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IMPLEMENTATION COMPLETION AND RESULTS REPORT

IDA-53400 / IDA-64130 / TF-16000

ON A CREDIT

IN THE AMOUNT OF SDR 65.1 MILLION
(US$100 MILLION EQUIVALENT)

AN ADDITIONAL CREDIT

IN THE AMOUNT OF EUR 21.9 MILLION
(US$25 MILLION EQUIVALENT)

AND A GRANT

IN THE AMOUNT OF US$6.65 MILLION
(US$131.65 MILLION EQUIVALENT)

TO THE

REPUBLIC OF NIGER

FOR THE

NIGER DISASTER RISK MANAGEMENT AND URBAN DEVELOPMENT PROJECT

April 26, 2023

Urban, Resilience and Land Global Practice
Western And Central Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 15, 2023)

Currency Unit =	CFA Franc (CFAF)
CFAF 619 =	US$1
US$ 1.33 =	SDR 1

FISCAL YEAR
July 1 – June 30

ABBREVIATIONS AND ACRONYMS

AF	Additional Financing
AHA	*Aménagement Hydro-Agricole* (Irrigated Perimeters)
CC/SAP	*Cellule de Coordination du Système d'Alerte Précoce (*Coordination Cell of the Early Warning System*)*
CERC	Contingency Emergency Response Component
CREWS	Climate Risks Early Warning System
DALY	Disability-Adjusted Life Year
DGPC	*Direction Générale de la Protection Civile (*General Directorate of Civil Protection*)*
DMN	*Direction de la Météorologie Nationale (*National Meteorology Directorate*)*
DNPGCCA	*Dispositif National de Prévention et de Gestion des Catastrophes et Crises Alimentaires* (National Mechanism for the Prevention and Management of Disasters and Food Crises)
DRM	Disaster Risk Management
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
EWS	Early Warning System
FCS	Fragile and Conflict-affected Situation
FCV	Fragility, Conflict, and Violence
FM	Financial Management
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEMS	Geo-Enabling initiative for Monitoring and Supervision
GoN	Government of Niger
GRM	Grievance Redress Mechanism
ICR	Implementation Completion and Results Report
ICT	Information and Communication Technology

IFR	Interim Financial Report
IHME	Institute for Health Metrics and Evaluation
IRI	Intermediate Results Indicator
IRM	Immediate Response Mechanism
IRR	Internal Rate of Return
ISR	Implementation Status and Results Report
LDCF	Least Developed Countries Fund
M&E	Monitoring and Evaluation
MAH-GC	*Ministère de l'Action Humanitaire et de la Gestion des Catastrophes* (Ministry of Humanitarian Action and Disaster Management)
MPC	Marginal Propensity to Consume
MRI	*Mécanisme de Réponse Immédiate* (Immediate Response Mechanism)
MTR	Midterm Review
NPV	Net Present Value
O&M	Operation and Maintenance
PAD	Project Appraisal Document
PAP	Project-Affected Person
PDES	*Plan de Développement Économique et Social* (Economic and Social Development Plan)
PDO	Project Development Objective
PGRC-DU	*Projet de Gestion des Risques de Catastrophes et de Développement Urbain* (Disaster Risk Management and Urban Development Project)
PIDUREM	*Projet Intégré de Développement Urbain et de Résilience Multisectorielle* (Niger Integrated Urban Development and Multi-sectoral Resilience Project)
PIMELAN	*Projet Intégré de Modernisation de l'Elevage et de l'Agriculture au Niger* (Agricultural and Livestock Transformation Project)
PIU	Project Implementation Unit
PV	Photovoltaic
RAP	Resettlement Action Plan
RF	Results Framework
RPF	Resettlement Policy Framework
RRA	Risk and Resilience Assessment
TF	Trust Fund
ToC	Theory of Change
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
VSL	Value of Statistical Life
WGI	Worldwide Governance Indicators

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P145268	Niger Disaster Risk Management and Urban Development Project
Country	**Financing Instrument**
Niger	Investment Project Financing
Original EA Category	**Revised EA Category**
Partial Assessment (B)	Partial Assessment (B)

Related Projects

Relationship	Project	Approval	Product Line
Additional Financing	P167352-AF-Niger Disaster Risk Management and Urban Development Project	17-May-2019	IBRD/IDA
Supplement	P145932-Niger Disaster Risk Management and Urban Development Project	11-Dec-2013	Global Environment Project

Organizations

Borrower	Implementing Agency
Ministry of Planning	Prime Minister's Office

Project Development Objective (PDO)

Original PDO

The Project Development Objective (PDO) is to improve Niger's resilience to natural hazards through selected disaster risk management interventions in targeted project sites and strengthening of Government's capacity to respond promptly and effectively to an eligible crisis or an emergency.

FINANCING

		Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing				
P145268	IDA-53400	100,000,000	100,000,000	90,775,595
P145268	IDA-64130	25,000,000	25,000,000	23,354,466
P145932	TF-16000	6,649,315	6,644,005	6,644,005
Total		**131,649,315**	**131,644,005**	**120,774,066**
Non-World Bank Financing				
Total		**0**	**0**	**0**
Total Project Cost		**131,649,315**	**131,644,005**	**120,774,066**

KEY DATES

Project	Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
P145268	11-Dec-2013	15-Aug-2014	04-Dec-2017	30-Jun-2020	31-Oct-2022

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
28-Mar-2016	12.04	Change in Implementing Agency Change in Results Framework Change in Institutional Arrangements
23-Mar-2017	39.07	Change in Components and Cost Reallocation between Disbursement Categories Change in Disbursements Arrangements
25-Apr-2019	84.09	Additional Financing Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Change in Safeguard Policies Triggered
29-Jun-2021	104.38	Change in Results Framework Change in Loan Closing Date(s) Change in Implementation Schedule Other Change(s)

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Satisfactory	Satisfactory	Substantial

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	12-Apr-2014	Satisfactory	Moderately Satisfactory	.94
02	27-Nov-2014	Moderately Satisfactory	Moderately Satisfactory	.95
03	16-Jun-2015	Moderately Satisfactory	Moderately Satisfactory	5.62
04	16-Dec-2015	Moderately Satisfactory	Moderately Satisfactory	10.19
05	20-Jun-2016	Moderately Satisfactory	Moderately Satisfactory	21.41
06	27-Dec-2016	Moderately Satisfactory	Moderately Satisfactory	33.73
07	30-Jun-2017	Moderately Satisfactory	Moderately Satisfactory	55.20
08	04-Apr-2018	Satisfactory	Moderately Satisfactory	64.21

09	03-Oct-2018	Satisfactory	Moderately Satisfactory	73.95
10	07-May-2019	Satisfactory	Moderately Satisfactory	84.09
11	22-Dec-2019	Satisfactory	Moderately Satisfactory	90.37
12	25-Jun-2020	Satisfactory	Moderately Satisfactory	95.52
13	01-Feb-2021	Satisfactory	Moderately Satisfactory	99.17
14	09-Aug-2021	Satisfactory	Moderately Satisfactory	106.04
15	05-Feb-2022	Satisfactory	Moderately Satisfactory	108.61
16	08-Aug-2022	Satisfactory	Satisfactory	112.43

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Agriculture, Fishing and Forestry	**20**
Other Agriculture, Fishing and Forestry	20
Public Administration	**26**
Central Government (Central Agencies)	11
Sub-National Government	10
Other Public Administration	5
Transportation	**5**
Other Transportation	5
Water, Sanitation and Waste Management	**49**
Other Water Supply, Sanitation and Waste Management	49

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)

Finance	**7**
Finance for Development	7
Disaster Risk Finance	7
Public Sector Management	**3**
Public Administration	3
Administrative and Civil Service Reform	1
Municipal Institution Building	2
Human Development and Gender	**6**
Gender	6
Urban and Rural Development	**62**
Rural Development	41
Rural Infrastructure and service delivery	41
Disaster Risk Management	21
Disaster Response and Recovery	7
Disaster Risk Reduction	7
Disaster Preparedness	7
Environment and Natural Resource Management	**22**
Water Resource Management	22
Water Institutions, Policies and Reform	22

ADM STAFF

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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. **At appraisal in November 2013, Niger was considered one of the poorest countries in Sub-Saharan Africa.** The economy was dominated by agriculture, which contributed 43 percent of gross domestic product (GDP). Frequent droughts, political instability, and fluctuations in revenue from Niger's mineral exports contributed to high volatility in its growth rate. A poor harvest in 2011 resulted in economic growth of only 2.3 percent and a severe cereal deficit, which triggered large inflows of humanitarian aid in 2012. Per capita GDP was about US$680, poverty rate was 60.8 percent, and life expectancy was 57 years. The country's high population growth rate of 3.3 percent per year was largely the product of an extremely high fertility rate of 7.6 children per woman.[1] Human development indicators in health and education were also among the lowest in the world.

2. **Niger was facing instability due to neighboring armed conflict, an influx of refugees, and the emergence of political and religious groups as alternative service providers and authorities.** The Libyan conflict led to the return of over 100,000 migrants and an outflow of arms. The coup d'état and rebellion in Mali resulted in an additional inflow of around 64,000 refugees into Niger. These challenges exacerbated an already fragile humanitarian situation, particularly in the northern Tillabéri region, which was hit hard by the 2012 food crisis. Boko Haram's activities in Niger, including recruitment and use of the country as a refuge, further threatened the economy, with the expulsion of Nigeriens from northern Nigeria and border closures adding to the strain.

3. **About 20 percent of Niger's population lived in urban areas, of which 40 percent lived in the capital, Niamey.** The urban population rate was expected to reach 40 percent by 2030 due to demographic and expected urban population growth. The contribution of urban areas to the country's GDP was about 50 percent while less than 8 percent of the national budget was dedicated to building or rehabilitating urban infrastructure. Limited technical capacity, unpredictable financial resources at the local government level, and weak coordination among Central Government entities remained the biggest urban challenges, thus contributing to the high vulnerability of poor urban households.

4. **Niger was also highly vulnerable to natural hazards, including floods and droughts.** Several factors contributed to rising disaster risks in Niger, including population growth (4.41 percent on average between 2000 and 2015)[2] and rapid urbanization, deforestation, increasing soil erosion and land degradation in watersheds, and climate variability. Disaster risk was exacerbated by inadequate planning, particularly with respect to proliferation of urban population settlements along the banks of the Niger and Komadougou Rivers; poor building standards; obsolete or inadequate infrastructure, such as vulnerable flood protection dikes; and limited emergency response and recovery capacity.

[1] Fertility remains high at 6.7 children per woman in 2020, leading to an estimated population increase to 31.3 million by 2027 and to 65.6 million by 2050. Persistently high fertility and declining child mortality have resulted in high population growth at 3.65 percent in 2021. Niger World Bank indicators.
[2] Niger City Scan, Global Facility for Disaster Reduction and Recovery and World Bank.

5. **In Niger, ten major droughts and nine flooding events were recorded over the last 30 years, leading to significant human losses and damages to infrastructure.** Drought episodes resulted in rural exodus and uncontrolled demographic growth in urban areas. Record precipitations in 2010 and 2012 led to significant floods affecting already vulnerable population, livestock, cropland, and rangeland. The flooding events in 2012 led to critical damage to infrastructure and housing in cities, villages, and irrigated perimeters (*aménagement hydro-agricoles*, AHAs) along the Niger and Komadougou Rivers.

6. **Subsequently, the Government of Niger (GoN) requested support from the World Bank** to help (a) rehabilitate infrastructures and improve livelihoods through effective and sustainable programs, (b) improve disaster risk management (DRM) capacity (that is, risk evaluation, planning, resilient building practices, early warning systems [EWSs] and emergency response), and (c) introduce long-term remedial programs in critical watersheds that pose a growing threat to urban areas and rural communities along major rivers. This request led to the Niger Disaster Risk Management and Urban Development Project (*Projet de Gestion des Risques de Catastrophes et de Développement Urbain*, PGRC-DU). The project design benefited from the previous national and regional projects (the third Community Action Program [PAC-3, P132306]), the regional committees for project analysis, the Local Infrastructure Development Project [PDIL, P095949], the Safety Net Project [PFS, P123399], the Community Action Project for Climate Resilience [CAP CR, P125669], and the Niger Community-Based Disaster Reduction Project [P145453].

Rationale for World Bank Engagement

7. **The objectives of the project were aligned with the World Bank's priorities reflected in the World Bank Strategy for Africa's second pillar** (Africa's Future and the World Bank's Support to It, March 2011):[3] (a) competitiveness and employment and (b) vulnerability and resilience. The project also directly contributed to the World Bank Country Partnership Strategy for the period FY13–16 (Report No. 76232 NE) and was squarely aligned with its second pillar 'reducing vulnerability'. The project was also in sync with Niger's Economic and Social Development Plan (*Plan de Développement Économique et Social*, PDES) 2012–2015 which was formulated by the GoN as a unifying framework for all sectoral policies and strategies. Finally, the project was in line with 'the Nigeriens feed Nigeriens Initiative (*Les Nigériens Nourrissent les Nigériens*)', specifically its second and fourth objectives: 'Increase the resilience of poor households by increasing their income' and 'Enhance national and local capacity to anticipate, prevent and manage food crises'.

Theory of Change (Results Chain)

8. **The Project Appraisal Document (PAD) did not include a Theory of Change (ToC)** as it was not required at the time of preparation. The inferred ToC based on the restructurings and Additional Financing (AF) remains valid for the original project design and is unpacked under the Efficacy section (Figure 1).

[3] World Bank website: https://www.icafrica.org/fileadmin/documents/Knowledge/World_Bank/1.Africa%27s%20Future%20and%20the%20World%20Bank%27s%20Support%20to%20It.pdf.

Figure 1. Theory of Change

ACTIVITIES	RESULTS	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES/PDO	LONG-TERM OUTCOME
▪ Drainage, irrigation and socio-economic services infrastructure ▪ Flood control infrastructure ▪ Watershed rehabilitation	▪ Sources of drinking water rehabilitated or developed (a/c) ▪ Targeted irrigable land rehabilitated (a/c) ▪ Watershed protection and land restoration achieved (a/c) ▪ Drainage rehabilitated (a/c) ▪ Drainage pavement realized (a/c) ▪ Sand stabilized (Koris) (a/c) ▪ Pond infrastructure realized (a/c)	Targeted flood protection and sustainable land and water management interventions contributing to increased resilience	Selected disaster risk management interventions in targeted project sites	Resilient growth in urban and rural areas along the Niger and Komadougou watersheds
▪ CERC emergency activities	▪ Client promptly prepared/ submitted activation package after a disaster (a)	Direct project beneficiaries		
▪ Support to local governance and civil society ▪ Strengthening of central government ▪ Strengthening DRM capacity ▪ ICT activities for urban development	▪ Urban master plans and local development plans developed/updated (b) ▪ Municipal budget allocated to solid waste collection and processing/transformation (b) ▪ Preparedness and emergency response supported (b) ▪ Urban development supported (b)	Performance of the early warning and response system for natural rapid onset hazards	Strengthened capacity to respond promptly and effectively to an eligible crisis or an emergency	
▪ Project Management	▪ FM and procurement regularly reported (c) ▪ Activities implemented (c) ▪ Registered grievances addressed			

Critical assumptions: (a) infrastructure in affected areas has been re-established; (b) adequate coordination mechanisms are in place among the central and local implementing agency, technical agencies, and local communities; and (c) no other emergencies causing significant damages (i.e., more floods, other natural hazards) or disruptions occur during implementation.

Project Development Objectives (PDOs)

9. The original PDO was to improve the Niger's resilience to natural hazards through (i) selected DRM interventions in targeted project sites, and (ii) strengthening of Government's capacity to respond promptly and effectively to an eligible crisis or an emergency.

Key Expected Outcomes and Outcome Indicators

10. **The key outcomes indicators as stated in the PAD were:**
    (a) **PDO indicator 1:** Direct project beneficiaries (4.0 million), of which female (50%);
    (b) **PDO indicator 2:** Targeted flood protection and sustainable land and water management interventions contributing to increased resilience (% of targeted interventions implemented); and
    (c) PDO indicator 3: Performance of the early warning and response system for natural rapid-onset hazards (e.g., floods, strong winds, and wild land fires) from local to national level (5.0).

Components

11. **Originally funded by a US$100 million IDA-53400 credit (P145268) and a US$6.64 million grant (P145932) by the Global Environment Facility (GEF) Least Developed Countries Fund (LDCF - Trust Fund [TF]-16000)**, the project included four components.

12. **Component 1**: **Flood Risk Management Investments** (IDA financing: US$70 million original allocation and US$76.30 million revised allocation after the AF/third restructuring and TF financing: US$6.65 million, total US$82.95). Flood risk management investments under Component 1 included the following:

- Subcomponent 1.1: Drainage, irrigation, and socioeconomic priority infrastructure, including (a) construction and/or rehabilitation of drainage canals and collectors and development of waste management systems, (b) rehabilitation of drinking water supplies and social infrastructures, and (c) rehabilitation of AHAs.
- Subcomponent 1.2: Flood protection infrastructure, including (a) improvement of riverbank protection through mechanical and biological processes, (b) stabilization of sandy intermittent waterways (*koris*), and (c) rehabilitation and upgrading of dikes where the LDCF grant would support biological bank protection.
- Subcomponent 1.3: Rehabilitation of watersheds, including (a) development of sustainable land and water management practices where the LDCF grant would specifically support land recovery works on glazes and plateau, (b) rehabilitation and development of pond control structures, (c) sand dune fixation, (d) reshaping or re-profiling of drainage canals, and (e) land restoration measures.

13. **Component 2: Capacity Building for Urban Development and Disaster Risk Management** (US$22 million original allocation and US$26 million revised allocation after the AF/third restructuring. US$21.1 million disbursed against US$26 million budgeted). Capacity-building activities under Component 2 included the following:

- Subcomponent 2.1: Support to elected officials, municipal services, and civil society, including: (a) strengthening of local government's fiduciary and technical capacity, collaboration frameworks (intergovernmental management), information management systems, and capacity; and (b) development of regional and municipal development, sanitation, and land use master plans.
- Subcomponent 2.2: Development of national capacities to foster institutional collaboration and integration of the project activities into the recipient's relevant institutions through, among others: (a) the development of a national sanitation policy on stormwater, wastewater, basic sanitation, and solid waste; (b) capacity strengthening for planning in urban and rural areas; and (c) provision of equipment and training to monitor river water levels and flows and maintain AHAs.
- Subcomponent 2.3: Strengthening of DRM capacities at the national and local levels through, among others, risk evaluation, risk reduction, emergency preparedness, and response, through activities, such as the development of risk atlas (hazard exposure, vulnerability, and loss probability information), development of real-time multi-hazard information systems for proper monitoring of risk and available resources, provision of equipment and training for emergency response, preparation of standard operating procedures for early warning

and response, preparation of guidelines for safe construction practices, and mainstreaming of disaster risk reduction and climate adaptation into the development process.

- Subcomponent 2.4: Building information and communication technology (ICT) capacities for urban development, through: (a) acquisition of high-resolution imagery for the six major cities, covered by the PGRC-DU, and equipment to replicate this work; (b) training youth and community members on digital cartography to gather information for urban planning shared as open maps and data; and (c) renovation of an existing innovation center plus equipment to serve as a training facility and collaboration space for young entrepreneurs and researchers to develop and manufacture new products for smart cities.

14. **Component 3: Project Management** (US$5 million original allocation and US$9.2 million revised allocation after the AF/third restructuring. US$11.1 million disbursed against US$9.2 million budgeted). This component financed a National Project Implementation Unit (PIU) and four Regional PIUs in charge of project management and monitoring, preparation of financial audits, and periodic evaluations. It also financed the provision of goods, training, operating costs, and consultants' services required to fulfill PIUs mandates.

15. **Component 4: Contingency Component** (US$0 original allocation and US$13.5 million revised allocation after the AF/third restructuring. US$4.6 million disbursed against US$13.5 million budgeted) also referred to as the Contingency Emergency Response Component (CERC). This component strengthened the Government's capacity to respond promptly and efficiently to an eligible crisis or emergency by supporting mitigation, recovery, and reconstruction efforts under an Immediate Response Mechanism (IRM), whose modus operandi was articulated after project effectiveness.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

16. Overall, the project underwent four changes: (a) a restructuring in March 2016; (b) a restructuring in March 2017; (c) an AF and restructuring in April 2019; and (d) a restructuring in June 2021.

Revised PDO Indicators

17. **The PDO scope remained unchanged, but PDO indicators were adjusted as follows (Table 1):**

(a) Increase of **PDO indicator 1** target under the AF/third restructuring to reflect CERC and AF activities;

(b) Change of measurement methodology for **PDO indicator 2,** under the AF/third restructuring due to a reduction of activities to be accounted for in this indicator;

(c) Change of target and unit of measurement of **PDO indicator 3** under the first restructuring to capture activity impact and changes of units of measurement and a new target.

Table 1: Revised targets of PDO indicators through four restructurings

Expected Outcomes	PDO Level Indicators	PAD End Target	1st Rest. 2016	2nd Rest. 2017	3rd Rest. /AF 2019	4th Rest. 2021
Applicable to Outcome 1 and 2	1. Direct project beneficiaries (of which female)	4.0 million (50%)	Unchanged	Unchanged	4.3 million (50%)	Unchanged
Outcome 1: Improving Niger's resilience to natural hazards through selected DRM interventions in targeted project sites	2. Targeted flood protection and sustainable land and water management interventions contributing to increased resilience	100% of targeted interventions implemented	Unchanged	Unchanged	Unchanged but there was a revision of measurement methodology[4].	Unchanged
Outcome 2: Strengthening of Government's capacity to respond promptly and effectively to an eligible crisis or an emergency	3. Performance of the early warning and response system for natural rapid-onset hazards (e.g. floods, strong winds, wild landfires)	100%	5 (number)	Unchanged	Unchanged	Unchanged

18. **At Intermediary level, two indicators and three sub indicators were substantially overachieved**, i.e.:

a) Indicator "Watershed protection and land restoration interventions measured by sub-indicators (ha)", was overachieved with 17,020 ha against the original target of 6,500 ha, as the target did not effectively account for the adjustments under the sub indicators' targets. The final target was not adjusted to effectively reflect the changes in sub indicators targets, under the third restructuring AF.
   i. Sub indicator "Restoration of degraded land (ha)" was overachieved with 11,020 ha against the original target of 6,500 ha due to the inclusion of works under the 2016 IRM, for which PGRC-DU resources were used, and reimbursed through the AF without revision of the indicator target.
   ii. Sub indicator "Stonewalls (km)" was overachieved with 80.59 km against the target of 10 km, revised through the third restructuring/AF, due to additional works requested only in 2022 by the municipalities of Agadez, Tahoua, Loubé, Bogon, and Azzem for protection of Koris, school enclosures, and rehabilitation of collapsed classrooms.

b) Indicator "Drainage infrastructure rehabilitation (km)" was overachieved with 120.95 km against the original target of 23.5 km is due to rehabilitation of not only primary drainage networks but also of additional secondary and tertiary drainage networks which were initially not planned, but which GoN requested due to their level of degradation.

c) Sub indicator "Area with detailed maps in digital and paper formats" was overachieved with 780 km2 against the original target of 400 km2 is due to the addition of two extra cities (Maradi and Zinder) for a total of 8 mapped cities instead of the original 6 cities.

19. **At Intermediary level, two indicators and three sub indicators were substantially underachieved:**

[4] As agreed at MTR, the list of activities to be considered for measurements of this indicator was reduced from nine to five, as the project costs were substantially underestimated at project preparation, rendering the delivery of 4 activities no longer possible. The indicator focuses on (a) regulation of structures along tributaries, (b) rehabilitation/development of pond control structures, (c) rehabilitation of old natural drains that have collapsed, and (d) rehabilitation of drainage gutters/collectors/sewers

a) Sub indicator "drainage pavement (km)" was underachieved with 9.3 km against the original target of 20 km is due to (i) the cancellation of a 1.5 km paved road section in Birni Konni, which GoN delivered under another project; (ii) the cancellation of 3.58 km paved road sections in Niamey, which GoN decided to convert into asphalt roads under another project; and (iii) the reallocation of funds initially dedicated to the drainage pavements to the construction of protective dykes in Niamey.
b) Sub indicator "Trained people on digital cartography" with 76 people against the original target of 200 people is due to start delays of ICT and academic activities, as well as security-related postponement by GoN of 2019 festivities in Tillaberi, rendering the co-financing for the ITIKAR start-up no longer feasible.
c) Sub indicator "Number of local innovation projects supported" was underachieved with 5 projects against the original target of 8 projects is due to rigorous candidate selection criteria and security-related cancellation of festivals for young people.
d) Indicator "Time taken the preparation/submission of the activation package by the Client for an eligible crisis or emergency triggering an Immediate Response Mechanisms (IRM)" was underachieved with 8 weeks against a target of 4 weeks is due to the fact that IRM activation requires two separated processes by two different actors (preparation/submission of the activation package by the Client, and approval/disbursement of funds by the WB), where measurement changes during implementation were not reflected in a target change.

Revised Components

20. **Project components remained the same during the life of the project.** The restructurings and the AF led to: (a) allocation of additional funds to certain components; (b) reallocation of funds between components and subcomponents; (c) cancellation of certain activities (Sirba and Gourouby watershed regulation and municipal drainage budgeting and master plan); and (d) introduction of additional activities under the AF/third restructuring to extend flood risk reduction investments to two additional regions, Agadez and Tahoua, and add new ICT activities.

Other Changes

21. **A simple (level 2) first restructuring was carried out on March 28, 2016.** This restructuring amended the Financial Agreement to reflect the following changes: (a) transfer of project oversight from the Ministry of Planning, Land Development and Community Development to the Prime Minister's Office following a government reshuffling on September 3, 2015; (b) disbursement schedule update; and (c) the results framework (RF) update. Two results were updated from the original PAD: 'Performance of the early warning and response system' was updated to measure the number of institutions contributing to the national early warning and response system coordinated by the National Mechanism for the Prevention and Management of Disasters and Food Crises (*Dispositif National de Prévention et de Gestion des Catastrophes et Crises Alimentaires*, DNPGCCA), with an end target of 5 instead of 'Yes/No' and 'Sources of drinking water rehabilitated or developed' was corrected from 260 to 190, as the 260 original value could not be delivered with the allocated budget.

22. **A second, simple (level 2) restructuring was carried out on March 23, 2017, to reallocate US$13.4 million to the CERC (Component 4)** as part of the IDA IRM activation. This reallocation aimed to address the negative impact of the 2016 flooding caused by heavy summer rains linked to the El Niño

phenomenon. The restructuring also included two additional regions, negatively affected by the floods, Agadez and Tahoua, that had not been initially featured in the original project design.

23. **A third, simple (level 2) restructuring with an AF of US$25 million (P167352) was signed between the GoN and IDA on September 2, 2019,** in line with the December 2017 midterm review (MTR) recommendations and following the GoN request to bridge the IRM-CERC financing gap. The closing date was extended by 12 months to June 30, 2021. In addition to replenishing the US$13.5 million that had been reallocated to the CERC as part of the second restructuring, the AF also scaled up project activities in the two additional regions, Agadez and Tahoua (US$7.5 million), and added new ICT activities (Subcomponent 2.4) and expanded them to Maradi and Zinder (US$4 million).

24. **A fourth, simple (level 2) restructuring was carried out on June 29, 2021,** to: (a) extend the closing date of the original and AF IDA credit (IDA 54300 and IDA 64130) to October 31, 2022; (b) revise the associated implementation schedule and disbursement estimates to allow for the completion of recovery and reconstruction activities financed by the 2020 IRM following the devasting 2020 floods; and (c) adjust two sub-indicators of the intermediate outcome indicator 'Drainage infrastructure rehabilitation'. The IRM was activated under the Niger Agricultural and Livestock Transformation Project (*Projet Intégré de Modernisation de l'Elevage et de l'Agriculture au Niger*, PIMELAN - P164509) but implemented by the PGRC-DU PIU.

25. **The four Regional PIUs under the National PIU were increased to six to help supervise activities in Tahoua and Agadez according to the third restructuring.** They were in charge of supporting the National PIU in managing the parent project and the AF, as well as an additional US$39.5 million for emergency response and recovery following the 2020 floods, as part of the September 2020 IRM activation. The IRM was activated in the context of devasting flood impacts and the then ongoing COVID-19 pandemic. The outcomes of these emergency funds are not under the purview of the PGRC-DU, as the IRM was activated through PIMELAN's CERC and therefore is not reviewed under this Implementation Completion and Results Report (ICR).

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

26. **The changes that were introduced had no impact on the original ToC.** The first restructuring moved the project under a more effective oversight, adjusted indicators, and reduced the output of underbudgeted activities. Conversely, the second and third restructurings reflected changes to the project due to CERC activation and provided additional funding to replenish the project after CERC activation. The second and third restructurings also scaled up critical subcomponents, that is, by expanding the project scope and the regional PIUs and increasing ICT activities and extended the closing date to allow for the completion of ongoing and new activities. A second closing extension was needed after the disruptions due to the 2020 floods, the responsibility for managing PIMELAN's IRM-CERC funds, and the implementation delays due to the COVID-19 pandemic.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

27. **According to the European Commission's INFORM Risk Index[5] and the World Bank Climate Change Knowledge Portal,[6] the frequency and severity of hydrometeorological hazards in Niger, namely floods and droughts, are expected to increase due to climate change,** and the population remains vulnerable to these hazards' impacts. Moreover, Niger is exposed to multiple conflicts and fragility risks stemming from structural causes and fragility drivers. The FY22 Niger Risk and Resilience Assessment (RRA) identifies several structural drivers of fragility, conflict, and violence (FCV), including: (a) cross-border insecurity and limited access to justice; (b) competition over scarce natural resources aggravated by climate change and demographic pressure; and (c) social and income intergroup inequality amid decreasing economic opportunities for women and the youth. The project addressed the latter two structural drivers of FCV through the infrastructure investment that will increase the resilience of these regions' populations to hazards such as the following: (a) natural disaster mitigation/control structures will ensure the free flow of goods and citizens, including labor, and cause fewer weather-related victims and livestock losses; (b) reconstructed water channeling and supply systems will improve the resilience of populations' livelihoods, especially women, youth, and the poor, as they will provide them with more reliable access to drinking water and irrigation; and (c) the establishment of a countrywide DRM system is a gradual process that will incrementally increase Niger's DRM system preparedness and improve its response at all levels in the future.

28. **The PDO remains highly relevant at closing as it has enabled the establishment of a post-disaster rehabilitation approach and the strengthening of the DRM system with an effective institutional framework.** The PDO remains consistent with the World Bank Country Partnership Framework FY18–FY22 (Report No. 123736 NE) Pillar 3 'Strengthening governance by promoting important sectoral reforms that improve service delivery, expand economic opportunity, bolster economic growth, and augment the resilience of the population to fragility and climate change'. Moreover, the ongoing World Bank US$250 million Niger Integrated Urban Development and Multi-sectoral Resilience Project (*Projet Intégré de Développement Urbain et de Résilience Multisectorielle*, PIDUREM - P175857) is capitalizing on the PGRC-DU outcome by increasing resilience to floods and improving urban management and access to basic services in selected municipalities in Niger.

29. **The PDO remains a priority for the GoN** and contributes to (a) the Niger PDES 2017-2021 Pillar 3 'Accelerate Economic Growth' and Pillar 5 'Sustainable Management of the Environment'; (b) the newly elected GoN 2021 policy declaration of 'strengthening of urban planning capacities and investment, the improvement of public services, and the strengthening of DRM, as key priority areas'; (c) the 2020 Prevention and Resilience Allocation objectives and the GoN's Prevention and Resilience Action Plan first strategic objective 'to improve integration of youth and women into the country's economic and social dynamics to mitigate FCV factors' and second strategic objective to 'decrease multidimensional insecurity through participatory security management and a stronger state presence in the border and

[5] European Union website: https://drmkc.jrc.ec.europa.eu/inform-index.
[6] World Bank website: https://climateknowledgeportal.worldbank.org/country/niger.

at-risk areas'; (d) the FY22 RRA for Niger recommendation No. 1 'strengthening the social contract through more effective local governance by accelerating decentralization and deconcentration with an emphasis on inclusive access to quality services at the regional and local levels'; and (e) Niger 2035 vision's Sustainable Development and Inclusive Growth Strategy (*Stratégie de Développement Durable et de Croissance Inclusive*). Furthermore, the GoN adopted a new DRM Law n° 2022-61 on December 19, 2022, consolidating all the achievements initiated by the project in recent years, for example, institutional systems, data and information management, preparedness and response to disasters and humanitarian crisis, recovery measures, actors' coordination, and disaster response financing.

30. **Considering the above, the relevance of the project is rated High**.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

31. **Error! Reference source not found.The PDO's achievement is assessed against the targets set at the PDO and intermediate results levels confirmed in the September 2019 AF/third restructuring and is unpacked along the lines of the two outcome statements and project components, as well as other relevant results not measured by the RF.** Throughout the project's four restructurings, the PDO was not changed; however, the scope of the project included two more regions, and some indicators were revised and calibrated to better achieve the project objective. The evaluation of the project's efficacy relies on three sources of evidence: (a) project documentation and regular reporting of the World Bank (that is, Aide Memoires, the MTR report, and Implementation Status and Results Reports [ISRs]); (b) the GoN's completion reports; and (c) interviews conducted with the World Bank team as well as the National PIU and Regional PIUs' members. The results measured by the PDO-level indicators and intermediate results indicators (IRIs) and their achievement levels compared to the set targets are presented in Annex 1.

32. **The PGRC-DU PDO level Indicator 1 Direct Project Beneficiaries is applicable to both project outcomes.** The PDO indicator 1 exceeded its targeted direct project beneficiaries reaching 4,375,633 and 102 percent of target while the female target was almost attained, 98 percent.

33. **The PGRC-DU achieved the targets for PDO indicator 2 related to the objective of improving the recipient's resilience to natural hazards.** This was achieved through selected DRM interventions in the targeted project sites, including the areas affected by the 2016 floods that were covered by the CERC. PDO indicator 2 was 100 percent achieved through the completion of resilient flood protection and sustainable land and water management interventions in the originally targeted regions: Diffa (6 municipalities), Dosso (22 municipalities), Niamey (5 municipalities), and Tillabéri (30 municipalities) located along the Niger and Komadougou Rivers, as well as in the watersheds of these two rivers and the two regions that were added to the project scope after the CERC activation: Tahoua (12 municipalities) and Agadez (7 municipalities).

34. **IRIs mainly exceeded the initial targets.** They include 492 sources of drinking water systems constructed (109.3 percent of initial target), 1,647 ha of targeted irrigated land rehabilitated (97 percent), and 120.95 km (515 percent) of drainage infrastructure rehabilitated. This significant overachievement (515 percent) can be explained by the fact that work was carried out on the secondary and tertiary drains and the belt collars of the 10 AHAs in the regions of Tillabéri and Dosso, whereas

initially, it was the main drains that were planned to be rehabilitated to facilitate water drainage. The original target was not updated via the four restructurings, in parallel with the increased activities.

35. **Key output indicators show uneven target achievements.** The watershed protection in terms of sand dune fixation and degraded land restoration achieved 262 percent (17,020 ha), as well as stonewalls built (80.59 km with 800 percent), and dike protection (47.57 km with 95.14 percent) and flood drainage infrastructure rehabilitated (8.82 km with 88 percent), drainage pavement (9.3 km with 47 percent), and Koris (6.40 km with 128 percent). Climate-resilient piped irrigation with improved structure, dikes, and water supply schemes was constructed to withstand future disasters; however, the development of operation and maintenance (O&M) plans was not assessed by regions.

36. **The PGRC-DU achieved the targets for PDO indicator 3 related to the objective of improving the resilience to natural hazards through strengthening of the recipient's capacity to respond promptly and effectively to an eligible crisis or an emergency.** PDO indicator 3, which captured the performance of the early warning and response system for natural rapid onset hazards (for example, floods, strong winds, and wild land fires), was achieved by improving the capacity, the equipment, the ability to mobilize resources, the provision of timely information of the five key national institutions involved in Early warning and disaster management the Ministry of Humanitarian Action and Disaster Management (*Ministère de l'Action Humanitaire et de la Gestion des Catastrophes*, MAH-GC), the General Directorate of Civil Protection (*Direction Générale de la Protection Civile* (DGPC), the Coordination Cell of the Early Warning System (Cellule de Coordination du Système d'Alerte Précoce (CC/SAP), the National Meteorology Directorate (*Direction de la Météorologie Nationale* (DMN), and the *Direction de la Gestion des Ressources en Eau*. The project also provided training and technical support to each institution for improved preparedness and response planning, and interinstitutional collaboration and coordination in terms of information and data sharing, and the establishment of coordination protocols for disaster preparedness and response. The Project benefited from the World Bank-executed 'Niger Strengthening Early Warning Services' technical assistance funded by the Climate Risks Early Warning System (CREWS), which provided trainings and support to the involvement in women in local Early warning systems. These institutions also benefited from parallel capacity support provided by the World Bank's Disaster Risk Financial Management Initiative (European Union funding) and risk management (United Nations Office for Risk Reduction).

37. **IRIs mainly exceeded the initial targets.** Development/updating of 26 urban master plans and local development plans was carried out (104 percent of achievement, while female participation in the plan formulation was almost achieved, 93.1 percent). The targeted earmarked 4 percent of the municipal budget allocated to solid waste collection and processing/transformation to allow for investment sustainability was overachieved (5 percent). Moreover, both the support for preparedness and emergency response and support for urban development were achieved (100 percent).

38. **Key output indicators show uneven target achievements of the support for preparedness and emergency response.** Four activities achieved their targets: (i) fully functional database of risk in Niger; (ii) support to civil protection for strengthening response capacity; (iii) support to national DRM agencies achieved; and (iv) supporting urban development. For the targets related to the development of ICT and digital tools, the target for detailed maps in digital and paper formats was overachieved by 780 out of 400 initially planned (195 percent), because the original target covered the mapping of 6 cities while 8 were mapped. The two other targets of these sub-indicators were not achieved, that is, 76 out of 200 people were trained ion digital cartography (38 percent), and five out of eight local innovation projects

were supported (63 percent). These low results on ICT outreach were caused by long delays in the identification and selection of start-ups that could benefit from the project, the lengthy thematic areas selection process, and difficulties in the obtention of drone flights' authorizations to collect data for the digital maps. Regarding local innovation projects, the nonachievement of the target is explained by the delay in the start of academic activities in the Innovation City (late reception of the renovation works financed by the PGRC-DU in 2021, during the COVID-19 outbreak and concomitant restrictions to social gathering which jeopardized the initial planning) and the demanding selection process of candidates.

39. **Other IRIs and key indicator outputs were considered in the RF and were meant to assess the government IRM reactivity as well as project management effectiveness.** Despite the preparation and approval of the IRM Operational Manual as the disbursement condition for the contingency component, the activation of the IRM took 8 weeks instead of 4 weeks (50 percent) for the following reasons: delays on post-disaster data collection from the client side and respective reviews by the World Bank. Project management IRI achievement is uneven: while the quality and timely submission of procurement and financial management (FM) reporting was achieved (100 percent), planned project activities implemented were almost achieved (89.9 percent), and the grievance redress mechanism (GRM) exceeded the target (112.5 percent). Regarding key output indicators, both FM and procurement reporting were achieved (100 percent).

40. **Besides the activities captured by the RF, the PGRC-DU financed additional activities.** They include the commissioning of solid waste bins, transfer stations, and transportation vehicles that are allowed to collect 300 tons of municipal waste per day out of Niamey's total generated waste of 550 tons per day. The urban paved roads allowed to increase access, mobility, and value of surrounding lands and residences: 9.3 km of paved roads. The rural investments allowed the beneficiaries to increase their nutritional intake and income through the following: (a) irrigated areas targeted by the project have been regularly harvested since their flood-proofing owing to the supply of seeds and fertilizers; (b) new fishing gears were provided to 1,000 fishermen; and (c) fodder was supplied to farmers to feed their livestock. The project installed 23 roundabout red lights platforms in Niamey to ease the traffic flow and reduce accidents. Also, the project generated 411,000 person-days of labor to the beneficiaries living in the targeted areas. Finally, the project installed 206 photovoltaic (PV) with a 53.4 kW capacity for the solar-powered red lights and streetlights. Additional PVs were installed under PIMELAN's IRM.

Justification of Overall Efficacy Rating

41. **The project exceeded all three targets for the PDO-level indicators under both outcomes, despite a slight underperformance in the share of women direct project beneficiaries and participating in decision-making committees.** At the IRIs' level, the project achieved seven of its nine indicators (meeting three indicators, exceeding four indicators and slightly underachieving two). Some project outputs were not met due to the fragile situation although the project implemented activities not foreseen in its initial design, which increased its efficacy. As a result, the project's efficacy is rated Substantial.

C. EFFICIENCY

42. **Design efficiency.** Although one of its objectives was to repair the 2012 flood damages, the PGRC-DU was not tagged as an emergency project. As a result, the data gathered was insufficient to draw a comprehensive baseline. Still, the project design contributed to the efficient use of project resources

that were leveraged by an AF/third restructuring not only to respond to the 2016 flood damages but also to consolidate the project gains. Yet, the flood protection intervention scope (secondary/tertiary drain densification instead of primary drain) had to be calibrated during the first restructuring that proved more effective and efficient. However, the design mainly suffered from inadequate institutional arrangements especially at the local level as the situation in Niger was unpredictable and still evolving at the start of project implementation that was gridlocked and struck by delays. Some RF targets and the institutional arrangements were also adjusted by the first restructuring. At the component level, Component 1 was straightforward in rehabilitating the damaged infrastructure identified by local governments and communities. Component 2 consisted mainly of institutional capacity building to improve the institutional and technical effectiveness of the DRM system. The two components proved inclusive, but like most post-emergency projects, the multiplicity of activities at the design stage coupled with the unsettling environment slightly affected the efficiency of the project. Component 4 or CERC was spot on as it was triggered after the 2016 floods.

43. **Implementation efficiency.** The PGRC-DU was affected by exogenous and endogenous factors (see section III.B) that delayed the achievements of all three PDO indicators. Moreover, the project faced serious delays after effectiveness as the feasibility studies to implement the rehabilitation and construction activities took more time than originally planned. Yet, the PGRC-DU was proactive as it sought an efficient reallocation of funds across activities and additional funding that helped a realignment of resources and needs. Overall, the project cost and duration relatively reflected the post-emergency nature of the task at hand. The project closed with no cost overruns, but with a nine-month extension to deliver all the ongoing activities under the project further to delays due to the COVID-19 pandemic and related restrictions, the volatile security context in some regions, and the management of the PIMELAN CERC activities: disbursement rate reached 99.15 percent and mirrored the physical execution rate of 90.45 percent (Annex 1). Components 1 and 2 showed partial underbudgeting and overbudgeting, respectively, due to the difficult security situation on the ground. Still, activity unit costs were within the same variation range as the ones occurring in unsecure areas. Component 3 budgeted costs and actual project management costs reached 7.4 percent well below the weighted average of the 8.5 percent benchmark based on six World Bank projects in the West Africa region despite four restructurings. Component 4 was well designed by the AF/third restructuring and was efficiently and satisfactorily implemented until closing as most funds were regularly disbursed (satisfactory rating until closing). Thanks to a flexible and iterative approach, several IRIs under Component 1 were overachieved (due to more effective technical solutions which were scaled up) or underachieved (due to solutions that proved less effective and therefore were scaled down).

44. **Administrative efficiency.** The World Bank provided targeted administrative spending and implementation support for project preparation that was efficient and where the World Bank costs were equivalent to 0.4 percent of the disbursed funds in line with the 0.4 percent regional benchmark and project supervision that was inefficient with 2.8 percent against a 1 percent regional benchmark due to four restructurings (see Annexes 2 and 3) and the management of the PIMELAN CERC while project coordination to improve environmental, social, and fiduciary arrangements benefited from careful and continuous support.

45. **Economic efficiency.** At appraisal in November 2013, the PGRC-DU was expected to generate tangible and intangible benefits by rehabilitating local infrastructure, improving watershed management, and restoring productive activities affected by recurrent floods faced by Niger, notably

the 2012 floods. Moreover, the second restructuring helped reshuffle and increase budget allocations across components to respond to the challenging situation in Niger after the 2016 floods while the response to the devastating 2020 flood was addressed through the PIMELAN. Crude benefits were estimated and used to calculate the ex-ante net present value (NPV) of US$132.5 million. The ex-post analysis considered a set of more robust benefits. The latter reaped strong and tangible economic gains, notably the benefits associated with improved water management and supply. The ex post economic analysis NPV amounts to US$158 million, mainly attributable to targeted flood protection and sustainable land and water management interventions. This is despite a growing adverse context, not fully anticipated at the time of the first and second restructurings and therefore not factored in at onset. Key findings of the ex-ante and ex-post analyses are summarized in Annex 4.

Assessment of Efficiency and Rating

46. **Based on the above considerations, the efficiency of the project is rated Substantial.** The PGRC-DU deployed a mix of least-cost investments and activities to meet the PDO. Despite the deterioration of the FCV and security context, the impact of two major floods in 2016 and 2020, and the COVID-19 pandemic, the project achieved tangible economic benefits with an NPV of US$158 million for those that could be calculated as well as intangible benefits. In a context of fragility, the project achieved benefits in terms of emergency assistance to damage-affected areas. The project also provided indirect benefits that are more difficult to quantify, such as those related to improved effectiveness or preparedness and response of the DRM system at the local level that will be tested with future disaster events. Finally, the project was implemented within the financial envelope, within the compounding fragility, crisis, geographic and adverse economic contexts (inflation rate and recession), and with several over-achievements in key resilience areas). Only the time frame was exceeded due to the disruptions of the 2016 and the 2020 floods, the emergency state declared in three regions as well as the COVID-19 pandemic with related restrictions.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

47. The relevance of the PDO was rated as High. Efficacy was rated as Substantial. Efficiency was evaluated as Substantial. As a result, an overall outcome rating is Satisfactory.**Error! Reference source not found.**

E. OTHER OUTCOMES AND IMPACTS (IF ANY)

48. **Gender.** Literature on the impacts of disasters shows that women are often differently and disproportionately affected by disasters. Although the project was not gender-tagged as this requirement did not exist at appraisal, gender impacts were achieved by the project through gender-sensitive approaches, specifically (a) participation of women in the consultations leading to decisions on rehabilitations and investments, (b) engagement of women's labor force (for example, cash for work), and (c) scaling-up of the successful experience of providing irrigated land to vulnerable groups including women. Moreover, the National PIU was staffed with an experienced community participation and gender specialist.

49. **Institutional strengthening** was an integral part of the project, and its outcomes are discussed in section II.B. The project contributed toward institutional capacity of DNPGCCA, MAG,[7] MAH-GC, MH,[8] MISPDAR,[9] MPLAN,[10] OSV,[11] and SCAP-RU,[12] due to improved institutional support for DRM capacity and fiscal mobilization (see section II. B).

50. **Poverty reduction and shared prosperity.** One of the project goals was to reduce poverty and to increase shared prosperity for the 4.37 million direct beneficiaries living in disaster-prone and poor areas where they not only benefited from more resilient infrastructure but also from increased opportunities in terms of increased cropland and rangeland. Moreover, the project provided temporary work in all the targeted regions to implement the infrastructure activities. There are also indications that the project had a positive impact on education, health—preventing deaths, injuries, and event-triggered epidemics—safety, and mobility. Yet, the economic growth rate slowed down to 3.6 percent, which translated into a 3 percent reduction in per capita income and 1.3 percentage points increase in poverty to 42.9 percent in 2020, drawing 685,000 people into extreme poverty due to the July 2020 floods exacerbated by the COVID-19 pandemic.

51. **Post-disaster response and reconstruction capacity.** The project was instrumental in creating solid emergency preparedness, response, and reconstruction capacity which includes a fully functional database of risks in Niger. This was achieved through the project's design that allowed to strengthen DRM institutions in terms of EWSs, contingency planning, capacity to respond to a disaster and reconstruct flood risk reduction infrastructure but more concretely enabled immediate post-disaster response through the triggering of IRM/CERC. The two successful experiences with the CERC activation allowed for the development of: (a) solid institutional capacities for post-disaster damage assessment; (b) technical planning and implementation of response/reconstruction actions; and (c) efficient fiduciary management of emergency funds, in line with flexibilities provided as part of the CERC.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

52. **Following the 2012 floods, the key factors during project preparation were the challenges to define realistic project objectives, to ensure a simple project design and appropriate selection of stakeholders, and to establish adequate risk mitigation measures.**

53. **Realistic objectives.** The PDOs were focused and realistic; however, as the project was prepared in less than a year in a fragile operational environment, it was a challenge to set targets for flood protection and sustainable land and water management interventions. However, following some implementation experience, the outcomes and outputs were sharpened by amending the RF during the

[7] Ministry of Agriculture (*Ministère de l'Agriculture*).
[8] Ministry of Water Resources (*Ministère de l'Hydraulique*).
[9] Ministry of Interior, Security, Decentralization and Customary and Religious Affairs (*Ministère de l'Intérieur, de la Sécurité Publique, de la Décentralisation et des Affaires Coutumières et Religieuses*).
[10] Ministry of Planning, Land Development and Community Development (*Ministère du Plan, de l'Aménagement du Territoire et du Développement Communautaire*).
[11] Vulnerability Monitoring Observatories (*Observatoires de Suivi de la Vulnérabilité*).
[12] Community-Based Early Warning and Emergency Response System (*Système Communautaire d'Alerte Précoce et de Réponse aux Urgences*).

first, second, and third restructurings by setting more realistic targets and by relying on the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) post-2016 flood assessment prepared before the second restructuring.

54. **Design challenges.** Solutions applicable to the Niger context were difficult to articulate given the large area of the country and the weak capacities of some stakeholder institutions. The original project design benefited from lessons learned from previous projects (as listed on para. 6) and was appropriately ambitious in institutional arrangements and type of activities despite the exogenous factors affecting the country (section III.B). The design also allowed the project to adjust indicators and activities to meet the challenges brought by the 2016 floods and the worsening FCV conditions, including in Diffa where the Government declared a State of Emergency in 2016, which affected project implementation. In fact, from project preparation to implementation, Niger was continuously facing a security crisis in the areas bordering Nigeria, Burkina Faso, and Mali, where armed groups carry out repeated attacks against the security forces and civilians. A state of emergency was declared in three project intervention areas (Diffa, Tahoua, and Tillaberi regions). Furthermore, the FCV conditions in Niger continue to worsen with an influx of refugees fleeing conflicts in Nigeria and Mali, as well as a combination of health (COVID-19), climate, and security shocks and crises that has hampered the growth of Niger's economy from 2019 to 2022.

55. **Selection of implementing agencies.** In the aftermath of the 2012 floods, the project housed the National PIU in the most relevant institution, that is, Ministry of Planning, Land Development and Community Development. However, through the first restructuring, the project was moved directly under the Prime Minister's Office to benefit from the increased authority, leverage, scope, and capacity to move the project forward. The project overcame some of the initial implementation difficulties by contracting Delegated Implementing Agencies to implement works and train beneficiaries, including those in insecure project areas.

56. **Adequacy of risk identification and mitigation measures.** At appraisal, the project's overall risk was rightly categorized as 'Substantial' and remained unchanged thereafter until closing, as the FCV concerns outweighed the Government's encouraging response on DRM. Risk mitigation measures—and the innovative CERC as part of project design—were effective and efficient to achieve the PDO and to meet or exceeded the RF targets.

57. **Reputational risks.** The project incorporated several measures to ensure transparency and accountability in implementation. They included a GRM with a specific indicator in the RF. This mechanism enabled the population in general and vulnerable persons especially, during resettlement, to use the project's GRM instead of seeking legal recourse, although the latter remained available to them if the former did not satisfy them. A proactive approach was also adopted to address or anticipate beneficiaries' grievances at a very early stage to resolve issues in a satisfactory manner.

58. **Implementation capacity and sustainability.** During preparation, the key concerns were low implementation capacity of staff and constraints in hiring quality personnel. To meet World Bank fiduciary standards and ensure efficient fund flow, a National PIU was created whose staff were continuously strengthened through tailored training programs. Staffing plans were finalized before appraisal and were updated after restructurings, while time-based consultancy contracts, World Bank support, and training provided by World Bank staff and consultants were also used. World Bank investment in capacity strengthening of government entities and the PIU was effective, as government

entities and PIU staff actively prepared the PIDUREM (World Bank approved in April 2022). This capacity strengthening is also sustainable, as government entities and select PIU staff are now implementing PIDUREM, drawing on their PGRC-DU expertise.

59. **Knowledge.** The project design integrated knowledge generation and dissemination through the improvement of the countrywide EWS capacity, equipment, and data acquisition. The project also created an enabling environment for the inclusion of Earth Observation (EO) for project component preparation as well as for needs assessment after the 2016 floods.

60. **Procurement and FM.** Assessments during project preparation pointed to high procurement and FM risks due to weak fiduciary capacity. At appraisal, manuals on FM and procurement were prepared; these manuals were updated over the course of the project. Procurement and FM support consultants were hired to train and help bridge the staff capacity gaps in preparing timely accounts and reports that were also monitored through two indicators in the RF.

61. **Community participation.** The project design incorporated the identification of beneficiaries based on a transparent participatory process that was further strengthened during the second restructuring. This measure increased confidence and resulted in a larger community endorsement of the DRM process in the regions. The social team carried out tailor-made trainings at the local level to improve understanding of DRM issues, especially appropriation by micro and small enterprises and communities.

B. KEY FACTORS DURING IMPLEMENTATION

62. **Commitment to DRM process and system strengthening.** The Prime Minister's Office demonstrated a strong commitment to improve flood protection and sustainable land and water management resilience. The transfer of the National PIU under the aegis of the Prime Minister's Office further strengthened Government commitment to achieving the PDO and the IRIs and the generation and use of scientific and technical DRM knowledge.

63. **Funds flow, staffing, and procurement.** Implementation started slowly, mainly because of the lack of adequate management and staffing and delays in finalizing the feasibility of several infrastructure interventions. The first restructuring in March 2016 put the project on a sustainable footing where IDA and GEF disbursements significantly increased from 18 percent to 30 percent as well as 12 percent to 21 percent, respectively, by December 2017 MTR.

64. **Restructuring.** Overall project implementation consistently improved, following the project's four restructurings in 2016, 2017, 2019, and 2021, particularly for Components 1 and 2 by the end of 2018 where the CERC trigger increased the disbursement of Component 1. These restructurings provided further clarity to the RF and reallocated funds across components for greater effectiveness.

65. **Collaborative and participatory approach.** The National PIU sought collaboration with key stakeholders as a key to successful project implementation: capacity building at all levels; data acquisition; development of plans; and remarkably high level of active and productive participation by community members, local organizations, and small and micro enterprises. Such collaboration and participation led to a more effective implementation of activities than would have been otherwise the case.

Factors Subject to the World Bank Control

66. **Adequacy of supervision.** The 22 implementation support missions provided the National PIU with extensive support from the World Bank. These missions made sure that the back-on-track action plan suggested early on by the World Bank was effective in implementing mitigation measures. The World Bank also ensured presence on the ground by leveraging World Bank staff from the Water Global Practice and subsequently by establishing a locally based World Bank staff in the country office.

67. **Regular, strategic, and outcome-focused support.** The World Bank worked with the GoN and the National PIU to complete the four restructurings on time. World Bank staff and consultants provided expert guidance during regular missions and interim technical missions on procurement, finance, safeguards, and monitoring and evaluation (M&E). The ISRs candidly detailed project setbacks and challenges and recorded the agreed solutions to overcome them. After the MTR, the progress toward PDO was upgraded to 'Satisfactory' in April 2018, which was retained until project closing. The fourth restructuring was able to upgrade the Implementation Progress in August 2022 to Satisfactory before project closing.

Factors outside the Control of the Government and/or Implementing Agencies

68. The project was affected by exogenous and endogenous factors including: (a) a poor macroeconomic outlook (pressure on inflation and strained public finances); (b) the CFA franc fluctuation over the project lifetime, which favored the project from 2018 till 2022 (−12.1 percent CFA Franc in relation to the US dollar during the February 2018-March 2022 depreciation trend); (c) COVID-19; (d) security concerns, mainly stemming from non-state actors in several Niger regions (including Tillabéri and Tahoua regions on Niger's western border with Mali and Burkina Faso where a state of emergency has been in effect since 2017, the Tahoua and Agadez regions at the northern border with Mali and Libya, the Diffa region at the eastern and southern border, and in the Maradi region at the southern border with Nigeria); (e) a steady increase in forced displacement with a growing cohort of refugees (249,945) and internally displaced persons (264,257) at the end 2021; and (f) increasing impacts due to changes in climatic conditions. Moreover, security concerns and the cyclical floods were compounded by the COVID-19 pandemic that led to restrictions on movement and business hours and the closure of the border with Nigeria, while the associated pause/termination of some project investment undermined Niger's economic activity and reversed some recent economic and social gains. It is estimated that poverty has increased by 1.3 percentage points to 42.9 percent in 2020, drawing 685,000 people into extreme poverty.

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

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

M&E Design

69. At appraisal, the M&E system was built upon the PAD RF to monitor the achievement of the PDO and outcome indicators through regular monitoring of inputs and outputs. M&E was used as a management tool with periodic reviews and audits, reporting of outputs to the World Bank, and maintaining of records on thematic areas including (a) social and environmental monitoring, (b) regular

project supervision, (c) physical progress monitoring and third-party quality audits, and (d) M&E of results achieved. This was carried out by the regional implementing units on a monthly basis and reported to the National PIU which in turn shared the reports on a quarterly basis with the World Bank. Financial progress was reported through the quarterly interim financial reports (IFRs). In addition, a third party was deployed for quality monitoring of works and compliance on social and environmental aspects.

70. The M&E function was designed as a three-tier mechanism from a strategic high level under the responsibility of the National Steering Committee, an intermediary level with the National PIU responsible for the continuous coordination and reporting of the project achievements, and a lower level supported by the Regional PIUs in charge of direct monitoring of physical progress on the ground. An information management system (database) supported by different regional PIUs, regions, and municipalities was developed online and made available to the public for transparency purposes.

71. The RF was revised under restructurings 1, 2, 3, and 4 including revision of PDO indicators and targets, as previously described, to reflect implementation experience and adjust to changing implementation circumstances. In general, the RF indicators during implementation were adequate to measure the quantitative and qualitative impacts of the project.

M&E Implementation

72. During the project cycle, M&E implementation was mostly rated Satisfactory, except between December 2015 and June 2016, when M&E was rated Moderately Satisfactory and Moderately Unsatisfactory, respectively. The first M&E report did not provide an objective methodology to measure indicators, and the project delivered the first M&E report only after 16 months of project effectiveness. However, the M&E methodology improved continuously and resulted in an integrated database combining information from procurement, FM, safeguards, and M&E, which provided an exhaustive view about project implementation by municipality, by sector, by subcomponent, and by cluster of beneficiaries. Starting April 2018 until project closure in October 2022, M&E implementation was considered Satisfactory due to the quality and periodicity of project reporting, using the conventional M&E system, and the completed design of a new M&E system with the Geo-Enabling initiative for Monitoring and Supervision (GEMS) finalized in June 2020. M&E activities were implemented using KoBoToolBox/Access databases, communication supports, and environmental and social safeguards, supported by regional offices.

M&E Utilization

73. M&E was used primarily to track and report on progress and to address key implementation issues revealed by the physical progress on the ground or by control bureaus, or by implementation support missions. The use of remote sensing tools, such as GEMS in fragile and conflict-affected situations (FCS) and a vast country with security and accessibility challenges, helped M&E task team and the PIU to monitor and evaluate the progress of infrastructure works. This allowed for flexibility and adaptation to a changing and volatile operating environment. Utilization and achievements include the preparation of 32 non-audit financial reports, audits of Project Preparation Fund (PPF) accounts from 2015 to 2021, annual audits by the Court of Accounts (*Cour des Comptes*, 2015–2018), annual audits by the Public Procurement Regulatory Agency, and the General State Inspection (*Inspection Général d'Etat*) in 2016. In addition, the National PIU received annual supervision missions from the Ministry of Planning and

control missions from the Social Security and the General Tax Directorate (*Direction Générale des Impots*).

74. Finally, the M&E was used to inform/ensure the presence of the project on the Internet through the creation of two websites www.pgrcdu-niger.org, and http://pgrcdu-niger.com, as well as a Facebook account.

Justification of Overall Rating of Quality of M&E: Substantial

75. The M&E system, as designed and implemented, has performed well and was continuously rated Satisfactory over the last five years of the project (2018–2022). It has allowed to assess the achievement of the PDO and the intermediate indicators stated in the RF. Qualitative M&E reports and results were timely disseminated and used to inform the management, communication, and implementation of the project in all its dimensions.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

76. **Environmental and social.** The project was considered an environmental category 'B' project since the impacts were anticipated to be small in scale and site specific and therefore manageable to an accepted level. Five safeguard policies were triggered: (a) Environmental Assessment (OP/BP 4.01), (b) Involuntary Resettlement (OP/BP 4.12), (c) Pest Management (OP/BP 4.09), (d) Physical Cultural Resources (OP/BP 4.11), and (e) Projects on International Waterways (OP/BP 7.50). Before appraisal, the following safeguards instruments were prepared, consulted upon, and disclosed by the borrower and the World Bank: Environmental and Social Management Framework (ESMF), Resettlement Policy Framework (RPF), and Pest Management Plan. For the project's AF in 2019, the three instruments were updated to reflect the addition of two regions, Tahoua and Agadez. For the IRM (CERC), PGRC-DU's ESMF and RPF have been updated to consider the regions concerned by the IRM as well as the activities identified in the Plan for Implementing Emergency Response (*Plan de Mise en Oeuvre de la Reponse d'Urgence* (PMRU)). These documents were validated during January 31–February 1, 2017, in Tahoua, by the ad hoc committee set up for this purpose by the Ministry of Environment, Urban Sewerage and Sustainable Development (*Ministère de l'Environnement, de la Salubrité Urbaine et du Développement Durable*).

77. **During project implementation, a Resettlement Action Plan (RAP) was prepared, consulted upon, and disclosed for the drainage construction works in Tahoua and Konni in compliance with OP 4.12**. The works will negatively affect 107 people who lose business structures, and/or some trees, or will have temporary loss of revenue but there will not be any physical resettlement. However, the RAP implementation plan was revised because of lack of funds for timely compensation payments. Instead of proceeding with the compensation, the Konni municipality agreed with the affected people that they would be rather exempted from daily taxes at the market site, which did not directly comply with the provisions of RAP. To ensure compliance of this change in the process, the PIU has been asked to provide details to show how this change in compensation method reflects the actual losses, what evaluation it was based on, and whether this agreement was voluntary; and to provide minutes of the meeting where this was agreed to by the project-affected persons (PAPs). The PIU is in the process of providing the necessary details.

78. **The PIU developed a GRM according to the RPF, at three levels**: village or project activity location, community, and prefect levels. At each level, a GRM committee was constituted of various local actors, including women, who could receive complaints in written or verbal manner. A GRM Manual was prepared by the project and included specific timelines for handling complaints as well as a tracking template. The project received only 19 complaints, which is a modest number given the scope of the activities. This may point to lack of communication by the project toward the population on how the GRM functions, what its role is, and how to access it. This point was also raised during the World Bank's supervision missions, to be remedied by ensuring the population knows how to use the mechanism and that the committee members know how to handle complaints. The need for regular verification of the full functionality and accessibility of a grievance mechanism in practice can be taken as a lesson learned for subsequent projects.

79. **Environmental and social compliance was rated Moderately Satisfactory**. During project implementation, environmental and social screening of subprojects was not systematically done despite the supervision mission recommendations, and civil works started before screenings or in some instances before safeguards documents were prepared and their implementation. Similarly, it was noted that a RAP may have been necessary for some of the works. To address and remedy any potential non-compliance, an environmental and social audit was conducted regarding specific works on draining pavements. The results of the audit note that there was no economic or physical displacement, only very limited temporary restriction of access. This illustrates a certain degree of lack of compliance with safeguards requirements by the PIU, which is likely due to lack of capacity on environmental and social safeguards. This may be attributed to the fact that the PIU had only one specialist at the project start who covered both environmental and social aspects. This was remedied during project implementation to ensure these tasks were managed by dedicated specialists. Adequate E&S staffing throughout project cycle is another lesson learned on environmental and social safeguards.

80. **Financial Management (FM).** Throughout the project implementation, the PIU complied with its FM reporting requirements, including timely submission of IFRs and audit reports for the annual accounts. However, the annual accounts from 2018 to 2020 were certified with a qualified opinion due to some expenses that were either unjustified or insufficiently justified. The PIU worked diligently to address these issues. As a result, in 2021 the qualifications on unjustified advances were lifted based on evidence deemed acceptable, and the annual accounts were certified as unqualified. At the project's closing date, there were no cases of ineligible expenditures on IDA funds. Overall, the FM performance was rated Substantial, while the FM risk was rated Moderately Satisfactory.

81. **Procurement.** During the implementation, long delays in the awarding of contracts were noted, particularly at the evaluation stage. The cause of these delays is linked to the difficulties in mobilizing members of the ad hoc contract evaluation committees. Delays have also been observed in the execution of activities due to the failure of companies. A Project Procurement Risk assessment (PPR) was conducted, and all the migration measures have been applied. The relevant procurement documents have been used. The procurement risk has been rated Substantial, and the overall performance is Moderately Satisfactory.

C. BANK PERFORMANCE

Quality at Entry

82. **The project's quality at entry is rated Satisfactory.** The project intended to respond to the emergency situation of the severe 2012 flood event that had significant negative impacts on Niger's cities and counties. Informed by lessons learned on DRM system from World Bank experience in Niger and the region, the project design responded to the vulnerabilities and priority needs of Niger, a country that is highly exposed to multifaceted risks in a context of fragility, insecurity, and rapid urbanization. The project was aligned with and informed by all World Bank priorities and GoN policies and strategies. The project's ability to adapt effectively and quickly to the various changes and events throughout its implementation confirmed the project's quality design and relevance. The project capitalized the lessons learned from the Local Infrastructure Development Project (PDIL, P095949), which closed in January 2013, and which confirmed that local government authorities, in consultation with community leaders and other key stakeholders, are better positioned than the Central Government to prioritize urban development and interventions aimed at increasing resilience to disasters. By positively affecting more than 4.3 million Nigeriens as evidenced by the first PDO indicator, the project benefited the poorest Nigeriens and the most climate-vulnerable districts, sometimes in remote or insecure environments (Diffa, Tillabéri, and so on).

83. **The project was prepared over a period of 7.7 months under regular procedures**. The project Concept Review was held on April 22, 2013, and the project was approved by the Board on December 11, 2013. Project readiness was fully achieved by effectiveness (August 15, 2014) with all prerequisite environmental and social instruments developed and disclosed (ESMF, Environmental and Social Impact Assessment [ESIA], RPF, and Social Management Plan); a procurement strategy (Project Procurement Strategy for Development) and plan for the 18 first months and a Project Implementation Manual adopted; a comprehensive RF developed, with indicators covering all results areas, including gender breakdown, baselines and targets; and a monitoring and reporting plan designed. Provisions for institutional mechanism, financial arrangements, and implementation modalities were agreed upon, with clear roles and responsibilities of the steering committee and the technical committee, and the National PIU was being built up and equipped with necessary management tools (staffing, computerized financial and accounting system, internal auditor, IRM Operational Manual, and so on). The Operational Risk Assessment Framework identified and assessed the risks that the project would face, and adequate mitigation measures were proposed. Continuous risks reassessments were done during the project lifetime.

Quality of Supervision

84. **World Bank performance in supervision was Satisfactory.** During the project's eight-year lifetime, the World Bank team organized 22 logistical and technical missions to support project implementation and track progress, while project performance and risk ratings were provided through 16 ISRs. Throughout the life of the project, an infrastructure specialist and a water specialist from the Water Global Practice based in Niamey were included as part of the task team. From 2019 to project closure, a Disaster Risk Management Specialist (ETC) was recruited in the Niamey office. These three Bank staff provided dedicated close implementation support to the project, allowing for a stronger presence in the field, important for a project covering various regions and given the large size of the country and the context of the COVID-19 pandemic. The project was rated Satisfactory for progress

toward development objectives in all ISRs from April 2018 until project closure at the end in October 2022. However, from November 2014 to February 2018, the project was rated Moderately Satisfactory due to delays of the recruitment of regional PIU teams, a slow start of project activities (including signing of agreements between the project and its partners 10 months after effectiveness), weak capacities issues, and poor quality of technical and procurement documentation. Subsequently, the project was rated Satisfactory, as the MTR (December 3–7, 2017) and a follow-up implementation support mission (February 12–23, 2018) had resolved the key implementation constraints, resulting in an IDA disbursement increase from 55 percent to 70 percent; the GEF disbursement increase to 30 percent; and tangible results in sustainable land and water management, flooding prevention, and the national risk information and EWS in Niamey, Dosso, Tillabéri, Diffa, and so on. These post-MTR achievements, marking a real turning point of the project, are the results of close supervision and extensive support provided by the World Bank team that allowed the project to continuously achieve remarkable results.

85. **Environmental and social safeguards issues during project implementation:**
   (a) Insufficient environmental and social staffing at PIU level (one specialist for both sectors);
   (b) Low involvement of the project's environmental and social staff in the preparation and analysis of relevant bidding documents in the field;
   (c) Insufficient signage and protective barriers to block access to work sites;
   (d) Poor implementation of site ESMPs and non-compliance by contractors with environmental and social clauses on sites
   (e) The need to improve GRM effectiveness (accessibility and communication) at the most decentralized level of the activities and verify its functionality; and
   (f) The RAP implementation approach for the drainage works in Tahoua and Konni; and
   (g) The need to enhance the communication aspects with the communities.

86. **On fiduciary aspects, the project experienced the issues of:**
   (a) Poorly or insufficiently justified expenses becoming ineligible expenditures for an amount of XOF 264.37 million;
   (b) Use of the project interest account to meet unplanned requests from sector ministries, without compliance with the *Note de Service* dated December 5, 2019, which specifies the eligible activities of this fund, signed by the Director of the Prime Minister's Office;
   (c) Long delays in the processing of requests for proposal and analyzing bids, often compounded by the unavailability of certain members of the evaluation committees, which come from sectoral ministries, at specific times;
   (d) Long delays in the execution of a certain number of contracts (AHA, collectors, dikes, traffic lights, and so on), including those relating to IRM, due to COVID-19 outbreak, and low performance of some contractors;
   (e) Delays in the World Bank 'no objections' due to task team leader changes in 2018–2020, which was the cruising period of the activities;
   (f) The misunderstanding about the elimination of the double review by the national procurement control agencies;
   (g) The lack of FM autonomy of PIUs at the regional level; and
   (h) The misuse and lack of maintenance of the material and equipment provided to public institutions or implementing partners.

87. **To overcome all those issues, the World Bank provided close and qualitative supervision and strong support** to the GoN to improve its capacity for compliance with environmental and social safeguards and with procurement and FM.

88. **During the life cycle of the project, the World Bank team strived to achieve the project's development objective** through adapting to unpredictable events, triggered by climate shocks or security threats that created new demands, and resolving all shortcomings arising from implementation. Four restructurings (2016, 2017, 2019, and 2021) and one AF (2019) have allowed the project to stay on track and reach successful completion. Furthermore, the team mobilized CREWS TF resources to provide additional technical value and specialized expertise in EWSs performance, strengthening the capacity of five national implementing institutions, with parallel support provided by Disaster Risk Financing and Insurance (DRFI) and United Nations Office for Disaster Risk Reduction.

89. **The World Bank team's reporting was candid, comprehensive, and of good quality**, appropriately covering the implementation challenges with relevant operational recommendations. Bottlenecks in the progress of project activities were systematically reported in the ISRs and objective ratings were given to the various performance indicators. Reporting to GEF and CREWS was also timely and adequately processed.

Justification of Overall Rating of Bank Performance

90. The World Bank's performance in ensuring both readiness and quality at entry and close and agile supervision to adapt through four restructurings justifies the overall rating of Satisfactory for the World Bank's performance.

D. RISK TO DEVELOPMENT OUTCOME

91. **The sustainability of investments is a critical concern.** The project highlighted the critical importance of ensuring high quality standards during the construction of infrastructure, as well as proper maintenance and operation of such infrastructure over time. The flood protection investments were implemented to be maintained with simple upkeep by existing management committees. However, the sustainability of these investments depends on the ability of these committees, in a context of weak technical and financial capacity of beneficiary municipalities. The mid-term review of the project identified several risks, including land issues and shortcomings in quality supervision and capacity of service providers. Specific mitigation measures were taken to address these risks, including effective land management, better stakeholder engagement, improved technical services, and control missions supervision by the National PIU and Regional PIUs. However, the risks remain, and the sustainability of the project outputs will depend on continued attention to these issues.

V. LESSONS AND RECOMMENDATIONS

92. **The strategic anchorage of the project at the Prime Minister's Office ensured successful multi-sectoral and multidimensional coordination and effective leadership.** The project involved eight sectoral ministries, six regions, 82 municipalities and a number of other stakeholders, requiring strong coordination and leadership by a powerful and transversal institution. This is of particular importance in flood resilience and urban development projects where interministerial and stakeholder coordination

is key to achieving results on the ground, reducing existing risks and avoiding creation of new risks, avoiding fragmentation of activities, and facilitating interministerial coordination and synergies. This is also aligned with Sendai Framework for Disaster Risk Reduction 2015–2030 recommendations.

93. **Good technical studies and appropriate control missions promote investment sustainability and long-term development outcomes.** To guarantee the effective and efficient execution of investments within the required budget and time frame, it is essential to have good study and control missions, quality technical designs, recruitment of firms with good technical experience and operational organization, and quality control of implementation. This problem of sometimes poor private contractor performance was noted at the national level during technical audits and the review of Niger's portfolio under the Country Portfolio Performance Review 2020–2022, which for the PGRC-DU delayed key operations such as the Diffa dike and other dikes along the Niger River, the Boubon landfill, and the Sirba flood control structure, which will be taken over by PIDUREM (P175857), which is the follow-on project after the PGRC-DU. Sustainable O&M in a weak capacity operating context must be handled by setting up an infrastructure management plan and local memorandums of understanding or protocols for investment O&M, including municipality and community participation.

94. **Integrating fragility into project design and using remote sensing and monitoring technologies improves project implementation in remote, insecure, or difficult-to-access areas in FCV countries.** By mitigating probable exposure to security risks and threats (as it was the case in Tillabéri and Diffa), anticipating unpredictable events or implementation challenges, and swiftly adapting to a volatile operating environment, the use of digital solutions, for example, GEMS or the new Project360, helped the project develop flexibility and adaptation to the changing local context. This good practice was confirmed with the FY22 RRA portfolio review that revealed the need to proactively identify FCV risks and implementation constraints and to integrate them into project design and to internalize the externalities by working at the local level, including through decentralized project implementation and stronger territorial presence, complemented by remote supervision. In a large country like Niger, this approach is amenable for decentralized operations in areas with potential security risks.

95. **Early hiring of staff in regional PIUs can help quick-start project activities and avoid implementation delays and shortcomings.** The project experienced several shortcomings at the beginning because of the absence of regional PIUs. But as soon as the staff was recruited and started to deliver, the project took off and the ratings became Satisfactory. It is important for urban projects including secondary cities with low capacities to anticipate the staffing of regional PIUs and ensure early implementation and disbursements.

96. **Solving fiduciary problems such as low disbursement rates, procurement delays, contracting double review, ineligible expenses, and so on requires a common vision about the project's performance and capacity-building activities.** The FM and procurement trajectory of this project is not unique but common in many other operations in the region. Therefore, it is extremely important that key actors involved in project management and implementation share the same vision of performance, result-oriented actions, transformational impact, and outcomes and collaborate closely together throughout project implementation. This requires initial and capacity building during the project's life, in parallel with staff turnover in National PIUs, ministries, and agencies. To avoid misuse of the project interest account, it is necessary to ensure wide dissemination of eligible activities and to build the capacity of implementing partners on the procedures for funding activities. Regarding the utilization

and maintenance of the material/equipment provided to implementing partners, it is important to establish clear guidance and rules, utilization protocols, and controls by an internal auditor.

97. **The innovative integration of flood risk management, drainage, land restoration, water management, urban development, planning capacities, early warning, preparedness, and response in a holistic manner proved to be an effective strategy for designing and supporting urban resilience.** Protecting cities and communities from floods requires the combination of structural and nonstructural measures. The PGRC-DU's investments in flood control barriers and watershed treatment are good practices. However, costly structural risk mitigation alone is insufficient for effective flood risk management and needs to be combined with cost-effective nonstructural measures, for example, flood risk mapping and communication, land use planning, flood forecasting and early warning, coordinated operation of flood management facilities, and emergency preparedness and recovery planning measures. Hence, an integrated flood risk management strategy is needed to balance disaster risk reduction and preparedness measures, by defining minimum levels of acceptable risk, to save lives in the short term while also focusing on long-term risk reduction. Even though the high level of insecurity delayed activities in some regions (Diffa and Tillabéri), the achievements were outstanding, and confirmed the relevance of the holistic approach that really brought transformational impacts to vulnerable cities and communities.

98. **An emergency response project like this one, which integrates forward looking urban resilience considerations, can serve a strong foundation for future larger and more transformative multisectoral urban resilience operations.** The outcomes of this project were scaled up in the US$250M IDA-financed Multi-sectoral Resilience Project (PIDUREM - P175857 2022-2028), which aims to increase resilience to floods, and improve urban management and access to basic services in selected municipalities in Niger. The PIDUREM (i) improved the balance between structural and non-structural approached to flood resilience mentioned in the lesson above, (ii) put greater emphasis on strengthening planning and management capacities of municipalities to improve resilience within the country's decentralization framework, (iii) adopted a spatial approach in the design of project activities to better account for socio-economic vulnerabilities, gaps in basic services, and exposure to fragility risks in addition to climate risks, and (iv) scaled up regional implementation units to cover the wider geographical scope. The positive results and the lessons of the PGRC-DU created the necessary technical and implementation capacities necessary for the preparation of the PIDUREM.

99. **In countries with limited human capacity and financial resources, capacity building is cost-effective and promotes the responsible participation of the actors involved.** The PGRC-DU developed a consolidated approach, based on the complementarity between the stormwater management system and the national local DRM system related to the establishment and use of EWSs, prevention measures, and capacity-building efforts. The project benefited from the capacity-building activities of key hydromet structures and other EWS actors (DGPC, CC/SAP, and the Directorate for Disaster Prevention and Warnings (*Direction de la Prévention et d'Alerte aux Catastrophes*), carried out with support from CREWS. Also, the network of about 600 women leaders trained by the MAH/GC, with the support of CREWS, on DRM in Niger's eight regions helped in the gender voice and leadership in the DRM decision-making process.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: To improve Niger's resilience to natural hazards

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Direct project beneficiaries	Number	0.00 17-Oct-2013	4,000,000.00 31-Dec-2019	4,300,000.00 31-Oct-2022	4,375,633.00 31-Oct-2022
Female beneficiaries	Percentage	50.00	50.00	50.00	49.16

Comments (achievements against targets):
Final target increased with the AF to account for geographical extension.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Targeted flood protection and sustainable land and water management interventions contributing to increased	Percentage	0.00 17-Oct-2013	100.00 31-Dec-2019	100.00 31-Oct-2022	100.00 31-Oct-2022

resilience (% of targeted interventions implemented)					

Comments (achievements against targets):
As agreed at MTR, the list of activities to be considered for measurements of this indicator was reduced from nine to five, as the project costs were substantially underestimated at project preparation, rendering the delivery of 4 activities no longer possible. The indicator focuses on (a) regulation of structures along tributaries, (b) rehabilitation/development of pond control structures, (c) rehabilitation of old natural drains that have collapsed, and (d) rehabilitation of drainage gutters/collectors/sewers. This indicator has been updated through the simple restructuring as part of the AF.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Performance of the early warning and response system for natural rapid onset hazards (e.g. floods, strong winds, wild landfires)	Number	0.00 17-Oct-2013	0.00 31-Dec-2019	5.00 31-Oct-2022	5.00 31-Oct-2022

Comments (achievements against targets):
Target unit was changed during the first restructuring from 100% to the number 5, representing the 5 institutions involved in EWS (MAH/GC, DGPC, CC/SAP, DMN, and DHL as the five national structures which implemented CREWS), to better assess performance.

A.2 Intermediate Results Indicators

Component: Comp. 1: Flood Risk Management Investments

Indicator Name	Unit of	Baseline	Original Target	Formally Revised	Actual Achieved at

	Measure			Target	Completion
Sources of drinking water rehabilitated or developed	Number	0.00 17-Oct-2013	260.00 31-Dec-2019	450.00 31-Oct-2022	492.00 31-Oct-2022

Comments (achievements against targets):
Target was decreased in the first restructuring from 260 to 190 to reflect the project's reduced activities, but under the AF in 2019 the target was increased to 450 to reflect the emergency intervention in Diffa with reallocation of a large number of people.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Targeted irrigable land rehabilitated	Hectare(Ha)	0.00 17-Oct-2013	2,000.00 31-Dec-2019	1,700.00 31-Oct-2022	1,647.27 31-Oct-2022

Comments (achievements against targets):
Under the AF, the end target was decreased from 2000 to 1700 ha to adequately reflect the implementation experience of the original project and the Immediate Response Mechanism (IRM). By project's end, the indicator target could not be fully achieved due to security reasons, as GoN had banned gatherings following its declaration of a State of Emergency in Diffa starting in 2016. Hence insecurity prevented the rehabilitation work for the irrigated parameters (AHA) in Diffa, despite availability/ validation of the preliminary and detailed design.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Watershed protection and land	Hectare(Ha)	0.00	6,500.00	6,500.00	17,020.00

restoration interventions measured by sub-indicators below		17-Oct-2013	31-Dec-2019	31-Oct-2022	31-Oct-2022
Sand dune fixation	Hectare(Ha)	0.00	5,500.00	5,500.00	6,000.00
Restoration of degraded land	Hectare(Ha)	0.00	6,500.00	6,500.00	11,020.00
Stonewalls	Kilometers	0.00	200.00	10.00	80.59
Dike protection	Kilometers	0.00	50.00	50.00	47.57

Comments (achievements against targets):

The AF separated watershed protection and land restoration into 2 indicators due to the divergent units of measurement (ha; km). Ultimately, the indicator was maintained, and the required distinction for accurate measurement/ reporting was made through the introduction of 4 sub-indicators: Sand dune fixation (Ha); Restoration of degraded land (Ha); Stonewalls (Km); Dike protection (Km).

- Restoration of degraded land (Ha): Large over-achievement is explained by the inclusion of works under the IRM 2016 for which resources were taken from the PGRC-DU funding and reimbursed through the AF without revising the target value of the indicator.
- Stonewalls (Km): Large over-achievement is explained by activities in Agadez, Tahoua, Loubé, Bogon, Azzem following requests from municipalities in 2022 for protection of Koris and school enclosures, alongside rehabilitation of collapsed classrooms in Loube.

- Dike protection (Km): Indicator was modified from 'Live fencing' to 'dike protection' during the AF due to implementation experience that Live fencing is not feasible as initially planned. Although all planned dike protection infrastructures were realized at 100%, the slight underachievement of the target is due to the fact that dyke construction in the regions of Dosso and Tillabéri was completed with shorter dykes than originally planned.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Drainage infrastructure rehabilitation	Kilometers	0.00 19-Feb-2019	23.50 31-Oct-2022	23.50 31-Oct-2022	120.95 31-Oct-2022
Drainage	Kilometers	0.00 19-Feb-2019	10.00 31-Oct-2022	10.00 31-Oct-2022	8.82 31-Oct-2022
Drainage pavement	Kilometers	0.00 19-Feb-2019	20.00 31-Oct-2022	20.00 31-Oct-2022	9.30 31-Oct-2022
Koris	Kilometers	0.00 19-Feb-2019	5.00 31-Oct-2022	5.00 31-Oct-2022	6.40 31-Oct-2022

Comments (achievements against targets):
The large over-achievement is due to the rehabilitation of not only primary drainage networks but also of additional secondary and tertiary drainage networks which initially were not planned, but which GoN requested due to their level of degradation.

New Indicators introduced through the AF to capture intervention in Agadez and Tahoua.

The underachievement of

1. *Drainage infrastructure rehabilitated (floods)* is due to the prioritization by GoN to rehabilitate damaged hydro-agricultural drainage infrastructure instead (i.e. indicator 4) in order to mitigate the severe economic loss for farmers. Hence, while indicator 4 with irrigated parameters (AHA) was overachieved, other drainage infrastructure here (indicator 4.1) was underachieved.
2. *Drainage pavement* is due to the cancellation of a 1.5 km section of paved road in the town of Birni Konni, which GoN delivered under another project. The freed-up IDA funds were used in the town of Konni to excavate a pond and create its embankment, which serves as a water outlet for nearby drainage collectors and the roadway.

For *Koris*, the final target of Koris was revised to 5km with the AF to reflect the postponed infrastructure rehabilitation in Tahoua, rendering the original target of 21.5km no longer feasible.

Component: Comp. 2: Capacity Building for Urban Development and Disaster Risk Management

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Development and/or updating of urban master plans and local development plans	Number	0.00 17-Oct-2013	39.00 31-Dec-2019	25.00 31-Oct-2022	26.00 31-Oct-2022

Comments (achievements against targets):
Target decreased during the AF as the target couldn't be achieved due to the country's institutional framework at the time, whereby local elections had been postponed to 2020, and the 14 urban audits (that were counted towards the final target of 39) could not be realized.

Indicator Name	Unit of	Baseline	Original Target	Formally Revised	Actual Achieved at

	Measure			Target	Completion
Percentage of female participation in decision committees for development and/or updating urban master plans and municipal development plans	Percentage	0.00 17-Oct-2013	25.00 31-Dec-2019	25.00 31-Oct-2022	23.27 31-Oct-2022

Comments (achievements against targets):
As the MTR identified that participation of women in municipal councils cannot be reported due to the postponing of municipal elections to 2020, the 2019 AF agreed to change the indicator to measure participation of women in developing regional and/or local plans.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Percentage of municipal budget allocated to solid waste collection and processing/transformation	Percentage	0.00 17-Oct-2013	5.00 31-Dec-2019	4.00 31-Oct-2022	5.00 31-Oct-2022

Comments (achievements against targets):
Revised to 4% during the AF due to the difficulty of municipalities to report on drainage maintenance.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Support preparedness and emergency response (measured by sub-indicators below)	Yes/No	No 19-Feb-2019	Yes 31-Oct-2022	Yes 31-Oct-2022	Yes 31-Oct-2022
Fully functional database of risk in Niger	Yes/No	N	Yes	Yes	Yes
Support to Civil Protection to strengthening response capacity (facilities, equipment, training)	Yes/No	N	Yes	Yes	Yes
Support to National DRM agencies (Equipment, training)	Number	0.00	10.00	10.00	10.00

Comments (achievements against targets):
New indicator was introduced during the AF to capture the DRM interventions.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Support urban development (measured by sub-indicators below)	Yes/No	No 19-Feb-2019	Yes 31-Oct-2022	Yes 31-Oct-2022	Yes 31-Oct-2022
Area with detailed maps in	Square	0.00	400.00	400.00	780.00

digital and paper formats	kilometer(km 2)				
Trained people on digital cartography	Number	0.00	200.00	200.00	76.00
Number of local innovation projects supported	Number	0.00	8.00	8.00	5.00

Comments (achievements against targets):

New indicators were introduced by the 2019 AF to capture the new activities to promote ICTs. Reasons for non- or over-achievement of some end targets:

- *Area with detailed maps in digital and paper formats*: the actual result reached 780 km2; the large overachievement is due to the fact that the original target covered mapping of only 6 cities, while the project mapped a total of 8 cities (adding Maradi and Zinder).
- *Trained people on digital cartography*: (i) start delays of ICT activities, (ii) start delay of academic activities and (iii) security-related postponement by GoN of the Dec 18, 2019 festivities in Tillaberi, rendering the co-financing for the ITIKAR start-up no longer feasible.
- *Number of local innovation projects supported* : (i) Rigorous candidate selection criteria and (ii) security-related cancellation of festival events for young.

Component: Comp. 3: Project Management

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Quality and timely submission	Yes/No	Yes	Yes	Yes	Yes

of Procurement and financial management reporting		17-Oct-2013	31-Dec-2019	31-Oct-2022	31-Oct-2022
Quality and timely submission of procurement reporting	Yes/No	No 19-Feb-2019	Yes 31-Oct-2022	Yes 31-Oct-2022	Yes 31-Oct-2022
Quality and timely submission of Financial Management reporting	Yes/No	No 19-Feb-2019	Yes 31-Oct-2022	Yes 31-Oct-2022	Yes 31-Oct-2022

Comments (achievements against targets):
As evidenced by Procurement Review and Financial Management Assessment this indicator continues to be achieved satisfactorily.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Planned project activities implemented	Percentage	0.00 17-Oct-2013	100.00 31-Dec-2019	100.00 31-Oct-2022	90.45 31-Oct-2022

Comments (achievements against targets):
The list of project activities has been updated, to take in account activities financed under the FA.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Grievances registered related to delivery of project benefits that are actually addressed	Percentage	0.00 19-Mar-2019	80.00 31-Oct-2022	80.00 31-Oct-2022	90.00 31-Oct-2022

Comments (achievements against targets):
The Project did not report on this indicator in the semester report. The Bank team requested a detailed list of Grievances to better assess the Grievance Redress Mechanism.

Component: Comp. 4: Contingency Component

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Time taken the preparation/submission of the activation package by the Client for an eligible crisis or emergency triggering an Immediate Response Mechanism (IRM)	Weeks	0.00 17-Oct-2013	4.00 31-Dec-2019	4.00 31-Oct-2022	8.00 31-Oct-2022

Comments (achievements against targets):
The activation of the IRM is a two-phase process that includes: (i) the preparation/submission of the activation package by the Client, and (ii) the approval/disbursement of funds by the Bank. The initial indicator does not reflect the responsibility of the Client. Hence, the MTR agreed to refocus the indicator on the time elapsed for preparation/submission of activation package by the Government and to exclude the Bank's processing time, which could lead to delays that are outside the scope of the project.

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1: To improve the Recipient's resilience to natural hazards through selected disaster risk management interventions in targeted project sites	
Outcome Indicators	PDO1. Direct project beneficiaries exceeded (almost achieved when disaggregated by percentage of female) PDO2. Targeted flood protection and sustainable land and water management interventions achieved
Intermediate Results Indicators	1. Sources of drinking water exceeded 2. Targeted irrigable land rehabilitation almost achieved 3. Watershed protection and land restoration significantly exceeded 4. Drainage infrastructure rehabilitation achieved
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. 492 sources of drinking water rehabilitated or developed 2. 1,641.27 ha of targeted irrigable land rehabilitated 3. 17,020 ha watershed protected, and land restored *3.1. 6,000 sand dunes fixed* *3.2. 11,020 ha land degraded restored* *3.3. 80.59 km of stonewalls built* *3.4. 47.57 km of dikes protected* 4. 120.95 km of drainage infrastructure rehabilitated *4.1. 8.82 km of drainage built* *4.2. 9.3 km of drainage pavement built* *4.3. 6.4 km of koris built*
Objective/Outcome 2: To improve the Recipient's resilience to natural hazards strengthening of the Recipient's capacity to respond promptly and effectively to an eligible crisis or an emergency	
Outcome Indicators	PDO3. Performance of the early warning and response system for natural rapid onset hazards achieved
Intermediate Results Indicators	1. Urban master plans and local development plans exceeded

	2. Female participation in decision committees for development and/or updating urban master plans and municipal development plans almost achieved 3. Municipal budget allocated to solid waste collection and processing/transformation exceeded 4. Support preparedness and emergency response achieved 5. Support urban development achieved
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. 26 urban master plans and local development plans achieved 2. 23.37% females participated in decision committees for development and/or update of urban master plans and municipal development plans 3. 5% municipal budget was allocated to solid waste collection and processing/transformation 4. Support preparedness and emergency response achieved *4.1. Database of risk in Niger is fully functional* *4.2. Support to Civil Protection to strengthening response capacity achieved* *4.3. Support to urban development achieved* *4.4. Support to 10 National DRM agencies achieved* 5. Support urban development achieved *5.1. 780 km^2 of area with detailed maps in digital and paper formats achieved* *5.2. 76 people trained on digital cartography* *5.3. 5 local innovation projects supported*
No specific PDO for CERC activation but could be considered under Objective/Outcome 1 and 2	
Outcome Indicators	No Indicator
Intermediate Results Indicators	1. CERC activation
Key Outputs by Component (linked to the achievement of the overall project)	1. 8 weeks taken by the Client for the preparation/submission of the activation package to trigger the IRM only achieved half target
No specific PDO for project management but could be considered under Objective/Outcome 1 and 2	
Outcome Indicators	No Indicator
Intermediate Results Indicators	1. Procurement and financial management reporting achieved

	2. Planned project activities achieved 3. Grievance Redress Mechanism exceeded
Key Outputs by Component (linked to the achievement of the overall project)	1. Quality and timely procurement and FM reporting achieved *1.1. Quality and timely submission of procurement reporting achieved* *1.2. Quality and timely submission of FM reporting achieved* 2. 89.92% of planned project activities implemented 3. 90% grievances registered related to delivery of project benefits and addressed

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Richard James	Task Team Leader
Ibrah Rahamane Sanoussi	Procurement Specialist
Beth Wanjeri Mwangi	Financial Management Specialist
Liba Chaja Strengerowski	Social Specialist
Amadou Konare	Environmental Specialist
Paivi Koskinen-Lewis	Social Specialist
Supervision/ICR	
Claudia Ruth Soto Orozco	Task Team Leader
Mahamadou Bambo Sissoko	Procurement Specialist
Sidy Diop	Procurement Specialist
Maman Hassane Gabari	Procurement Specialist
Helsy Priscilla Damiano	Financial Management Specialist
Ahohouindo Mongnihoude Jean L Gbaguidi	Financial Management Specialist
Illya Miko	Team Member
Mamadou Ali Boureima	Team Member
Salifou Abdou Dan Baba	Procurement Team
Abdouramane Abdoulaye Saley	Team Member
Mohamed Nanzoul	Team Member
Vivien Deparday	Team Member
Ibrah Hachimou	Environmental Specialist
Koffi Hounkpe	Team Member
Taibou Adamou Maiga	Team Member

Paivi Koskinen-Lewis	Social Specialist
Taoufiq Bennouna	Environmental Specialist
Cecile Lorillou	Team Member
Kristyna Bishop	Social Specialist
Demba Balde	Social Specialist
Daniel P. Gerber	Team Member
Sung Heng C. Kok Shun	Team Member
Hadidia Diallo Djimba	Team Member
Brahim Ould Abdelwedoud	Task Team Leader
Sylvie Debomy	Task Team Leader
Sabine Beddies	Task Team Leader
Jean-Batpiste Migraine	Task Team Leader
Fadi Doumani	Consultant

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY13	7.000	182,732.94
FY14	17.153	351,663.68
FY15	0	0.00
Total	**24.15**	**534,396.62**
Supervision/ICR		
FY14	7.841	50,101.09
FY15	23.853	170,591.82
FY16	18.332	134,365.22
FY17	33.021	161,687.44
FY18	37.785	479,595.50
FY19	32.013	586,877.90
FY20	53.788	532,154.87
FY21	105.190	583,864.67
FY22	90.532	635,751.66
FY23	30.048	247,511.97
Total	**432.40**	**3,582,502.14**

ANNEX 3. PROJECT COST BY COMPONENT

Components	IDA Amount at Approval (US$, millions)	TF Amount at Approval (US$, millions)	IDA Parent and AF Amount at Third Restructuring (US$, millions)	IDA Parent and AF Amount at Closing (US$, millions)	TF Amount at Closing (US$, millions)	Percentage of Third Restructuring (%)
Component 1: Flood Risk Management Investments	70.0	6.65	76.30	77.7	6.64	102
Component 2: Capacity Building for Urban Development and Disaster Risk Management	22.0	—	26.00	21.1	—	81
Component 3: Project Management	5.0	—	9.20	11.1	—	120
Component 4: Contingency Component	0.0	—	13.50	4.6	—	34
Total	**100.0**	**6.65**	**125.00**	**114.45**	**6.64**	**92**

ANNEX 4. EFFICIENCY ANALYSIS

I. Ex Ante Economic Analysis Review

1. **November 2013 PAD.** The US$106.65 million PGRC-DU was declared effective in August 2014 with a duration of seven years. Its objective was to support the Government in rehabilitating and scaling up the DRM infrastructure and restoring productive activities affected by the 2012 flooding disaster faced by Niger. The PAD included a back-of-the-envelope economic analysis where the US$64 million damages were assessed in 2012 while the 175 victims were mentioned but not accounted for in monetary terms in the damages. The 2012 damages were considered as benefits to accrue every three years as the cycle of serious floods was reported every three years based on the analysis assumptions. Over 25 years, the costs considered were the PGRC-DU plus an undisclosed amount for O&M. The NPV ranged between US$76 million and US$189 million while the internal rate of return (IRR) ranged between 23 percent and 33 percent and the present value of the benefit-cost ratio ranged between 2.33 and 3.10 and discounted between 5 percent and 20 percent while a sensitivity analysis considered a reduction in benefits and increase in cost of 20 percent. The project investment scope included (a) rehabilitating the existing urban and rural flood control, irrigation, and drainage infrastructures that were destroyed during floods by 'building back better'; (b) building new flood control, drainage, and irrigation infrastructure to control future floods by regulating water flow; (c) improving water management through rehabilitation of improved watersheds and land management through sustainable land management; (d) rehabilitating and developing infrastructure in Niamey that was severely affected by floods and accounts for 40 percent of all the urban population in Niger; (e) strengthening DRM and social accountability of the Central Government, local government institutions, elected officials, and civil society; (f) strengthening capacity for disaster risk identification, monitoring, EWS, preparedness, and response to such events; and (g) promoting post-disaster economic recovery and livelihoods in the project areas. Moreover, the investments were to reap benefits in terms of increasing the rice area harvested, yield, and productivity leading to rate of return ranging between 23 percent and 33 percent. The project was also reported to have many tangible and intangible direct and indirect potential benefits on DRM, agriculture productivity, employment, and poverty alleviation in rural areas that were qualitatively mentioned in terms of (a) reversing land degradation, soil erosion, deforestation, risk of pest outbreaks for crops, decrease in crop and livestock productivity, and decline in agricultural production potential; (b) strengthening DRM and technical capacity of all the participating agencies involved in DRM; (c) strengthening institutional capacity of all such agencies involved in project implementation; (d) improving the consultation with stakeholders and beneficiaries and coordination among participating agencies resulting in better information and knowledge flow as well as social accountability and improved governance; (e) increasing preparedness and timely response through better planning, coordination, and monitoring; (f) having a positive fiscal impact in the project area; and (g) generating employment opportunities.

2. **March 2016 first restructuring ex ante economic analysis review.** There was no update to the economic analysis in the first restructuring paper as some costs were reshuffled across subcomponents and a target output was reduced.

3. **March 2017 second restructuring ex ante economic analysis review.** The CERC was triggered, and economic analysis was not updated in the second restructuring paper as some costs were reshuffled

across subcomponents and target outputs were adjusted. The damages of mid-2016 flooding in Niger were reported by UNOCHA but were not monetized.

4. **September 2019 AF/third restructuring ex ante economic analysis review.** The total AF of US$25 million was to be disbursed over two years. The proposed replenishment of US$13.5 million did not require to update the economic analysis as there were no new activities while all project activities remained valid. Still, the new activities proposed a total amount of US$11.5 million (US$6.5 million for rehabilitation of dikes, drainage, *koris*, and pond control infrastructure and US$4 million to support urban development through ICT activities) where an economic analysis was apparently carried out indicating the feasibility of this operation. The analysis focused only on the additional activities under this AF and did not include activities that were originally identified by the parent project. While it is mentioned that the development impact of the AF new activities was positive and substantial, no figures or analysis in the main text or as an annex were available to review and reanalyze.

5. **June 2021 amendment letter extending the closing date to October 2022** allowed all the ongoing activities to be finalized which did not have any bearing on the economic analysis, except on the disbursement spread over a longer period which was negligible.

II. Ex Post Economic Analysis

6. Not all benefits accruing from various activities backed by indicators in the RF were calculated due to lacking end-of-project data, for example, irrigable cropland rehabilitated, or the productivity of areas harvested with the distributed seeds, or the productivity of livestock fed with the distributed fodder. Table 4.1 provides the project activities backed by indicators as well as the benefit typology, the benefit method considered and used, as well as the results. Several other activities not backed by indicators could also generate benefits and are listed below. However, most of these benefits are qualitative and could not be exploited to derive some sort of efficiency. Still, the benefit calculation by indicator considered is just to give an order of magnitude of the project gains. The total mean benefit calculated amount to US$132.5 million (Table 4.1)

Table 4.1. Project Activities, and Benefit Typology, Considered, Method and Results

Activities Backed by Indicators	Benefit Typology	Benefit Considered	Benefit Method	Benefit in the First Year of Cumulative (US$ million)
Component 1				
PDO1. Direct project beneficiaries	Tangible			
PDO2. Targeted flood protection and sustainable land and water management interventions achieved	Tangible			
1. 492 sources of drinking water rehabilitated or developed	Tangible	Yes	Averted water burden of disease	2.8
2. 1,641.27 ha of targeted irrigable land rehabilitated	Tangible	Partial	Productivity change	0.13

Activities Backed by Indicators	Benefit Typology	Benefit Considered	Benefit Method	Benefit in the First Year of Cumulative (US$ million)
3. 17,020 ha watershed protected, and land restored	Tangible	Yes	Dose response	47.30
3.1. 6,000 sand dunes fixed	Tangible			
3.2. 11,020 ha land degraded restored	Tangible	Yes	Productivity change	0.58
3.3. 80.59 km of stonewalls built	Tangible			
3.4. 47.57 km of dikes protected	Tangible			
4. 23.5 km of drainage infrastructure rehabilitated	Tangible			
4.1. 8.82 km of drainage built	Tangible			
4.2. 9.3 km drainage pavement built	Tangible			
4.3. 6.4 km koris built	Tangible			
Component 2				
PDO3. Performance of the early warning and response system for natural rapid onset hazards achieved	Intangible	Yes	Meta-analysis	17.01
1. 26 urban master plans and local development plans achieved	Intangible			
2. 23.37% female participated in decision committees for development and/or updated urban master plans and municipal development plans	Intangible			
3. 5% municipal budget was allocated to solid waste collection and processing/transformation	Tangible			
4. Support preparedness and emergency response achieved	Intangible			
4.1. Database of risk in Niger is fully functional	Intangible			
4.2. Support to civil protection to strengthening response capacity achieved	Intangible			
4.3. Support to urban development achieved	Intangible			
4.4. Support to 10 national DRM agencies achieved	Intangible			
5. Support urban development achieved	Intangible			
5.1. 320 km^2 of area with detailed maps in digital and paper formats achieved	Intangible			
5.2. 76 People trained on digital cartography	Intangible			
5.3. 5 local innovation projects supported	Intangible			
Component 3				
1. Quality and timely procurement and FM reporting achieved	Intangible			
1.1. Quality and timely submission of procurement reporting achieved	Intangible			

Activities Backed by Indicators	Benefit Typology	Benefit Considered	Benefit Method	Benefit in the First Year of Cumulative (US$ million)
1.2. Quality and timely submission of FM reporting achieved	Intangible			
2. 89.92% of planned project activities implemented	Tangible			
3. 90% grievances registered related to delivery of project benefits and addressed	Intangible			
Component 4				
1. 8 weeks taken by the Client for the preparation/submission of the activation package to trigger the IRM	Intangible			
Other benefits not monitored in the RF				
Urban road pavement	Tangible	Yes	Hedonic pricing	**12.10**
Temporary jobs created	Tangible	Yes	Marginal Propensity to Consume (MPC)	**0.11**
Fishermen activities	Tangible	Yes	Meta-analysis	**0.02**
Carbon emission averted (PV)	Tangible	Yes	Replacement Cost	**0.76**

III. Benefit Valuation Methods

Component 1

Improved Potable Water

7. The largest health burden is diarrheal disease and premature mortality. A reduction in diarrheal disease and mortality is usually expected on average for population groups from improvement in reliability and quality water and/or improved sanitation. The percentage reductions are based on Bassi et al. (2014), where improved water through 482 water fountains is serving on average 250 people per water fountain[13] or 120,500 people per day could reduce the mortality and morbidity of waterborne diseases by 50 percent. However, time savings are not considered as data was not collected on time saved per person hauling water.

8. The steps in a quantitative assessment of health benefits (drinking water and sewage/hygiene) are to reduce premature death and morbidity associated with some waterborne diseases. Expected reduction in annual incidence of diarrheal disease and diarrheal mortality is presented in Table 4.2. A midpoint 50 percent reduction is considered for improved water quality for the population that will have access to the improved water quality as reported in Bassi et al. (2014).

[13] Viola website: https://www.veolia.com/fr/groupe/medias/actualites/acces-eau-potable-niger#:~:text=Chaque%20borne-fontaine%20alimente%20en%20moyenne%20250%20personnes%2C%20et,une%20borne-fontaine%20qui%20alimente%20environ%202%20000%20personnes.

Table 4.2. Expected Diarrheal Morbidity and Mortality Reduction from Water and Sanitation Improvement

Group	Current Water Supply and Sanitation Coverage	Population Distribution	Water and Sanitation Improvement	Expected Average Reduction in Diarrheal Disease and Mortality	
				Already Good Hygiene (%)	Substantial Scope for Hygiene Improvement (%)
1	Improved water supply and sewage connection		Improvement in reliability and quality of water (so as to ensure plentiful and safe water supply) for those of this population currently having water reliability and quality problems	15	45
2	Improved water supply but no sewage connection		(a) Improvement in reliability and quality of water (so as to ensure plentiful and safe water supply) for those of this population currently having water reliability and quality problems. (b) Sewage connection (and flush toilet for those with dry toilet or no toilet) for all of this population.	35	65
3	Not improved water supply but sewage connection		Reliable and safe water supply to premises for all of this population	25	55
4	Not improved water supply and no sewage connection		Reliable and safe water supply and sewage connection (and flush toilet for those with dry toilet or no toilet) for all of this population	45	75
	Total	**100%**			

Source: Bassi et al. 2014.

9. The quantification of deaths and diseases is based on the Institute for Health Metrics and Evaluation (IHME)[14] data, where waterborne disease risk factors are available for Niger in 2019 and they are available for 100,000 population in terms of death and morbidity using the burden of disease's Disability-Adjusted Life Year (DALY) metric and IHME (2019):

- The value of statistical life (VSL), which stands for the risk for reducing mortality, is used for premature death based on Lindhjem and Navrud (2010) as well as OECD (2015).
- A GDP per capita for DALY lost is used for morbidity (Murray and Lopez 1996).

[14] IHME website: <https://vizhub.healthdata.org/gbd-compare/>

10. For premature death, a benefit transfer was applied to derive the VSL in Niger. The transfer of the unit to adjust for differences in income value is as follows:

$$WPp = WPs \times (Yp/Ys)^{ß},$$

where

WPp = willingness to pay in policy country;

WPs = willingness to pay in study country;

Yp = income in the country policy denominated in purchasing power parity dollar (PPP$);

Ys = income in the country of study denominated in purchasing power parity dollar (PPP$); and

ß = income elasticity for different environmental goods and services, which are considered normal goods, typically greater than 0 (perfectly inelastic which would have meant that ß is set at 1.2).

11. In this particular case, the income elasticity is assumed to be conservatively more inelastic, which means that the percentage responsiveness of quantity demanded is significantly and slightly lower to the percentage change in income[1]. The VSL or the reduction of risk of premature death in Niger is US$32,462 in 2021 for each premature death and the GDP per capita stands at US$595.

12. The benefits associated with improved access to quality water reached US$2.8 million with a lower bound of US$1.8 million and an upper bound of US$4.1 million (Table 4.3). However, this does not account for the time saved hauling water from distant water sources.

Table 4.3. Monetization Associated with Improved Water Quality

Input	Targeted Population	Water-Based Death/Population	Water-Based YLD/Population	Death	YLD	Death VSL	YLD GDP	Middle Bound	Lower Bound	Upper Bound
	#	#/100,000	#/100,000	#	#	US$ million	US$ million	US$ million	US$ million	US$ million
Provinces	120,500	140.97	280.96	170	339	5.5	0.1	5.7	3.6	8.2
Risk reduction				50%	50%					
Averted death and morbidity				85	169	2.8	0.1	2.8	1.8	4.1

Source: Murray and Lopez (1996); Bassi et al. (2014); IHME website: https://vizhub.healthdata.org/gbd-compare/; and World Bank (2022).
Note: YLD stands for Year Lived with Disability.

13. **Hydrometeorological event producing damages to public and private assets.** For damages and forgone opportunities in terms of economic value added and damages to natural, public, and private assets, the Dose-Response Methodology builds on IMDC et al. (2017). Flood-effect functions used dose-response methods to link the intensity and length of an event with its effects per category of 31 categories of land use value added and buildup assets whereas land rehabilitation is assigned the lowest density with the lowest full value per ha restored. Direct tangible damage to assets (for example, buildings and

infrastructure) reflects restoration costs and is mainly dependent on flood depth. In addition, indirect tangible damages include losses of stocks and losses due to interruption of production of goods or services (for example, transport). Both direct and indirect tangible damages can be expressed in monetary terms and depend on the values at risk and their vulnerability. Damage functions specify the percentage loss of the total value of an asset at risk, in function of flood characteristics (the flood depth, the duration, and the water speed). These characteristics are part of the hazard assessment. Damage functions for direct damages are more certain compared to those for indirect losses, as the latter also depend on the duration of a flood event which was set at once per year. The generic method used builds on the results of the more detailed models and uses average damage functions that are applied to values at risk, expressed as US$/ha, sometimes different for the different land use categories (residential, industry, services, agriculture, and so on). Tangible assets are identified by using the GDP per ha, which is an indicator for the assets at risk (buildings) and the impact on economic activities. GDP per ha can be estimated based on data for local GDP per capita and population density. In this particular case, only tangible assets and value added (categories of rural and urban land use as well as transportation are reported in Table 4.3) will be considered in rural and urban areas. The first method is based on a dose-response function that relies on damage and risk per grid cell (1 ha). For a single event (for example, one type of flood), the damage per grid cell is calculated as follows:

$$\text{Damage} = (\text{max value at risk}) \times (\text{damage function}),$$

where

Max value at risk includes the value of the assets (buildings, infrastructure, and so on) (US$/ha), production values (US$/ha per year), and ecosystem services (US$/ha per year).

Damage functions cover flooding.

14. Damage assessment methods per damage assessment cover the different damage categories (tangible, non-tangible, direct, and indirect) and the indicators to be used to assess the damage. Damage functions and indicators for values at risk are estimated and damages are valued in monetary terms (US$ per event). The first indicator is the area (ha) affected, differentiating between different land use categories and the number of people affected.

15. Exposure assessments map the people, assets, production, and ecosystem service values at risk. The final indicator for the exposure assessment is the number of people (victims at risk of dying or being injured in a flood event is calculated above by using the risk premium to reduce premature deaths and injuries), the surface (ha) per type of land use, and the values at risk, with 31 land use categories and classes reflecting differences in the values at risk and vulnerabilities. Per grid cell of 1 ha, a single land use is defined based on a combination of information on population density (based on worldpop land use maps) and land use characteristics (open street maps, land use maps, and observations). Of interest for this analysis is the urban fabric which reflects a combination of residential land use and economic activities (services, small factories, and so on), public functions (education and health care), transport-related infrastructure (roads, bus stations, and so on), and agriculture. As land use maps were not combined with the hazard maps, the density will be used to determine the dose-response function to be used. The values at risk depend on the population density and the economic productivity per capita in the targeted areas based on their densities. Although different subclasses were calculated, only the one associated with the target area densities is specified in Table 4.4.

16. The damage functions for floods (tangible damages) are based on the review of worldwide literature on flood damage functions in (Huizinga et al. 2017). It has to be noted that the information for Africa is very limited and that the selected damage functions build on information for other continents. The dose retained for the dose-response function is a conservative midpoint for a short and long duration for an average water depth of 0.5 m for each event.

Table 4.4. Damage Functions for Floods Short to Long Midpoint Duration (Few Hours to Several Days) and Value Derived for Land Restoration, Adjusted for 2021 Prices

Indicator.	GDP/ha	Water Depth (m)								
	US$/ha	0	0.5	1	1.5	2	3	4	5	6
R1 for land restoration	53									
R9 for watershed	17,884	0%	23%	40%	56%	67%	86%	95%	98%	100%

Source: Adapted from IMDC-Tractebel-UNESCO/IHE-Vito (2017).

17. By applying the midpoint damage function for short to long duration of 0.5 m flooding (23 percent) and the likelihood of yearly event occurrence every two years associated with flood-proofing, the targeted areas are provided with an amount for R9 of US$3,917.5 per ha for proofing and R1 with US$53 per ha for rehabilitation. With 17,020 ha and 11,010 ha, the first-year improvements provide an amount equivalent to US$47.3 million and US$0.58 million per year, respectively.

Cropland

18. The project improved 155 ha of cropland to increase agricultural production by providing all the needed ancillary equipment (wells, irrigation, storage, and so on). The data collected by the Project Implementation Unit (PIU) provided additional information on the irrigated cropland in Dosso and Tillabéri, but not on AHA (368 ha) where both the new areas were cultivated, and the productivity increased. Rice as a crop is considered and is harvested twice a year while the profit margins are assumed to remain constant and are conservatively set at 20 percent. The amounts are derived from the *Ministère de l'Agriculture et de l'Elevage* (2020). Table 4.5 provides the net improved production over the last two years of the project of US$262,102 over two years, and the project could definitely reap additional benefits in the future.

Table 4.5. Cropland Value Added of Harvest

Input	Unit	Production and Area	Productivity Improvement	Profit Margin	2021	2022
Rice	XOF/ha	213,563		20%		
Dosso incremental farmland	ha	88	+8%			
Tillabéri incremental farmland	ha	67	+32%			
Dosso rice value added	XOF million/ha				40.5	40.5
Tillabéri rice value added					37.8	37.8
Exchange rate end of year	XOF/US$				579.0	617.1
Dosso incremental farmland	US$ million				69,864	65,547
Tillabéri incremental farmland	US$ million				65,365	61,326

Input	Unit	Production and Area	Productivity Improvement	Profit Margin	2021	2022
Cumulative	US$ million				135,229	262,102

Source: Ministère de l'Agriculture et de l'Elevage website: www.agricultureelevage.gouv.ne; and World Development Indicators (2022).

Component 2

Early Warning System

19. Benefits from Component 2 related to EWSs will help reduce premature death, diseases. and injuries as well as economic losses. Economic literature suggests that benefits vary from 1:4 to 1:36 per dollar invested according to Hallegate (2012). The latter estimates incorporate three types of benefits: (a) avoided asset losses due to natural disasters, (b) saved lives per year, and (c) additional economic benefits. The third category is the most important one (representing up to three-fourths of potential benefits), is less robust from an empirical point of view, and does not necessarily apply to poor countries. Thus, a very conservative approach is assumed considering only the benefits derived from (a) and (b). Under this scenario, the benefits per dollar invested decreased from 1:1 to 1:6, with an average of 1:3.5 as the development of national observatories and warning systems is at an early stage. The economic costs of the investments stand at US$4.8 million with benefits to start accruing in 2022 and are annualized over the project lifetime.

Niger Population Perception on Inclusiveness, Accountability, and Governance

20. In the absence of a perception survey at the end of the project due to the security situation, the Worldwide Governance Indicators (WGI) and the Ibrahim Index of African Governance were used to measure the evolution of trust in government. Niger's WGI[15] score for 'voice and accountability' was in free fall from 34.0 to 25.1 between 2014 and 2019 but the trend turned positive in 2020 with a score reaching 32.9, although lower than 2014. Similarly, the country's Ibrahim Index of African Governance score for 'rights and inclusion' is also on a downward slope with renewed prospects after the 2015 election where the score reached 60.4 to 53.5 in 2019. Each of these scores has exhibited volatility over this period and since, especially during periods of political, security, and pandemic shocks. However, these indicators reflect the perception of the entire population of Niger and not necessarily the areas targeted by the project per se (Table 4.6).

Table 4.6. Niger Score on Inclusiveness, Accountability, and Governance

Index	2014	2015	2016	2017	2018	2019	2020	2021
Voice and Accountability	**34.0**	**32.5**	**29.1**	**28.6**	**25.1**	**25.1**	**29.5**	**32.9**
Public Perception of Overall Governance	**60.4**	**64.7**	**56.1**	**47.6**	**50.5**	**53.5**	**n.a.**	**n.a.**

Source: WGI website: <Worldwide Governance Indicators | DataBank (worldbank.org)>; and Ibrahim Index of African Governance website: Ibrahim Index of African Governance (IIAG) Data Portal | Mo Ibrahim Foundation.

[15] WGI website: Worldwide Governance Indicators | DataBank (worldbank.org).

Other Benefits Not Captured in the RF

Hedonic Appreciation of Urban Land due to Urban Road Improvement

21. A hedonic method is suggested to derive the incremental cost of land associated with urban road improvement. The improvement reflects the economic opportunities that are derived from factors associated with time, services, access, dust, dirt, vector-borne diseases, and so on that will be perceived by economic agents after enjoying paved and flood-proofed roads. A benefit transfer based on a previous hedonic method used in a Senegal Project (World Bank, 2012 -- PROGEP - P122841) to derive the appreciation of urban land prices is used although with a very conservative increase of 10 percent for the land from each side (20 meters × 20 meters) over the 9.3 km stretch rehabilitated by the project. Only land prices are considered as apartment and commercial prices are a function not only of the location and the quality of the infrastructure in the surrounding area but also of their construction attributes (view, material used, number of windows, balconies, bathroom, and so on) that could therefore not be controlled for in this analysis. The appreciation is a one-off value that is used in the economic analysis at the last year of the project. Incidentally, a speculative spree usually follows any urban road and flood-proofing improvement, and this appreciation was evidenced in all African cities and towns where urban improvements and notably paved and flood-proofed roads were planned. The marginal appreciation amounts to US$12.1 million, and it is a one-off increase (Table 4.7).

Table 4.7. Land Appreciation due to Urban Road Improvement and Flood Proofing

Unit	Urban Road Length	Surrounding Land	Average Land Next to Paved Roads	Total Land Price	Exchange Rate	Marginal Appreciation of Land Price
	m	20 × 20 m	XOF/m^2	XOF	US$/XOF	US$ million
Niamey	4,470.25	178,810	2,500	3,594,081,000	617.1	5.8
Tahoua	2,440.00	97,600	1,500	1,961,760,000	617.1	3.2
Konni	2,389.00	95,560	1,000	1,920,756,000	617.1	3.1
Total	9,299.25	371,970			617.1	12.1

Source: World Bank (2012); and *Coin Afrique Immobilier* website: https://ne.coinafrique.com/categorie/immobilier.

Economic Multiplier Effect due to Labor-Income Activities

22. With regard to the person-days of employment created of 411,030 persons per day, a multiplier effect, which is caused by additional funds from investments leading to the proportional increase in the overall income of the economy, is used to have the net effect on the GDP. It is assumed that persons employed belong to low-income households and accumulate very little wealth. The aggregate MPC out of transitory income ranges between 0.2 and 0.4 and is consistent with most of the large estimates of the MPC reported in empirical studies in low-income countries.[16] Therefore, a midpoint MPC is used to derive the net effect on GDP that is considered as a benefit to the economy and the person-days of employment is derived from the GDP per day as value added labor. The number of days is equally annualized from 2015

[16] Carroll et al. 2017.

to 2021 when the project started disbursing while the latest extension was not considered in the calculation.

23. The calculation of the multiplier formula is as follows:

$$k = 1 / (1 – MPC),$$

where

k is the multiplier.

Table 4.8. Income Effect on Local Economies

Input	2015	2016	2017	2018	2019	2020	2021	Total
Expenditure	77,887	80,471	83,295	91,814	89,140	91,323	95,707	
MPC	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
Multiplier (k)	1.43	1.43	1.43	1.43	1.43	1.43	1.43	
Change in Real GDP, US$	**111,267**	**114,959**	**118,993**	**131,163**	**127,342**	**130,461**	**136,725**	**644,684**
GDP per capita, US$	*484.2*	*500.2*	*517.8*	*570.7*	*554.1*	*567.7*	*594.9*	
GDP per capita per day, US$	*1.33*	*1.37*	*1.42*	*1.56*	*1.52*	*1.56*	*1.63*	
Employment, person-days	58,719	58,719	58,719	58,719	58,719	58,719	58,719	411,030

Source: Carroll et al. (2017); World Development Indicators (2022).
Note: GDP is used in lieu of disposable income as it is not readily available.

24. The total net effect of the multiplier on local GDP amounted to US$644,684 from 2015 to 2021 (Table 4.8).

Fishermen Activities

25. There is no data regarding the level of expected profits from the 1,000 fishermen who were provided with boats in targeted areas. The results of a study in West Africa are used to estimate the cash flow generated.[17] The study shows an average increase in beneficiaries' incomes between 20 percent and 40 percent. A midpoint estimate of a 30 percent income increase is used while it is estimated that 623 households (5.92 capita per household)[18] (annualized over the period) will benefit from income-generating activities. The gross national income between 2015 and 2022 is considered for income per capita over six years as the benefits accrue with a one-year lag and is considered over the lifetime of the project only. A total of US$172,360 is generated (Table 4.9).

Table 4.9. Additional Income Generated from Fishermen Activities

Input	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Gross national income per capita	US$	560	530	520	570	590	550	590	

[17] Crépon et al. 2015; Poncin 2006; and USAID 2014.
[18] *Institut National de la Statistique* website: www.istat-mali.org.

Input	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Income increase with a lag: 30%	±%		168.0	159.0	156.0	171.0	177.0	184.1	
Fishermen benefits	US$, millions		24,000	22,714	2,286	4,429	5,286	26,297	27,349
Cumulative benefits	US$, millions		24,000	46,714	69,000	93,429	118,714	145,011	172,360

Source: Institut National de la Statistique website: www.stat-niger.org; and World Development Indicators (2022).

Carbon Emission Averted

26. Solar systems were installed in Niamey (156 panels with 300 W capacity each) and Birni N'Gaoré (50 panels with 150 W capacity each) during implementation that reduced ambient air-related health diseases, opportunity loss, and so on as well as global pollution. Although the former is acknowledged, only the latter could be valued where CO_2-eq reductions were assumed and considered the following hypothesis: (a) the PV total capacity is 0.05 MW and 0.01 MW, respectively; (b) the irradiance per day is 4.6 hours and 4.8 hours, respectively; (c) the number of sunny days per year is 324 days and 337 days, respectively; (d) the CO_2-eq emissions are the midpoint of the electricity generated by a diesel generator (0.26676 ton of CO_2-eq/MWh) or an oil-fired plant (0.777 ton of CO_2-eq/MWh); (e) the social cost of carbon is derived from the High-Level Commission on Carbon Prices (2017); (f) PV panels have a productive lifespan of 25–30 years; and (g) the estimated CO_2-eq emission averted is the product of these variables per year. The averted carbon emissions are equivalent to about US$57,396 over 18 years (Table 4.10) with the benefits accruing in 2021. Also, the project installed PV under PIMELAN - P164509 but those are not included in the calculations.

Table 4.10. Estimated CO_2-eq Averted due to the Installation of Solar Systems

Area	Irradiance	Capacity per PV	PV	Total Capacity	Sunny Days per Year	Total Electricity Production	Midpoint	2021 CO_2-eq Social Cost	2021 CO_2-eq Emission Averted
Unit	hours per day	W	#	MW	#	MWh	ton CO_2-eq/MWh	US$ per ton	US$
Niamey	4.6	300	156	0.05	324	70	0.52188	61.35	2,233.0
Birni N'Gaoré	4.8	150	50	0.01	337	12	0.52188	61.35	388.4
Total						82			2,521.7

Source: Stern and Stiglitz (2017); RTE France website: Eco2mix – CO_2 Emissions per kWh of Electricity Generated in France | RTE (rte-france.com); Government Evaluation of PACT (2021); Our World in Data website: Carbon Dioxide Emissions Factor, kg CO_2 per MWh (ourworldindata.org); www.climatestotravel.com/climate/niger; and Global Photovoltaic Power Potential by Country | ESMAP.

Results of the Benefit-Cost Analysis

27. The ex post economic analysis was carried out and was based only on the tangible quantifiable benefits accruing under the combined four components of the project. The project will also reap tangible and intangible benefits that are not quantified. The economic analysis was performed by using a 6 percent

social discount rate as suggested by the World Bank over 25 years based on the opportunity cost of capital and country risk over the project period as it is an emergency project. Moreover, 4 percent and 8 percent discount rates are also shown. Table 4.11 summarizes the results of the economic analysis. The AF is viable under all three scenarios. The base case scenario has a positive NPV of US$158 million as well as a robust IRR of 16 percent and positive present value benefit-cost ratio of 2.6.

Table 4.11. Benefit-Cost Analysis

Key Economic Indicators	Project		
	25 Years Discounted At		
Scenario	**4%**	**6%**	**8%**
Benefit-cost analysis			
NPV (US$ million)	*240.6*	**158.0**	*101.2*
IRR (%)	*16%*	**16%**	*16%*
Present value benefit-cost ratio	*3.3*	**2.6**	*2.1*
Viability	*Yes*	**Yes**	*Yes*

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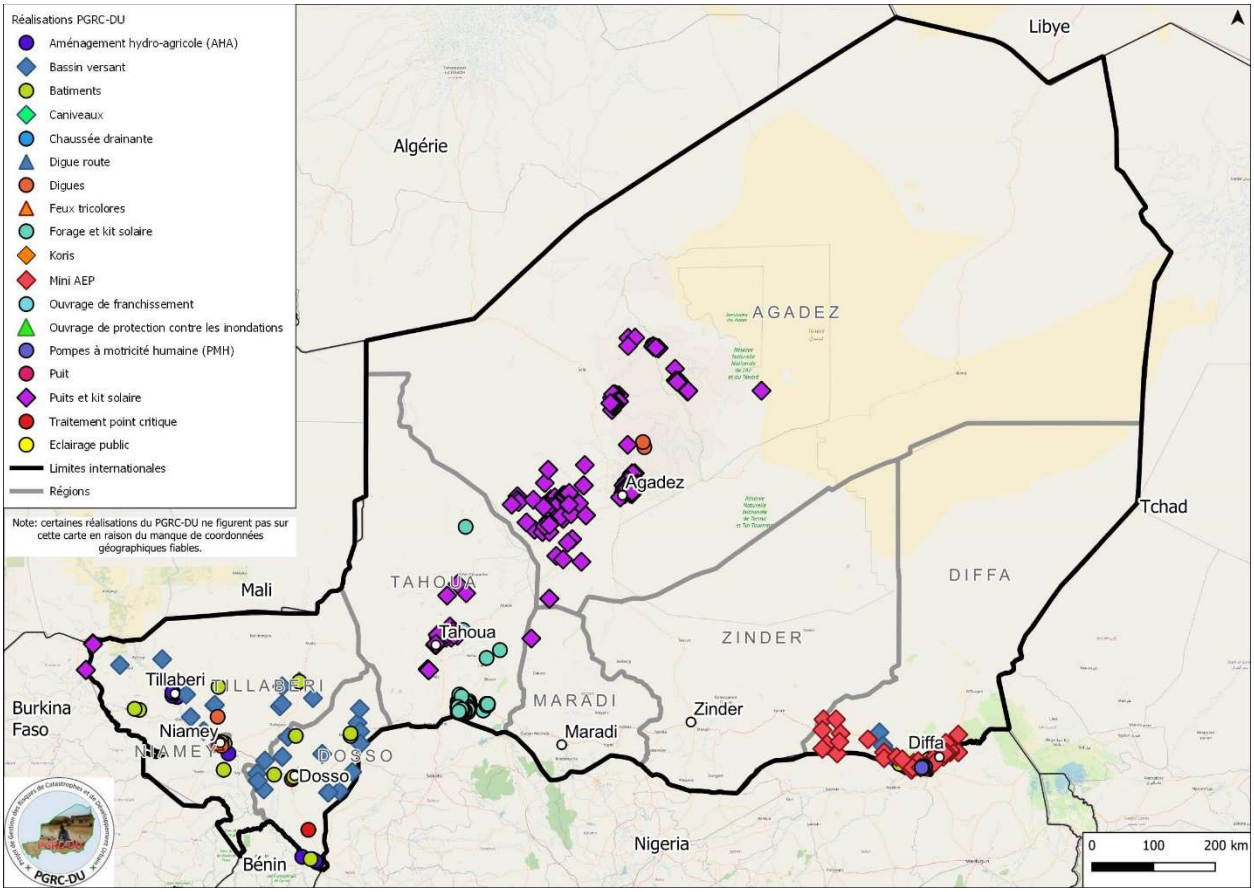
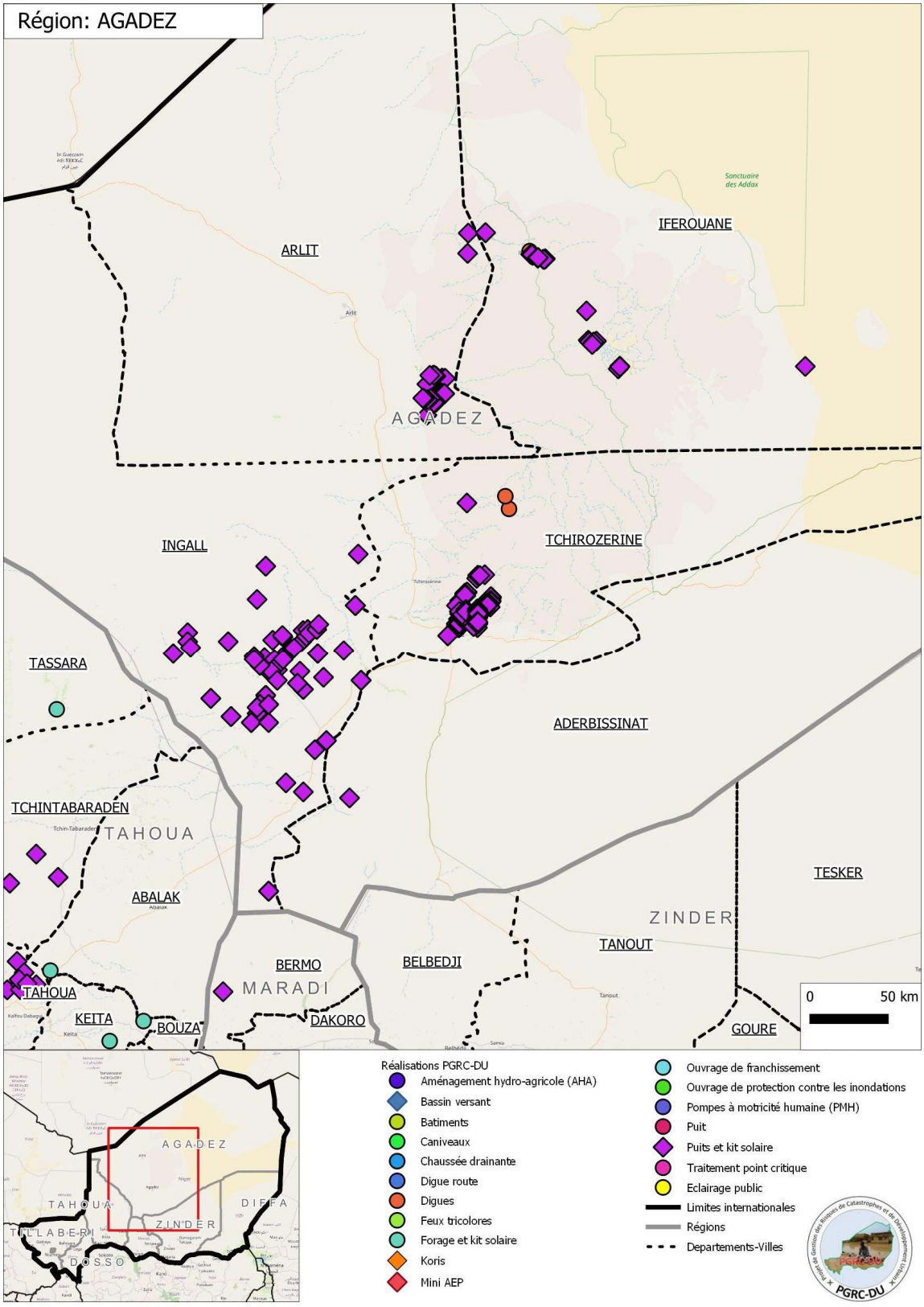
ANNEX 5. MAPS OF THE INFRASTRUCTURE ACHIEVED

Synthesis Map of All Infrastructures at the National and Regional Levels

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Forage et kit solaire
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Ouvrage de protection contre les inondations
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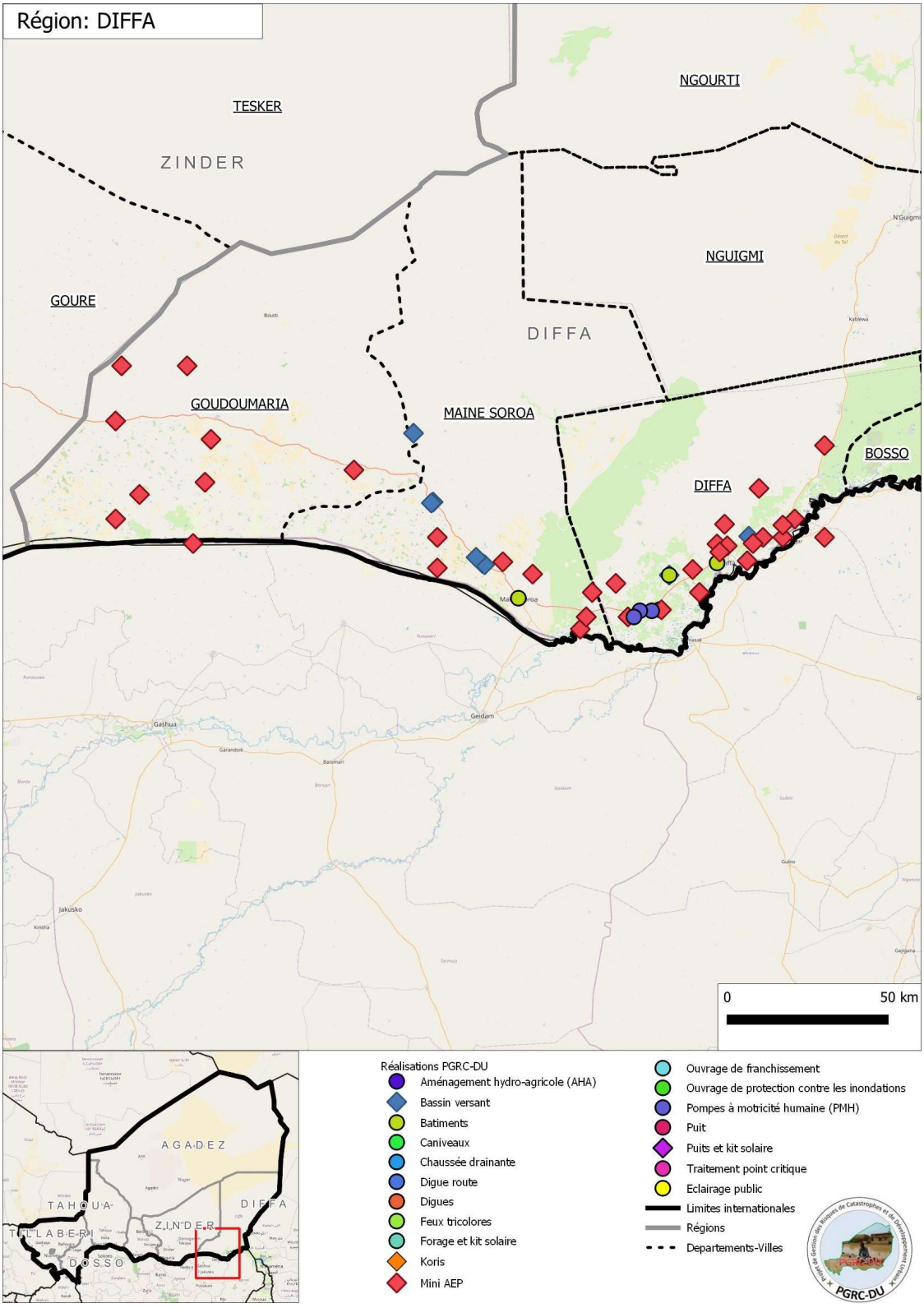
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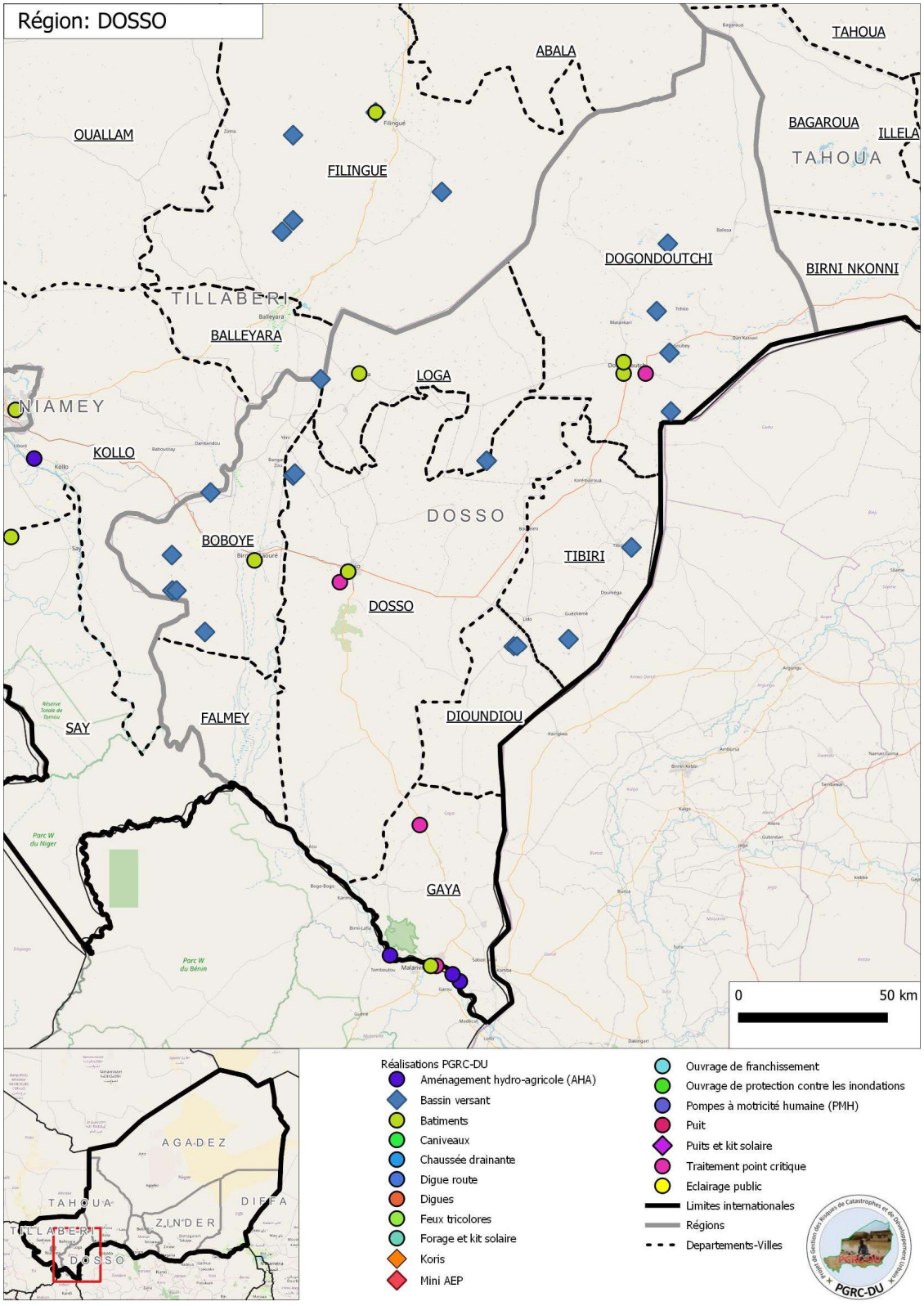
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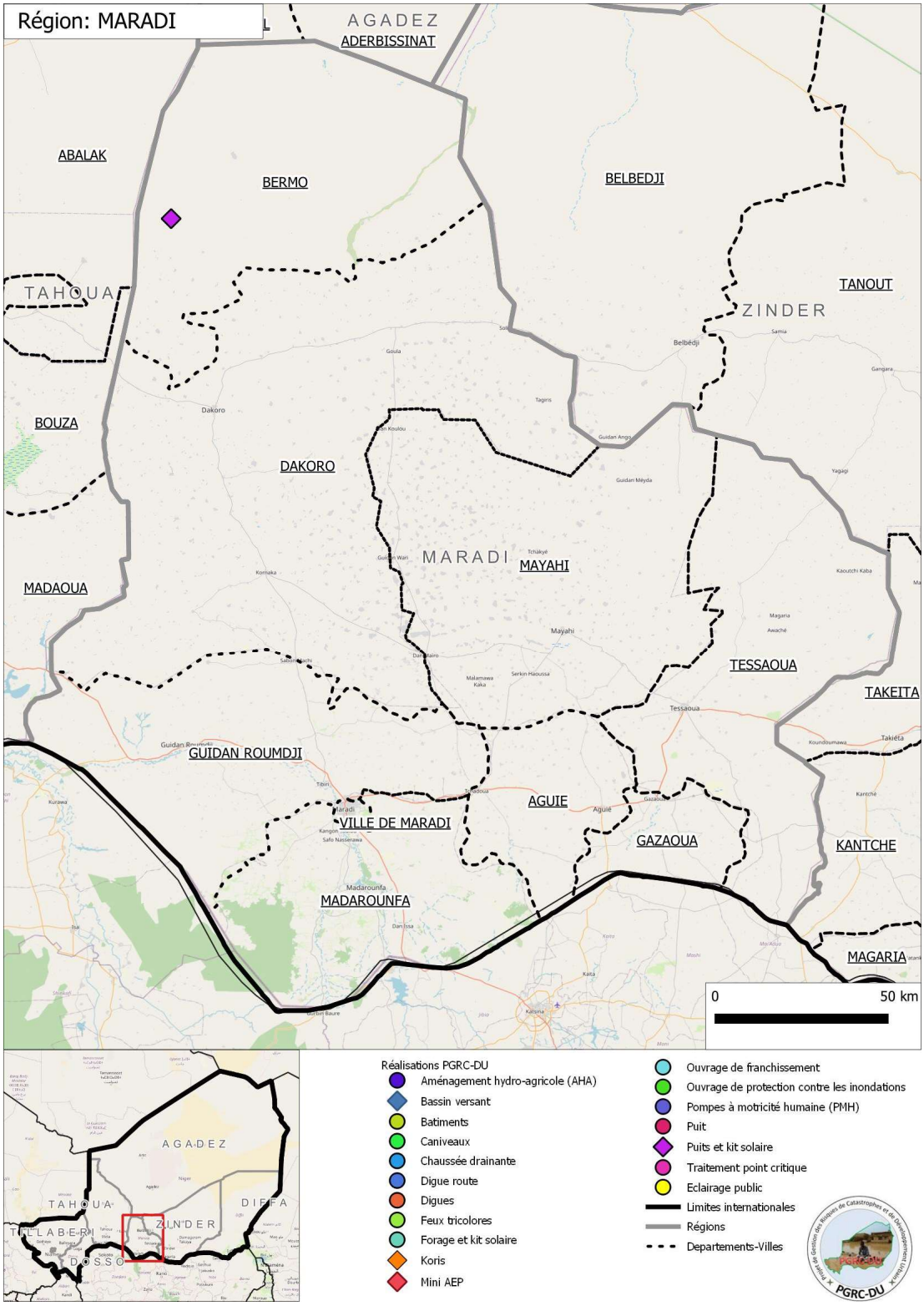
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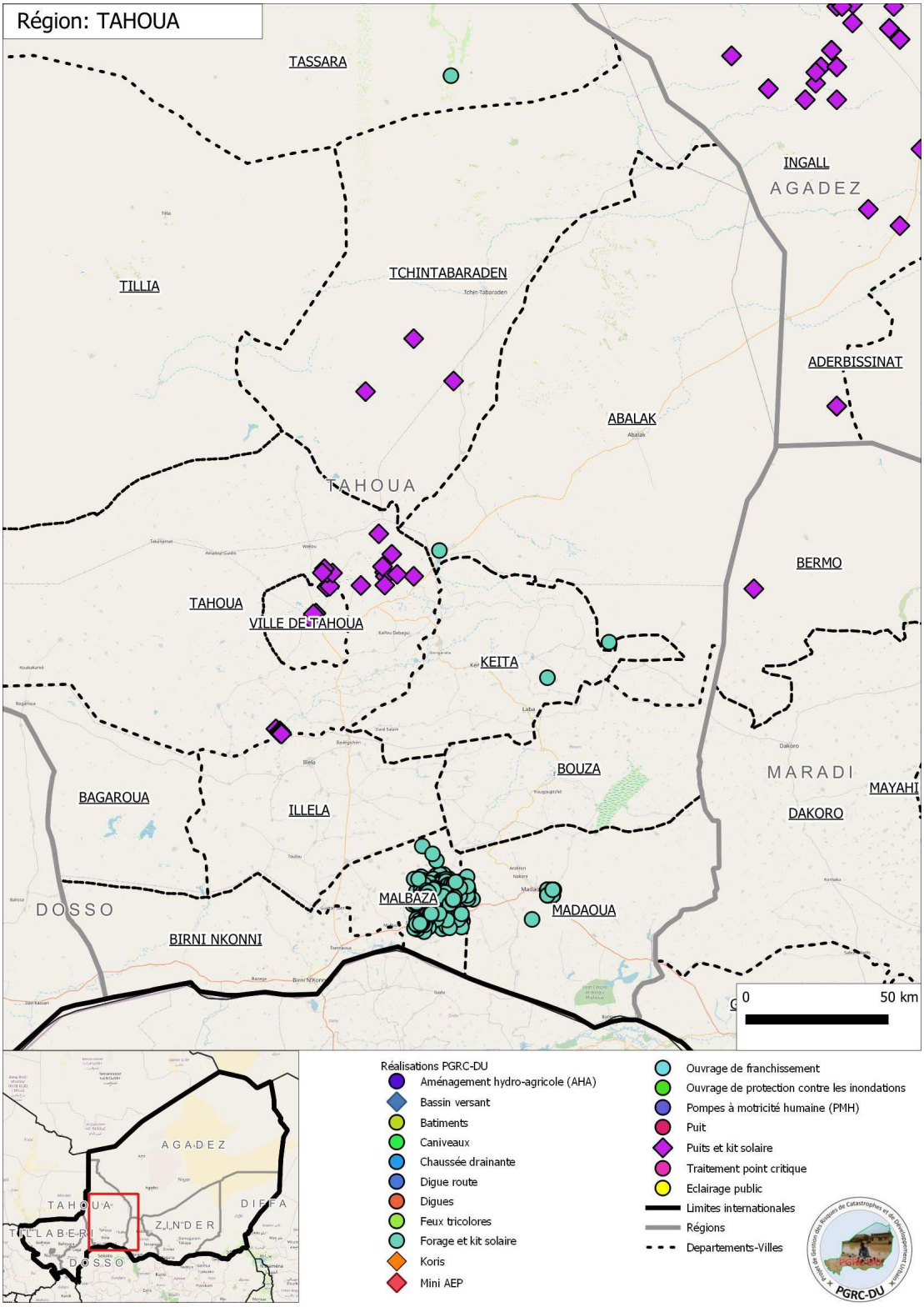
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DOSSO
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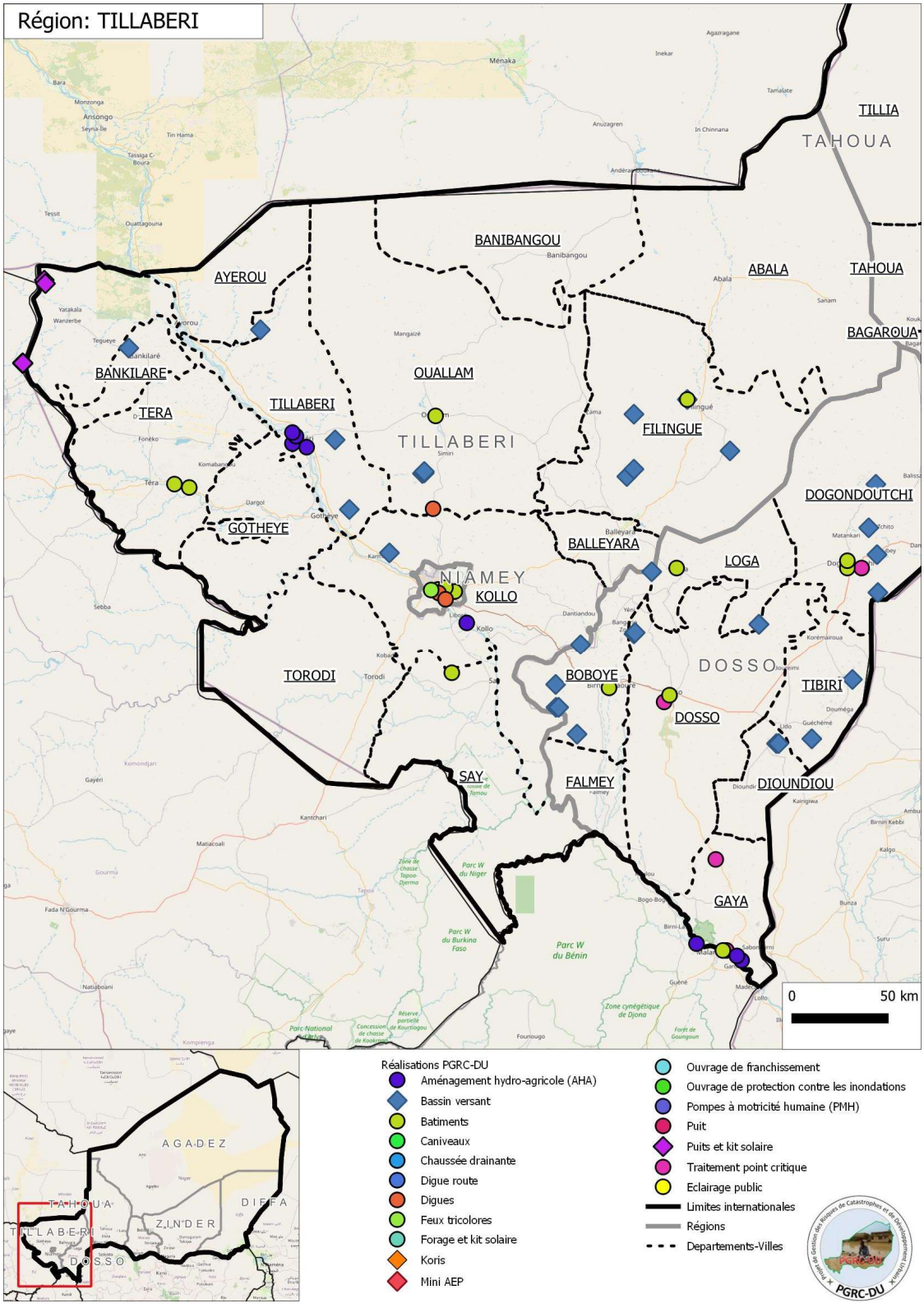
50 km
Réalisations PGRC-DU
Aménagement hydro-agricole (AHA)
Bassin versant
Batiments
Caniveaux
Chaussée drainante
Digue route
Digues
Feux tricolores
Forage et kit solaire
Koris
Mini AEP
Ouvrage de franchissement
Ouvrage de protection contre les inondations
Pompes à motricité humaine (PMH)
Puit
Puits et kit solaire
Traitement point critique
Eclairage public
Limites internationales
Régions
Departements-Villes
PGRC-DU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TAHOUA
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AYEROU
ABALA
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BAGAROUA
BANKILARE
TERA
TILLABERI
OUALLAM
FILINGUE
TILLABERI
DOGONDOUTCHI
GOTHEYE
BALLEYARA
LOGA
NIAMEY
KOLLO
TORODI
BOBOYE
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Réalisations PGRC-DU
Aménagement hydro-agricole (AHA)
Bassin versant
Batiments
Caniveaux
Chaussée drainante
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Feux tricolores
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Koris
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Ouvrage de protection contre les inondations
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Departements-Villes
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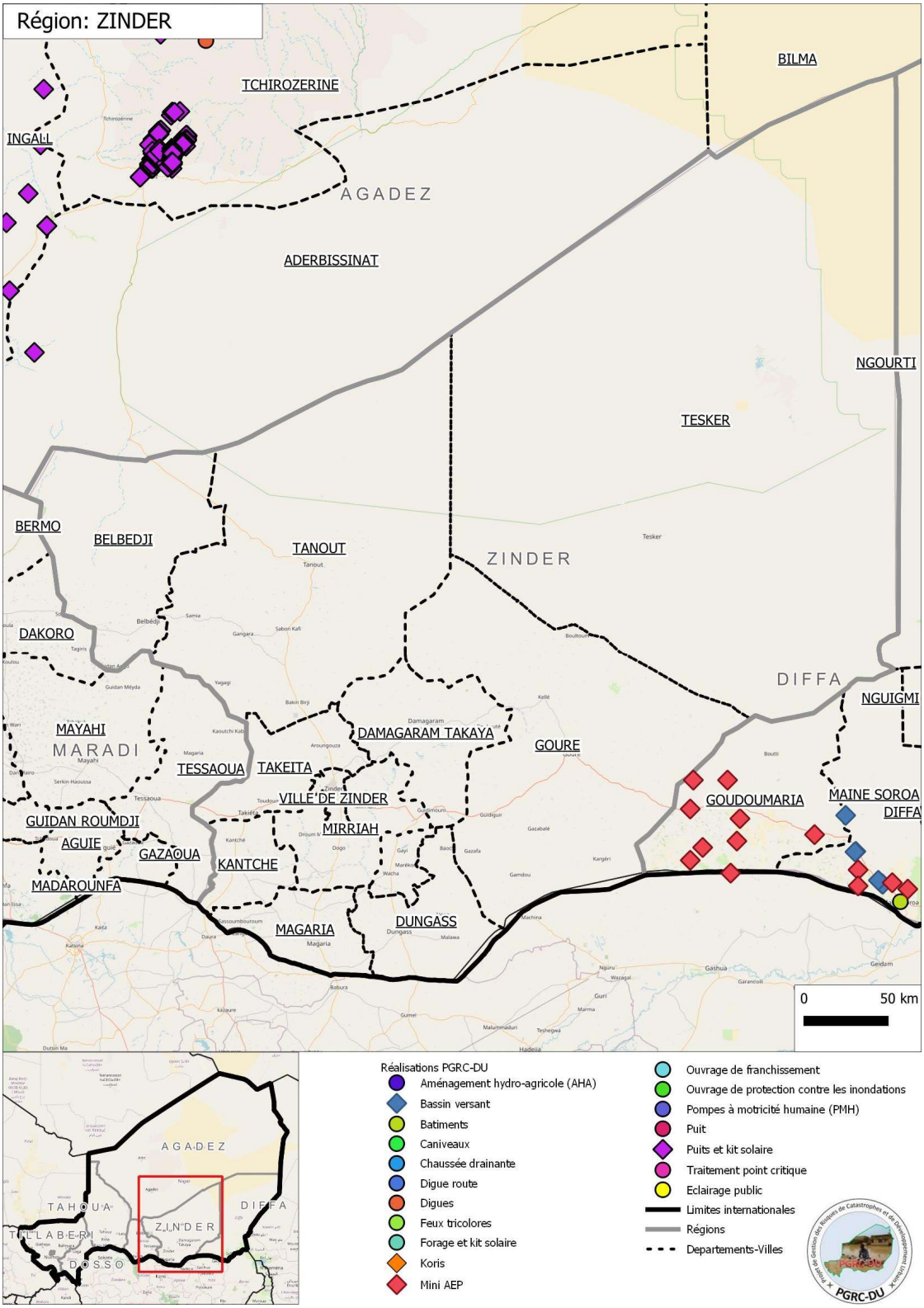
Région: ZINDER
TCHIROZERINE
BILMA
INGALL
AGADEZ
ADERBISSINAT
NGOURTI
TESKER
BERMO
BELBEDJI
TANOUT
ZINDER
DAKORO
DIFFA
NGUIGMI
MAYAHI
MARADI
DAMAGARAM TAKAYA
GOURE
TESSAOUA
TAKEITA
VILLE DE ZINDER
GOUDOUMARIA
MAINE SOROA
DIFFA
GUIDAN ROUMDJI
MIRRIAH
AGUIE
GAZAOUA
KANTCHE
MADAROUNFA
MAGARIA
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TAHOUA
DIFFA
ZINDER
TILLABERI
DOSSO
Réalisations PGRC-DU
Aménagement hydro-agricole (AHA)
Bassin versant
Batiments
Caniveaux
Chaussée drainante
Digue route
Digues
Feux tricolores
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ANNEX 6. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

Beyond the editorial comments, the GoN expressed its overall agreement with the findings and the ratings provided by the ICR and provided some specific recommendations to clarify certain aspects. Specific suggestions were provided regarding the following aspects:

(a) Indicators: justification of overachievement and underachievement of certain objectives, rationale of changes in targets, and explanations on changes in measurement methodology.
(b) Challenges to implementation that affected safeguards monitoring, FM, procurement, and M&E, including the fragile context/lack of security and the COVID-19 pandemic, and issues with certain institutional partners and contractors.
(c) Lessons learned regarding safeguards monitoring, including preparation and implementation of RAPs, and operationalization of the GRM.

ANNEX 7. SUPPORTING DOCUMENTS

World Bank Documents

Concept Stage and Appraisal Stage Integrated Safeguards Data Sheet (Reports No. ISDSC3594 and No. ISDSA6116)

Project Appraisal Document (Report No. PAD817)

Advance Agreement for Preparation of the Proposed Disaster Risk Management and Urban Development Project (Letter No. Q862)

Environmental Assessment: Resettlement Plan and Environmental and Social Management Framework (Reports No. RP1497 and No. E4314)

IDA Financing Agreement (Credit No. 5340-NE)

Aide Memoires and Midterm Review Report

ISRs (1–16)

Project Paper Restructuring (Report No. RES22186)

Project Paper Additional Credit (Report No. PAD3224)

Credit Numbers 5340-NE and 6413-NE Amendment to the Financing Agreements Letter (June 30, 2021)

World Bank Group Country Partnership Framework FY13–FY16 (Report No. 76232 NE)

World Bank Group Country Partnership Framework FY18–FY22 (Report No. 123736 NE)

Client Documents

Project Operations Manual

Rapport d'Achèvement du PGRC-DU, Version définitive, Gouvernement du Niger, Février 2023