

CREWS PROJECT FINAL REPORT (Date of submission)

Section 1. General Project Information

1. Project title	Mali - Hydrological and Meteorological Services Modernization	2. Project reference	CREWS/CProj/07/Mali
3. Lead Implementing Partner of the project	World Bank	4. Other Implementing Partners involved in the project	WMO
5. Operational Partners involved in the project	- Mali Météo, - General Directorate for Civil Protection (DGPC), - National Hydrological Department (DNH), - National Food Security Early Warning System (SAP)	6. Expected Project duration/timeframe (from year – to year)	2017-2025
7. Actual Project duration/timeframe (if no-cost extensions were approved)	8 years	8. Total funding approved by Steering Committee (in US dollars), including fees	US\$ 3,333,000 (US\$ 3,083,000 WB and US\$ 250,000 WMO)
9. Total funding executed in actual duration	WB: US\$ 2,775,000 WMO: US\$ 250,000 (fully executed)	10. Reporting focal point(s) from Implementing Partners	World Bank: Mare Lo: marelo@worldbank.org WMO: Michel Nikiema: pmnikiema@wmo.int
11. Total funding leveraged by organization and what it was used for	The project leveraged and supported the implementation of the Strengthening Climate Resilience in Mali project (“Mali Hydromet Project”) with US\$ 22.25 million financing from the Green Climate Fund (GCF) and US\$ 8.75 million financing from World Bank (International Development Association).		
12. Report Certified Accurate by (with signature):			

Section 2. Overall Project Performance

13. Summary of outcomes and outputs	The CREWS Mali Project was implemented by both the World Bank and by WMO with the joint objective to strengthen Mali's hydro-meteorological, early warning and response systems. The CREWS Mali Project provided implementation support to the <i>Strengthening Climate Resilience in Mali Project</i> ("Mali Hydromet Project") (P161406) which is financed by a grant of the Green Climate Fund (GCF) (US\$ 22.75 million) and World Bank / IDA (US\$ 8.25 million) while also complementing it with several self-standing activities to ensure the sustainability of the early warning systems in Mali. The project was completed on January 17, 2025. In 2025 the project was restructured to align with the Bamako Urban Resilience project (PRUBA) (P171658) which is a US\$ 250 million World Bank / IDA loan that focuses on strengthening urban resilience and drainage management to sustain the relevant hydromet operations in the country. The CREWS Mali grant supported the project to achieve several key results that were transformational for strengthening the hydrometeorological value chain in Mali. The CREWS Mali grant contributed to those achievements directly and indirectly for example by providing knowledge, information, trainings and consultants. Herewith the key results of the Mali Hydromet project: • A total of 46 meteorological stations and 27 hydrological stations were installed and are operational, supporting the delivery of 33 weather, climate, and hydrological products and services by Mali Météo and DNH. As a result, 24-hour forecast accuracy improved by an estimated 22.17% over the project period. • The project strengthened institutional and human capacity through extensive training, reaching over 2,217 professionals from hydrometeorological, food security, and civil protection institutions. In parallel, six Standard Operating Procedures (SOPs) were developed to enhance coordination and response for early warning services. • At community level, 251 food security early warning groups (SCAP-RU) were established or reactivated, with 393 women actively participating or leading these groups, reinforcing women's role in local disaster preparedness. In addition, 36 agro-meteorological support groups were created to improve dissemination of climate information to communities. • Overall, the project reached more than 3 million beneficiaries, exceeding the original target of 2.7 million. This expansion was supported by the launch and scale-up of the SOS Sécurité mobile application, which now has over one million users and enables real-time alerts and access to hydrometeorological and emergency information. • Key infrastructure investments were completed, including new facilities for Mali Météo, SAP, and DGPC, alongside the provision of operational equipment, vehicles, drones, and ambulances. The project also supported the establishment of a master's degree programme in disaster risk management, contributing to long-term national capacity building. (A) The CREWS Mali Project directly supported numerous activities in Mali that were self-standing but in general aligned with the hydromet value chain in the country. • Training of women and support networking of women's associations
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	on climate-related risks and early warning mechanisms. • Community mapping was conducted in Bamako to support flood management, flood modelling, flood forecasting. • An Agreement was signed on 18 May 2021 with WeatherForce to ensure better computation and delivery of agroclimate indices to 5 national meteorological services, including Mali-Météo. • Conducting a baseline study on the project indicators and support monitoring and implementation. • Technical support was provided for the preparation of a new investment project on urban climate resilience in Bamako ("PRUBA"). This project is currently financing improvements in the drainage infrastructure of Bamako, improved monitoring and contingency planning and is instrumental to strengthen disaster preparedness in Mali. • The West African Service Center on Climate Change and Adapted Land Use (WASCAL) was recruited to support the formulation of a training plan on flood management and early warning for strengthening technical capacity on early warning and introduced the concept of operations (CONOPS). • The study on the <i>Socio-economic Impact of Flooding in Mali</i> was conducted in 2025 with a robust methodology, geospatial data analysis, compilation of data from different ministries and household survey (remote and phone survey). This supported the establishment of a robust data baseline for the assessment of disaster impacts. Training was provided to practitioners from different ministries and departments on the use of the database in October 2025. • The study on <i>Water Resources and Guidance on Flood Early Warning for the Haut Bani River Basin</i> was conducted with the support of an engineering consulting firm from Mali. This analysis established a hydrological-hydraulic model for the Haut Bani River Basin, estimated impacts of floods on the basin as well as infrastructure and population, and proposed a way forward to mitigate flood impacts. The report was reviewed with experts from the different responsible technical ministries and disseminated in June 2025. • A workshop and training of women on the gender dimension of the national contingency plan and a training on communication methods and perception for women in terms of early warning systems data. Both training courses were conducted in 2025. Two consultants trained women and support networking of women's associations on climate-related risks and early warning mechanisms. • A training on the WIS2 toolbox for meteorologists and hydrologists was conducted from June 16 to June 20 in Lome, Togo. This training provided an important missing piece of crucial capacity for the experts
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	of Mali Meteo to transfer data to the global network of WMO (GBON) and thereby strengthening global and regional weather and climate models. • A final beneficiary analysis of the Mali Hydromet Project was supported in September 2025 providing guidance on the perspective of project beneficiaries notably those who were supported through the SCAP-RU and GLAM network. (B) WMO implemented a range of activities aimed at strengthening forecasting capacities, hydrometeorological data management, and the use of climate information for early warning services in Mali. Since 2017, WMO has supported Mali-Météo and national partners, including the National Hydrological Directorate (DNH), through capacity development and technical support in areas such as flash flood guidance, severe weather forecasting, hydrometeorological data collection and sharing, sub-seasonal forecasting, agrometeorological services including crop calendars for food security monitoring (with FURV), and sand and dust storm forecasting. WMO also supported Mali-Météo and other national stakeholders through the implementation of the Flash Flood Guidance System (FFGS), the development of agrometeorological information products, the computation of agroclimatic indices, and strengthening capacities in severe weather forecasting, seasonal and sub-seasonal forecasting, and sand and dust storm monitoring and forecasting. At least 40 experts from Mali-Météo and partner institutions strengthened their capacities through CREWS-supported activities, including training on flash flood guidance, weekly and monthly forecasting, crop calendar development, and hydrometeorological data collection and management. Key activities implemented under the CREWS Mali Project included: • Training of Mali-Météo staff on interpretation of numerical weather prediction products, use of satellite information and delivery of warning services (Ouagadougou, 2–4 May 2019). • Training of Mali-Météo and DNH staff on the optimal use of seasonal (1–3 months) and sub-seasonal (10 days to 1 month) forecasts for agrometeorology and hydrology (Toulouse, 13–17 May 2019). • Training of Mali-Météo staff on the use of the Météo-France Land Data Assimilation System (LDAS) for agrometeorological applications (AGRHYMET, Niamey, 28–29 May 2019). • Participation of Mali in the West Africa Flash Flood Guidance System inception workshop (Dakar, 25–27 June 2019). • Participation of Mali-Météo staff in specialized training on climate early warning forecasting in Israel. • Recruitment of WASCAL to support training and capacity
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	development activities in Mali and Niger. • Recruitment of an individual consultant to support hydrometeorological data collection, management and data sharing. • Training of agrometeorologists on R-Instat and development of crop calendars (Ouagadougou, 24–28 February 2020). • Working sessions on hydrometeorological data sharing to support the development of the Flash Flood Guidance System and validation of watershed delineations for Mali. • Development of GIS layers, estimation of runoff thresholds and training of meteorological and hydrological forecasters on calibration and operational use of the Flash Flood Guidance System. • Support to the MISVA platform (Monitoring of Intra-Seasonal Variability over Africa), including training and regular technical briefings to strengthen intra-seasonal forecasting capacities. • Development and delivery of agro-climatic indices through cooperation with WeatherForce to support Mali-Météo and other NMHSs in the region.

14. Rating of CREWS Indicators achievement

Complete the following for the selected CREWS indicators in the project results framework, at both outcome and output level. Use the unit of measure and disaggregation level defined for each indicator¹.

¹ CREWS Results Framework.

CREWS Outcome 1: National and local multi-hazard early warning systems prioritized and funded

Indicator	Baseline level	End-of project target level	End-of-project result (Set as a percentage)	If target was not achieved, please summarize the reason. If target was achieved, please summarize main achievements	Progress rating ²
# of LDCs and SIDS with national investment plans and budgets prioritizing multi-hazard early warning programmes	n/a	n/a	n/a 1	The project is based on a robust investment plan for hydromet services in Mali, which was prepared before the launch of the grant. CREWS Mali supported the formulation of a plan to reduce the impact of floods in the Haut Bani River Basin.	
Output 1.1 A country and/or region has developed or strengthened legislative and/or institutional frameworks to support and sustain multi-hazard early warning systems					
# of national plans, strategies and legislations on early warnings approved and/or implemented	n/a	n/a	n/a	The indicator was not monitored by the grant. However, the Mali Hydromet project advanced the institutional strengthening of SAP to AVANSA.	
# of coordination mechanisms strengthened or established to enhance collaboration on early warning among national or regional institutions	0	6	6	The Mali HYDROMET project supported the implementation of 6 Standard Operating Procedures (SOP) that support among others and effective coordination of early warning services.	
Output 1.2 Multi-hazard needs, gaps and priority assessments, analyses and related investment plans for early warning systems in a country or region are driven by CREWS financing					
# of multi-hazard assessments, analyses and other mapping of needs, gaps priorities that inform investment requirements on early warning	0	3	2	The Mali HYDROMET prepared an investment plan for strengthening flood early warning and based on the recommendations acquired the relevant observation equipment. CREWS Mali prepared an investment plan to reduce floods in the Haut Bani River Basin.	
Output 1.3. Partnerships and cooperation frameworks developed for financing and scaling up support to multi-hazard early warning systems					

² Use scale system provided in the Annex of this document.

Total volume of funds leveraged by national institutions and development partners (in USD) through CREWS investments	US\$ 31 million	US\$ 31 million.	US\$ 31 million.	The CREWS Mali Project enabled the preparation and implementation of the Mali Hydromet Project. In addition, the project supported the preparation and implementation of Strengthening Urban Resilience in Bamako Project (PRUBA) with a total budget of US\$ 300 million (including an AF of US\$ 50 million).	
# of LDCs and SIDS benefiting from GCF resources through the GCF-SAP CREWS Scaling Up Framework	n/a	n/a	n/a	n/a The project supported the implementation of GCF resources.	

CREWS Outcome 2: Improved early warning service delivery and accessibility by national and regional institutions

Indicator	Baseline level	End-of project target level	Target for reporting period	If target was not achieved, please summarize the reason. If target was achieved, please summarize main achievements	Progress rating
EW Maturity Index	n/a	n/a	n/a	The indicator was not reported.	
# of hazards which pose a risk of life and economic loss for which forecasting and warning services are in place in LDCs and SIDS through CREWS support	3 (drought, floods, storms and other extreme weather events)	3 (drought, floods, storms and other extreme weather events)	3 (drought, floods, storms and other extreme weather events)	The early warning for drought and food security has been strengthened through the GLAM and SCAP-RU network and the support to the SAP / ANVANSA network. The Mali HYDROMET project has furthermore supported the establishment of the flood early warning system "SACI". This is operational.	
Output 2.1 Risk information and tools generated by countries to enable the delivery of impact-based early warnings					
# of risk data tools developed or strengthened to generate early warning products and/or support impact-based warnings.	0	1	1	The MALI Hydromet Project with the support of the CREWS grant prepared the SOS Sécurité mobile phone application that facilitates early warning. More than 1 million people have downloaded the app so far.	
Output 2.2. Monitoring, analysis and forecasting of hazards that threaten the country/region are improved and sustained by the countries					

# of functioning monitoring and observation systems established or strengthened per hazard	60	90	106	46 new observation stations have been installed by the project.	
# of hazards monitoring, analysis and forecasting processes developed or improved	0	1	1	The Mali HYDROMET project with the support of the CREWS grant prepared a flood early warning system (SACI).	
# of forecasting and prediction products developed and/or accessed from WMO Global Prediction Centers (GPCs), Regional Specialized Meteorological Centers (RSMCs) and NMHSs.	n/a	n/a	n/a	The CREWS Mali Project enabled training to support Mali Meteo to transmit data to WMO's global meteorological data network.	
Output 2.3 Warnings are communicated by the countries based on common alerting protocols under agreed standard operational procedures (SOPs)					
# of warnings issued in CAP format	n/a	n/a	n/a		
# of updated LDCs and SIDS entries in the WMO register of alerting authorities	n/a	n/a	n/a		
# of communication channels through which warnings are disseminated in the area covered by a prediction service for a given hazard(s)	17	35	33	In total 33 products are available to disseminate weather and climate information (bulletins, specific warnings, etc).	
Output 2.4 Warnings are received, understood, and acted upon based on co-produced preparedness and response plans by the countries					
# of preparedness and anticipatory action plans or Standard Operating Procedures (SOPs) that are operational and linked to prediction and warning services	0	6	6	The Mali Hydromet Project prepared 6 Standard Operating Protocols (SOP) on a range of issues relevant for early warning.	

# of risk maps, advisory and other warning products that are available and adapted to the user group/ development sector needs	0	1	2	The Mali Hydromet Project prepared a flood forecasting (SACI). It is operational since December 2024 / January 2025. The CREWS Mali project supported the preparation of flood risk maps for the Haut Bani River Basin.	
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CREWS Outcome 3: Early warning programmes are driven by people-centered and gender-responsive principles and promote private sector engagement

Indicator	Baseline level	End-of project target level	End-of-project result (Set as a percentage)	If target was not achieved, please summarize the reason. If target was achieved, please summarize main achievements	Progress rating
Level of integration of people centered and gender responsive approaches ³	n/a	n/a	n/a		
Level of users' engagement satisfaction in the people-centered and gender-responsive approaches/activities ⁴	n/a	n/a	n/a	The Mali Hydromet Project conducted a user engagement survey. The CREWS Mali Project supported a focus group discussion with beneficiaries of the project.	
Output 3.1 People of different backgrounds, gender, youth, older persons, people with disability, poor, marginalized, displaced, and non-native, as well as related institutions have co-produced climate and weather information products tailored to their needs					
# of climate and weather information products co-designed to users' needs by group representing vulnerable segments of exposed populations	100	171	251	In total, there are 251 active SCAP-RU networks that support food security early warning and contingency planning at the local level.	
# of women and men trained through X # of capacity building programmes provided by CREWS	0	1500	2117	In total, 2117 people were trained by the project. The project supported 393 women leaders and members of the SCAP-RU network in coordinating and managing local food security networks and information dissemination	

³ Please grade your project based on the following criteria: **Low**- The project did not perform consultations, activities to promote gender quality, and activities /developed products with a people-centered approach. **Medium**- There is evidence of the project performing at least one consultation, one activity to promote gender equality, and one activity/product developed with a people-centered approach. **High**- There is evidence the project performed more than one consultation, activities to promote gender equality, and activities/products developer with a people-centered approach.

⁴ This indicator will only be completed when the survey is performed. Please provide the overall result of your survey result based on the following criteria: **Low**- Users do not feel the project considered their opinion, context and experience when developing or strengthening early warning systems. **Medium**- Users feel the project somewhat considered their opinion, context and experience when developing or strengthening early warning systems. **High**- Users feel the project considerably considered their opinion, context and experience when developing or strengthening early warning systems.

				The CREWS Mali project provided additional training support for example on the disaster preparedness database.	
# of CREWS projects that have included gender equality early warning as an objective or outcome.	0	1	1	The Mali Hydromet Project addressed gender quality as a priority.	
# of target outputs and activities on gender early warning (e.g., assessments and capacity building)	n/a	n/a	n/a		
Output 3.2 Private sector is engaged to foster innovation and sustainability in delivery of early warning services					
# of agreements with private sector to co-finance or co-implement Early Warning System initiatives	n/a	n/a	n/a	The project was not involved in engaging with the private sector.	

15. Lessons learned and challenges

Provide important challenges and lessons learned, in bullet points, in terms of what worked well, what did not, what can be improved from the project, including what were the factors that hindered or enabled successful project implementation (200 to 250 words).

Challenges

The security crisis in Mali and the wider Sahel region significantly affected project implementation. Restrictions on travel to Mali made it difficult to bring in international experts, limiting the pool of qualified firms able to conduct key studies such as the socio-economic flood impact assessment and the Haut Bani river basin analysis. Travel to Bamako was strongly discouraged, movement outside the capital was nearly impossible, and World Bank staff faced similar restrictions. Diplomatic tensions with France further complicated mobility by interrupting direct flights to Europe. As a result, competitive international procurement was not feasible, and selection had to be limited to firms already operating in Mali. This substantially delayed consultant recruitment and slowed overall project implementation.

Lessons Learned

The CREWS Mali Project faced several challenges that generated important lessons for future hydromet and early warning operations in fragile contexts.

(A) With regard to the activities implemented by the World Bank, these were the main lessons learned:

- Interim financing, such as that provided through CREWS, proved essential to maintain continuity for the support to the national weather, climate, water and early warning services. This was particularly relevant for time that the Mali Hydromet Project was

suspended due to the coup d'état in Mali and at the start of the project when financing from GCF was delayed.

- Mixing the CREWS Mali Project indicators with those of the Mali Hydromet Project made it difficult to attribute results. As seen above, the CREWS results framework of the Mali Hydromet project combines the indicators of the Mali Hydromet Project and those of the CREWS Mali project. Future grants should employ a streamlined set of indicators that measure specific, realistic contributions of hydromet activities That can only and directly be related to CREWS funding.
- The project operated across many thematic areas and institutions, creating a need for strong coordination. Expert and beneficiary feedback underscored the importance of a clearly resourced support mechanism that brings together departments working on meteorology, hydrology, emergency response, climate adaptation, and community engagement—especially during crises such as COVID-19 or political instability.
- In Mali's fragile and conflict-affected context, project implementation relied largely on a core team of dedicated, locally based consultants. While opportunities for international expertise were limited, this was effectively offset by strong local knowledge and experience. For example, the firm that conducted the Haut Bani River Basin study had prior collaboration experience with international partners and was able to lead the assignment independently and to a high technical standard. However, security constraints and a limited pool of qualified firms made it challenging for the World Bank task team to recruit consultants through competitive and timely procurement processes, resulting in delays in implementation.

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(B) With regard to the activities implemented by WMO, these were the main lessons learned:

- One key lesson is the importance of regional cooperation and training platforms. Collaboration with regional institutions such as AGRHYMET, WASCAL, Météo-France and other regional partners enabled Mali-Météo to benefit from technical expertise and forecasting tools that are shared across West Africa. Regional initiatives such as the Flash Flood Guidance System (FFGS) and the MISVA platform proved effective in strengthening forecasting capacities and facilitating knowledge exchange among national meteorological services.
- Another important lesson is the value of capacity development focused on operational forecasting tools and data management. Training activities related to numerical weather prediction products, agrometeorological applications, data management and subseasonal forecasting helped strengthen the ability of Mali-Météo and partner institutions to deliver early warning information and climate services.
- Project implementation also faced challenges related to security constraints in Mali and the wider Sahel region, which limited international travel and required adjustments in implementation modalities. In this context, regional training activities and partnerships

with regional institutions proved essential to ensure continuity of activities and maintain progress in strengthening national capacities.

16. Sustainability and exit strategy

Provide a description of the exit measures undertaken to ensure sustainability of the results attained by the project/programme. The section should also cover key recommendations to guide and/or improve similar interventions in the future. (200 to 250 words).

The CREWS TF supported early warning services in Mali, with many activities now fully institutionalized. Sustainability was a core principle of the CREWS Mali, which strengthened the entire EWS and hydromet value chain—from data generation and training to institutional capacity, information and alert dissemination, and response systems. To ensure long-term sustainability, the TF focused on reinforcing key institutions (Mali Meteo, DNH, DGPC and SAP/now ANVASAN) through technical studies, knowledge production, training, quality management, information dissemination. The complex nature of weather, climate, water and early warning services and high operation and maintenance costs often required external funding through TF like CREWS Mali. As such, some of the technically complex functions that were supported by CREWS Mali will continue to require support. Complementary initiatives, such as the PRUBA urban development project, are enhancing flood management capacity in Bamako. The Government of Mali is exploring a follow-up operation with a broader scope, while the World Bank's Contingency Emergency Response Project (CERP, 2025) provides rapid financing mechanisms for future disasters and emergencies.

17. Knowledge management and social media

Provide a list of knowledge activities / products (when applicable) that were produced and not included in the last status report. Include any links to press releases, videos, or communication items and/or social media. Please attach with this report any supporting files, including photos, videos, stories, and other documents.

In the final reporting period, no external communication was conducted through, for example, social media. A dissemination event was organized on June 30, 2025, to present the findings of the *Water Resources and Guidance on Flood Early Warning for the Haut Bani River Basin* study and the *Study on Socio-economic Impact of Flooding in Mali* to stakeholders in Mali. In September 2025, a consultation meeting with beneficiaries was conducted and in October a training on the use of the database developed through the study in socio-economic impacts of floods.

18. Partnerships & stakeholder engagement

Optional: If the project worked with any of the following partners that were not included in the last status report, please provide a summary of the partnership activities.

Civil Society Organisations and/or NGOs	The CREWS Mali project did not directly work with Civil Society organizations and NGO. Few organizations such as the Red Cross in Mali, the Women Leaders Network on Gender, and the Traditional Communicators Network were involved on raising awareness, training and sensitization activities, especially in remote and insecure areas of the country.. In addition, the project collaborated with a wide range of civil society organisations and NGOs, such as AVPIP, REFEDE MALI, CERAD, AMAPEF, GRIDAC, AMAVF, Association Karangebou des femmes de Badalabougou, AEPF, ADESA, Association Bulumda, ADCOPS, ONG AFAD, Sahel Toguna, ENERGIA, ASFEM, and APEGA.
Academic Institutions	The CREWS Mali worked directly with West Africa Science Center on Climate Change and Adapted Land use (WASCAL) to formulate a Concept of operations for the hydromet services in Mali.
Private Sector	The CREWS Mali Project did not have any relevant private sector collaboration.

19. Financial management

Total financing approved (in approved project proposal):	US\$ 3,025,000 (US\$ 2,775,000 for the WB and US\$ 250,000 for WMO)
Cumulative amount by end-of-project (<i>how much has been used, actual expenditure</i>):	US\$ 2,768,503.35 for WB and US\$ 250,000 for WMO
Percentage used by end-of-project:	99.8% WB and 100% WMO

20. Supporting documents

List and annex to the report any documents providing details on project activities that where NOT reported in the final status report such as reports of training sessions, assessment reports, online solutions and tools, manuals, summaries of high-level discussions etc.

Study on *Water Resources and Guidance on Flood Early Warning for the Haut Bani River Basin* (draft report, not published)

Study on *Socio-economic Impact of Flooding in Mali* (draft report, not published)

1. Annex. Progress rating

Interpretation of color coding		
Achieved		The indicator achieved its end-of-project target.
Partially achieved		The indicator's end-of-project target was only partially achieved.
Not achieved		The indicator's end-of-project target was not achieved, and no progress was made during implementation.

