported, we obtain that the project's contribution to improving local economies along the river increased from 0 in 2028 to US$2.9 million in 2024 and constant afterward. Accordingly, its present value is estimated at US$23 million (b).

- *Reuse of dredged material.* The material that was dredged from the river – sand, gravel – is now reused by local populations as construction material. A local survey conducted in Macina showed that the average price of the dredged material is about US$7 per m^3 – although this is a conservative estimate, as it reflects only the cost of transport without covering the real economic value of the material.[16] Assuming the material will be reused in the following five years after the project's end, the present value of this benefit is estimated at US$2.2 million (c).

- *Avoided groundings and repair costs*. According to COMANAV statistics, there were numerous COMANAV ship groundings before 2021, with an average repair cost of about US$30,000 per year. The communications with the PMU revealed that the river rehabilitation works (markers, dredging, purchasing of a rescue and recovery boat) led to a substantial reduction of these costs. Assuming that these activities reduced the number of groundings only by half, the present value of the saved costs is estimated at US$0.1 million (d).

[11] The estimation is based on a GDP per capita in Mali of US$897 in 2024 (https://data.worldbank.org), 220 days of work, 8 hours a day.
[12] Estimated as difference between: a) the cost per passenger in the absence of the project = US$1.4/liter of gas * 0.0094 liters/km * 48 km between Macina and Diafarabe = US$6; b) the cost per COMANAV passenger (with project) = US$2; c) the cost per pinasse passenger (with project) = US$1. Hence, the switch from road to water transport led to cost savings of US$5/passenger that switched to pinasses and US$4/passenger that switched to COMANAV boat.
[13] The quantity increase for COMANAV boats is estimated as the difference between the total quantity transported in 2024 (7,000 t) and that expected to have been transported in the absence of the project in 2021 (4,153 t), which equals to 2,847 t. For pinasses, the increase in quantity is estimated as 5 t/pinasse/day * 17 pinasses * 24 weeks (168 days) = 14,280 t (based on communications with the PIU).
[14] Based on the local price of fresh fish (US$3.3/kg), rice (US$3/kg), millet (US$1.8/kg), oil (US$3.3/kg) and flour (US$0.8/kg), the average price of commodities is roughly estimated at about US$2.4/kg. Applying this price to the incremental quantity (17,127 t) gives a total of US$41.9 million.
[15] It varies between 7 percent in South Africa to 12 percent in Kenya, based on the countries' transport statistics reported in www.statista.com
[16] Based on communications with the PIU.

2. *Benefits from micro-projects.* The project supported the adoption of 109 micro-projects in income-generating activities related to livestock breeding, market gardens, arboriculture, pisciculture. A study conducted at the end of the project estimated that these micro-projects generated a net income between US$500 and US$2,000, with an average of US$1,250 per beneficiary per year[17]. Considering the gradual adoption of micro-projects (32 in 2022, 38 in 2023, and 39 in 2024), the present value of the income generated by micro-projects is estimated at US$1.1 million. (e)

3. *Benefits from irrigated areas.* In addition to the economic activities supported by micro-projects, the project invested in the creation of vegetable gardens (6 ha). Considering using the average net income from vegetable production (US$3,000/ha/year)[18], the present value of these benefits is estimated at about US$0.1 million. (f)

Based on the above valuations, the benefits generated by the project are estimated at about ***US$27.3 million*** (a-f).

Overall, the CBA shows a **net present value of US$8.5 million, a benefit-cost ratio of 1.5,** and an **IRR of 13 percent** (Tables A1 and A2). It should be noted that these results are conservative because: 1) they do not include other benefits provided by the project, such as improved livelihoods in communes farther from the river; saved lives and avoided injuries due to safer and quicker evacuation transport in case of floods and other disasters; 2) they are based on conservative assumptions, particularly related to the "without project" scenario, where the benefits of river transport (e.g., people, goods) are assumed to remain constant over time, rather than gradually declining due to increased sedimentation in the absence of the project. A sensitivity analysis indicates that the project remains attractive even for an increase of the annual operation and maintenance costs related to dredging (from 1 percent to 25 percent of the capital cost) and for a 40 percent decrease in the additional quantities transported by boats between Ke Macina and Diafarabe.

TABLE 10: RESULTS OF THE CBA FOR THE OVERALL PROJECT (US$ MILLION)

	2018	2019	2020	2021	…	2024	…	2038	2039	PV
Costs										
- Investment costs	0.0	1.0	1.4	4.1	…	10.3	…	0	0	18.1
- Annual O&M costs	0.0	0.0	0.0	0.0	…	0.0	…	0.1	0.1	0.5
- Other costs (benef. contrib)	0.0	0.0	0.0	0.0	…	0.02	…	0.02	0.02	0.2
Total costs	***0.0***	***1.0***	***1.4***	***4.1***	***…***	***10.3***	***…***	***0.1***	***0.1***	***18.8***
1.Benefits from improved transp.										
- Benefits for boat passengers	0.0	0.03	0.04	0.04	…	0.08	…	0.08	0.08	0.8
- Improved commercialization	0.0	0.0	0.0	0.0	…	2.9	…	2.9	2.9	23.0
- Reuse of dredged material	0.0	0.0	0.0	0.0	…	0.6	…	0.0	0.0	2.2
- Avoided groundings	0.0	0.0	0.0	0.0	…	0.02	…	0.02	0.02	0.1
2.Benefits from micro-projects	0.0	0.0	0.0	0.0	…	0.1	…	0.1	0.1	1.1
3.Benefits from irrigated areas	0.0	0.0	0.0	0.0		0.1		0.1	0.1	0.1
Total benefits	***0.0***	***0.03***	***0.04***	***0.04***	***…***	***3.8***	***…***	***3.2***	***3.2***	***27.3***
Net benefits	**0.0**	**-1.0**	**-1.3**	**-4.1**	**…**	***-6.5***	**…**	**3.1**	**3.1**	**8.5**

[17] MEADD. 2024. Rapport d'evaluation finale du projet de rehabilitation economique et environnementale du fleuve Niger. June 2024.
[18] USAID. 2016. Mali: Agriculture Indicators Report. Rainy and Dry Seasons. The report provides a gross margin between US$1,591/ha/y for leafy greens, US$3,699/ha/y for okra and US$7,138/ha/y for squash. We assume the gross margin from okra, and deduct 20 percent, to obtain the net income (US$3,000).

TABLE 11: CBA SUMMARY BY COMPONENT (US$ MILLION)

Component	NPV (US$ million)	B/C ratio	IRR
Component 1	-5.9	0	n.a.
Component 2	18.6	3	34%
Component 3	-4.2	0	n.a.
Overall project	**8.5**	**1.5**	**13%**

C. Financial considerations

Overall, it is important to note that the positive economic results depend on the sustained operation and maintenance of the physical investments after the end of the project (e.g., dredging, port rehabilitation). The project's sub-component 2.2 supports the costs of inspection, maintenance, and upkeep of Macina and Diafarabé ports for one year (2024). Moreover, the project has initiated an analysis of the institutional arrangements and costs required to maintain these investments beyond 2024, which is anticipated to be completed by the newly planned Mali Landscape Restoration Project (P177041).

Furthermore, in addition to the economic benefits estimated in the previous section, the project brought financial profits to boat operators. These were estimated at: i) US$21,900 per year for all pinasse operators, based on an average ticket price of US$2.5/passenger and 8,752 additional passengers (for 2024 and following years); and ii) US$66,300 per year for all COMANAV boats, based on an average ticket price of US$66/passenger and additional 1,007 passengers (for 2024 and following years)[19]. These gains are expected to increase the financial stability of boat operators, which will be especially helpful when the need to replace aging boats arises.

[19] The estimations are based on ticket price data drawn from the Borrower's ICR for COMANAV boats (p. 48) and from MEADD. 2024. Rapport consolidé de la collecte des données de transports fluviaux sur le troncon Ke Macina-Diafarabé (p. 10) for pinasses.

ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

The ICR report has been shared with the Borrower.

ANNEX 6. SUPPORTING DOCUMENTS

TABLE 12: KEY WORLD BANK PROJECT DOCUMENTS

Document	Report No.	Date
Project Appraisal Document	PAD1338	21-Feb-2018
Financing Agreement		29-Mar-2018
Implementation Status and Supervision Reports	#1-14	
Restructuring Paper #1	RES38242	18-Sep-2019
Restructuring Paper #2	RES45578	02-Mar-2021
Restructuring Paper #3	RES47702	19-Jan-2022
Country Partnership Framework FY16-FY19	94005-ML	03-11-2015
Systematic Country Diagnostic Update	175888	2022
Poverty & Equity Brief		April 2023
Next Generation Africa Climate Business Plan	150468	2020
World Bank Gender Strategy (FY16–FY23)		2015
Western and Central Africa Region priorities (2021–2025)	159265	2021
Green, Resilient and Inclusive Development Framework	DC2021-0004	2021
Climate Change Action Plan 2021–2025		2021

TABLE 13: KEY BORROWER PROJECT DOCUMENTS

Document	Date
Borrower's Project Completion Report	June 2024
Final Beneficiary Satisfaction Survey	February 2023
Final Joint ABFN / COMANAF Assessment of River Transport Data on the Ké Macina-Diafarabé section	October 7-13, 2024
Consolidated report on river transport data collection on the Ké Macina-Diafarabé section (over three seasons: 2020-2021; 2022-2023; 2023-2024)	
Completion Report - Supervision and control of dredging works	June 2024
Control and Monitoring of Work to Surface the Talagneini Channel	July 2024

ANNEX 7. CHANGES TO OUTCOME INDICATORS

TABLE 14: ORIGINAL AND REVISED OUTCOME INDICATORS

#	Original OI	Revised OI	Rationale for change
Outcome 1: Demonstrate approaches for the improvement in navigation and port services			
OI1	Average vessel speed between Diafarbé and Macina (km/h) *Baseline: 14 km/h* *Target: 30 km/h*		**Deleted.** Underlying assumptions were incorrect, as the average speed of COMANAV vessels would not increase as a result of project interventions. COMANAV vessels, with an average age of 44 years, have a maximum observed speed of 8 km/h.
		Travel time of COMANAV vessels from Macina to Diafarabé (hours) *Baseline: 8 hours* *Target: 6 hours*	**New indicator.** Introduced to replace original OI1. The indicator measures the effect of project interventions to clear obstructions and mark the safest navigation route on travel time between the ports of Macina to Diafarabe.
Outcome 2: Demonstrate approaches for the improvement in port services			
OI2	Quantity of traffic at ports by COMANAV (passengers/year) *Baseline: 1,000* *Target: 10,000*	Quantity of traffic at the Macina and Diafarabé ports by river carriers (passengers/year) *Baseline: 12,000* *Target: 13,800*	**Revised.** The indicator was not corrected when the project's initial scope was reduced prior to approval. It was initially envisioned to construct/rehabilitate six ports along the Niger River with a target to increase port traffic by COMANAV ten-fold. However, only the ports of Macina and Diafarabe were finally approved. Furthermore, it was discovered that only an approximate estimate of 10 percent of passengers traveled between Macina and Diafarabe in COMANAV vessels, with the majority travelling by pinnaces and canoes. The revised indicator measured traffic at the ports by all river carriers with a target of a 15 percent increase in traffic.
Outcome 3: Demonstrate environmental restoration			
OI3	Area restored / developed in the NID through opening of lateral channels (ha) *Baseline: 0 hectares* *Target: 50 hectares*	Area restored/developed in the NID (ha) *Baseline: 0 hectares* *Target: 200 hectares*	**Revised.** This indicator was formulated based on the project's initial (larger) scope, which envisioned the opening of four channels. However, only one channel would be treated by the project. Despite the reduced scope, the target value was revised upwards based on a feasibility study and inclusion of areas restored/developed by the local population through income-generating micro-projects.
Outcome 4: Increase access to improved livelihood activities at targeted sites in the Niger Inner Delta (NID)			
OI4	Local villages with access to improved livelihood activities (#) *Baseline: 0* *Target: 12*		**Deleted.** The original project scope envisioned opening four channels that would benefit 12 villages through access to flood waters for irrigation purposes. With just one channel to be opened, it was more relevant to measure the project's impact through the number of beneficiaries (new indicator).
		People with increased benefits from the project's socio-economic investments (#) *Baseline: 0* *Target: 2,300*	**New indicator.** Introduced to replace original OI4. Instead of measuring the number of villages, the new indicator measured the population benefiting from project activities, with an emphasis on activities that contribute to employment, including beneficiaries of income-generating micro-projects.

ANNEX 8. SUMMARY OF BENEFICIARY SATISFACTION SURVEY

The Government of Mali, in its fight against the effects of climate change, has received funding from the World Bank to implement the Economic and Environmental Rehabilitation of the Niger River in Mali (PREEFN) project. Implemented by the Agence du Bassin du Fleuve Niger (ABFN), the project aims to contribute to the development of the fragile agro-ecological zone of the Inner Niger Delta (DIN). It comprises 3 three components

- Strengthening strategic management and monitoring of the resources of the River Niger ;
- Improving the socio-economic viability of activities on the River Niger ;
- Project management.

This project targets the construction of civil engineering infrastructures such as river quays, channels, bank improvements and the dredging of critical points on the river. It comprises a number of sub-projects which, as with any intervention that brings about environmental and social changes, have impacts on biophysical and human components in terms of disruption of the living environment, generation of solid and liquid waste, work-related insecurity, occupation of private land, etc.

During the mid-term review, it was recommended that a beneficiary satisfaction survey be organized to measure how the project was perceived by its beneficiaries.

Ultimately, this evaluation should enable the on-board project to analyze the degree of satisfaction of the beneficiaries of the actions carried out by the project, and also the relevance, effectiveness, impact, sustainability and consideration of the gender aspect in the implementation of the project.

METHODOLOGICAL APPROACH

The methodological approach consisted in carrying out a qualitative and quantitative evaluation in order to analyze the degree of satisfaction of the beneficiaries of the actions carried out by the PREEF, as well as the relevance, effectiveness, impact, sustainability and consideration of the gender aspect in the implementation of the project.
The assessment was made in terms of the essential and lasting changes produced in the attitudes, practices and living conditions of the stakeholders (beneficiary populations and other players).
The study was structured as follows:

- ✓ A theoretical phase dealing with literature review, the design and validation of collection tools, their administration, and the practical organization of the field phase;
- ✓ A field phase devoted to collecting and analyzing the data collected;
- ✓ Finally, a reporting phase was devoted to the production of interim and final reports.

The surveys took place in the four PREEFN intervention communes of Macina, Kokry, Kolongo and Diafarabé. The surveys were carried out by administering questionnaires and interview guides using smartphones, and the results were compiled on the KoboToolbox platform.

Sampling

In terms of sampling, we used purposive sampling to form a representative sample of all key players, without resorting to chance.
To ensure that the sample was representative, all the intervention municipalities were included. We drew a sample for each target based on the available sampling frame.
Two major project activities were covered by this satisfaction survey. These were the microprojects financed and the rehabilitated quays.
The target sample size is determined by the following formula:

$$n = D * \left(Z_\alpha + Z_\beta\right)^2 [\frac{P_1(1-P_1)+P_2(1-P_2)}{(P_1+P_2)^2}]$$

Where:

- N = minimum sample size per survey series or comparison group ;
- D20 = effect of experimental design (standard value of D is 2)
- P1 = Estimated level of an indicator measured as a proportion at the time of the first survey ;
- P2 = Expected level of the indicator either at a future date or for the project area such that the variation (P2 - P1) is the size of the change we wish to measure;
- Zα = Score-Z index α corresponding to the degree of confidence with which we would like to be able to conclude that an observed change in size (P2 - P1) would not have happened by chance ;
- Zβ = Score-Z index β corresponding to the degree of confidence required to be certain of observing a change (P2 - P1) if it has actually occurred.

This formula is recommended for both basic and impact valuation methods.
Assuming an average increase in indicators of 10 percentage points from P1=40% to P2=50%, and using the standard parameters of 90% significance level and 55% power, with values for alpha (α) = 1.282 (for a one-tailed test) and beta (β) = 1.126, the estimated sample size is around 214 actors (beneficiaries) to be surveyed. Assuming a 10% non-response rate, the final sample size is 194 households.

TABLE 15SAMPLE SIZE ESTIMATES

D (Default value)	P1 (Specify)	P2 (Specify)	Alpha (Specify)	Beta (Specify)	Zalpha (Automatic calculation)	Zbeta (Automatic calculation)
2	0,4	0,5	0,9	0,55	1,282	1,126

Total population size	323
Sample size	194
Non-response forecast	10
Total sample size	214

Overall, the sample was as follows:

20 In a cluster survey to determine the effect of experimental design, Katz (AJCN, 1995 Jan; 61(1) :155-60) found that the effect ranged from 0.44 to 2.59. The use of D=2.0 is therefore conservative.

TABLE 16 QUANTITATIVE SAMPLE

Quantitative targets	Expected size	Size obtained	Coverage rate
Microprojet players	64	62	**97%**
Users of rehabilitated platforms	150	214	**143%**
Total	**214**	**276**	**129%**

TABLE 17 DISTRIBUTION OF RESPONDENTS BY GENDER

Targets	No. of men	No. of women	Total	% woman
Microprojet players	44	18	62	41%
Users of rehabilitated platforms	164	50	214	30%
Total	**208**	**68**	**276**	**25%**

For the qualitative component, two qualitative research methods were used: Focus Group Discussions (FGD) and in-depth Individual Interviews (IE) with selected key informants: Focus Group Discussions (**FGD**) and in-depth Individual Interviews (**IE**) with selected key informants. Interview guides were developed and adapted in close collaboration with the PREEFN team.
Key players interviewed to gather qualitative information included: members of Community Monitoring Committees, Complaints Management Committees, representatives of local technical services, and local and administrative authorities. The Focus-Group-Discussion (FDG) consisted of 5 to 10 people.

MAIN RESULTS OF THE STUDY

The key results of this evaluation are presented by activity below.

A. DEGREE OF BENEFICIARY SATISFACTION

a- Rehabilitation of the Macina and Diafarabé wharves

The survey reveals that the localities of Ké Macina and Diafarabé have become the main poles of attraction for socio-economic activities, around which the surrounding villages travel to trade. This corroborates the results of the survey. Nine out of ten (9/10) of quay users estimate an increase in their income with the rehabilitation of the quay, i.e. 91% of users. Around 85% of those interviewed felt that the quay had opened up employment opportunities for them and the local population, not to say that the rehabilitation had led to the creation of new economic activities around the quay by the local population. In other words, new people have started up business around the quay. 95% of transporters say that the quay is used as a storage area for fairground merchandise. As for the general quality of the docks built, the satisfaction score is 95%, against 5% who say it's fair. On the other hand, 43% of respondents complained about the

unsuitability of the docking ramp for boats and pinnaces, as well as the gabions. As a result, it was recommended that the gabions should be concreted over, as they had deteriorated with boats bumping into the gabion walls.
The rehabilitation of the Macina and Diafarabé quays has been hailed by the entire population of the area, as it has given a proud image and a radiant face to these riverside localities.

b- Implementation of socio-economic activities

PREEFN has financed 32 socio-economic micro-projects in the communes of Macina, Kolongo, Kokry and Diafarabé, with the aim of improving living conditions for communities.
The beneficiaries' satisfaction score for the composition of the kits or goods supplied was 78%, compared with 22% who said they were not very satisfied. With regard to the profits generated by microproject activities, it appears that around eight out of ten (8/10) of those interviewed have made a profit from their microproject activity, compared with 2/10 who have not yet made a profit. The latter have not yet commercialized their products.

B. RELEVANCE

The evaluation notes that the proposed socio-economic activities are consistent with the socio-economic and cultural development plans (PDSEC) of the target communes in the Ségou and Mopti regions. On the basis of data previously collected by the project from the relevant authorities, the rehabilitation of the wharves and the micro-projects emanate from the beneficiary populations with a view to diversifying livelihoods and improving incomes.
70% of those interviewed felt that the PREEFN project's actions were relevant to the needs of the local population and had adapted to community development challenges. All PREEFN activities were subject to public consultation with stakeholders before they began.

C. EFFICIENCY

Comments indicate that PREEFN's activities have led to concrete solutions to help the poorest members of the population (specifically women and young people). The expected results were achieved in a timely manner, according to 96% of interviewees. What's more, PREEFN has responded favorably to the needs of local women and young people, in a proportion of 97%.

D. IMPACT

The survey shows that 52% of river transporters achieved a monthly income of between FCFA 50,000 and FCFA 100,000 after wharf rehabilitation, whereas the minimum expenditure basket in Mali is FCFA 65,000 per household per month. We can consider that half of the transporters earn the average monetary value of the goods and services a

household needs to satisfy its basic needs, thanks to the rehabilitation of the quays. What's more, nine out of ten (9/10) quay users estimate that their income will increase as a result of quay rehabilitation.

As far as microprojects are concerned, 78% of beneficiaries have made a profit from their activities, compared with 22% who have not yet done so. The latter, mainly fatteners, have not yet commercialized their products.

E. SUSTAINABILITY

To ensure its sustainability, the project has set up grassroots bodies made up of local stakeholders. These are: *Community Monitoring* ***Committees***, *Complaints Management* ***Committees***, *which include the management of cases of GBV*, and *Microproject Approval Committees*. Setting up these committees in each of the project's communes is an appropriate exit strategy for the post-project period.

Institutional support from the relevant technical departments is essential to ensure the long-term viability of the project. The results of this study show that the State's decentralized technical services are members of all the basic bodies, which has made it possible to monitor the wharf rehabilitation work and the implementation of micro-projects. According to the members of these bodies, this is the first time that a project in their area has involved local players and services to this extent.

As for PREEFN's intervention strategy, 90% of the beneficiaries of PREEFN's achievements testified that the citizen engagement approach was the key to the success of the project's achievements. They appreciated this innovative approach, unknown to them until the advent of PREEFN.

F. TAKING INTO ACCOUNT GENDER AND SOCIAL COHESION

This section aims to assess the involvement of women and young people in the project, the extent to which the gender aspect has been taken into account, and social cohesion.

First and foremost, women and young people - 96% of those interviewed - stated that they had been involved in the targeting and identification of needs, in consultations and in the choice of beneficiaries of u PREEFN, and felt that the project had worked towards equal opportunities. 99% of those surveyed confirmed that the project's intervention strategy had helped to strengthen relations between different groups in my community. Women and young people unanimously affirmed that PREEFN had helped them gain access to socio-economic opportunities.

Based on the above findings, it is safe to say that the vast majority of PREEFN's achievements have been appreciated by the project's various stakeholders.

RECOMMENDATIONS

a- For microprojects :

1. Establishment of a memorandum of understanding between PREEFN and the technical departments directly involved in project activities.
2. Ensure that the basic bodies are covered by an operating budget
3. Strengthen the NGO's capacity to ensure effective coordination of the project's various activities.
4. Set up or encourage the setting up of a fund to support youth entrepreneurship and self-employment.
5. The selection criteria for micro-projects are too rigid and need to be streamlined. There are too many filters. First there's the pre-selection, then the selection by the selection committee and then the final selection.
6. The acceptance of infrastructure, equipment and products must be carried out with the participation of specialists in the field. In other words, in addition to the design office, the relevant deconcentrated government technical service (STDE) must be present.
7. Project beneficiaries not only need to be monitored, but also supported by appropriate training in: (i) production techniques; (ii) simplified business management; and (iii) functional literacy.
8. Setting up an empowerment system to ensure the sustainability and ownership of the project by the beneficiaries.
9. Deliver materials and equipment on time.

b- For docks :

10. Seal the metal benches under the sheds,
11. Rehabilitate three (03) 40 m x 16 m access roads,
12. Rehabilitate five (05) 2 m wide intermediate staircases.