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INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT

IN THE AMOUNT OF SDR 6.0 MILLION
EQUIVALENT TO US\$8.25 MILLION
FROM THE INTERNATIONAL DEVELOPMENT ASSOCIATION (IDA)

TO THE

REPUBLIC OF MALI

FOR A

STRENGTHENING CLIMATE RESILIENCE IN MALI PROJECT

May 2, 2019

Social, Urban, Rural And Resilience Global Practice
Africa Region

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CURRENCY EQUIVALENTS

Exchange Rate Effective April 8, 2019

Currency Unit = Franc CFA

585 FCFA = US\$1

US\$1 = SDR 0.72

FISCAL YEAR

January 1 - December 31

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ABBREVIATIONS AND ACRONYMS

ACMAD	African Centre of Meteorological Application for Development
ADCP	Acoustic Doppler Current Profiler
AFD	French Development Agency
AFDB	African Development Bank
AEDD	Environment and Sustainable Development Agency
AGRHYMET	Agro-Meteorological and Hydrological Specialized center of the CILSS
AMESD	African Monitoring of Environment for the Sustainable Development
AWS	Automatic Weather Stations
ASNaCC	National Strategy for Adaptation to Climate Change
ASECNA	Agency for Civil Aviation Security in Africa and Madagascar
BP	Bank Procedure
CERC	Contingent Emergency Response Component
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
CSA	National Food Security Commissariat
CGSP	National Public Services Control Authority
CSCR	Strategic Framework for Growth and Poverty Reduction
CNOU	Emergency Operations Center
COP	Conference Of Parties
CPF	Country Partnership Framework.
CPM	Critical Path Method
CONOPS	Concepts of Operations
DAC	Administrative and Accounting Unit
DCP	Data Collection Platform
DGPC	General Directorate for Civil Protection
DNACPN	National Directorate for Sanitation, Pollution Control and Nuisance
DNH	National Directorate for Water Resources
DRH	Hydraulic Regional Office
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ECOWAS	Economic Community of West African States
ECO-AGRIS	Integrated Regional Agricultural Information System
ESA	European Space Agency
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EU	European Union
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EWS	Early Warning System
FCS	Fragile and Conflict affected Situations
FM	Financial Management
GBV	Gender Based Violence
GCF	Green Climate Fund

GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
GPN	General Procurement Notice
GoM	Government of Mali
GIZ	German Development Agency
GPN	General Procurement Notice
GEF	Global Environment Facility
GEMS	Geo-Enabling method for Monitoring and Supervision
GRS	Grievance Redress Service
HYCOS	Hydrological Cycle Observing System
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
ICT	Information and Communications Technology
IDA	International Development Association
ILWAC	Danish Integrated Land & Water Management for Adaptation to Climate
IPF	Investment Project Financing
IRD	French Research and Development Agency
ISACIP	Institutional Support Project to the African Climate Institutions
ISP	Implementation Support Plan
IWRM	Integrated Water Resource Management 2 Project
KGTF	Korean Green Growth
LCS	Least Cost Selection
LEGAM	Legal - AFR and MENA Regions
MSPC	Ministry of Security and Civil Protection
MESA	Monitoring for Environment and Security in Africa
MEE	Ministry of Energy and Water
METEOSAT DCS	METEOSAT Data Collection System
MMA / MALI METEO	National Agency for Meteorology
M&E	Monitoring and Evaluation
MTR	Mid-Term Review
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NASA	National Aeronautics and Space Administration
NBA / ABN	Niger Basin Authority
NDS	National Food Security
NGO	Non-Governmental Organization
NMHS	National Meteorology and Hydrological Services
NPF	New Procurement Framework
NWP	Numerical Weather Prediction
NSC	National Steering Committee
NPV	Net Present Value
OMVS	Senegal River Basin Development Authority

O&M	Operation and Maintenance
OPCS	Operations Policy and Country Services
OP	Operational Policy
PAGIRE	Integrated Water Resources Management Action Plan
PANC	Action Plan for Implementation
PCU	Project Coordination Unit
PDO	Project Development Objective
PICP	Planning for Adaptation to Climate Change
PIM	Project Implementation Manual
PNCC	National Climate Change Policy
PPSD	Project Procurement Strategy for Development
PRMC	Cereals Market Restructuring Program
PSC	Project Steering Committee
QBS	Quality Based Selection
QCBS	Quality and Cost Based Selection
QMS	Quality Management Systems
REOIs	Requests for Expressions of Interest
RPF	Request for Proposal
SAP	National Food Security Early Warning System (under CSA)
SCD	Systematic Country Diagnosis
SCAP-RU	Community pre-alert system
SNCC	National Climate Change Strategy
SNSA	National Food Security Strategy
SOE	Statement Of Expenditures
SOP	Standard Operation Procedure
SPN	Specific Procurement Notice
SSO / OSS	Sahara and Sahel Observatory
SSS	Single Source Selection
SORT	Systematic Operations Risk-Rating Tool
SWFDP	Severe Weather Forecasting Demonstration Project
TTL	Task Team Leader
ToR	Terms of Reference
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
UNDB	United Nations Development Business
VfM	Value for Money
WMO	World Meteorological Organization



BASIC INFORMATION

Country(ies)	Project Name	
Mali	Strengthening Climate Resilience in Mali Project	
Project ID	Financing Instrument	Environmental Assessment Category
P161406	Investment Project Financing	B-Partial Assessment

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input checked="" type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input checked="" type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Disbursement-linked Indicators (DLIs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input checked="" type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
23-May-2019	15-Jun-2024

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The proposed Project Development Objective (PDO) is to improve the provision of and the access to the country’s hydro-meteorological, early warning and emergency response services

Components



Component Name	Cost (US\$, millions)
Capacity Building and Institutional Development	6.70
Improvement of Hydromet and Early Warning Infrastructure	15.12
Enhancement of Service Delivery and Warnings to Communities	6.20
Project Management	5.00
Contingent Emergency Response Component	0.00

Organizations

Borrower: The Republic of Mali

Implementing Agency: Ministry of Security and Civil Protection (MSPC) - Directorate-General for Civil Protection (DGPC)

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	33.00
Total Financing	33.00
of which IBRD/IDA	8.25
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Development Association (IDA)	8.25
IDA Grant	8.25

Non-World Bank Group Financing

Counterpart Funding	2.00
Borrower/Recipient	2.00
Trust Funds	22.75
Green Climate Fund	22.75



IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
National PBA	0.00	8.25	0.00	8.25
Total	0.00	8.25	0.00	8.25

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2019	2020	2021	2022	2023	2024
Annual	0.00	0.40	0.86	1.94	2.69	2.36
Cumulative	0.00	0.40	1.26	3.20	5.89	8.25

INSTITUTIONAL DATA

Practice Area (Lead)

Social, Urban, Rural and Resilience Global Practice

Contributing Practice Areas

Climate Change and Disaster Screening

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

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	Yes
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)



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

COMPLIANCE

Policy

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

Yes No

Does the project require any waivers of Bank policies?

Yes No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04		✓
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓



Involuntary Resettlement OP/BP 4.12	✓
Safety of Dams OP/BP 4.37	✓
Projects on International Waterways OP/BP 7.50	✓
Projects in Disputed Areas OP/BP 7.60	✓

Legal Covenants

Sections and Description

FA - Schedule 2 Section I. A. 1. (b). The recipient has established no later than three (3) months after the Effective Date, or such other date as agreed by the Association, and thereafter maintained throughout Project implementation, the Project Steering Committee with composition acceptable to the Association and defined in the PIM, to provide strategic guidance and oversight of the Project.

Sections and Description

FA – Schedule 2 Section III. B. 1. (b). under Category (2), no withdrawal shall be made for Emergency Expenditures under Part 5 of the Project, unless and until the Association is satisfied, and has notified the Recipient of its satisfaction, that all of the following conditions have been met in respect of said Emergency Expenditures :

- (i) the Recipient has determined that an Eligible Emergency has occurred, has furnished to the Association a request to include said Eligible Emergency under Part 5 of the Project in order to respond to said Eligible Emergency, and the Association has agreed with such determination, accepted said request and notified the Recipient thereof;
- (ii) the Recipient has prepared and disclosed all safeguards instruments required for said Eligible Emergency, and the Recipient has implemented any actions which are required to be taken under said instruments, all in accordance with the provisions of Section I.C of this Schedule;
- (iii) the Coordinating Authority has adequate staff and resources, in accordance with the provisions of Section I.B.1(b) of this Schedule, for the purposes of said activities; and
- (iv) the Recipient has adopted the Emergency Response Operational Manual in form, substance and manner acceptable to the Association and the provisions of the Emergency Response Operational Manual are fully current in accordance with the provisions of Section I.B of this Schedule, so as to be appropriate for the inclusion and implementation of Part 5 of the Project.

Conditions

Type	Description
Effectiveness	The PCU has been established and its key staff have been appointed in a manner acceptable to the Association.



Type	Description
Effectiveness	The Project Implementation Manual has been adopted in accordance with Section I.A.2 of Schedule 2 of the Financing Agreement.



MALI HYDROLOGICAL AND METEOROLOGICAL SERVICES MODERNIZATION PROJECT

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I. STRATEGIC CONTEXT

A. Country Context

1. Mali is a sparsely populated, predominantly dry, landlocked Sahelian country with an undiversified, agriculture-based economy. With an area of 1,241,248 sq. km, it shares 7000 km of boundaries with seven countries - Algeria, Niger, Burkina Faso, Côte d'Ivoire, Guinea, Senegal and Mauritania. It has an estimated population of 18.5 million in 2017, of which 63 percent live in rural areas and 12 percent in the capital (Bamako). The country is divided into eight administrative regions excluding Bamako. The northern regions of Gao, Kidal, and Timbuktu represent two-thirds of the entire country's area but host only 10 percent of its population. The populated areas are concentrated in the South, close to the Niger and Senegal Rivers.
2. Mali has experienced unstable and challenging political and security situations since the 2012 political crisis. Particularly, the northern half and central areas of the country have faced significant issues of Fragility, Conflict and Violence (FCV). In 2015, a peace agreement was signed by the Government and two armed groups to end the conflict in the north of the country. The peace agreement has created the minimum conditions for the Malian authorities to address the challenges of poverty reduction, notably in Northern Mali. However, implementation remains challenging as the security situation in Northern Mali, and even in parts of the center of the country, remains volatile.
3. Economic growth in Mali has remained strong despite its vulnerability to exogenous shocks. Growth is projected to remain robust despite persistent insecurity spreading to the center and southern regions, real GDP growth is estimated to have reached 5.3 percent in 2017 compared to 5.8 percent in 2016. With a gross domestic product (GDP) per capita of around US\$750, Mali remains poor. The economic structure has not changed much since the 1990s, with the primary (agriculture, gold) and tertiary (trade, transport, and public administration) sectors each contributing between 35 percent and 42 percent to GDP, and the small industrial sector making up the balance.
4. The poverty level in Mali is high with over half (50.6 percent) of the population living on less than \$1.90 a day. Life expectancy is low (58 years) and malnutrition rates are high (28 percent of children under five are stunted). Mali ranks 182 out of 189 in the Human Development Index (2017) with globally one of the highest scores on the Gender Inequality Index (0.678) and lowest on the Gender Development Index (0.811). Ninety percent of poor people live in rural areas, relying on rain-fed agriculture and agro-pastoralism. Such households are highly vulnerable to shocks, such as drought, which can erode their productive assets and outputs (livestock, crop production etc.).
5. Mali is exposed to several climate related hazards, but is particularly vulnerable to droughts, floods and locust invasion. From 1980 to 2014, more than 7 million people were affected by 28 major drought and flood events. On average, this results in a conservative estimation of an annual economic impact of approximately US\$140 million. In 2018, the country was affected by a number of floods that led to ten lives lost, more than 5,200 homes destroyed, 1,500 hectares of farms flooded, and 70,000 people affected.
6. Two-thirds of Mali's land area is classified as desert or semi-desert, and the country is one of the most drought-prone in the world. Annual precipitation ranges from over 1000 mm per year in the South to less than 200 mm per year in the North. There is high inter-annual variability in rainfall, with dry years becoming more frequent since 1968. Most of the flood-prone areas are located along the Inner Niger Delta (64,000 sq. km), but also in urban areas. More than 1.5 million fishermen, rice farmers and herdsman depend on annual flooding of the rivers for their



livelihoods. Floods in urban areas can result in loss of lives, livelihoods and assets, while rural floods can cause low production of rice and fish.

7. Natural disasters (drought, flood and locust infestations), environmental degradation, and fluctuating commodity prices have led to numerous food security and health challenges in Mali. Food insecurity is a recurring challenge that is exacerbated by climate change. This is particularly the case for vulnerable rural households, which are largely dependent on subsistence farming and livestock herding. Given the structure of the economy with a large proportion of the population living on rain-fed agriculture, irrigation from rivers, and agro-pastoralism, frequent droughts, which could be linked to climate change, could increase exposure to food and nutrition insecurity. In the agricultural season 2017 – 2018, while being considered average in terms of production, approximately 3.5 million people (18 percent of the population) were at risk of food insecurity.

8. Climate change effects are increasingly felt in Mali, in the form of higher temperatures and reduced precipitation, further impacting Mali's development gains. Records from MALI METEO indicate that the country has become hotter and drier over the last several decades. Since 1960, temperatures have increased by 0.7°C across most of the country. While long-term trends may be difficult to identify within existing climate variability, records from 1960-2005 show that overall annual precipitation trends are decreasing slightly, with a significant reduction in the wettest months (July and August), and a slight increase at the beginning of the rainy season (May). According to different projections, climate change is expected to increase inter-annual variability and the occurrence of extreme climatic events. According to climate scenarios developed for Mali, the average annual temperature is likely to increase between 1.2 to 3.6°C by the 2060s, and between 1.8 to 5.9°C by the 2090s.

B. Sectoral and Institutional Context

9. Mali has adopted a climate change framework to guide climate and disaster resilience activities. It is a signatory to the UNFCCC and the Kyoto Protocol and is currently formulating a National Adaptation Plan (NAP) for medium- and long-term adaptation planning. Mali has strengthened its institutional and policy framework for climate adaptation and mitigation. It set up the Environment and Sustainable Development Agency (AEDD) in 2010 for coordinating national environmental policy and as the national secretariat on climate change. It supported the development of the National Climate Change Policy (PNCC), the National Climate Change Strategy (SNCC), and the Action Plan for Implementation (PANC), which were adopted in July 2011.

10. The National Agency for Meteorology (MALI METEO), the National Directorate for Water Resources (DNH), the General Directorate for Civil Protection (DGPC) and the National Food Security Early Warning System (SAP) are the key agencies responsible for weather and climate services including early warning and disaster risk management in Mali. Hydro-meteorological agencies provide information products and services in a way that assists decision making by individuals and organizations. Such products and services require appropriate engagement along with an effective access mechanism and must respond to user needs. Hydro-meteorological products and services involve high-quality data from national and international databases on hydro-meteorological conditions, as well as maps, risk and vulnerability analyses, assessments, and long-term projections and scenarios. Depending on the user's needs, these data and information products may be combined with non-hydro-meteorological data, such as agricultural production, health trends, population distributions in high-risk areas, road and infrastructure maps for the delivery of goods, and other socio-economic variables.



11. MALI METEO is an autonomous agency under the Ministry of Equipment and Transport. It has the mandate to provide reliable and timely weather and climate information, as well as appropriate services to public and private users. Its network of meteorological observations includes 60 synoptic and automatic stations, 4 weather radars, 54 agro-meteorological stations, 214 rainfall observation stations, 2 systems to receive METEOSAT Second Generation satellite images (with the support of WMO, EUMETSAT and the Regional Center of Agro-Hydro-Meteorology - AGRHYMET). A detailed assessment of MALI METEO in 2014 highlighted the precarious financial and staffing situation of the agency, as well as the obsolescence of the network of observation stations, leading to inadequate services to communities.

12. The National Directorate for Water Resources (DNH) is part of the Ministry of Energy and Water (MEE). Its responsibilities include: (i) inventory and evaluation of the water resources development potential, (ii) oversight of studies for, and supervision of, the construction of hydraulic works and their proper operation and management; (iii) evaluation of development projects and, (iv) participation in sub-regional initiatives to manage water resources. The hydrological network has 140 stations, of which 103 stations are operational. Only one station in Mali is equipped with a water level recorder and rating curves for most stations have not been controlled for more than 10 years, meaning that the sparse data collected is of unreliable quality.

13. The Directorate General for Civil Protection (DGPC) is part of the Ministry of Security and Civil Protection. It's the coordinating body for disaster risk management. The DGPC's primary mission is to develop action plans under the National Civil Protection Policy and to ensure its implementation, while also ensuring inter-ministerial coordination for mainstreaming disaster risk management and climate change adaptation among sector-specific activities. However, civil protection services lack critical infrastructure to be able to work with their focal points from different ministries to prevent, prepare for or respond to a disaster.

14. In 2003, Mali created the Food Security Commissariat (CSA). Chaired by the Prime Minister, CSA establishes food security policies, implements the national food security strategy, and provides coordination during food security crises. Food security and nutrition monitoring is carried out by the Early Warning System (SAP), under the Office of the President. The current mandate of SAP makes it responsible for the monitoring of food production, determining areas at risk, and identifying vulnerable populations. SAP coordinates information obtained from over 20 members of its network, including NGOs, regional and international organizations.

15. These four institutions face a similar set of challenges: (i) Low funding from the government for development and maintenance of infrastructure, observing systems, forecasting tools, staff competencies, and service delivery mechanisms; (ii) Lack of adequately qualified and trained personnel and low capacity of these agencies to stay up to date with regards to rapid advances in science and technology; (iii) Limited cooperation among the agencies involved in Early Warning Systems; (iv) Limited recognition of the socio-economic value of their services; (v) Limited services delivery to communities; and (vi) Lack of effective mechanisms for collaboration between public and private sectors. In addition, (i) SAP lacks the inclusion of urban and peri-urban areas, and (ii) inadequate information management systems, while DGPC is still facing problems for effective implementation of its coordination mandate.

C. Higher Level Objectives to which the Project Contributes

16. The proposed engagement is well aligned with Mali's Country Partnership Framework (CPF) FY16 – FY19 (Report No. 94005-ML), which includes an elaborated resilience pillar focused among others on improving risk management mechanisms for the poor and vulnerable and mitigating climate shock. The proposed project will



address the following limitations and challenges: poor infrastructure, poor observation network, limited forecasting and modeling capability, poor service delivery to end-users and inadequate preparedness of communities for effective response.

17. The proposed project is also aligned with the World Bank twin-goals for shared prosperity and poverty reduction through mainly the benefits of better response to food insecurity and emergency, which have high impact on the poor. The project will address furthermore two pillars of the World Bank Gender Strategy (FY16-23): Pillar 2 (Removing Constraints for More and Better Jobs) and pillar 4 (Enhancing Women's Voice and Agency and Engaging Men and Boys).

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

The proposed Project Development Objective (PDO) is to improve the provision of and the access to the country's hydro-meteorological, early warning and emergency response services.

B. Project Beneficiaries

19. Project beneficiaries are the general public, who will receive improved weather, water and climate information, the selected population that is the most vulnerable to flood and drought risks, who will get improved early warning systems, and farmers receiving improved agro-meteorological services in selected areas and crops. Certain institutions involved in the project will also benefit from increased capacity to deliver hydro-meteorological data and services.

20. Improved hydromet and early warning services will potentially benefit all the population. The Project will directly or indirectly benefit about 5.3 million people who are vulnerable to hydro-meteorological hazards in Mali. Half of these, or 2.7 million people, will be direct beneficiaries of new or improved food security early warning services, agro-meteorological services, and flood early warning services under the project. In addition, indirect beneficiaries will have access to enhanced hydro-meteorological services providing information on optimal times for planting, viable crops, production risks, as well as yield management. The project will also support more accurate identification of the vulnerable population through the food security and flood early warning systems. In addition, Mali's agro-meteorological advisory program will be strengthened to provide more accurate and tailored information to producers.

21. Although women make up 65 percent of farmers, they largely do subsistence farming and have very limited land use and ownership rights. The land where mostly women grow crops is usually of poorer quality. Because they do not own these plots, women mostly do not invest in them, and often do not use appropriate adaptation techniques or tools and fertilizers. As a result, these plots produce lower yields and are more vulnerable to climate change.

22. A Gender Assessment and Gender Action Plan have been prepared during project preparation. The Gender Action Plan will be updated and executed during project implementation. A gender expert will be dedicated to the project to finalize results-monitoring, especially in regards of the action plan proposed for component 3. Actions



and gender-smart solutions. The project is expected to reduce gender inequalities through specific activities based on women's needs. In particular, Component 1 will ensure that all activities will support actions to increase the role and leadership of women in the operation and management of hydro-meteorological and disaster management services and Component 3 will ensure that information and service delivered will be tailored to all, considering the additional challenges women and vulnerable populations face (such as illiteracy, language, access to communication devices etc.).

C. PDO-Level Results Indicators

23. The Results Framework (Section VII) will be used to monitor progress towards achievement of the PDO and intermediate indicators. Indicators would be collected and updated at a minimum with an annual frequency, while some intermediate indicators would be updated every trimester. The PDO level indicators identified are as follows:
- Improved hydro-meteorological observation forecast and modeling capacities: as measured by the number of products and services delivered by MALI METEO and DNH;
 - Enhanced risk mapping and early warning services: as measured by (i) number of food security community early warning systems established; and, (ii) Number of direct beneficiaries receiving early warning services on flooding and food insecurity;
 - Enhanced Emergency Response and Disaster Management: as measured by the reduction in mean emergency-response lead time for flooding.

III. PROJECT DESCRIPTION

A. Project Components

24. **Component 1. Capacity Building and Institutional Development (US\$6.7M: \$5.1M GCF and \$1.6M IDA – SDR 1.15M equivalent).** This component will support strengthening of institutional capacities and building human resources capacity of the participating departments and services. This component in the GCF proposal includes (a) Training and capacity building programs; (b) Enhancing operating frameworks; and, (c) Detailed design and system integration of project activities. Activities and components are now clustered according to hydro-meteorological services (sub-component 1.1), civil protection and flood management (sub-component 1.2) and food security monitoring (sub-component 1.3).

25. While this component will assist all four government institutions involved in the project to strengthen their individual institutional capacity to meet their mandate, it is very important that the approach is collaborative to foster harmonization in the beneficiary department. Also, this component will ensure that all activities will support actions to increase the role of women in the operation and management of hydro-meteorological and disaster management services at all levels.

- **Sub-component 1.1: Institutional strengthening for core hydro-meteorological services:** This sub-component will be executed in partnership with MALI METEO and DNH. Specifically, this sub-component will include, inter alia: (i) a review of current operating framework for both institutions to identify weaknesses and opportunities for improvement; (ii) reinforce the operating framework in light of the findings of the review for both institutions (MALI METEO and DNH) to strengthen their institutional capacity and mandate through the development of Standard Operating Procedures (SOPs), and Concepts of Operations (CONOPS) for the delivery of services; (iii) strengthen the Quality Management Systems (QMS) of MALI METEO and DNH to raise standards and quality control/verification processes; and (iv) implement a long-term and on-demand capacity development and



training program for staff of MALI METEO and DNH. Training activities will include formal training at universities, study tours, distance learning and training in WMO regional centers.

- **Sub-component 1.2: Institutional strengthening and capacity building for flood early warning services and emergency preparedness and response:** This sub-component will be executed in partnership with DGPC. DGPC currently provides limited services in disaster risk management due to a lack of effective implementation of its coordination mandate based on pending legislation issues. Under this sub-component, activities will include, inter alia: (i) a review of the current operating framework; (ii) reinforcement of the operating framework of DGPC and development of Standard Operating Procedures (SOPs) for early warning systems, emergency and immediate response; (iii) development of a National Alerting Protocol confirmed by decree; (iv) strengthening of the Quality Management Systems (QMS) of DGPC to raise standards and quality control/verification processes; and (v) implementation of a long-term and on-demand capacity development and training program for staff of DGPC (men and women). While DGPC has been implementing an ongoing program to recruit new staff and train current ones, this sub-component will help DGPC assess current gaps in skills and finance required training program to address these gaps. DGPC will introduce instruments for effective gender mainstreaming and promote community actions.

- **Sub-component 1.3: Institutional strengthening and capacity building for delivery of improved food security early warning services:** This sub-component will be executed in partnership with SAP and will include, inter alia: (i) implementation of a long-term and on-demand capacity development and training program for staff of SAP, and (ii) the establishment of community early warning system and emergency response mechanisms to facilitate local monitoring and decision-making. Modalities and areas of training will be similar to sub-component 1.2 and training will be carried out in close collaboration with Permanent Interstate Committee for Drought Control in the Sahel/Regional Center of Agro-Hydro-Meteorology (CILSS /AGHRYMET).

26. **Component 2. Improvement of Hydro-meteorological and Early Warning Infrastructure (US\$15.12M: \$11.15M GCF and \$3.97M IDA – SDR 2.86M equivalent).** This component will finance the modernization of the observation network, relevant data collection software and hardware, as well as effective communication tools. In addition, the project will finance under this component specialized equipment, vehicles and civil works (refurbishment or extension of existing facilities). This component in the GCF proposal includes (a) Expanding and upgrading hydro-meteorological observation networks; (b) Enhancing data collection & transmission, forecasting and decision support systems; and, (c) Strengthening preparedness and emergency response facilities and operations. Activities and components are now clustered according to hydro-meteorological services (sub-component 2.1), civil protection and flood management (sub-component 2.2) and food security monitoring (sub-component 2.3).

- **Sub-component 2.1: Expanding and upgrading hydro-meteorological observation infrastructure and Information and Communication Technology (ICT) for the delivery of core hydro-meteorological services:** This sub-component will be executed in partnership with MALI METEO and DNH and will include, inter alia: (i) modernization of the meteorological and hydrological monitoring networks through rehabilitation of priority stations, installation of new sensors, rain gauges, and automatic hydro-meteorological stations; (ii) strengthening transmission, data management and dissemination hardware at MALI METEO and DNH for the integration of data into the global production chain, archiving and sharing across relevant entities; (iii) strengthening technical systems for performing meteorological, hydrological and climate modelling and forecasting at MALI METEO and DNH, especially in numerical weather prediction, severe weather forecasting, flood modelling, database management, and impact-



based forecasting (iv) refurbishment of buildings for synoptic observations, refurbishment of maintenance room at MALI METEO; (v) specialized vehicles for operation and maintenance of MALI METEO and DNH observation networks; and (vi) specialized equipment for water quality monitoring especially in mining areas.

- **Sub-component 2.2: Modernization of physical infrastructure and ICT for the delivery of flood early warning and the management of emergency response:** This sub-component will be executed in partnership with DGPC and will include, inter alia: (i) installation of an Emergency Operations Centre (for rescue operation) at DGPC and an Emergency Coordination Centre (for disaster recovery, humanitarian aid) with adequate communication equipment; (ii) specialized equipment and vehicles (e.g. trucks for the delivery of emergency goods, water pumps and fire truck with pumping capabilities, generators, ambulance, etc.), specialized vehicles (pickup) for emergency operations, maintenance and surveys; and, (iii) construction and equipment for the Call Processing Centre.

- **Sub-component 2.3: Modernization of physical infrastructure and ICT for the delivery of food security and response capacity:** This sub-component will be executed in partnership with SAP and will include, inter alia: (i) construction/rehabilitation of office; (ii) modernization of food security Early Warning Systems (EWS) infrastructure at SAP through equipment, data management systems (e.g. transitioning from paper to mobile collection surveys for food vulnerability, resilience and permanent agricultural monitoring); and, (iii) vehicles (pickup) for the collection and management of data at regional level.

27. **Component 3. Enhancement of Service Delivery and Warning to Communities (US\$6.2M: \$5.0M GCF and \$1.2M IDA – SDR 0.86M equivalent).** This component will assist in the delivery of more accurate, timely and user-friendly products and services to decision-makers, end-users and communities. It will promote the reliability and relevance of MALI METEO and DNH to DGPC, SAP, as well as to the public and decision makers. Improved last mile services require the institutionalization of a blend of organizational and decision-making processes, effective communication equipment, and recognition of early warning information. This is the key project component in terms of gender mainstreaming. This component in the GCF proposal includes (a) Enhanced service delivery; and, (b) Improved early warning and community preparedness. Activities and components are now clustered according to hydro-meteorological services (sub-component 3.1), civil protection and flood management (sub-component 3.2) and food security monitoring (sub-component 3.3).

- **Sub-component 3.1: Strengthening users and communities access to core hydro-meteorological and climate information services:** This sub-component will be executed in partnership with MALI METEO and DNH and will include, inter alia: (i) the strengthening of communication channels related to weather, water and climate information to the general public through media (web, radio, TV, newspapers), cellphones, sectoral online services, etc. with a gender-disaggregated approach and particular attention to vulnerable groups, who may have difficulty understanding or accessing information; (ii) strengthening the communication of tailored agro-meteorological and climate services for producers, and (iii) design and development of an open source integrated platform for data exchange and early warning across the four beneficiary entities.

- **Sub-component 3.2: Building users and communities access to flood early warning services and response:** This sub-component will be executed in partnership with DGPC and will include, inter alia: (i) access to new flood early warning services in one selected urban area and rural, peri urban areas among climate vulnerable communities; (ii) the development of Multi-Risk Contingency Plans for emergency preparedness and response for selected municipalities based on highest vulnerability to flood risk; and (iii) the development of flood risk mapping



and geographic information systems for selected areas. This sub-component will also contain a citizen engagement activity, whereby local communities provide feedback on how the contingency plan was developed and how the plan was executed.

- **Sub-component 3.3: Strengthening users and communities access to food security information services and response:** This sub-component will be executed in partnership with SAP and will include, inter alia: (i) strengthening of communities' access, in particular local decision makers and smallholder farmers, to early warning information services on agriculture, livestock and food security in chronically food insecure communities; (ii) strengthening of selected communities' access to agrometeorological data and technical advice, including raising awareness of the importance of diversifying practices to improve agriculture yields; (iii) support for implementing the Harmonized Framework in selected areas by reinforcing food security surveys and monitoring crop years (e.g. monitoring crop yields and reserves on grain/animal forage); and (iv) capacity development and training for communities, community champions and experts to participate, understand and function as active agents for food security vulnerability surveys, resilience and permanent agricultural monitoring.

28. **Component 4. Project Management (US\$5.0M: \$1.5M GCF, \$1.5M IDA – SDR 1.08M equivalent and \$2.0M Government).** This component will finance the following activities: (i) operating costs; (ii) technical design of sub-projects; (iii) procurement, financial management, safeguards, monitoring and evaluation, quality control and contract management; and (iv) audit, studies and assessments required under various project components.

29. **Component 5. Contingent Emergency Response Component (US\$ 0 in IDA only).** Following an adverse natural event that causes a major disaster, the Government of Mali may request the World Bank to re-allocate project funds to support mitigation, response, recovery and reconstruction. This component, known as the Contingent Emergency Response Component (CERC), would draw resources to unallocated expenditure category to reallocate financing from other components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available because of an eligible emergency, as agreed between the government and the World Bank.

30. **Areas of Intervention:** Some basic services will be provided at the national level (seasonal and daily forecasting, ten-day agro-meteorological reports, etc.). More specialized services (such as flood forecasting systems, personalized agro-meteorological information services, warning reports to anticipate impacts, etc.) will be provided to selected zones to be identified based on the following criteria: (i) presence of specific hydro-meteorological natural hazards; (ii) exposure of populations and critical infrastructures (urban zones, roads, irrigation, transport, hospitals, schools, etc.); (iii) exposure of populations on food insecurity, and (iv) presence of investment projects, which would allow for an optimal utilization of hydro-meteorological services (notably towards crop producers, livestock herders, fishermen, hydropower generators, aviation and other transport related sectors, extractive industries, local government, micro-insurance and urban planners).

B. Project Cost and Financing

31. The lending instrument is Investment Project Financing, through two grants, in the respective amounts of US\$22,750,000 provided by the Green Climate Fund (GCF) and US\$8,250,000 provided by the International Development Association (IDA). In addition, the Government of Mali will contribute US\$2,000,000 as in counterpart funding for the project. The total project cost is US\$33,000,000. The implementation period is five years.



32. The GCF Board approved the project in June 2016. The Accreditation Master Agreement was signed between the World Bank and GCF in November 2017 but only became effective on February 1, 2019. Soon after the present IDA co-financing component is approved by the World Bank Board, it is expected that the GCF and the World Bank will commence the negotiations of the Funded Activity Agreement, and subsequently, the Grant Agreement for the GCF fund will be signed with the Republic of Mali. The expected signing date of the Funded Activity Agreement is within six months of the World Bank Board date. The Team expects the GCF Grant to start disbursing within one month of the declaration of effectiveness of the Funded Activity Agreement. However, in case there are delays in accessing GCF funds, which is unlikely, the project will be restructured to revise the end-targets of the results framework while keeping the same PDO.

Table 1: Project Cost by Component and Source of Funding

Project Components	Project cost	IBRD or IDA Financing	Trust Funds	Counterpart Funding
Component 1: Capacity Building and Institutional Development	6,655,000	1,555,000	5,100,000	
Component 2: Improvement of Hydromet and Early Warning Infrastructure	15,123,000	3,973,000	11,150,000	
Component 3: Enhancement of Service Delivery and Warnings to Communities	6,222,000	1,222,000	5,000,000	
Component 4: Project Management	5,000,000	1,500,000	1,500,000	2,000,000
Component 5: Contingency Emergency Response Component	0	0	0	
Total Costs	33,000,000	8,250,000	22,750,000	2,000,000
Total Project Costs				
Front End Fees				
Total Financing Required	33,000,000	8,250,000	22,750,000	2,000,000

C. Lessons Learned and Reflected in the Project Design

33. Avoid disconnected support: A review of projects and programs that aim at strengthening weather and climate services shows that the support was scattered, with insufficient strategic direction and mainly focused on procuring several automatic weather stations for water or meteorology only. Or, these projects just simply focus on building capacity within a specific domain of a project. As a result, these projects failed to reach the integrated scale that was supposed to enable national hydro-meteorological and early warning services, which should sustain these improvements. Ultimately these services do not receive the required recognition from government and beneficiaries. This process is adopting a different approach, the “service delivery approach”, whereby the



improvements or modernization undertaken are driven by the products and services required by the beneficiaries. In addition, the project will coordinate closely with other existing and planned projects and initiatives relevant for the modernization of hydro-met, early warning and response services.

34. Full value chain Integrated and harmonized modernization approach: Based on these lessons, and the Global Framework for Climate Services, developed by WMO, the project proposes a harmonized approach to modernizing hydro-meteorological services, by structuring modernization processes around three components, that works in parallel: (i) institutional strengthening and capacity building; (ii) infrastructures systems modernization; and (iii) service delivery for sectors and end-users, and early warning systems. The program promotes information sharing, at both global, regional and national levels, fosters collaboration and reduces costly fragmentation and duplication.

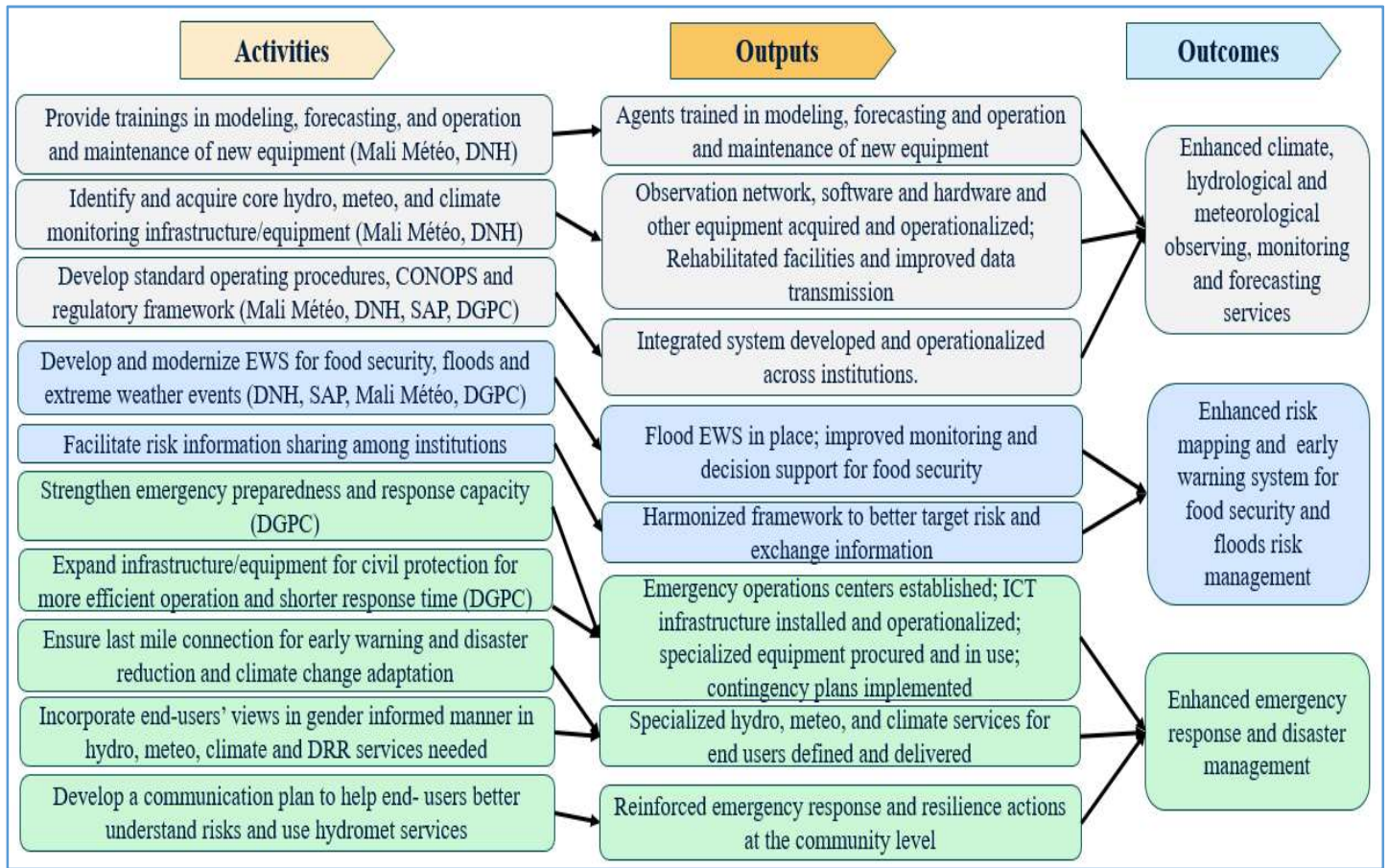
35. Security: To prevent vandalism, damage or theft of project assets, fences will be erected around hydro-meteorological stations to prevent access. Very often it is the solar panels that are stolen from hydro-meteorological equipment; one option being considered is to link the energy source of the hydro-meteorological station to that of community drinking water stations, where solar power is used to pump the water. These facilities are closely protected by the community, so the energy source would be more secure. Awareness raising and training of local communities about the importance of these hydro-meteorological stations will be part of component 3, so that the community appreciates the value of the infrastructure to enhance their own wellbeing.

D. Results Chain: Theory of Change

36. The following problem statement is proposed: “Weak hydro-meteorological, early warning and response services are conducive to losses associated with extreme weather and climate events and often limit productivity”. Outcomes will be achieved based on the following assumptions: (i) availability of a hydrological and meteorological network, (ii) existence of a Disaster Risk Management (DRM) and an emergency response legal framework, and (iii) people reached with awareness campaigns and early warning services.

37. The figure below presents the analysis identify inputs, activities, outputs and outcomes.

Figure 1: Theory of Change Diagram



IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

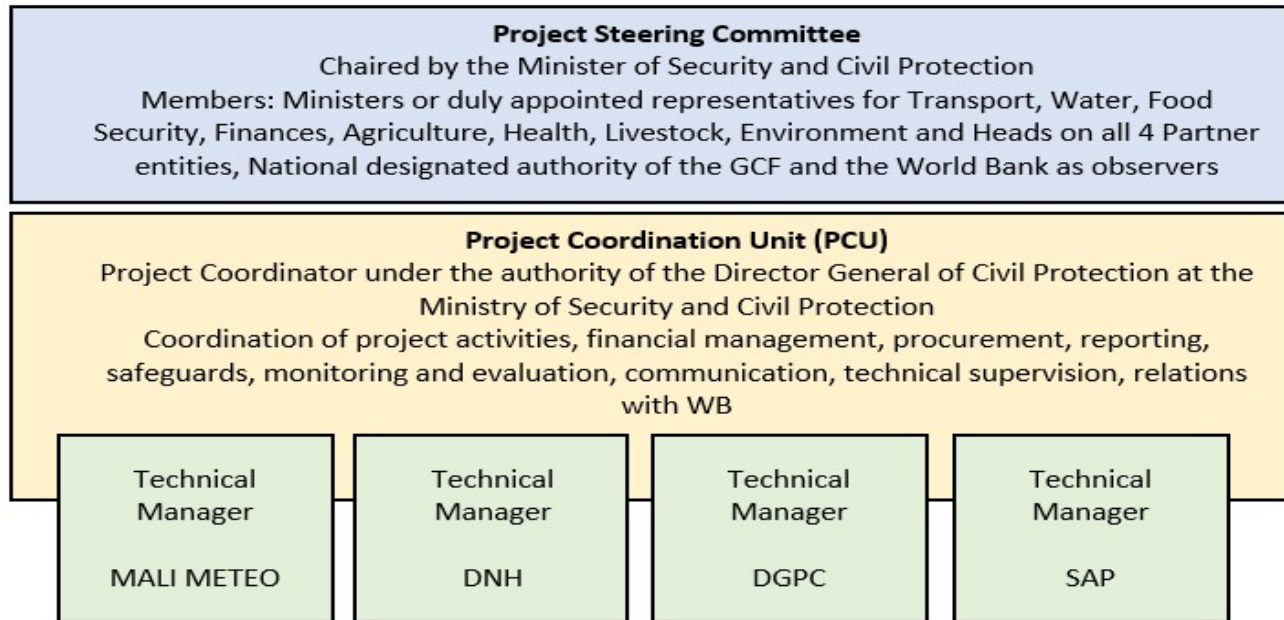
38. DGPC will set up a Project Coordination Unit (PCU) for the implementation of the Project, with civil servants and consultants, to strengthen financial management, procurement, safeguards and reporting functions. The Administration and Accounting Unit (DAC) of the DGPC will support fiduciary aspects; DGPC, DNH, MALI METEO and SAP will support the PCU by providing technical resources and inputs for operations and maintenance, developing terms of reference and participating in bid evaluation committees for procurement. Each of the four agencies will appoint technical Project managers (two staff for each entity, a technical manager and a deputy), a civil servant as permanent member of the PCU, who will coordinate the activities in his/her department. However, DGPC, as the Executing Entity, will remain administratively responsible for project management and reporting through its PCU.

39. A Project Implementation Manual (PIM) will be developed by the PCU prior to effectiveness of the Project. Most investment operations in Mali use country systems coupled with dedicated software for financial management, and follow World Bank procedures for procurement, audits and safeguards, and monitoring and evaluation. This operation will follow the same good practice. DGPC will be responsible for the overall implementation and management of the project, and compliance with its fiduciary and safeguards requirements.



40. A Project Steering Committee (PSC) will be established with representation from the respective ministries of all four entities (DGPC, SAP, DNH, and MALI METEO), the Ministry of Finance, Agriculture, Health, Livestock, and Environment. The Heads of the four beneficiary entities will also be members of the Steering Committee, as well as the national designated authority to the GCF. The World Bank will be an observer. It will be chaired by the Minister of Security and Civil Protection or his representative. The PSC will meet twice a year, will be responsible for strategic orientation and review progress. The PSC can have an extraordinary meeting to discuss a specific issue if need be.

Figure 2: Schematic Representation of Implementation Arrangements



B. Results Monitoring and Evaluation Arrangement

41. The results monitoring framework assesses progress towards the Project Development Objective (PDO) through key indicators; while intermediate indicators will monitor the progress of each component over the life of the Project. The detailed methodology for calculating indicators will be provided in the Project Implementation Manual, which includes the Monitoring and Evaluation Manual, that will be developed before project effectiveness.

42. Project progress will be monitored by the Project monitoring and evaluation staff based on official data sources monitored directly by MALI METEO, DNH, CSA/SAP and DGPC, with the assistance of the national platform for disaster risk management. In addition, each evaluation will gauge progress towards the PDO, assess the impact of the Project on the beneficiaries, assess the quality of the work carried out under different components, and evaluate overall project efficiency. A mid-term review (MTR) of the project progress will be conducted at the latest 36 months after the project effectiveness date.

43. Each Project progress report shall cover the period of one calendar semester (6 months) and shall be furnished to the World Bank not later than one month after the end of the period covered by such report.

44. Periodic implementation support missions of the World Bank team will include reviews/audits of the



following: (i) Social and Environmental Monitoring, (ii) Regular Quality Supervision & Certification, (iii) Periodic Physical Progress Monitoring & Third-Party Quality Audit, and (iv) Results Monitoring and Evaluation. Additionally, there will be a project management milestone chart to ensure administrative and implementation related activities are completed on schedule. The project implementation units may also explore the installation and use of a more systematic Critical Path Method (CPM)- based software for the physical and financial progress monitoring of various sub-components and sub-projects within.

C. Sustainability

45. The hydro-meteorological and climate data, information, forecasts, warnings and other products are provided as a “public good”, because of their public safety value and cross-cutting socio-economic benefits. At the same time, there is a strong demand for the products and services from improved hydro-meteorological services, particularly in the civil aviation, transport, tourism, energy, agriculture, water resources management and health sectors. These products and services are critical to: (i) Provide early warning to reduce the economic and social impacts of floods, drought and other adverse weather events; (ii) Develop water resources for agriculture, hydropower and water supply; and (iii) Inform safer air, marine and road transportation.

46. However, selective generalization of the products and services of this Project for profit-making sectors has been envisaged only for the subsequent stage when hydro-meteorological services have graduated into more advanced self-sustaining business models and are outside the scope of this Project. Options to strengthen sustainability include partial cost recovery from institutional users, public-private partnership to strengthen the revenue base of hydro-meteorological services and residual budget support from beneficiary governments for O&M, including human resources. In addition to revenues from the sale of services to the private sector and to respective government departments and agencies, hydro-meteorological services may also be subsidized by other government users, such as MALI METEO earning a percentage of all airport taxes, since air-traffic control uses MALI METEO forecasting services.

47. The Government of Mali has agreed to allocate sufficient funds for the staff, investment and operational budgets. The total US\$2 million counterpart funding represents 6.8 percent of the total annual budget of these entities over the 5-year implementation period and will contribute to installation, operation and maintenance of equipment, as well as to cover staff time for involved entities. An operations and maintenance plan is being developed by the Government of Mali and will be part of the project implementation manual. The maintenance for hydro-meteorological equipment will comply with WMO recommendations available in the Guide to Meteorological Instruments and Methods of Observation. Each of the four recipient entities will be responsible for operation and maintenance of equipment, works and systems under their area of competence.

D. Role of Partners and Current Initiatives

48. The project will operate in tandem with the supporting activities of other development partners and technical institutions. The project will have operational synergies with the activities of the World Meteorological Organization, with which the project is fully coordinated and aligned with the National Framework for Climate Services promoted by it. In addition, the project will also build synergies with sub-regional hydro-meteorological institutions such as the African Center of Meteorological Application for Development (ACMAD) and AGRHYMET as well as with the relevant river basin authorities who have a complementary mandate.

49. In Mali, there are several ongoing projects and programs addressing various aspects of climate and disaster



risks that can be capitalized by the proposed Project. It is therefore critical that donors act in a coordinated manner, to maximize opportunities and synergize activities. For this purpose, consultations have been held with several donor partners throughout the development of the project. None of the existing initiatives specifically target the improvement of hydro-meteorological information and warning systems with end-to-end connectivity. Major ongoing projects are described below:

- a. The European Union (EU) is currently supporting the establishment of a regional system for food security monitoring (ECO-AGRIS) hosted by the Permanent Interstate Committee for Drought Control in the Sahel (CILSS, €18 million); as well as the Monitoring of Environment and Security in Africa (MESA) program with a budget of €37 million for the African continent.
- b. USAID supports various activities, including (i) supporting an institutional strengthening project for MALI METEO, aimed at providing sustainable financing for the newly formed autonomous public entity, (ii) providing technical assistance to improve climate data, including the establishment of rainfall estimates over the entire country, and (iii) supporting the development of a decision making tool for farmers using agro-meteorological information, in conjunction with MALI METEO and the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT).
- c. Through a GEF-funded project (US\$9,000,000), UNDP is supporting disaster prevention and preparedness for major risks (mainly floods) across seven municipalities (three in Bamako, two in Mopti and two in Kayes). In addition, with funding of about €1.3 million from the National Strategy for Adaptation to Climate Change (ASNaCC) project, UNDP will be supporting the installation of meteorological stations with MALI METEO.
- d. With approximately €1.5 million per year over five years, the German Society for International Cooperation (GIZ) will be providing technical assistance to support the implementation of the National Strategy on Climate Change (ASNaCC) and the Innovative Project Planning for Adaptation to Climate Change (PICP).
- e. WMO will be providing technical expertise to develop a national framework for climate services in Mali to better understand the needs of different user groups (Global Framework for Climate Services).
- f. For nearly 10 years, and until October 2015, the French Development Agency (AFD) has provided funding to the Integrated Water Resource Management 2 project, with the objective to support the Niger Basin Authority (NBA) with hydrological data collection, analysis and modeling to monitor water resources along the Niger River.
- g. The French Civil Protection Agency provides training for Malian civil protection officers (first aid, road rescue, fire prevention, operational management and emergency command) through the project Support to Civil Protection in Africa (APCA).
- h. With funding from the Korean Green Growth (KGGTF) managed by the World Bank, Research and Development Institute (IRD) piloting an innovative method for the estimation of rainfall based on cellular networks (Rain Cell Africa), which will support the development of public-private partnerships between MALI METEO and Orange cellphone operator.
- i. The African Development Bank (AfDB) supports (i) since 2014, the establishment of a regional water observatory, the Water Resources Coordination Unit of the Economic Community of West African States (ECOWAS), and (ii) the Institutional Support Project to the African Climate Institutions (ISACIP), for US\$30 million, to strengthen the capacity of African Climate Institutions to generate climate information and to allow their wide dissemination to end users.
- j. Through the Strengthening Disaster Resilience in Sub-Saharan Africa Program, which is an initiative of the ACP Group of States, financed by the European Union and implemented by the World Bank, ECOWAS is supported to strengthen its regional flood management strategy and advance its regional coordinating role in support of hydro-meteorological services in West Africa.
- k. The Climate Risks and Early Warning Systems (CREWS) initiative, which is a joint initiative of WMO, World Bank's



Global Facility for Disaster Reduction and recovery (GFDRR) and UNISDR, supports Mali in capacity building and technical assistance for early warning systems through a World Bank executed grant.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

50. The general risks associated with project implementation are summarized in the Systematic Operations Risk-Rating Tool (SORT) (table 2).

Table 2: Systematic Operations Risk-rating Tool (SORT)

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

51. The overall risk rating is High, mainly due to the security situation, the general political and institutional instability, the macroeconomic context, the technical design of the project, implementation capacity and sustainability, and fiduciary risks. Most of these risks are rated substantial and high. Therefore, strong mitigation measures will be established to ensure that they do not interfere with the successful implementation of the Project. Ongoing dialogue with the Government and intermittent workshops as well as training will also be arranged to make sure that the Project is implemented in a risk-informed manner and meets client demands and needs to achieve the Project’s development objectives in an efficient manner.

Table 3: Risks and Mitigation Measures

Risks	Risk Mitigating Measures	Risk Rating
Political and governance	Social unrest risks are significant with a lack of progress in the security situation in the North and recent violence in the Center (through terrorist attacks). These can affect the delivery of public services, distract the government’s attention and divert resources from ongoing projects. While the instruments available to the World Bank Group in this area are limited, implementation will be adapted to insecure areas. This risk is mitigated through the combination of the several measures, including: (i) Active monitoring of the security situation in both the North and Center by the CMU-based Crisis Management Team that meets on a weekly basis; and, (ii) a firm commitment by the Government avoid	H



	project work and missions to high-risk areas in the North and the Center. The project will implement a Gender Action Plan, which include measures against Gender Based Violence (GBV). Project will contribute to protecting vulnerable individuals by promoting emergency preparedness at community level, raising gender awareness and by promoting the inclusion of woman into decision making processes for disaster risk management.	
Macroeconomic	Macroeconomic or external factors preclude government from sustaining its financial commitments under the project. Even though Mali’s fiscal situation and management have remained sound during the last crisis, given the stabilizing effect of the membership in the West African Economic and Monetary Union and recent public financial management reforms, fluctuating oil prices and a further drop in gold prices have the potential to negatively affect fiscal accounts. Adverse weather effects would only aggravate this situation. Given Mali’s limited fiscal buffers, such risks have the potential to affect budget execution and domestically financed public investment, possibly generating an accumulation of expenditure arrears. The volatility of commodity markets may also result in macroeconomic shocks. For instance, gold prices respond closely to changes in world economic activity, interest rates, inflation, and political stability.	S
Technical design of the project	Given the complex administrative arrangements, the technical design of the project might be at risk. Some of the project activities are part of the current work plan, however most others are new in the context of Mali and hence a strong support to implementation agencies is required. Also, emergency response activities require strong information, education and communication campaigns to create the demand for hydro-meteorological information to be used for risk reduction, mitigation and prevention activities. Proposed mitigation actions include the application of integrated approach that requires combining strategically packages for procurement. The project will also benefit from the support of experts to the process.	S
Institutional capacity for implementation and sustainability	The 4 beneficiary entities (MALI METEO, DNH, CSA/SAP and DGPC) require additional capacity for effective implementation and coordination of the project. Despite strong commitment and the considerable progresses made by the country, institutional challenges remain to be addressed. Moreover, some of these agencies are underfinanced and with limited number of skilled staffs. This can undermine the medium to long term sustainability of the project. To reduce these risks the project will provide additional technical and institutional support through World Bank Executed activities (CREWS currently under implementation in collaboration with WMO), that will allow the recruitment of international advisors to provide hands-on support in various technical areas. To increase medium to long term sustainability the project will explore the following : (i) the use of a System Integrator firm which will contribute to the coordination of the 4 beneficiary entities during project implementation; (ii) the incremental collaboration with the private sector for the production and delivery of hydro-meteorological services; (iii) cost efficiency through technological updating, innovation, twinning arrangements with advanced agencies and regional collaboration; (iv) partial and preliminary cost-recovery pilots with productive sectors such as agriculture and civil aviation; (v) the elaboration of an Operation and Maintenance (O&M) Plan for the duration of the project to be included in the Project Implementation Manual.	S
Fiduciary	The limited experience of the Ministry of Security and Civil Protection (MSPC) managing World Bank’s projects carries a high risk to project implementation. To strengthen MSPC procurement capacities, the project will recruit a procurement consultant that will be responsible for procurement in the first year and gradually transfer responsibilities to a selected procurement officer within DGPC. The consultant will be responsible for both carrying out the necessary procurement procedures, but also to train the designated DGPC procurement staff. The procurement risk is rated high. Consequently, additional measures are incorporated into the design of the project FM arrangements to mitigate this risk, including (i) elaborate Project Implementation Manual including financial and accounting procedures, (ii) purchase and customize accounting software will take place, (iii) the recruitment of a Financial Management Officer, (iv) the recruitment of an accountant, (v) the	H



	recruitment of an internal auditor, and (vi) recruitment of the external auditor acceptable to the International Development Association (IDA). The overall Financial Management residual risk rating at project preparation is considered Substantial.	
Other (Security)	<p>There is a risk that the project is affected by conflict and vandalism. Tight security procedures will be put in place by DGPC to ensure security of staff working on this project. In order to prevent vandalism and damage to project assets, fences will be erected around hydro-meteorological stations to prevent access. Very often the solar panels are stolen from hydro-meteorological equipment. One option being considered by the team, is to link the energy source of the hydro-meteorological station to solar powered pumps of community drinking water stations. These facilities are closely protected by the community. Awareness raising and training of local communities about the importance of these hydro-meteorological stations will be part of component 3, so that the community appreciates the value of the infrastructure for their own wellbeing. All equipment procured under the project will be included in the national inventory. As it is the case for all government-owned equipment in Mali, the equipment will be covered under self-underwriting option by the Government. In addition, viable insurance options will be explored with implementing partners.</p> <p>In relation to security concerns, conflict in the North of the country will be a challenge for project implementation. However, since there are no rivers or significant agricultural production in the North, this will not substantially affect the project, as very few stations will be needed in the North. Simple meteorological data could be obtained through alternative sources such as remote sensing calibrated with historical datasets. Security of staff is taken very seriously by government. The PCU is housed by the Directorate General for Civil Protection, which has well trained security personnel, with appropriate experience and the necessary equipment required to protect the project staff and assets.</p>	H
Overall Risk	The overall risk is deemed High	H

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

52. Significant economic gains are anticipated through the successful implementation of this Project in Mali. The gains are associated with (i) the results of more accurate mapping of risks (flood and food security), (ii) better early warning systems, (iii) stronger preparedness mechanisms, and (iv) more efficient responses. These outcomes are translated into reduced losses from flooding and droughts and enhanced productivity, particularly in agriculture. From a user perspective, the project would provide an opportunity to substantially improve key services to sectors such as water resources, hydropower, aviation and agriculture. Based on expected improvements in the forecasting and early warning services, the main benefits that the economic analysis is expected to measure will be: (a) reduction in economic losses caused by floods; (b) reduction in drought losses and increased agricultural productivity; and (c) increased efficiency of civil protection and food security interventions due to enhanced preparedness and accuracy of targeting of relief operations.

53. The public-sector financing is entirely justified and necessary because this project will strengthen the delivery of a public good - hydro-meteorological data and services - which is critical for sustainable development, medium- and long-term adaptation planning for environment, social and economic development, and protection of vulnerable communities, their assets and livelihoods. hydro-meteorological services have an official mandate for climate information and forecasts, weather reports and early warnings, to deliver in the public sector. This has remained a core government function across countries and regions. Moreover, the cross-cutting near-term and mid-term benefits accruing from improved hydro-meteorological services to core development sectors of agriculture, water management, energy, transportation and health are sufficient rationale for this public-sector investment, which will have a high economic return on investment in net terms.



Financial Analysis

54. By comparing the costs and benefits of the Project, an understanding of the relative value of the planned investments over time can be generated. While the implementation phase of the Project is 5 years, for this analysis, it is assumed that the project impact is 15 years. This assumes that equipment such as computers would have an average life of 3-4 years, vehicles and hydro-meteorological stations would have an average life of 7-10 years, while new buildings would have a much longer life-span, in the range of 30-40 years. An average of 15 years is therefore taken. Operations and Maintenance (O&M) costs are assumed at 15 percent of project investments. O&M costs thus increase linearly over the first 4 years as cumulative project investments are made, reaching a constant 15 percent of total capital costs during years 5-15. Benefits are assumed to increase linearly starting from year 2, reaching a constant maximum for years 5-15.

55. Since Mali's GDP growth rate has been on average 4.5 percent in the past decade, a discount rate of 5 percent is used to calculate the Net Present Value (NPV). The NPV was calculated to be US\$124.4 million, with a discount rate of 5 percent. This represents a benefit-cost ratio of 1 to 5. The Internal Rate of Return (IRR) was calculated to be 65 percent.

B. Technical

56. After 30-40 years of neglect, the Mali hydro-meteorological system needs considerable resources and efforts to rebuild its institutional framework, create the most basic infrastructure, and develop a service delivery culture and capacity.

57. The design of the system considers the value chain of hydro-meteorological services and aims at strengthening end-to-end hydro-meteorological systems from observation networks, data management systems, forecasting systems to service delivery. The design of the observation networks will consider automation and telemetry systems and be enhanced by installing (i) surface meteorological and lightning detection network (Automatic Weather Stations), agro-met stations, rain gauges, lightning detectors, power supply, telecommunication for field stations, etc.), (ii) automatic hydrological stations and specialized hydrological equipment (Acoustic Doppler Current Profiler, bathymetric instruments, sediment measurement instruments, current meters) for rivers and small flood-prone watersheds. The data obtained from the enhanced observation networks will be quality assured by establishing (iii) calibration facility and will feed into the (iv) data management and forecasting systems, where modernizing Information and Communications Technology (ICT) infrastructure is at its core.

58. The project aims at improving lead time and accuracy of weather, climate and hydrological forecasts and developing and improving information products in an efficient and effective manner by leveraging regional and global resources, for example, by participating in WMO Severe Weather Forecasting and Demonstration Project (SWFDP) and developing forecast accuracy verification system. MALI METEO and DNH will jointly develop flood and drought forecasting. The accuracy of forecasts (lead time, forecast accuracy versus measured data) will be part of the monitoring and evaluation program. Development, dissemination and utilization of climate information products will be particularly emphasized under the National Framework for Climate Services, which empowers demand driven climate services for sectoral users as well as end-users down to the community. The seamless operation and cooperation among key agencies involved will be ensured and streamlined by developing and operationalizing SOP, establishing information exchange platform and reinforcing (CNOU) infrastructure.



C. Financial Management

59. The financial management arrangements of DGPC have been assessed to ensure that the implementing entity: (i) uses project funds for the intended purposes in an efficient and economical way; (ii) prepare accurate and reliable accounts as well as timely periodic financial reports; (iii) safeguard assets of the Project; and (iv) have acceptable auditing arrangements. The assessment complied with the World Bank Financial Management Manual for Investment Project Financing effective March 1, 2010 and last revised on February 10, 2017.

60. Financial Management (FM) arrangements were found to be adequate subject to meeting the following requirements: (i) elaborate Project Implementation Manual including financial and accounting procedures, (ii) purchase and customize accounting software will take place, (iii) the recruitment of a Financial Management Officer, (iv) the recruitment of an Accountant, (v) the recruitment of an internal auditor, and (vi) recruitment of the external auditor acceptable to the International Development Association (IDA).

Table 5: Financial Management Action Plan

Action	Deadline (Indicative)
Elaborate PIM including accounting, financial and administrative procedures	Before Effectiveness
Recruit a Financial Management Officer providing training services as well as support to the team	Not later than two months after effectiveness
Recruit or appoint an accountant	
Purchase accounting software	
Recruit part-time internal auditor	Not later than six months after effectiveness
Recruit an external auditor	

61. The conclusion of the assessment is that the financial management arrangements in place meet the World Bank’s minimum requirements, subject to meeting some initial requirements, and therefore are adequate to provide, with reasonable assurance, accurate and timely information on the status of the Project required by the World Bank. The overall Financial Management residual risk rating at project preparation is considered Substantial. Additional details on the FM assessment are found in Annex 1.

D. Procurement

62. Project procurement activities will be carried out by DGPC, which is also housing the Project Coordination Unit. The project will recruit a procurement consultant that will be responsible for procurement in the first year and gradually transfer responsibilities to a selected procurement officer within DGPC. The consultant will be responsible for both carrying out the necessary procurement procedures, but also to train the designated DGPC procurement staff. Given: (i) the country context and associated risk; (ii) the fact that DGPC should set up a procurement unit to handle procurement activities; and (iii) the fact that DGPC has no procurement experience and no procurement capacity, the procurement risk is rated high. Details are provided in Annex 2.

E. Social (including Safeguards)

63. The proposed Project is not expected to have any negative social impacts or risks related to social safeguards. No land will be acquired that would lead to economic or physical displacement of people; construction of new hydro-meteorological equipment installations will be limited to public lands or buildings where they do not affect users’ livelihoods or habitation; no project activities will take place on lands traditionally occupied by villagers on the



project zone. However, OP/BP 4.12 has been triggered as a precautionary measure and the borrower has prepared a Resettlement Policy Framework (RPF) to take in account any impact which can happen during project implementation. The RPF was cleared by the Regional Safeguards Advisor and disclosed both in the country and the World Bank's website. Prior to sub-project screening, public consultation will be held in project zone to inform stakeholders and take in account their concerns.

64. **Citizen engagement.** The proposed Project activities are based on continuing citizen engagement and stakeholder consultation and participation throughout the project cycle (design, preparation, and implementation). The project will close the loop between the national hydro-meteorological services and user communities of weather and climate services, such as smallholder farmers, women-groups, communities exposed to flood risk and others. The project will enable short and long-term adaptation planning of households, farmers, communities, as well as local and national government. This will include the identification of forecasting services needed by local communities, identification about of the best means of communicating (e.g. regarding language, culture, technology) forecasts and information with beneficiaries, establishing a feedback mechanism (with local established communities such SCAP-RU and GLAM), piloting and developing products jointly with beneficiaries, as well as discussions on cost recovery. The Project will furthermore identify appropriate ways of involving communities in weather and climate monitoring, e.g., as voluntary gauge readers and maintenance of stations. An indicator has been agreed on to assess beneficiary feedback on agro-meteorological services.

F. Environment (including Safeguards)

65. **Safeguard Policy triggered and relevant instrument:** The proposed Project has an Environmental Risk Category B investment under the World Bank's Operational Policy on Environmental Assessment (OP/BP 4.01) and has a moderate environmental risk. OP/BP 4.01 is the only environmental policy triggered under the proposed Project. Impacts would primarily be associated with the installation and rehabilitation of observation equipment and any required establishment of access road or paths to these observation stations. The project will mostly rehabilitate existing hydrological (manual scales and automatic recorders) and meteorological stations (synoptic, meteorological, agro-meteorological, rain gauges) with preference when relevant for keeping the previous/current location (for continuation of homogenous climate series). Civil works associated with such investments may have potential minor risks and adverse impacts. The Borrower prepared and disclosed an Environmental and Social Management Framework (ESMF) to guide the selection of the subprojects.

66. Potential negative impacts may include: (i) loss of vegetation on construction sites; (ii) accidents and nuisances on construction sites; (iii) pollution of surface waters; (iv) increasing of dust emissions during demolition work; (v) landscape modification of the living environment due to new construction of observation stations; (vi) risk of infectious diseases and (vii) risks of social conflict in case of site access limitation. Particular attention will be given among other to: (i) Occupational Health and Safety; (ii) Safe handling and disposal of industrial wastes hazardous, and management of other solid and liquid wastes; (iii) GBV; and, (iv) Grievance redress management.

67. **Institutional arrangement for safeguards implementation:** The PCU will hire a skilled and full time Social Development Specialist and a skilled and full time Environmental Safeguard Specialist with the role and responsibility to ensure project's compliance on social and environmental safeguards. It recognized that the National Directorate for Sanitation, Pollution Control and Nuisance (DNACPN) has extensive experience monitoring World Bank funded operations in Mali and has therefore continuously dealt with World Bank Safeguards specialists both in terms of projects preparation and implementation as well as safeguards training sessions. The PCU will



engage with DNACPN a permanent dialogue that will clarify the role and responsibilities of both parties in the safeguard's compliance. All sub projects will be systematically subject to safeguards screening that will decide which safeguards instruments are relevant for the sub-project environmental and social risks and impacts mitigation measures. The Project Implementation Manual will detail the safeguards screening and mitigation process, the Gender Based Violence management and the grievance redress mechanism.

68. **Technical feasibility studies and preparation of site-specific safeguards instruments alignment.** The consultants in charge of completing technical feasibility studies will work closely with the consultants working on the preparation of site Environmental safeguards specific instruments to ensure alignment during the project implementation and to avoid unnecessary delays.

69. **Consultation and disclosure:** During the preparation of the ESMF, the main stakeholders were consulted. The ESMF was prepared, reviewed and disclosed in Mali on March 13, 2019 and at the World Bank website prior appraisal (March 19, 2019). The consultation of the main stakeholders will continue throughout implementation period.

70. **Environmental and Social safeguards monitoring:** Regular monitoring reports on the implementation of environmental and social safeguards provisions will be provided to the World Bank for review. These reports will be verified during project supervision missions.

G. Other Safeguard Policies (if applicable)

H. World Bank Grievance Redress

Communities and individuals who believe to be adversely affected by a World Bank supported project may file a complaint to the World Bank's Grievance Redress Service (<http://www.worldbank.org/GRS>). Project affected communities and individuals may submit their complaint to the World Bank's Inspection Panel (IP) (<http://ewebapps.worldbank.org/apps/ip/Pages/Home.aspx>) to determine whether harm occurred, or could occur, because of non-compliance with policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and World Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service, please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the IP, please visit www.inspectionpanel.org.



VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Mali

Strengthening Climate Resilience in Mali Project

Project Development Objective(s)

The proposed Project Development Objective (PDO) is to improve the provision of and the access to the country’s hydro-meteorological, early warning and emergency response services

Project Development Objective Indicators

Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Improved Hydro-Meteorological Early Warning Services							
Number of products and services delivered by MALI METEO and DNH (Number)		17.00	17.00	17.00	21.00	26.00	35.00
Enhanced risk mapping and early warning services							
Number of food security community early warning systems established (Number)		100.00	100.00	110.00	125.00	150.00	175.00
Number of female head of Community Early Warning Systems (Number)		20.00	20.00	25.00	30.00	35.00	45.00
Number of direct beneficiaries		300,000.00	500,000.00	1,000,000.00	1,600,000.00	2,200,000.00	2,700,000.00



Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
receiving early warning services on flooding and food insecurity (Number)							
Enhanced Emergency Response and Disaster Management							
Reduction of mean emergency response lead time for flood (Percentage)		0.00	10.00	20.00	30.00	40.00	50.00

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Institutional Strengthening, Capacity Building							
Development of Standard Operating Procedures for DGPC, MALI METEO, DNH and SAP (Yes/No)		No	No	Yes	Yes	Yes	Yes
Number of agents supported to acquire specific professional training (MALI METEO, DNH, DGPC and CSA/SAP) (Number)		0.00	20.00	60.00	120.00	240.00	360.00
Enhanced operating framework for Hydro-meteorological services and data sharing (Yes/No) (Yes/No)		No	No	Yes	Yes	Yes	Yes
Number of extension agents		0.00	0.00	200.00	500.00	1,000.00	1,500.00



Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
trained in specific skills (Number)							
Modernization of Observation Infrastructure and Forecasting							
Number of Meteorological Stations installed or upgraded (synoptic, rainfall, agro-meteorology) (Number)		60.00	60.00	70.00	90.00	90.00	90.00
Number of hydrometric and water quality stations installed or upgraded (Number)		0.00	0.00	20.00	40.00	40.00	40.00
Integrated system developed and operationalized across institutions. (Yes/No)		No	No	No	Yes	Yes	Yes
Emergency Operations Center (CNOU) Operational (Yes/No)		No	No	No	Yes	Yes	Yes
Number of Local SAP Groups equipped with adequate communication tools (Number)		0.00	0.00	20.00	30.00	40.00	50.00
Number of stations feeding the central online data platform on time (Number)		60.00	60.00	80.00	110.00	120.00	130.00
Enhancement of Service Delivery to End-Users							
Establishment of a Communication System to deliver timely and Adequate agro-meteorological services (Yes/No)		No	No	No	Yes	Yes	Yes
Number of local groups for agrometeorological assistance (Number)		17.00	17.00	17.00	20.00	30.00	40.00



Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Beneficiary Feedback on agrometeorological services (Percentage)		0.00	0.00	10.00	20.00	30.00	40.00
Number of contingency plans developed following a participatory approach (Number)		0.00	0.00	1.00	2.00	4.00	6.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Number of products and services delivered by MALI METEO and DNH	Currently, MALI METEO is delivering 12 products and services and DNH 5 to various beneficiaries. With the project, the capacity of MALI METEO and DNH will increase with new skills in observation, data collection, analysis, modelling and forecasting. This will allow them to design new tailored products and services.	Annual	Annual reports of MALI METEO and DNH. The Project Coordination Unit will ensure citizen engagement in the process.	MALI METEO and DNH are responsible for providing the data annually to the PCU.	MALI METEO, DNH, PCU



<p>Number of food security community early warning systems established</p>	<p>The national food security early warning system currently relies on 100 local systems, called SCAP-RU. They are instrumental in how the country monitors and responds to risks of food insecurity. They collected data on food security from their local communities that they send to the center for treatment, analysis and recommendation. Once an alert is generated at the center combining data from MALI METEO and DNH, the alerts are sent to the SCAP-RU delegates who are responsible for the dissemination at the community level. Through the project, SAP agency will identify new 75 areas where SCAP-RUs will be created. The communities will select their delegated that will be trained. The head of the SCAP-RU will benefit from a smart phone.</p>	<p>Annual</p>	<p>Data source will be SAP, as they report progress on the project.</p>	<p>Desk review. of SAP annual reports. PCU could select to conduct field mission and survey some areas.</p>	<p>SAP in collaboration with the Project Coordination Unit</p>
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<p>Number of female head of Community Early Warning Systems</p>	<p>This is the number of SCAP-RU that are led by female delegates.</p>	<p>Annual</p>	<p>Desk review. of SAP annual reports. PCU could select to conduct field mission and survey some areas.</p>	<p>SAP, PCU</p>	<p>SAP, PCU</p>
<p>Number of direct beneficiaries receiving early warning services on flooding and food insecurity</p>	<p>The project has a number of interventions including the provision of weather forecast, flood early warning, food security monitoring and early warning, and response to emergency. The number of direct beneficiaries will combine all the people who receive such services.</p>	<p>The count will be done at the beginning of the project to capture the baseline, at mid-term and at the completion of the project.</p>	<p>Project Implementation Unit Annual Report</p>	<p>The methodology will combine surveys, information from various media and challenge of dissemination</p>	<p>Project Coordination Unit</p>
<p>Reduction of mean emergency response lead time for flood</p>	<p>This indicator will measure the time elapsed between when information on a flood is received by DGPC and the moment they arrive on the ground to start emergency operation.</p>	<p>Annual. An annual average of this response time will be computed.</p>	<p>Civil Protection agency.</p>	<p>DGPC will undertake a desk review of information for the call center and the emergency coordination center.</p>	<p>DGPC, PCU</p>

**Monitoring & Evaluation Plan: Intermediate Results Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Development of Standard Operating Procedures for DGPC, MALI METEO, DNH and SAP	Capacity building activities will lead to the development of Standard Operating Procedures for all 4 institutions involved in the project.	On time during implementation	Project Monitoring Reports, DGPC	DGPC, MALI METEO, DNH and SAP	Project Implementation unit
Number of agents supported to acquire specific professional training (MALI METEO, DNH, DGPC and CSA/SAP)	This is the combined number of agents trained based on all accepted modalities under this project.	Annual	PCU Annual Report	Verification of training records and counting of experts trained from MALI METEO, DNH, DGPC and SAP	PCU
Enhanced operating framework for Hydro-meteorological services and data sharing (Yes/No)					
Number of extension agents trained in specific skills	The 4 entities have local agents, sometimes volunteers that participate in their regular mandate. These will be trained so that their skills are raised to contribute to the project objective.	Annual	Semi-annual reports provided by the 4 entities.	Count done by the 4 entities	DNH, Mali Meteo, DGPC, SAP
Number of Meteorological Stations installed or upgraded (synoptic, rainfall,	Number of stations acquired and intalled	Annual	Project Coordination Unit	Verification of installation and	Project



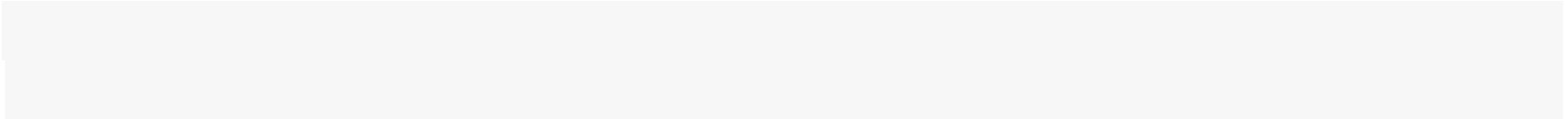
agro-meteorology)			Annual Report with contribution from Mali Meteo	functioning	Coordination Unit
Number of hydrometric and water quality stations installed or upgraded	DNH will receive 20 hydrometric stations and 20 stations to monitor water quality	Annual reports of DNH and PCU	DNH and Project Coordination Unit count at reception of stations and installation progress.	Count by DNH and PCU	DNH, PCU
Integrated system developed and operationalized across institutions.	An integrated system to be developed and operationalized that allows all 4 involved institutions to work together in managing risk	One time assessment	PCU	PCU	Project Coordination Unit
Emergency Operations Center (CNOU) Operational	The project will assist DGPC operationalize the National Center for Emergency Operations	On time	DGPC reports	DGPC Data	DGPC, PCU
Number of Local SAP Groups equipped with adequate communication tools	SAP works with local SAP groups to help in the process of conducting surveys and collecting needed data. Currently the collect of info is done on	Annual	SAP, PCU	SAP, PCU regular reporting	SAP, PCU



	paper. With the project, the collect will be done on smart phones and automatically transmitted to the center for processing.				
Number of stations feeding the central online data platform on time	This indicator will capture the integration of all stations in order to be available for end-user production	Annual	MALI METEO and DNH Reports	MALI METEO, DNH, PCU	MALI METEO, DNH, PCU
Establishment of a Communication System to deliver timely and Adequate agro-meteorological services	The delivery of end-user products to producers, vulnerable people..	Annual	MALI METEO, SAP	MALI METEO, SAP, PCU	MALI METEO, SAP, PCU
Number of local groups for agrometeorological assistance	MALI METEO currently has 17 local groups for agrometeorological assistance. The project will help increase to number to 40. The groups create a bulletin which includes advise to producers. These groups include various sectors such as producers, livestock, meteo, SAP	Annual	MALI METEO reports, PCU	MALI METEO	MALI METEO, PCU
Beneficiary Feedback on agrometeorological services	This is an indicator to measure the improvement in the level of satisfaction of the 40 GLAMs created. They will be annual surveys to measure 3 levels on	Annual	MALI METEO, PCU	Satisfaction Survey	MALI METEO, PCU



	satisfaction: Not satisfied, moderately satisfied, and satisfied. Moderately Satisfied and Satisfied will represent 100. The project will help improve the satisfaction level by 40 percent for the baseline which will be computed at the beginning of implementation				
Number of contingency plans developed following a participatory approach	Contingency plans are developed in a workshop with the participation and contribution local elected and appointed authorities, local CSO organizations, and beneficiary delegates. At the end of the workshop, participants will receive a survey on the process and their satisfaction of how the final plan reflects their views. Only plans that receive 80% satisfaction rate will qualify for the purpose of this indicator.	The indicator will be reported as the contingency plans are completed	Survey organized by PCU after contingency plan workshops	Surveys and calculations done PCU	The Project Coordination Unit





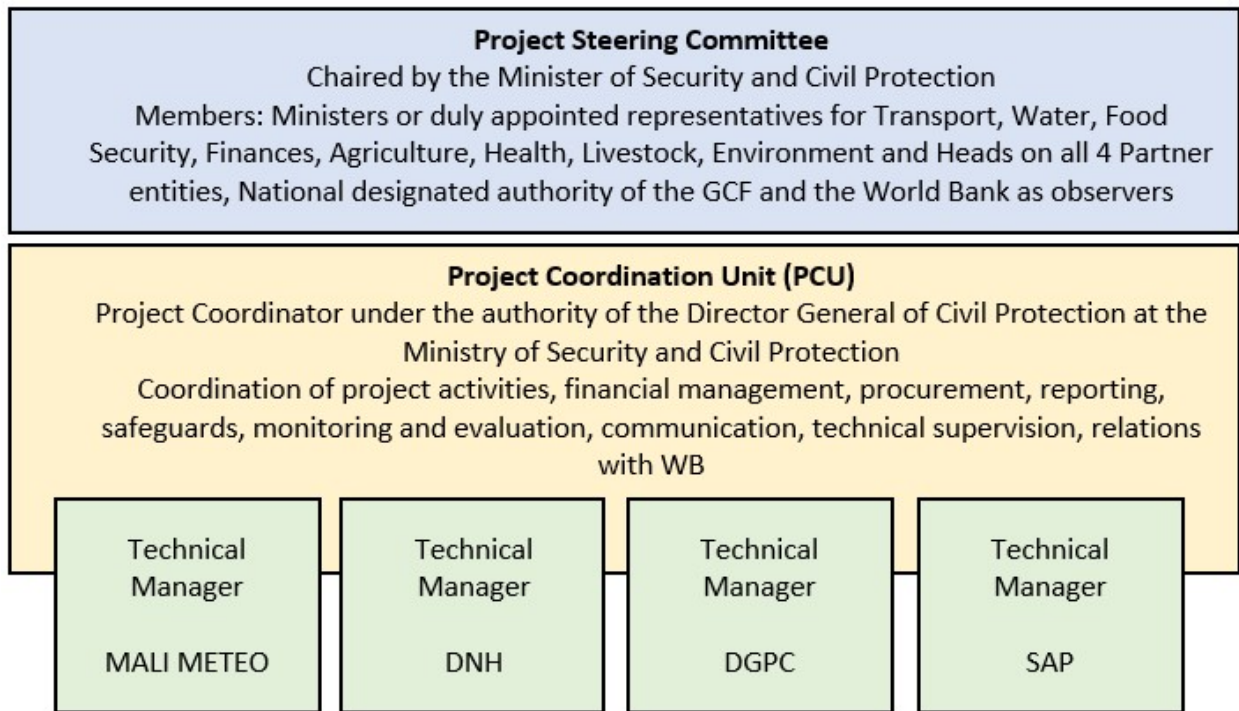
ANNEX 1: IMPLEMENTATION ARRANGEMENTS

COUNTRY: Mali
STRENGTHENING CLIMATE RESILIENCE IN MALI PROJECT

Project Institutional and Implementation Arrangements

1. The Project Coordination Unit to be constituted in the Directorate-General for Civil Protection will coordinate project implementation as the Executing Entity, with support from technical staff from all four entities supported by the project, who will work as Implementing Partners¹. The Administration and Accounting Unit (DAC) of the DGPC will support financial aspect. The Project will be managed by civil servants and with support from external consultants, including for procurement and safeguards.

Figure 1: Schematic Representation of Implementation Arrangements



Note: Technical Project Manager for each beneficiary entity will be responsible for technical leadership with regard to formulation of activities, specification of equipment, ToR, bids technical evaluations, implementation and monitoring in close collaboration with PCU Project Coordinator

¹The option of using the Mali Climate Fund to manage the proposed project was considered as an option. It was concluded that the Fund’s capacity was not adequate for implementing a project of such technical and institutional value.



2. All activities will be directly executed by the PCU of the DGPC. DGPC, DNH, MALI METEO and CSA/SAP will participate in the project implementation by providing technical resources for operation, maintenance, project implementation, developing terms of reference and participating in bid evaluation committees for procurement. However, DGPC is alone responsible for project implementation and reporting. DGPC, MALI METEO, DNH and SAP will all be implementing partners in support of the PCU in DGPC, which will serve as the Executing Entity. The PCU/DGPC will sign a memorandum of understanding with the other entities. Details of the MOU will be presented in the Project Implementation Manual.
3. The PCU will carry out the Project in accordance with the provisions and requirements set forth or referred to in the Project Implementation Manual (PIM), which will be developed prior to project effectiveness. Most recipient-executed projects in Mali use country systems coupled with dedicated software for financial management, and follow World Bank procedures for procurement, audits and safeguards, and monitoring and evaluation. This project will also follow this practice.
4. The PCU will be supported by experts from DGPC, SAP, DNH and MALI METEO, and will have the capacity to recruit experts for short term consultancies, to implement activities with good understanding of technical and local contexts.
5. The PCU will comprise:
 - a Project Director (civil servant) to oversee overall project performance and management;
 - a Project Coordinator (civil servant) to coordinate project implementation on a day to day basis;
 - a Procurement Specialist (civil servant);
 - a Financial Management Specialist (civil servant);
 - a Procurement Consultant;
 - a Financial Management Consultant,
 - a Safeguards Consultant;
 - an Environment Safeguard Consultant,
 - a Social Safeguard Consultant;
 - a Monitoring and Evaluation Consultant;
 - an Internal Auditor (civil servant);
 - an External Auditor (firm);
 - 2 technical managers for each participating agency; and,
 - Additional staff as needed.
6. A Project Steering Committee (PSC) will be established with representation from the respective ministries of all four entities (DGPC, SAP, DNH, and MALI METEO), the Ministry of Finance, Agriculture, Health, Livestock, and Environment. The Heads of the 4 beneficiary entities will also be members of the Steering Committee as well as the national designated authority of the GCF. The World Bank will be observer. It will be chaired by the Ministry of Security and Civil Protection or his representative. The PSC will meet twice a year, will be responsible for strategic orientation and review progress. The PSC can have an extraordinary meeting to discuss a specific issue if need be.
7. The implementation of the Contingent Emergency Response Component (CERC) requires that the Recipient take the following measures:



- i. prepare and furnish to the Association for its review and approval, an operations manual, which shall set forth detailed implementation arrangements for the CERC, including: (i) designation of terms of reference for and resources to be allocated to, the entity to be responsible for coordinating and implementing the CERC; (ii) specific activities which may be included in the CERC, Eligible Expenditures required for these activities, and any procedures for such inclusion; (iii) financial management arrangements for the CERC; (iv) procurement methods and procedures for Emergency Expenditures to be financed under the CERC; (v) documentation required for withdrawals of Emergency Expenditures; (vi) environmental and social safeguard management frameworks for the CERC, consistent with the Association's policies on the matter; and (vii) any other arrangements necessary to ensure proper coordination and implementation of the CERC;
- ii. afford the Association a reasonable opportunity to review said proposed operations manual;
- iii. promptly adopt such operations manual for the CERC as shall have been approved by the Association;
- iv. ensure that the CERC is carried out in accordance with the CERC Operations Manual; provided, however, that in the event of any inconsistency between the provisions of the CERC Operations Manual and this Agreement, the provisions of this Agreement shall prevail; and
- v. not amend, suspend, abrogate, repeal or waive any provision of the CERC Operations Manual without prior approval by the Association.

8. The Recipient shall, throughout the implementation of the CERC, maintain the Coordinating Authority, with adequate staff and resources satisfactory to the Association. The Recipient shall undertake no activities under the CERC Part (and no activities shall be included in the CERC Part) unless and until the following conditions have been met in respect of said activities:

- i. The Recipient has determined that an Eligible Crisis or Emergency has occurred, has furnished to the Association a request to include said activities in the CERC Part in order to respond to said Eligible Crisis or Emergency, and the Association has agreed with such determination, accepted said request and notified the Recipient thereof; and
- ii. The Recipient has prepared and disclosed all safeguards instruments required for said activities, in accordance with the CERC Operations Manual, the Association has approved all such instruments, and the Recipient has implemented any actions which are required to be taken under said instruments.

Financial Management

9. A Financial Management assessment of the implementing unit DGPC designated to manage the Project, was carried out in 2019. The objective of the assessment was to determine whether DGPC has acceptable FM arrangements in place to ensure that the project funds will be used only for intended purposes, with due attention to considerations of economy and efficiency. The assessment complied with the World Bank Financial Management Manual for Investment Project Financing effective on March 1, 2010 and last revised on February 10, 2017.

10. The Director-General of DGPC, which hosts the PCU, will oversee all aspects of project management and implementation, including the financial management, procurement and safeguards aspects of the Project, including the preparation of the financial statements and quarterly Interim Unaudited Financial Reports, monitoring financial transactions on the Project's accounts and making the necessary arrangements for the annual financial audit of the Project. The overall financial management risk is substantial.



11. DGPC has satisfactorily implemented a World Bank-funded project from 2012 to 2015, involving the same implementing partners (MALI METEO, DNH and SAP).

12. This is summarized in the financial management action plan as follows:

Table 1: Financial Management Action Plan

Action	Deadline (indicative)
Elaborate PIM including accounting, financial administrative procedures	Before Effectiveness
Recruit Financial Management Officer providing training services as well as support to the team	Not later than two months after effectiveness
Recruit or appoint an accountant	
Purchase accounting software	
Recruit part-time internal auditor	Not later than six months after effectiveness
Recruit an external auditor	

13. **Internal control system.** The internal control system comprises (i) a steering committee to oversee the project activities, and (ii) a Project Implementation Manual including an updated section on Administrative, Financial, Procurement and Accounting Procedures, which will be adopted before effectiveness and an internal audit function to carry out ex-post reviews and to evaluate the performance of the overall internal control system.

14. **Planning and budgeting.** The PCU will prepare a detailed annual work plan and budget (AWPB), which need to be approved by the project Steering Committee. The PCU will submit the approved AWPB to the World Bank, no later than November 30, before the year when the work plan should be implemented.

15. **Accounting.** The SYSCOHADA, assigned accounting system in West African Francophone countries, will be applicable. The existing multi-project accounting software will be customized to host the book-keeping of the project.

16. **Financial reporting.** Every quarter, the PCU will submit an Interim Financial Report (IFR) to the World Bank within 45 days after the end of the calendar quarter period. The IFRs should provide sufficient pertinent information for a reader to establish whether (i) funds disbursed to the project are being used for the purpose intended, (ii) project implementation is on track, and (iii) budgeted costs will not be exceeded. The PCU will use the IFR format of the ongoing IDA funded projects. The report may include:

- An introductory narrative discussion of project developments and progress during the period, to provide context to (or other explanations of) the financial information reported;
- A Sources and Uses of Funds Statement, both cumulatively and for the period covered by the report, showing separately funds, provided under the Project (IDA, Borrower, Recipients);
- A Uses of Funds by Components Statement, cumulatively and for the period covered by the report;
- The designated account reconciliation, including bank statements and general ledger of the bank



account;

- Explanation of variances between the actual and planned activities and budget.

Annually, the PCU will prepare Project Annual Financial Statements, which will comply with SYSCOHADA and World Bank requirements. Annual Financial Statements may comprise:

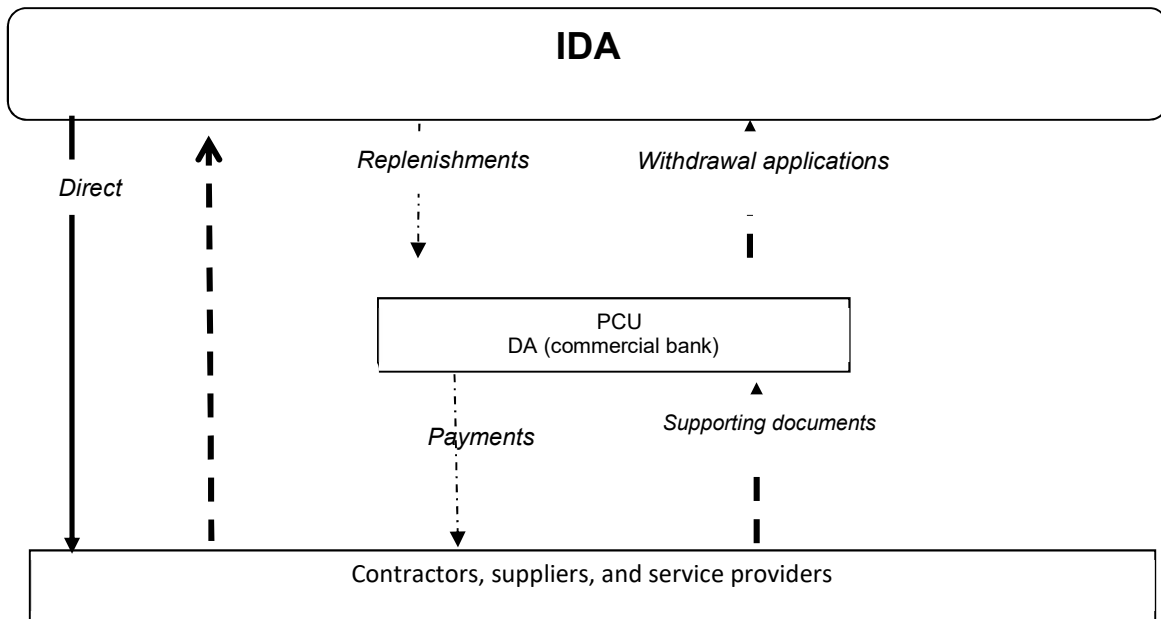
- Project presentation and project developments and progress during the year, to provide context to (or other explanations of) the financial information reported;
- A Statement of Sources and Uses of Funds which recognizes all cash receipts, cash payments and cash balances;
- A Statement of Commitments;
- Accounting policies adopted and explanatory notes.

Disbursements

17. Disbursements under this project will be carried out in accordance with the provisions of the Disbursement Guidelines for Investment Project Financing dated February 2017, the Disbursement and Financial Information Letter and the Financing Agreement.

18. The project will finance 100 percent of eligible expenditures inclusive of taxes. A Designated Account (DA) will be opened in a commercial bank under terms and conditions acceptable to IDA. An initial advance up to the ceiling of the DA will be made and subsequent disbursements will be made against submission of Statements of Expenditures (SOE) reporting on the use of the initial/previous advance. The option to disburse against submission of quarterly unaudited Interim Financial Report (also known as the Report-based disbursements) could be considered, as soon as the project meets the criteria. The other methods of disbursing the funds (reimbursement, direct payment and special commitment) will also be available to the project. The minimum value of applications for these methods is 20 percent of the DA ceiling. The project will sign and submit Withdrawal Applications (WA) electronically using the [eDisbursement] module accessible from the World Bank's Client Connection website.

Figure 2: Flow of Funds and Disbursement Arrangements



19. **External Auditing:** The Financial Agreement will require the submission of Audited Financial Statements from the PCU to the World Bank within six months after each year-end. An external auditor acceptable to the World Bank will be recruited. The external auditor will prepare a Management Letter to provide observations, comments, and recommendations for improvements in accounting records, systems, controls and compliance with financial covenants in the Financial Agreement. The PCU will recruit a technically competent and independent auditor acceptable to the World Bank within six (6) months after the project effective date. The recruitment for the external audit of the financial statements of the project should be done through terms of reference agreed by IDA.

20. **Implementation Support Plan:** Based on the outcome of the FM risk assessment, the following implementation support plan is proposed. The objective of the implementation support plan is to ensure the project maintains a satisfactory FM system throughout its life.

Table 3: FM Implementation Support Plan

FM Activity	Frequency
Desk reviews	
Interim financial reports review	Semester
Audit report review of the program	Annually
Review of other relevant information such as interim internal control systems reports	Continuous as they become available
On-site visits	
Review of overall operation of the FM system (Implementation Support Mission)	Twice in the year
Monitoring of actions taken on issues highlighted in audit reports, auditors' management letters, internal audits, and	As needed



other reports	As needed
Transaction reviews	
Capacity-building support	During implementation and as and when needed
FM training sessions	

21. **Governance** The risk of irregularities and corruption within the project activities is substantial given the country context and performance of different sectors. In addition, the lack of appropriate or effective oversight mechanisms could jeopardize Project implementation. A strong fiduciary arrangement has been designed and put in place to mitigate these risks; some measures to improve transparency such as providing information on the project status (publication of the project and project audited financial statements on its website); and recruitment of a dedicated (consultant) FM Officer familiar with the World Bank FM procedures and internal auditor.

Procurement

22. The Recipients will carry out procurement under the proposed project in accordance with the World Bank’s “Procurement Regulations for IPF Borrowers” (Procurement Regulations) dated July 2016 and revised in November 2017 and August 2018 under the “New Procurement Framework (NPF), and the “Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants”, dated October 15, 2006 and revised in January 2011 and as of July 1, 2016.

23. All procuring entities as well as bidders, and service providers, i.e. suppliers, contractors and consultants shall observe the highest standard of ethics during the procurement and execution of contracts financed under the project in accordance with paragraph 3.32 and Annex IV of the Procurement Regulations.

24. The Recipients shall prepare and submit to the World Bank a General Procurement Notice (GPN) and the World Bank will arrange for publication of GPN in United Nations Development Business (UNDB) online and on the World Bank’s external website. The Recipients may also publish it in at least one national newspaper.

25. The Recipients shall publish the Specific Procurement Notices (SPN) for all goods, works, non-consulting services, and the Requests for Expressions of Interest (REOIs) on their free-access websites, if available, and in at least one newspaper of national circulation in the Borrower’s country, and in the official gazette. For open international procurement selection of consultants using an international shortlist, the Borrower shall also publish the SPN in UNDB online and, if possible, in an international newspaper of wide circulation; and the World Bank arranges for the simultaneous publication of the SPN on its external website.

26. The Project Coordination Unit (PCU) created and housed at the Directorate-General for Civil Protection of the Ministry of Security and Civil Protection, will be responsible for the project planning, financial and procurement management, M&E, and internal auditing. The Coordinator will be responsible for decision making during the procurement process. A Procurement Specialist proficient in World Bank Procurement procedures will be recruited to support the implementation of the project.

27. Filing and record keeping: The Procurement Procedures Manual will set out detailed procedures for maintaining and providing readily available access to project procurement records, in compliance with the Loan



Agreement. The PCU will assign one person responsible for maintaining the records. The logbook of the contracts with unique numbering system shall be maintained.

28. The signed contracts as in the logbook shall be reflected in the commitment control system of the Borrower's accounting system or books of accounts as commitments whose payments should be updated with reference made to the payment voucher. This will put in place a complete record system whereby the contracts and related payments can be corroborated.

29. Project Procurement Strategy for Development: As part of the preparation of the project, the Borrower (with support from the World Bank) has prepared the Project Procurement Strategy for Development (PPSD) which describes how fit-for-purpose procurement activities will support project operations for the achievement of project development objectives and deliver Value for Money (VfM). The procurement strategy is linked to the project implementation strategy at regional, country and state level ensuring proper sequencing of the activities. It considers institutional arrangements for procurement; roles and responsibilities; thresholds, procurement methods, and prior review, and the requirements for carrying out procurement. It also includes a detailed assessment and description of state government capacity for carrying out procurement and managing contract implementation, within an acceptable governance structure and accountability framework. Other issues taken into account include behaviors, trends and capabilities of the market (i.e. Market Analysis) to inform the procurement plan. The activities also require strong technical capability to prepare proper technical specifications in order to avert lack of, or inadequate, market response. This capability – or a plan to enhance it, is considered in the strategy. Special arrangements like direct contracting, use of SOEs, UN Agencies, third party monitors, local NGOs, Force Account, or civil servants needs, results-based arrangements, need for prequalification, if any, are considered and addressed.

30. The recruitment of civil servants as individual consultants or as part of the team of consulting firms will abide by the provisions of paragraph 3.23 (d) of the Procurement Regulations.

31. Special Considerations: Mali is on the harmonized list of Fragile and Conflict affected Situations (FCS) countries and therefore the Project will trigger paragraph 12 of the Policy for Investment Project Financing in order to apply flexibilities and simplification to facilitate procurement implementation. These procurement arrangements therefore draw on the World Bank Guidance on Procurement Procedures in Situations of Urgent need of Assistance or Capacity Constraints issued on July 1, 2016.

32. Procurement Plan: The Recipient and the Implementing Agency prepared a detailed 18-month procurement plan which was agreed by the Governments and the World Bank during the grant negotiations. The Procurement Plan will be updated in agreement with the World Bank Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

33. The Implementing Agency will carry out procurement for the needs to implement the Project for the purpose of the project as included in the Procurement Plan and agreed with the World Bank.

34. The scope of procurement is described in the Project Procurement Strategy for Development and the Procurement Plan agreed by the World Bank and summarized below.

Summary of the Procurement Strategy for Development



Contracts Title, Description and Category	Estimated cost (US\$)	World Bank oversight	Procurement approach/	Selection methods	Evaluation method
Good and services					
Acquisition of vehicles PC10, H5, SAP7, M7	370,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition, installation of (20) automatic synoptic Stations and (10) agro-meteorological stations and installation of required solar energy systems (panels, batteries, and accessories)	1 600,000	YES	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of (5) specialized emergency response vehicles and implementation of transmission mechanisms between vehicles and stations.	475,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition, installation of classical meteorological equipment and supplies	350,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition and installation pollution level sensors and installation lightning detectors (M4 and M3)	500,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of equipment for the calibration lab.	400,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition, installation of telecom equipment (central server, internet connection and VPN) – High performance Computers – High resolution scanner – Digitizer Table A0 – portable GPS – Digital camera – License (M14 and PC8)	300,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of transmission equipment for vehicles and stations	250,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of equipment for the forecasting and calibration center and the recording studio	250 000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of equipment for deploying and commissioning	100,000	NO	National/Open	Request for Quotations	Lowest evaluated cost



Contracts Title, Description and Category	Estimated cost (US\$)	World Bank oversight	Procurement approach/	Selection methods	Evaluation method
solutions					
Internet connection	80,000	NO	National/Limited	Request for Quotations	Lowest evaluated cost
Acquisition of de Motocycles	50,000	NO	National/Limited	Request for Quotations	Lowest evaluated cost
Acquisition office furniture for the Coordination Unit	350,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of computer hardware and various equipment for the management of the project (PCU + SAP)	622,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Acquisition of project management software	50,000	NO	National/Limited	Request for Quotations	Lowest evaluated cost
Acquisition of equipment (analysis kit) identified by the assessment of current observation system for Regional Offices (DRH) to undertake on-site analyses	8,000	NO	National/Limited	Request for Quotations	Lowest evaluated cost
Establishment and implementation of transmission means for vehicles and stations	200,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Setting-up of recording studio	100,000	NO	National/Open	Request for Quotations	Lowest evaluated cost
Equipment for the forecasting and calculation center	250,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Modernization of archive room (equipment and office furniture, etc.)	150,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Setting-up of calibration room.	450,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Works					
Construction works and furnishing of the National Emergency Operation Center (CNOU)	3,670,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Construction works for SAP Office	1,000,000	NO	National/Open	Request for Bids	Lowest evaluated cost



Contracts Title, Description and Category	Estimated cost (US\$)	World Bank oversight	Procurement approach/	Selection methods	Evaluation method
Rehabilitation, Creation of hydrological stations and operationalization of the optimum network	1,541,700	NO	National/Open	Request for Bids	Lowest evaluated cost
Construction works for the forecasting center and electrification of the head office of MALI METEO	1,000,000	NO	National/Open	Request for Bids	Lowest evaluated cost
Rehabilitation of offices of the Division of Monitoring and Management of Water Resources (DNH)	314,135	NO	National/Open	Request for Bids	Lowest evaluated cost
Consultants Services					
Recruit a consultant for study and preparation of operational support to reinforce DNH in its activities of continuous monitoring of the state of rivers and the risk of flooding; master plan on water resources; Establish an inventory of information needs of users and prioritize them	1,891,000	YES	International/Open	Quality and Cost Based Selection	Lowest evaluated cost
Studies and supervision of construction works for the forecasting center and the electrification of the head office of MALI METEO	70,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Study of the rehabilitation of the building for Division of Monitoring and Management of Water Resources	23,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Development of the Application for early warning and for information gathering/sharing	400,000	NO	International/Open	Quality and Cost Based Selection	Lowest evaluated cost
Development of IT solutions for operations management	400,000	NO	International/Open	Quality and Cost Based Selection	Lowest evaluated cost
Recruit a consultant for the training on SARRA Model and modeling	100,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost



Contracts Title, Description and Category	Estimated cost (US\$)	World Bank oversight	Procurement approach/	Selection methods	Evaluation method
Facilitate conservation and dissemination of hydrological products	100,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Architectural and technical studies of the Emergency Operation Center (CNOU) and monitoring of works	400,000	NO		Quality and Cost Based Selection	Lowest evaluated cost
Establishment and implementation of information system for risk management and threats (risk visualization and decision support software)	100,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Technical audits	100,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Financial audits	100,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Revamping of the website of DGPC and posting online an information system on current risks	85,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Diagnostic studies for the adaptation of the urban vulnerability survey tool	80,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Develop and SMS data collection tool	60,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Establishment of a GIS and a database based on data provided by stations	50,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Recruit a consultant to elaborate a manual of procedures	40,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Consultants-specialists in financial management	240,000	YES	National/Open	Selection of Individual Consultants	Lowest evaluated cost
Consultants-specialists in procurement.	240,000	YES	National/Open	Selection of Individual Consultants	Lowest evaluated cost



Contracts Title, Description and Category	Estimated cost (US\$)	World Bank oversight	Procurement approach/	Selection methods	Evaluation method
Consultants-specialists in social safeguards	240,000	YES	National/Open	Selection of Individual Consultants	Lowest evaluated cost
Consultants-specialists in environmental safeguards.	240,000	YES	National/Open	Selection of Individual Consultants	Lowest evaluated cost
Consultants-specialists in Monitoring and evaluation	240,000	YES	National/Open	Selection of Individual Consultants	Lowest evaluated cost
Consultants for detailed technical specifications and integration of project plans for DGPC	205,000	YES	National/Open	Selection of Individual Consultants	Lowest evaluated cost
Architectural and technical studies for the office of SAP and monitoring of works	137,200	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Application development for warning and dissemination tool for hydrological products	132,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Recruit a consultant to translate information and key messages on the monitoring of agropastoral campaign and early warning	115,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Support for the integration of disaster and climate risk management into school and university curricula	80,000	NO	National/Open	Consultant's Qualification Based Selection	Lowest evaluated cost
Recruitment of a technical expert to support the implementation of the National Emergency Operation Center (CNOU)	100,000	NO	National/Limited	Selection of Individual Consultants	Lowest evaluated cost
Recruitment of a technical expert for drafting the specifications of the SAP office	100,000	NO	National/Limited	Selection of Individual Consultants	Lowest evaluated cost

35. Training, Workshops, Study Tours, and Conferences: Training activities would comprise workshops and training, based on individual needs, as well as group requirements, on-the-job training, and hiring consultants for developing training materials and conducting training. Selection of consultants for training services follows the



requirements for selection of consultants above. All training and workshop activities (other than consulting services) would be carried out on the basis of approved Annual Work Plan / Training Plan that would identify the general framework of training activities for the year, including: (i) the type of training or workshop; (ii) the personnel to be trained; (iii) the institutions which would conduct the training and reason for selection of this particular institution; (iv) the justification for the training, how it would lead to effective performance and implementation of the project and or sector; (v) the duration of the proposed training; and (vi) the cost estimate of the training. Report by the trainee(s), including completion certificate/diploma upon completion of training, shall be provided to the Project Coordinator and will be kept as parts of the records, and will be shared with the World Bank if required.

36. A detailed training and workshops' plan giving nature of training/workshop, number of trainees/participants, duration, staff months, timing and estimated cost will be submitted to IDA for review and approval prior to initiating the process. The selection methods will derive from the activity requirement, schedule and circumstance. After the training, the beneficiaries will be requested to submit a brief report indicating what skill have been acquired and how these skills will contribute to enhance their performance and contribute to the attainment of the project objective.

37. Operational Costs: Operational costs financed by the Project would be incremental expenses, including office supplies, vehicles operation and maintenance cost, maintenance of equipment, communication costs, rental expenses, utilities expenses, consumables, transport and accommodation, per diem, supervision costs, and salaries of locally contracted support staff. Such services' needs will be procured using the procurement procedures specified in the Project Implementation Manual (PIM) accepted and approved by the World Bank.

38. Procurement Manual: Procurement arrangements, roles and responsibilities, methods and requirements for carrying out procurement shall be elaborated in detail in the Procurement Manual which may be a section of the PIM. The PIM shall be prepared by the Recipient and agreed with the World Bank not later than within three months of effectiveness.

39. Procurement methods: The Borrowers will use the procurement methods and market approach in accordance with the Procurement Regulations.

40. Open National Market Approach is a competitive bidding procedure normally used for public procurement in the country of the Borrower and may be used to procure goods, works, or non-consultant services provided it meets the requirements of paragraphs 5.3 to 5.6 of the Procurement Regulations.

41. **Guiding principles for procurement:** The Government and the World Bank agreed to mainstream the implementation of the project into the existing legal entity and structure and based on the following principles: (i) DGPC, through its PCU, will be made more responsible and accountable in project implementation with a focus on strengthening country systems; (ii) equity; and (iii) performance-based agreements which make providers accountable for delivering specific results. Procurement activities of the project will be carried out by the procurement unit within DGPC acting as part of the PCU that will report to the Director General of the said institution.

42. Procurement Risk Rating: An assessment of the capacity of DGPC to implement procurement activities for the project was carried out by a World Bank procurement team in December 2017. The assessment found that DGPC has procurement experience from a previous Grant which successfully closed in June 2015. The project will recruit a procurement consultant that will be responsible for procurement in the first year and gradually transfer



responsibilities to a selected procurement officer within DGPC. The consultant will be responsible for both carrying out the necessary procurement procedures, but also to train the designated DGPC procurement staff.

43. The key issues and risks concerning procurement for implementation of the project have been identified and include:

- a. The administrative system as it operates in practice creates opportunities for informal interference in the procurement process by senior officials – creating opportunities for waste, mismanagement, corruption, collusion and fraud;
- b. Government officials likely to be involved in project procurement through tender committees and the national control system ensuring that the rules are respected and able to handle complaints from bidders may not be familiar with procurement procedures according to World Bank guidelines and rules;
- c. Control and regulation mechanism according to the provisions of the Country procurement law and its application procedures could delay the procurement process if mandatory reviews are required;

The overall unmitigated risk for procurement is High. Proposed corrective measures which have been agreed to mitigate the risk are summarized in the following table.

Table 4: Action plan of corrective measures

Ref	Tasks	Responsibility	Due date
1	Prepare a management guide that will include procurement methods to be used in the project along with their step by step explanation as well as the standard and sample documents to be used for each method.	PCU/DGPC	By effectiveness
2	Recruit a procurement consultant with strong experience in World Bank procurement procedures who will provide technical assistance to the DGPC.	PCU/DGPC	3 months after effectiveness
3	Organize a launch workshop involving all stakeholders	PCU/DGPC	3 months after effectiveness
4	Identify the root cause of procurement delays at national level and propose appropriate solutions (global)	PCU/DGPC	At project mid-term review

44. **Contract Management and Expenditure Reports:** As part of the Procurement Management Reports (PMR), PCU will submit contract management and expenditure information in quarterly reports to the World Bank for the project. The procurement management report will consist of information on procurement of goods, works and consultants’ services and compliance with agreed procurement methods. The report will compare procurement’s performance against the plan agreed at negotiations and as appropriately updated at the end of each quarter. The report will also provide any information on complaints by bidders, unsatisfactory performance by contractors and any information on contractual disputes if any. These contract management reports will also provide details on payments under each contract and will use these to ensure no contract over-payments are made or no payments are made to sanctioned entities.



45. The thresholds for particular market approaches and procurement methods are indicated in the below table. The thresholds for the World Bank’s prior review requirements are also provided in the table below:

Table 5: Thresholds for Procurement Methods, and Prior Review

No	Expenditure Category	Contract (C) Value Threshold* [eq. USD]	Procurement Method	Contracts Subject to Prior Review / [eq. US\$]
1	Works	$C \geq 15,000,000$	Open Competition International Market Approach and Direct Contracting	$\geq 5,000,000$
		$200,000 < C < 15,000,000$	Open Competition National Market Approach	None
		$C \leq 200,000$	RfQ	None
2	Goods, IT and non-consulting services	$C \geq 3,000,000$	Open Competition International Market Approach and Direct Contracting	$\geq 1,500,000$
		$100,000 < C < 3,000,000$	Open Competition National Market Approach	None
		$C \leq 100,000$	RfQ	None
3	National shortlist for selection of consultant firms	$C < 200,000$	for Consulting Services	None
		$C \leq 400,000$	for Engineering and Construction Supervision	None
4	International shortlist for selection of consultant firms	$C \geq 200,000$	for Consulting Services	$\geq 500,000$
		$C \geq 400,000$	for Engineering and Construction Supervision	$\geq 500,000$
5	Selection of Individual consultants	All Values	All Approaches	$\geq 200,000$
6	Direct	All Values		As agreed in the



No	Expenditure Category	Contract (C) Value Threshold* [eq. USD]	Procurement Method	Contracts Subject to Prior Review / [eq. US\$]
	contracting			Procurement Plan
7	Training, Workshops, Study Tours	All Values	Based on approved Annual Work Plan & Budgets (AWPB)	Annual Work Plan & Budgets (AWPB)

Note: The thresholds in the above Table are for the purposes of the initial procurement plan for the first 18 months. The thresholds will be revised periodically based on re-assessment of risks. All contracts not subject to prior review will be post-reviewed.

Environmental and Social (including safeguards)

46. **Safeguard Policy triggered and relevant instrument:** The proposed Project has an Environmental Risk Category B investment under the World Bank’s Operational Policy on Environmental Assessment (OP/BP 4.01) and has a moderate environmental risk. OP/BP 4.01 is the only environmental policy triggered under the proposed Project. Impacts would primarily be associated with the installation and rehabilitation of observation equipment and any required establishment of access road or paths to these observation stations. The project will mostly rehabilitate existing hydrological (manual scales and automatic recorders) and meteorological stations (synoptic, meteorological, agro-meteorological, rain gauges) with preference when relevant for keeping the previous/current location (for continuation of homogenous climate series). Civil works associated with such investments may have potential minor risks and adverse impacts. The Borrower prepared and disclosed an Environmental and Social Management Framework (ESMF) to guide the selection of the subprojects. The ESMF clearly defines the environmental and social screening process of all subprojects that will be funded under IDA resources.

47. Potential negative impacts may include: (i) loss of vegetation on construction sites; (ii) accidents and nuisances on construction sites; (iii) pollution of surface waters; (iv) increasing of dust emissions during demolition work; (v) landscape modification of the living environment due to new construction of observation stations; (vi) risk of HIV/AIDS and infectious diseases and (vii) risks of social increase of social conflict in case of site access limitation. Particular attention will be given among other to: (i) Occupational Health and Safety; (ii) Safe handling and disposal of industrial wastes hazardous, and management of other solid and liquid wastes; (iii) Gender Based Violence and (iv) Grievance redress management.

48. **Institutional arrangement for safeguards implementation:** The PCU will hire a skilled and full time Social Development Specialist and a skilled and full time Environmental Safeguard Specialist with the role and responsibility to ensure project’s compliance on social and environmental safeguards. It recognized that DNACPN has extensive experience monitoring World Bank funded operations in Mali and has therefore continuously dealt with World Bank Safeguards Specialists both in terms of projects preparation and implementation as well as safeguards training sessions. The PCU will engage with DNACPN a permanent dialogue that will clarify the role and responsibilities of both parties in the safeguard’s compliance. All sub projects will be systematically subject to safeguards screening that will decide which safeguards instruments is relevant for the sub-project environmental and social risks and impacts mitigation measures.



49. The Project Implementation Manual will detail the safeguards screening and mitigation process, the Gender Based Violence management and the grievance redress mechanism.

50. Technical **feasibility studies and preparation of site-specific safeguards instruments Alignment**. The consultants in charge to complete technical feasibility studies will work closely with the consultants working in the preparation of site Environmental safeguards specific instruments to ensure alignment during the project implementation and to avoid unnecessary delays.

51. **Consultation and disclosure**: During the preparation of the ESMF, the main stakeholders were consulted. The ESMF was prepared, reviewed and disclosed in Mali and at the World Bank website prior appraisal. The consultation of the main stakeholders will continue throughout during the project implementation period.

52. **Environmental and Social safeguards monitoring**: Regular monitoring reports on the implementation of environmental and social safeguards provisions will be provided to the World Bank for review. These reports will be verified during project supervision missions.

Monitoring and Evaluation

53. As with all World Bank Investment Project Financing, a detailed result monitoring framework will be developed to assess progress towards the Project Development Objective (PDO) through key indicators; while intermediate indicators will monitor the progress of each component over the life of the Project. The detailed methodology for calculating indicators will be provided in the Monitoring and Evaluation Manual that will be developed by the Government of Mali.

54. Project progress will be monitored by the Project monitoring and evaluation team based on official data sources monitored directly by MALI METEO, DNH, SAP and the DGPC, with the assistance of the national platform for disaster risk management and guidance from the PSC, using the NTC. In addition, a number of individual evaluations will gauge progress towards the PDO, assess the impact of the Project on the beneficiaries, assess the quality of the work carried out its different components, and evaluate overall project efficiency.

55. The project will integrate digital platforms for data collection and dissemination (weather and climate data, warnings, tailored information for decision making) for farmers as well as for flood early warning system in rural and urban areas. It will support the development of digital skills on weather and climate

56. For real-time data collection and analysis, the project will implement the Geo-Enabling method for Monitoring and Supervision (GEMS). The GEMS method enables project teams to use open source tools for in-field collection of structured digital data that automatically feeds into a centralized M&E system. The integrated data can include any kind of indicators, based on tailor-made forms; photos, audio, videos; time and date stamps; and GPS coordinates that allow for automated geo-mapping of the information. Using these tools systematically allows the project to enhance the transparency and accuracy of M&E and increase the accountability of third-party monitoring.



57. The Grant Agreement will detail the reporting requirement of the Government of Mali vis-à-vis the World Bank in accordance with the provisions of Section 2.06 of the Standard Conditions and on the basis of the indicators acceptable to the World Bank. Each Project Report shall cover the period of one calendar semester and shall be furnished to the World Bank not later than one month after the end of the period covered by such report. The Mid-Term and Completion Reports shall be furnished to the World Bank no later than six months after the Mid-Term / Closing Date. The indicative timeline is as follows:

Milestones	Expected Dates
Start of Project Implementation	09/01/2019
Interim Evaluation	07/15/2021
Project Completion	06/15/2024
Final Evaluation	12/15/2024

58. Additionally, there will be a project management milestone chart to ensure administrative and implementation related activities are completed on schedule. The project implementation units may also explore the installation and use of a more systematic Critical Path Method (CPM)- based software for the physical and financial progress monitoring of various sub-components and sub-projects within.

Role of Partners (if applicable)



ANNEX 2: IMPLEMENTATION SUPPORT PLAN

COUNTRY : MALI

Mali Hydrological and Meteorological Services Modernization Project

Strategy and Approach for Implementation Support

1. The Project Implementation Manual (PIM) will present the main implementation modalities and institutional arrangements to support those modalities. The PIM and its adoption are considered as standard operating procedures for the project. The strategy of the Implementation Support Plan (ISP) has been developed according to the nature and the characteristics of the project, as well as its risk profile. The strategy focuses on the principal risks identified and the agreed risk mitigation measures described in the SORT. It will also provide the technical advice necessary to facilitate achieving the PDO. The ISP also identifies the minimum requirements to meet the World Bank's fiduciary obligations.

Implementation Support Plan and Resource Requirements

2. **Collaboration** with other key stakeholders and the government is a central factor for Project implementation. The Government has developed several key policies and has created and/or strengthened national institutions that are directly linked to decentralization, poverty reduction, and local development planning.

3. **Technical support:** Technical support will be provided to the implementing partners in general, and the PCU, in particular. This will ensure compliance with different agreed modalities and procedures. On the other hand, experts of the PCU will provide regular inputs to the agencies in each of these activities.

4. The World Bank will provide continuous extensive technical support through participating in the project implementation support missions, Mid Term Review (MTR). This support will be crucial to the identification of the main factors that may hinder the proper implementation of the activities. The support will include a continuous assessment of risks (outlined in the SORT), fiduciary requirements and inputs, and safeguards. The World Bank team will also support the implementation of the agreed Governance and Anti-corruption Plan and provide guidance in resolving any issues identified.

5. **Procurement:** Implementation support will include the following elements: (a) providing training; (b) reviewing procurement documents and providing timely feedback to the Procurement staff; and (c) providing detailed guidance on the World Bank's Procurement Guidelines to the PCU; and (d) monitoring procurement progress against the detailed Procurement Plan.

6. **Financial Management:** Support will include the provision of training to the concerned financial management staff, including consultants and reviewing the project financial management system (on a semi-annual basis), including accounting, reporting, and internal controls. The current financial management staffing arrangement under DGPC will be reinforced to implement the project. In the perspective that the project generates a workload, this FM team should be reinforced through the recruitment of a chief financial officer and an internal auditor. The



work-program of the Internal Audit Unit will be revised within three months after the project effectiveness to take into consideration the new project specificities. The team will have the overall FM responsibility over, budgeting, accounting, reporting, disbursement, internal control and auditing. The project will recruit a financial management consultant that will be responsible for financial management and accounting in the first year of the project. This consultant will also be responsible for training DGPC staff in the PCU, who will progressively take over this function as they become more familiar with World Bank Financial Management procedures and standards.

7. FM Implementation support missions will be consistent with a risk-based approach and will involve a collaborative approach with the project team. A first implementation support mission will be performed six months after project effectiveness. Afterwards, the missions will be scheduled by using the risk based approach model and will include the following: (i) monitoring of the financial management arrangements during the supervision process at intervals determined by the risk rating assigned to the overall FM Assessment at entry and subsequently during Implementation (Implementation Status and Results Report - ISR); (ii) integrated fiduciary review on key contracts, (iii) review the Interim Financial Reports (IFRs); (iv) review the audit reports and management letters from the external auditors and follow-up on material accountability issues by engaging with the task team leader, Client, and/or Auditors; the quality of the audit (internal and external) also is to be monitored closely to ensure that it covers all relevant aspects and provide enough confidence on the appropriate use of funds by recipients; and, (v) physical supervision on the ground; and (vi) assistance to build or maintain appropriate financial management capacity.

8. **Procurement:** In addition to the prior procurement review carried out by the World Bank, the procurement specialist recommends at least one mission every six months for the first two years and one mission every year for the next years to provide support to the implementation of procurement activities. This support will include not only the organization and functioning of the procurement unit but also the implementation of procurement activities listed in the procurement plan. One post-review of procurement activities will be carried out every year. As agreed with the Government, contracts will be published on the web. Annual compliance verification monitoring will also be carried out by an independent consultant and would aim to: (a) verify that the procurement and contracting procedures and processes followed for the project were in accordance with the Financing Agreement; (b) verify technical compliance, physical completion and price competitiveness of each contract in the selected representative sample; (c) review and comment on contract administration and management issues as dealt with by the implementation entity; (d) review capacity of the implementation entity in handling procurement efficiently; and (e) identify improvements in the procurement process in the light of any identified deficiencies.

9. **Safeguards:** Support to environmental and social safeguards will need staffed missions to project sites twice a year. Implementation support for safeguards team in the immediate term will include recruiting two full-time Environmental and Social Safeguards consultants for the implementation of the project, to assist with training and capacity building for the PCU, and to help the establishment of a partnership with the Ministry of Environment (for the approval of studies and external monitoring). The consultants will support the performance of the PCU, to ensure that full environmental and social functions are carried out in a timely and effective manner, including:

- a. Ensure the PCU takes ownership over the implementation of the environment and social management;
- b. Ensure that companies respect the environmental commitments laid out in the ESMF and RPF;
- c. Carry out site visits of construction sites to ensure social and environmental measures are addressed;



- d. Intervene urgently to any incident or accident that requires verification and monitoring;
- e. Notify any breach of the commitments to environmental and social management;
- f. Inform affected communities and NGOs of their rights regarding the implementation of the project;
- g. Ensure that the complaints of the population are identified and properly addressed;
- h. Ensure that national regulations and safeguard policies of the World Bank are respected in the phases of preparation and during the work.

10. The project should make provisions to ensure consultants are available to complete the Environment and Social Management Plan and make sufficient budget allocations. In addition, it is suggested to carry out technical inspections of the safety of the infrastructure through the regular monitoring, supervision and evaluation of the project. Support will also be provided to strengthen the environmental and social capacities of members of the Project Steering Committee by organizing awareness sessions and training on environmental and social safeguard documents.

11. To ensure documents are shared and backed-up as necessary, the project will organize a training workshop and capacity building of stakeholders involved in environmental and social management of the project. Furthermore, the workshop will help participants understand the environmental and social challenges of the project and potential impacts, environmental regulations applicable to the project; guidelines and backup tools from the World Bank; the provisions of ESMF, the procedure for selection and environmental responsibilities in the implementation of good environmental and social practices; environmental monitoring of construction sites and environmental monitoring.

12. Monitoring and Evaluation: Adequate support to M&E activities will need staffed missions to project sites at least twice a year. The PCU will be responsible for the overall coordination of M&E activities, their consolidation, and the preparation of periodic fiduciary and M&E reporting, including impact and output indicators as well as annual audit of project's financial statements. Under the M&E plan, units of measurement, baseline values, targets, frequency, data source/methodology and responsibility for data collection will be defined for each outcome indicator and each intermediate level indicator. The data is expected to inform semi-annual implementation support missions to track project progress in terms of outcomes in the implementation status and results (ISRs) reports, and for the final evaluation of the project in the implementation completion and results (ICR) report. Reporting and use of M&E data as well as assessment of capacity will be described and rated in the ISRs, and will be reviewed at project mid-term.

13. M&E capacity support under the project will include technology, equipment, training on data collection, content management, information updates and basic system troubleshooting and maintenance. The M&E specialist of the PCU will be supported with a consultant if necessary during the first year of the project. Efforts will be made to fully empower national institutions in the M&E of the project outcomes, ensuring that it is strongly linked to the national M&E system. The PCU will be responsible for producing timely and pertinent information that will become key management tool for decision makers.

14. **Overall project management:** The Task Team Leader (TTL), with the support of the Country Office and other colleagues, will provide regular supervision of all operational aspects, as well as coordination with the client and among World Bank team members. It is projected that a total of three implementation support missions will be required the first year of implementation, and two missions per year thereafter over the project period. The ISP



will be reviewed at least once a year to ensure that it continues to meet the implementation support needs of the project.

15. Implementation support missions, carried out on a regular basis by World Bank teams, will entail routine quality checks at various stages of implementation. Periodic monitoring will include process reviews/audits, reporting of outputs and maintaining updated records. Broad thematic areas that will be supervised and monitored include the following: (i) Social and Environmental Monitoring, (ii) Regular Quality Supervision & Certification, (iii) Periodic Physical Progress Monitoring & Third-Party Quality Audit, and (iv) Results Monitoring and Evaluation.



ANNEX 3: Economic and Financial Analysis

COUNTRY: MALI

STRENGTHENING CLIMATE RESILIENCE IN MALI PROJECT

1. Significant economic gains are anticipated through the successful implementation of this Project in Mali. The gains are associated with (i) the results of more accurate mapping of risks (flood and food security), (ii) better early warning systems, (iii) stronger preparedness mechanisms, and (iv) more efficient responses. These outcomes are translated into reduced losses from flooding and droughts and enhanced productivity, particularly in agriculture. From a user perspective, the project would provide an opportunity to substantially improve key services to sectors such as water resources, hydropower, aviation and agriculture. Based on expected improvements in the forecasting and early warning services, the main benefits that the economic analysis is expected to measure will be: (a) reduction in economic losses caused by floods; (b) reduction in drought losses and increased agricultural productivity; and (c) increased efficiency of civil protection and food security interventions due to enhanced preparedness and accuracy of targeting of relief operations.
2. Based on these improvements in the forecasting, early warning services, and emergency responses, the main benefits that this economic analysis include:
 - a. The reduction of economic losses caused by floods was calculated to be US\$2.6 million annually, over 10 years. This was based on the assumption that early warning systems provided by DNH and DGPC would give households additional lead time to evacuate and move main household assets (cars, motorbikes, televisions, etc.) to higher ground, therefore reducing flood losses by 5 percent. Global experience indicates a conservative overall range of 5-8 percent potential reduction of impacts. For example, a reduction of 8.5 percent was estimated in Russia² and 10 percent for flooding in southeastern Europe³, while Subbiah et al (2009)⁴ reported an overall potential reduction due to early warning of 3.6 percent of total damages. This project will not uniformly increase early warning system lead times throughout the country down to the local level, and may not be perfectly accurate, a conservative estimate of 5 percent was therefore selected for the purposes of this calculation. Average annual flood losses (US\$52 million) was calculated based on a combined average of two data sources: (i) average annual losses reported by the Government between 2005 and 2012 (US\$60 million) and (ii) average annual losses estimated by UNISDR using probabilistic method based upon Government estimates between 2005 and 2014 (US\$45 million).

- b. Reduced drought losses, combined with increased agricultural productivity, were estimated at US\$19.5 million annually. This estimation was based on the assumption that improved seasonal forecasting, agro-meteorological information systems and enhanced food security early warning system would improve farmer productivity and reduce crop losses. Since crop loss data were not available, the

² World Bank (2005). Russian Federation Hydromet Modernization Project. Project Appraisal Document, Report No. 3 1465-RU, Washington, D.C.

³ World Bank, UNISDR, WMO & FMI (2008). Strengthening the Hydrometeorological Services in South Eastern Europe. South Eastern Europe Disaster Risk Mitigation and Adaptation Programme.

⁴ Subbiah, A.R., Bildan, L., Narasimhan, R. (2009). Background Paper on Assessment of the Economics of Early Warning Systems for Disaster Risk Reduction. World Bank-UN Project on the Economics of Disaster Risk Reduction, GFDRR, Washington.



calculation was based on existing agricultural production data, estimating the combined increase in farmer efficiency and reduced agricultural losses, as an increase of the overall national agricultural output by at least 0.5 percent. This estimation is based on a study of Hallegatte (2012), which employed a benefit-transfer approach to develop estimates of the benefits and costs of improving hydro-meteorological information and early warning systems in developing countries. In terms of productivity increase, Hallegatte (2012) determined that in Europe, weather forecasts have led to value-added gains between 0.1 percent and 1.0 percent in weather-sensitive sectors. The mid-point of this estimate was therefore applied to Mali but may potentially be higher since the production increases are more significant in developing countries such as Mali. The agricultural production of Mali is estimated at US\$ 3.9 billion in 2012 based on World Bank data.

c. The increase in efficiency of humanitarian food relief interventions, due to enhanced preparedness and accuracy of targeting, was calculated to amount to US\$0.7 million per year, over 10 years. The assumption is based on estimated efficiency gains estimated at an increase by 0.5 percent, due to enhanced accuracy of food security targeting system, combined with increased coordination and prepositioning of food relief assets. The estimated food security needs for 2015 was used as the baseline and were estimated at US\$142 million, both in terms of government reserves and international donor support, based on aiddata.org information. This is also the case when comparing to other data related to losses in previous drought years, such as 2011, where losses were estimated at US\$150 to 200 million; while the 2004/5 drought resulted in US\$380-480 million (16.4 percent productivity reduction). Food aid is provided to Mali even in years without major droughts, which is why an increase in efficiency of only 0.5 percent was chosen.

3. Additional benefits have been identified in a qualitative manner, identifying potential benefits in economic, social or environmental terms. Most of these benefits are considered as indirect consequences of activities proposed under the present operation. Often, this means that the realization of these benefits is greatly enabled by the modernization of hydrological and meteorological services but remain conditional on the implementation of additional targeted activities. Other benefits are simply hard to quantify due to conceptual or data limitations and are therefore described in this section from a qualitative perspective. The following co-benefits have been considered:

- With hydropower producing about one-quarter of the country's electricity, efficiency gains in production can be anticipated due to river flow forecasting information, resulting in improved management and operation of hydropower dams. Further downstream benefits may also include incentives for private investments and making strides towards electrification objectives in both rural and urban areas.
- More efficient water resources management will support irrigated agriculture, water supply, watershed management, including support to environmental flows, erosion control, etc.
- Potential for improved hydro-meteorological information and modeling to inform infrastructure design, such as roads.
- Hydro-meteorological services provide data and products that contribute to the safety of aviation operations, both nationally and internationally. The measurements and forecasts of conditions en route and at, or on the approach to, terminal aerodromes are useful for minimizing aircraft operating costs.
- Social benefits may also accrue to the most vulnerable, with timely and adapted post-disaster



interventions preventing mid- and long-term impacts on various well-being dimensions: health (e.g. disease outbreaks), nutrition, psychological impacts, and education.

- Last, but not least, improving hydro-meteorological information and services has the potential to reduce background risk and consequently boost investments and growth in key economic sectors (second dividend of resilience).

4. Partial cost-recovery through customized climate and weather information products can be contemplated as a commercial activity as part of the longer-term business plan of MALI METEO. However, this may not be achieved during implementation of the Project due to the time needed to graduate to a level of maturity needed to produce high-quality marketable services aimed at private sector users.

5. The public-sector financing is entirely justified and necessary because this project will strengthen the delivery of a public good - hydro-meteorological data and services - which is critical for sustainable development, medium- and long-term adaptation planning for environment, social and economic development, and protection of vulnerable communities, their assets and livelihoods. hydro-meteorological services have an official mandate for climate information and forecasts, weather reports and early warnings, to deliver in the public sector. This has remained a core government function across countries and regions. Moreover, the cross-cutting near-term and mid-term benefits accruing from improved hydro-meteorological services to core development sectors of agriculture, water management, energy, transportation and health are sufficient rationale for this public-sector investment, which will have a high economic return on investment in net terms.

Financial Analysis

6. By comparing the costs and benefits of the Project, an understanding of the relative value of the planned investments over time can be generated. While the implementation phase of the Project is 5 years, for this analysis, it is assumed that the project impact is 15 years. This assumes that equipment such as computers would have an average life of 3-4 years, vehicles and hydro-meteorological stations would have an average life of 7-10 years, while new buildings would have a much longer life-span, in the range of 30-40 years. An average of 15 years is therefore taken. Operations and Maintenance (O&M) costs are assumed at 15 percent of project investments. O&M costs thus increase linearly over the first 4 years as cumulative project investments are made, reaching a constant 15 percent of total capital costs during years 5-15. Benefits are assumed to increase linearly starting from year 2, reaching a constant maximum for years 5-15.

7. Since Mali's GDP growth rate has been on average 4.5 percent in the past decade, a discount rate of 5 percent is used to calculate the Net Present Value (NPV). This is justified by the fact that although there is high potential for future growth in the country, there are also high risks caused by potential climatic, political and price shocks. A 5 percent discount rate represents an understanding that future costs and benefits are relatively important in comparison to the current situation – concurrent with concerns regarding climate change.

8. The NPV, which is the difference between the discounted total benefits and cost, was calculated to be US\$124.4 million, with a discount rate of 5 percent. This represents a benefit-cost ratio of 1 to 5. The Internal Rate of Return (IRR), which is the discount rate that zeroes out the NPV, or the interest rate that makes the



NPV of all cash flows equal to 0, was calculated to be 65 percent.

9. The following sensitivity analysis was carried out, as illustrated in the table below. The below analysis demonstrates that even with both a decrease in benefits by 20 percent, combined with an increase in operations and maintenance (O&M) costs by 20 percent, the internal rate of return remains high (60 percent). And even when combining this with the highest (15 percent) discount rate, the Net Present Value exceeds the costs of the project by 34 percent, demonstrating a benefit-cost ratio of 1.3 to 1 at the minimum.

Table 4: Sensitivity Analysis – Net Present Value and Internal Rate of Return

	NPV (0%)	NPV (5%)	NPV (10%)	NPV (15%)	IRR
Baseline	\$203.60	\$124.39	\$78.88	\$51.55	65%
20 % decrease in benefits	\$148.88	\$89.29	\$55.23	\$34.90	49.64%
20 % increase in O&M costs	\$194.60	\$118.62	\$74.99	\$48.81	62%
20% decrease in benefits & 20% increase in O&M costs	\$139.88	\$83.52	\$51.34	\$32.16	47%



ANNEX 4: Specific Project Design Analysis

COUNTRY: MALI

STRENGTHENING CLIMATE RESILIENCE IN MALI PROJECT

1. Several institutions are involved in the monitoring, elaboration and forecast of weather and climate information, products and services. These institutions are direct partners of the project:
2. MALI METEO is an autonomous agency under the Ministry of Equipment and Transport. It has the mandate to provide reliable and timely weather and climate information as well as appropriate services to public and private users. Their network of meteorological observations includes 60 synoptic stations, 4 weather radars, 54 agro-meteorological stations, 214 rainfall observation stations, 2 systems to receive METEOSAT Second Generation satellite images (with the support of WMO, EUMETSAT and AGRHYMET). USAID funded a detailed assessment of MALI METEO in 2014. It highlighted the precarious financial and staffing situation of the agency, as well as the obsolescence of the network of meteorological and agro-climatological stations, leading to inadequate services to communities. The assessment concluded that the spatial resolution, number of monitored parameters and reliability of land-based synoptic, climate and agro-meteorological stations are inadequate to address users' needs. Many observation systems including radars are nonfunctional or not used for weather forecasting. Field visits revealed that communication systems are unreliable and slow, with frequent power outages.
3. The National Directorate for Water Resources (DNH) is part of the Ministry of Energy and Water (MEE) and is responsible for water resource management and regulation in Mali. DNH's responsibilities include inventory and evaluation of water resources development potential within the framework of the National Plan; oversight of studies for, and supervision of, the construction of hydraulic works and their proper operation and management; evaluation of development projects in the water sector; and participation in sub-regional bodies and initiatives to manage water resources. In addition, DNH supervises and coordinates the work of regional and sub-regional offices that provide water services; maintains a documentation and information center; and runs the Water Quality Laboratory. The hydrological network has 140 stations but only 103 stations are operational. Apart from the Niger and Volta-HYCOS stations, only one station in Mali is equipped with a water level recorder. Except for the 15 Niger-HYCOS stations, the rating curves have not been controlled for more than 10 years, meaning that the sparse data collected is of unreliable quality.
4. Serious infrastructure and capacity bottlenecks are impeding provision of quality hydrological data and information services to users of water resources. For example, DNH maintains a database on boreholes, which is regularly updated but suffers from location errors. There is no hydrological modeling or flood forecasting capability in the country. There is no operational data exchange with MALI METEO, which can help develop such products.
5. Food security and nutrition monitoring is carried out by the Early Warning System (SAP), under the Office of the President. It was created through the Cereals Market Restructuring Program (PRMC) in 1980s. In 2002, Mali developed and adopted the National Food Security Strategy (SNSA), which was the basis for creating the Food Security Commission (CSA) in 2003. Chaired by the Prime Minister, the CSA establishes food security policies, implements the national food security strategy, and provides coordination during food security crises. The current mandate of SAP makes it responsible for the monitoring of food production and availability situation, determining



areas at risk, and identifying vulnerable populations. SAP coordinates information obtained from over 20 members of its network, including regional agencies, international organizations and NGOs. The EU supported a comprehensive audit and restructuring proposal for SAP (food security), which has recommended improving the involvement of local staff in information analysis to ensure benefits are realized by the local stakeholders. Food Security early warning system in Mali faces the following limitations: (i) Low inclusion of vulnerability assessment in food and nutrition security in urban and peri-urban areas; (ii) low capacities of decentralized SAP's actors in terms of collection and transmission of information; (iii) shortage of qualified personnel and insufficient financial resources to carry out all evaluations and survey; and (iv) tools to collect and communicate are obsolete.

6. The Directorate General of Civil Protection (DGPC) is a part of the Ministry of Security and Civil Protection, and is the coordinating body for disaster risk management, including emergency preparedness, response and longer-term prevention activities. The DGPC's primary mission is to develop action plans under the National Civil Protection Policy and to ensure its implementation, while also ensuring inter-ministerial coordination for mainstreaming disaster risk management and climate change adaptation among sector-specific activities. The strengthening of technical (meteorological, hydrological, food security) services brings benefits in terms of saving life and building resilience if civil protection services have an upstream engagement in the process. In Mali, the national strategy for disaster risk management provides a large mandate to civil protection services. However, civil protection services lack critical infrastructure (incident coordination room, data management systems) to be able to work with their focal points from different ministries to prevent, prepare for or respond to a disaster.

7. These four institutions suffer from the following weaknesses: (i) Low funding from government for development and maintenance of infrastructure, observing systems, forecasting tools, staff competencies, and service delivery mechanisms; (ii) Lack of adequately qualified and trained personnel and low capacity of these agencies to undertake continuous modernization resulting from rapid advances in science and technology; (iii) Limited cooperation among the agencies involved in EWS; (iv) Limited recognition of the socio-economic value of NMHSs and their services; (v) Limited recognition of the socio-economic value of NMHSs and their services; (vi) Limited services delivery to communities; (vii) Lack of effective mechanisms for collaboration between public and private sectors; and, (viii) Lack of communication and service delivery mechanisms. In addition, SAP faces the challenges of (i) lack of inclusion of urban and peri-urban areas, (ii) inadequate information management systems, and (iii) ineffective communication of early warning to the affected population. DGPC is still facing problems for effective implementation of its coordination mandate due to pending legislation;

8. The needs for modernizing weather, climate, food security and disaster risk management services in Mali are substantial and have been formulated in different institutional assessments for the government and development partners over the years. Among others, USAID financed in 2013 and 2014 an institutional review of the national hydro-meteorological services. EU supported a diagnosis of the national mechanism for food security, while other organizations, notably WMO have provided continuous support for formulating the institutional needs of the involved national entities. These provide an overview of the investment needs of the involved national entities, considering infrastructure investments and strengthening human resources and service delivery aiming at institutional sustainability. The main constraints pointed by the Government of Mali are the lack of resources to ensure regular operational budget to the Agencies as well as for investment in modern equipment and technologies. The following SWOT analysis presents the current situation of the four entities responsible for hydro-meteorological services and disaster risk management.



Table 1: SWOT Analysis of responsible entities

<p>Strengths</p> <ul style="list-style-type: none"> • The Strategic Framework for Growth and Poverty Reduction (CSCR 2012-2017), specifically identifies flood and drought hazards, and the resulting food insecurity, as significant barriers to addressing poverty reduction; • MALI METEO and DNH are sole designated national authorities on matters relating to meteorology, climatology and water resources; • MALI METEO and DNH own and operate the basic observing systems according to international standards, participating at regional and global levels to the understanding of weather, water and climate phenomenon; • SAP coordinates information obtained from over 20 members of its network, including both regional agencies, international organizations and NGOs; • DGPC is responsible for issuing early warning to the population at risk • Climate information at various time scales is required for adaptation. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low funding of MALI METEO, DNH, SAP and DGPC from government for development and maintenance of infrastructure, observing systems, forecasting tools, staff competencies, and service delivery mechanisms; • Low capacity of these agencies to undertake continuous modernization resulting from rapid technological advances; • Lack of adequately qualified and trained personnel; • Limited cooperation among the agencies involved in EWS; • Limited recognition of the socio-economic value of NMHSs and their services; • Limited services delivery to communities; • Lack of effective mechanisms for collaboration between public and private sectors; • Lack of communication skills; • SAP lacks inclusion of urban and peri-urban areas, (ii) inadequate information management systems, and (iii) ineffective communication to the affected population. • DGPC facing problems for effective implementation of its coordination mandate due to pending legislation.
<p>Opportunities</p> <ul style="list-style-type: none"> • Strong Government ownership; • Growing awareness of the public and the decision makers on the value added of and growing demand for weather and climate services; • Existence of development partners and funding agencies as a potential source of resources; • Strong need for improved services; • Climate change is a high level political and developmental issue at national, regional and international levels; • Existence of regional and sub-regional institutions to strengthen partnerships and coordination. 	<p>Threats</p> <ul style="list-style-type: none"> • Inadequate budget lines; • Continued lack of visibility; • Lack of personnel policy aimed at retention, retraining and incentivization; • Agencies continuing business as usual without a end-user-oriented strategy; • Emergence of alternative sources that issue climate and weather information not built on international scientific consensus and the without contributions to the national observations infrastructure; • High staff turn-over.

9. The design of the system duly considers the value chain of hydro-meteorological services and aims at strengthening end-to-end hydro-meteorological systems from observation networks, data management systems, forecasting systems to service delivery. The project therefore targets: (i) institutional strengthening and capacity building; (ii) infrastructure and network improvements at scale and; (iii) enhancement of the knowledge and service delivery to end-users.



10. Key services that will be delivered by project are: (i) early warning for flood risk in selected urban area(s) and vulnerable populations in one of the main river basins of the country; (ii) food security early warning in 15 municipalities (districts) selected amongst the most vulnerable to drought; and (iii) tailored agrometeorological services (pilots) in selected areas and crops.

Table 2: Services provided by each entity as part of the project (new service and/or improved)

Producer	Services
MALI METEO	Agro-meteorological service to targeted agriculture producers (cotton, maize, sorghum, rice, etc.) through mobile, voice and SMS application
MALI METEO	Mobile application to general public
MALI METEO	Meteorological services to transport and energy companies (indirectly provided by the activities of this project)
MALI METEO, DNH	Flood forecasting service in one selected cities and vulnerable communities of one selected river basin (like Niger basin)
CSA/SAP	Food Security service to CNSA, GTP, council of government ministers, Ministry of Agriculture, UN agencies, NGOs and decentralized agencies through monthly newsletters, food insecurity maps (harmonized framework), information sharing platform, mobile applications, radios, awareness sessions and website. Development of a mobile application for data collection and transfer at the central level.
CSA/SAP	Food Security service to decentralized agencies and public through monthly bulletins, Agri-Alert application, mobile application, radios and sensitization sessions
CSA/SAP	Mobile application to collect and transfer data to central level
DGPC	Mobile application to general public Watch for alert signals on the Call Processing Centers Dematerialized distribution of the Daily Civil Protection Bulletin with short-term vigilance indices

11. The design of the observation networks will consider automation and telemetry systems and be significantly enhanced by installing (i) surface meteorological and lightning detection network (Automatic Weather Stations (AWSs), agro-met stations, rain gauges, lightning detectors, standard equipment, power supply, telecoms for filed stations, etc.), and (ii) automatic hydrological stations (data collection platforms, automatic stage recorders) and specialized hydrological equipment for rivers and small flood-prone watersheds (including urban). The data obtained from the enhanced observation networks will be quality assured by establishing a calibration facility and will feed into the data management and forecasting systems, where modernizing Information and Communications Technology (ICT) infrastructure is at its core. The monitoring and evaluation in chronically food insecure zones will be enhanced by the provision of technical equipment and materials to collect, analyze, archive and disseminate information.

12. Staff of MALI METEO will enhance their capacities by providing last mile delivery in cooperation with private companies like telecom operators and media in general to disseminate the information but also like agro industrial



companies to co-develop new services sharing added value to produce meteorological services to support all stakeholders. To succeed on this last mile delivery, MALI METEO will especially improve its observing network and IT capacities to better forecast extreme events. All the following elements of the value chain will be improved or created: (i) human resources through initial and continuing training, (ii) observing network with synoptic stations (20), agro-meteorological automatic stations (10), (iii) radio sounding, (iv) access to RainCell data, (v) local data concentration, global data access through satellite reception and telecommunications facilities to exchange data with WMO and with following information system, (vi) numerical weather prediction with downscaling of global forecast, and (vii) information systems for the different expert domain (climatology, forecast, service production, meteorological services dissemination). MALI METEO will finally improve its last mile delivery by identification of end-user's needs, training and user awareness, local community's sensitization and feedback mechanisms.

13. DNH staff will enhance their service delivery by providing more accurate and timely data and cooperating with MALI METEO to develop and operate an early warning system for flood. DNH will improve its observing network with level of water and current measurements in the rivers. DNH will improve its flood modelling in selected areas after assessing the vulnerability of these areas. To realize that, DNH will (i) map the risk areas, (ii) define their vulnerability, and (iii) forecast the flow evolution in real time. DNH, together with MALI METEO, will finally improve its last mile delivery by identification of end-user's needs and dissemination of services using the appropriate media through mobile operator, TV, radio and Internet.

14. DGPC will be a key beneficiary of the data produced and distributed by MALI METEO and DNH. The project will support the development and operation of a 24/7 monitoring and emergency system. Following the recommendations of the National Code of Alert, the DGPC will play a significant role in disseminating the alert to the population both by technological and on the ground means. By providing real time and uninterrupted surveillance and strengthening immediate emergency response, the Project will contribute to the DGPC mandate to protect people, assets and the environment as well as to deploy on the ground preventive measure and support of the affected populations with timely interventions (immediate emergency response). The availability of real-time situation data will allow DGPC to optimize the limited resources available for rescue operations. The project will support the installation and operationalization of the Operational Center. The Operation Center will allow the optimization of field rescue operations, by readjusting in real time staffing and equipment to the evolution of the emergency.

15. CSA/SAP staff will enhance its capacities by providing accurate and timely data to produce national Harmonized Framework on food security and to support national and local leaders to take actions accordingly. The CSA /SAP will improve its communication system by (i) identifying means and tools used by local populations and smallholder's farmers, (ii) selecting tools and ways of communication, and (iii) identifying keys partners to receive and disseminate information on agro-meteorology, agricultural production and food security. A feedback, as well as satisfaction mechanisms will be set-up between the central and local levels. This is a key project component in terms of gender mainstreaming and focuses on impacts for end-beneficiaries and their capacity to understand and react to warnings. The better inclusion of women in the hydro-meteorological services and decision-making on an equal footing to men would improve productivity and climate risk resilience. In case of emergency, facilities and information will be in place to prevent and address gender-based violence.

16. To achieve these results the coordination amongst data producers and users is essential. The project foresees to put in place the following flows of information for each one of the three key services (Figures 1 - 3).



Figure 1: Flood Early Warning System - Information and Service Flow

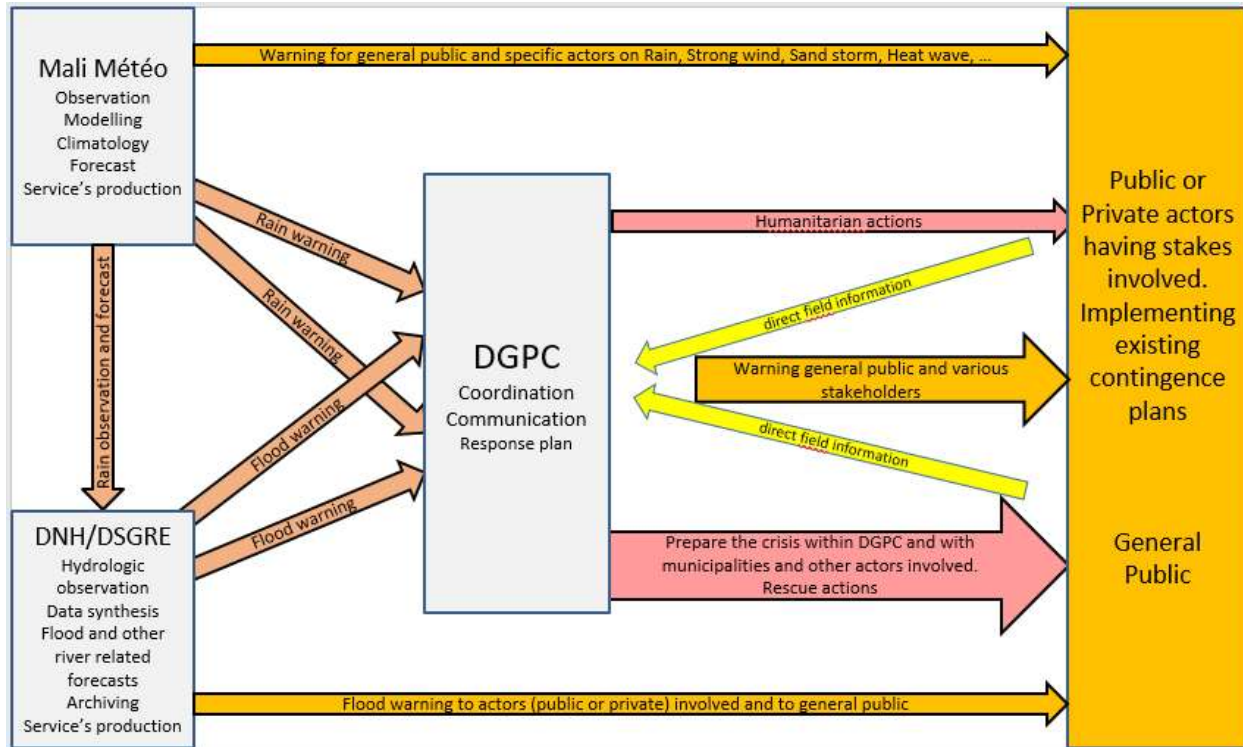




Figure 2: Food Security Early Warning System - Information and Service Flow

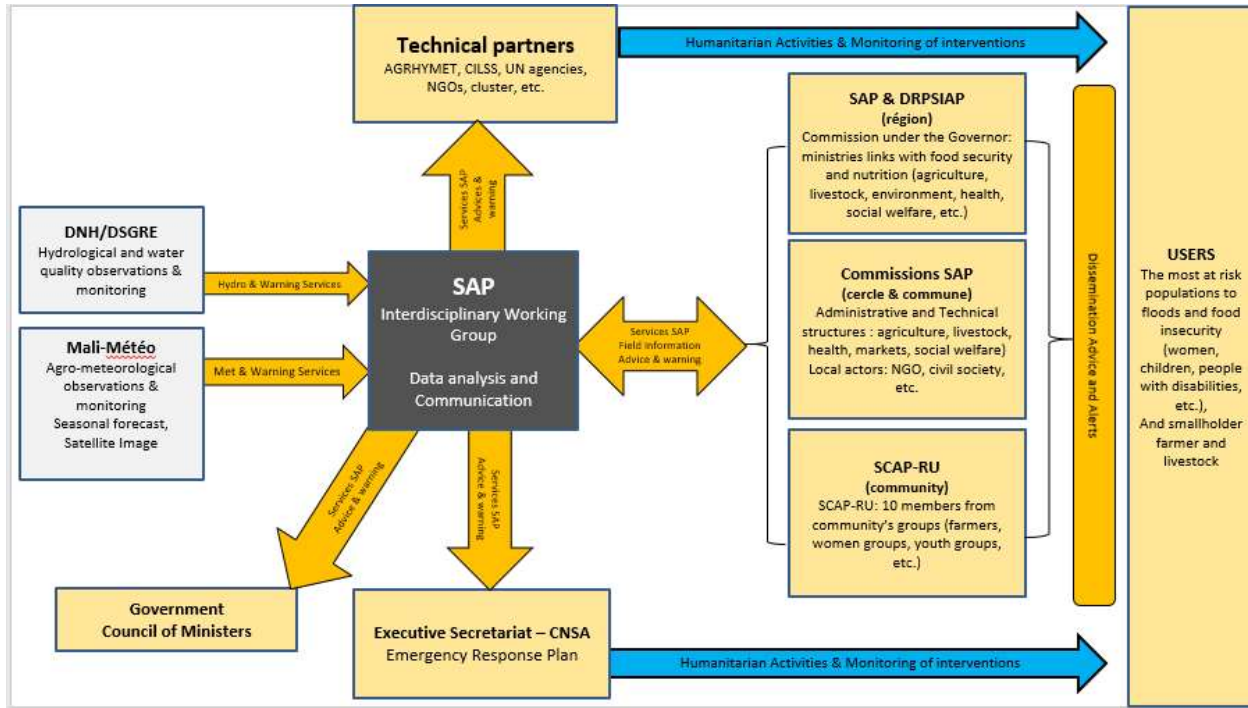
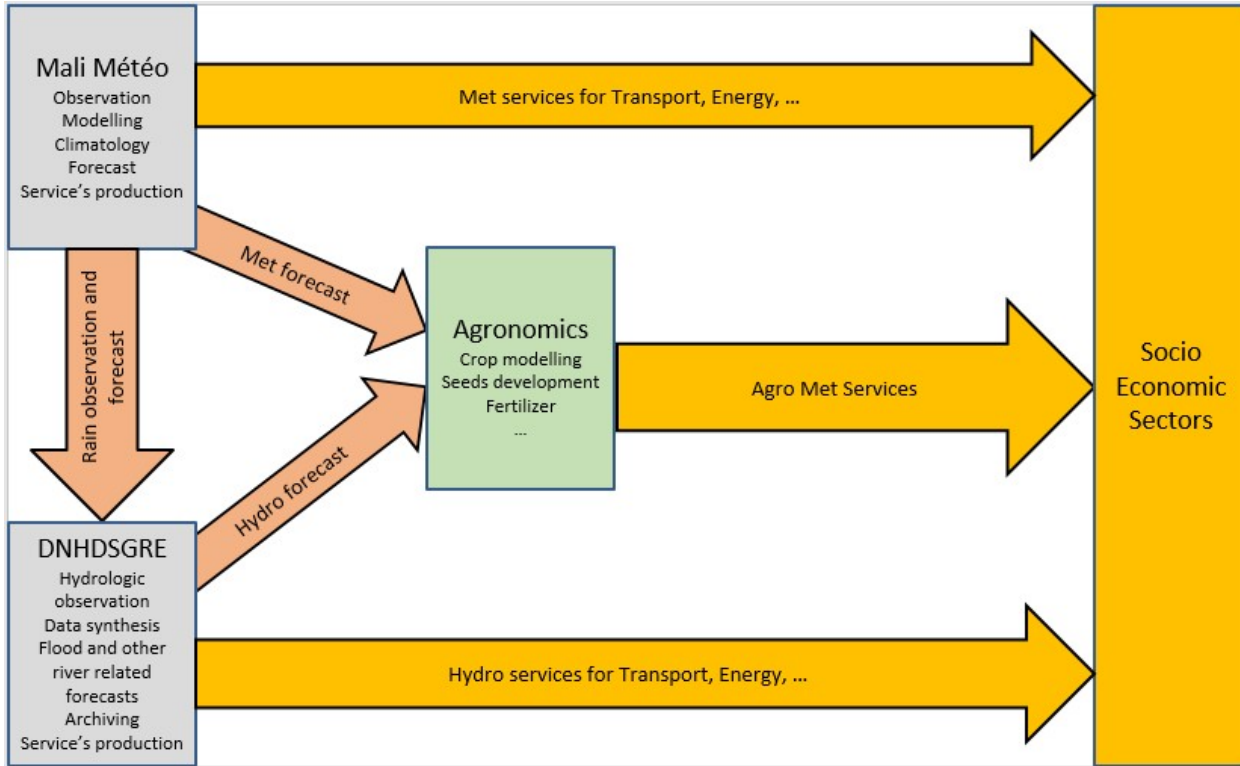




Figure 3: Agriculture Services - Information and Service Flow



17. The following indicative budget will be implemented in partnership with the five beneficiary entities (in US\$ million):

Table 3: Project Budget by Component and Beneficiary Entity (indicative), in US\$ million

Components	MALI METEO		DNH		DGPC		SAP		TOTAL	
	GCF	IDA	GCF	IDA	GCF	IDA	GCF	IDA	GCF	IDA
OVERALL	8.3	0.7	4.0	1.1	7.1	4.4	3.3	2.1	22.8*	8.3*
Component 1	1.9	0.0	0.6	0.9	1.7	0.1	1.0	0.6	5.1	1.6
Component 2	4.9	0.7	2.6	0.1	2.0	2.3	1.7	0.9	11.2	4.0
Component 3	1.6	0.0	0.8	0.2	1.9	0.5	0.7	0.6	5.0	1.2
Component 4	0.0	0.0	0.0	0.0	1.5	1.5	0.0	0.0	1.5	1.5
Component 5	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0

* GCF: US\$ 22.75 million and IDA: US\$ 8.25 million