

Simplified Approval Process

Annex 2a: Logical framework



LOGICAL FRAMEWORK TEMPLATE

LOGICAL FRAMEWORK				
1. GCF Impact level: Paradigm shift potential (max. 300 words)				
The CWIMEWS project catalyzes a structural departure from Yemen's current approach to climate and water risk management -- from fragmented, agency-specific monitoring toward a unified, anticipatory, impact-based system governed by shared data protocols and a permanent national authority. Prior to this project, CAMA, NWRA, MAIF, and CDA operated in near-complete isolation, with no unified platform, no standardized data exchange protocols, and no multi-hazard early warning function linking climate information to community-level action. Over 70 percent of hydrometeorological stations are non-operational and current flash-flood warning lead times of approximately 48 hours are insufficient for effective anticipatory action. CWIMEWS breaks this fragmentation at its institutional root: by formalizing inter-agency data-sharing agreements, establishing the CWIMS platform as the common operational backbone, and institutionalizing the System Management Unit within MWE as the permanent national authority, the project creates the enabling architecture that no single agency could build unilaterally. The paradigm shift is institutional, technological, regulatory, and behavioral simultaneously. Institutionally, it formalizes collaboration between agencies that have operated independently for decades and establishes governance precedent for data as a shared national resource. Technologically, it introduces solar-powered telemetry-enabled sensors, cloud-hosted data infrastructure, open-source impact-based forecasting frameworks, and WMO-GBON compliant station specifications -- reintegrating Yemen into real-time global meteorological data exchange. Regulatory precedents established under CWIMEWS will outlast the project and provide the governance foundation on which subsequent I-WISE MPA phases and future climate investments will build. Behaviorally, the shift from reactive crisis response to structured anticipatory action is codified through Community Early Action Plans anchored in local institutions and communities. Country ownership is the institutional mechanism through which the paradigm shift becomes permanent. CWIMEWS is not an externally designed intervention -- it was formulated by the Ministry of Water and Environment through its Climate Change Unit. The project is explicitly identified as a priority intervention under Yemen's NDC Vision 2025 and GCF Country Programme, and is aligned with the National Adaptation Programme of Action. Broad stakeholder engagement from April 2025 to February 2026 included the Minister of Water and Environment, CAMA, NWRA, MAIF, GSMRB, EPA, CDA, governorate authorities, basin committees, and community representatives across all nine priority basins. Beyond project close, national ownership is institutionalized through the permanent SMU within MWE, a phased operational and financial handover from UNDP to MWE by Year 5, government ownership of all physical assets vested in the Ministry of Finance, and explicit integration of O&M costs into government budget processes offering that the paradigm shift is not dependent on continued external financing to endure.				
Assessment Dimension	Current state (Baseline)		Potential target scenario (Description)	How the project/programme will contribute (Description)
	Description	Rating		
Scale	Yemen's climate and water information systems are fragmented, with limited coverage and functionality. Over 70% of hydromet stations are non-operational, and early warning systems reach only a fraction of the population.	<u>Low</u>	A unified, national Climate & Water Information Management and Early Warning System (CWIMEWS) delivers real-time, actionable climate and water data to all governorates, covering millions of direct and indirect beneficiaries. The system enables anticipatory	CWIMEWS will rehabilitate and expand monitoring networks, digitize legacy archives, and operationalize multi-hazard early warning systems. By integrating ground and satellite data, and building institutional capacity, the project will scale up climate resilience from pilot basins to national coverage, directly benefiting vulnerable communities and enabling future

			adaptation, disaster risk reduction, and improved water management at scale.	expansion.
Replicability	Climate and water information management in Yemen is fragmented, with limited integration across basins and no unified national system. Existing initiatives are often isolated, lacking mechanisms for systematic replication or scaling.	<u>Low</u>	The CWIMEWS project is designed with both country-wide and basin-level architecture. After successful implementation and demonstration of impact in targeted priority basins, the CWIMEWS system can be systematically replicated in additional basins across Yemen. The modular design and standardized protocols facilitate integration into a national program, enabling full country-wide coverage and harmonized climate risk management.	By implementing CWIMEWS in selected high-risk basins, the project will generate operational models, technical standards, and governance frameworks that can be directly applied to other basins. Lessons learned and best practices from the initial sites will inform phased expansion, ensuring context-appropriate adaptation. The project's digital platforms, data standards, and coordination mechanisms are intentionally designed for scalability, allowing for seamless integration into a unified, country-wide climate and water information management system. This approach ensures that, as capacity and resources grow, the benefits of CWIMEWS can reach all regions of Yemen, supporting national adaptation goals and setting a replicable model for other countries facing similar challenges.
Sustainability	Climate and water information services in Yemen are largely dependent on short-term donor funding, with weak institutional ownership and limited integration into national budgets or long-term policy frameworks.	<u>Low</u>	The CWIMEWS system is fully institutionalized and sustained beyond the project period, anchored by strong national leadership, integrated into government structures and budgets, and supported by robust governance and technical capacity.	Sustainability is a core design principle of CWIMEWS. The Climate Change Unit (CCU) under the Ministry of Water and Environment (MoWE) is taking a leadership and ownership role in the project, serving as both the host and chair of the System Management Unit (SMU) and the Technical Coordination Committee (TCC). This ensures that stewardship of physical and digital assets—such as rehabilitated monitoring stations, data platforms, and early warning infrastructure—remains within national institutions. The project will build institutional capacity, integrate operations and maintenance costs into national recurrent budgets, and develop sustainable business models for data services. Regular technical audits, real-time performance tracking, and continuous stakeholder feedback

				will support adaptive management and long-term effectiveness. By embedding the CWIMEWS governance framework within the CCU/MoWE, the project guarantees national ownership, accountability, and the ability to sustain and scale climate services well beyond the duration of donor support.
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2.1. GCF Outcome level: Reduced emissions and increased resilience (IRMF core indicators 1-4, quantitative indicators)						
GCF Result Area	IRMF Core Indicators (1-4) ¹	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final ²	
<u>ARA1 Most vulnerable people and communities</u>	<u>Core 2: Direct and indirect beneficiaries reached</u>	<i>Reports compiled by the Joint Project Implementation Unit (JPIU) at key points of the project implementation (i.e., baseline, annual performance reports, mid-point and end of project) based on data gathered from relevant national service providers and technical coordination committees (e.g., MoWE/CCU (SMU), CAMA/YMS, NWRA, EPA, MAIF), validated by WB and submitted to the GCF</i>	0	2.9 M (Male: 1.47 M, Female: 1.43 M)	9.2 M (Male: 4.66 M, Female: 4.54 M)	<i>The final direct beneficiary target assumes full operationalization of CWIMEWS services across all eight governorates (approximately 9.2 million people), with a phased roll-out starting in priority basins and scaling to entire targeted basins and their governorates by project end. While the system is designed to serve as a country-wide program, we have not specified national coverage given the current conflict situation in Yemen. This figure represents the total estimated population coverage for the project; we have not split direct and indirect beneficiaries to avoid any risk of double counting.</i> <i>Given the critical nature of establishing the CWIMEWS system, we assume that early-stage setup—including infrastructure, governance, and capacity building—will require significant time. Therefore, the mid-term target is set at 30% of the final goal, reflecting phased implementation and progressive scaling as systems become fully operational.</i> <i>Given Yemen's fragile and conflict-affected context and the inherent volatility of the operating environment, Means of Verification will be fully elaborated in the Project Operations</i>

¹ The IRMF Indicators are set out in the [Integrated Results Management Framework](#)

² The final target means the target at the end of project/programme implementation period. However, for core indicator 1 (GHG emission reduction), please also provide the target value at the end of the total lifespan period which is defined as the maximum number of years over which the impacts of the investment are expected to be effective.

						Manual, finalized during the inception phase. This will specify data sources, collection methods, reporting frequencies, and responsibilities by verification source. The method will be further developed during the inception phase and documented in the POM. This will include gender-disaggregated data collection protocols and coverage.
<u>ARA1 Most vulnerable people and communities</u>	<u>Supplementary 2.4: Beneficiaries (female/male) covered by new or improved early warning systems</u>	Reports compiled by the JPIU at key points of the project implementation (i.e., baseline, annual performance reports, mid-point and end of project) based on data gathered from relevant national service providers and technical coordination committees (e.g., MoWE/CCU (SMU), CAMA/YMS, NWRA, EPA, MAIF), validated by WB and submitted to the GCF	0	2.9 M (Male: 1.47 M, Female: 1.43 M)	9.2 M (Male: 4.66 M, Female: 4.54 M)	The final direct beneficiary target assumes full operationalization of CWIMEWS services across all eight governorates (approximately 9.2 million people), with a phased roll-out starting in priority basins and scaling to entire targeted basins and their governorates by project end. While the system is designed to serve as a country-wide program, we have not specified national coverage given the current conflict situation in Yemen. This figure represents the total estimated population coverage for the project; we have not split direct and indirect beneficiaries to avoid any risk of double counting. Given the critical nature of establishing the CWIMEWS system, we assume that early-stage setup—including infrastructure, governance, and capacity building—will require significant time. Therefore, the mid-term target is set at 30% of the final goal, reflecting phased implementation and progressive scaling as systems become fully operational. Given Yemen's fragile and conflict-affected context and the inherent volatility of the operating environment, Means of Verification for each indicator will be fully elaborated in the Project Operations Manual, finalized during the

						<i>inception phase. This will specify data sources, collection methods, reporting frequencies, and responsibilities by verification source.</i> <i>The method will be further developed during the inception phase and documented in the POM. This will include gender-disaggregated data collection protocols and coverage.</i>
<u>ARA1 Most vulnerable people and communities</u>	<u>Supplementary 2.7: Change in expected losses of lives due to the impact of extreme climate-related disasters in the geographic area of the GCF intervention</u>	<i>Reports compiled by the JPIU at key points of the project implementation (i.e., baseline, annual performance reports, mid-point and end of project) based on data gathered from relevant national service providers and technical coordination committees (e.g., MoWE/CCU (SMU), CAMA/YMS, NWRA, EPA, MAIF), validated by WB and submitted to the GCF</i>	0	10% reduction in expected loss of life	30% reduction in expected loss of life	<i>Recent floods in 2024–2025 caused over 150 fatalities across multiple governorates, while cyclones in previous years (e.g., Chapala, Megh, Mekunu) resulted in significant mortality in coastal areas. However, Yemen does not maintain a standardized annual mortality rate for climate-related disasters; therefore, the indicator will be expressed as a percentage reduction compared to the baseline year (2026) rather than absolute numbers.</i> <i>The baseline assumes current conditions with limited early warning coverage and fragmented institutional response. Targets are set at 15% reduction by mid-term and 30% reduction by project end, reflecting phased implementation of impact-based multi-hazard early warning systems, improved lead times, and community early-action protocols.</i>
<u>ARA2 Health, well-being, food and water security</u>	<u>Core 2: Direct and indirect beneficiaries reached</u>	<i>Reports compiled by the JPIU at key points of the project implementation (i.e., baseline, annual performance reports, mid-point and end of project) based on data gathered from relevant national service providers and technical coordination committees (e.g., MoWE/CCU (SMU), CAMA/YMS, NWRA, EPA, MAIF), validated by WB and submitted to the GCF</i>	0	2.9 M (Male: 1.47 M, Female: 1.43 M)	9.2 M (Male: 4.66 M, Female: 4.54 M)	<i>The final direct beneficiary target assumes full operationalization of CWIMEWS services across all eight governorates (approximately 9.2 million people), with a phased roll-out starting in priority basins and scaling to entire targeted basins and their governorates by project end. While the system is designed to serve as a country-wide program, we have not specified national coverage has not been specified given Yemen's conflict situation and the volatile operating environment, which may require adaptive sequencing of basin-level activities as documented in the conflict-sensitive access protocol in the Project Operations Manual.</i> <i>Beneficiary figures represent total estimated population coverage across the targeted basins;</i>

						direct and indirect beneficiaries have not been disaggregated at this stage to avoid double counting, and will be refined through the baseline study conducted during the inception phase
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2.2. GCF Outcome level: Enabling environment (IRMF core indicators 5-8 as applicable)

Select at least two relevant IRMF core (enabling environment) indicators to monitor and elaborate the baseline context and project/programme's targeted outcome against the respective indicators. Rate the current state (baseline) vis-à-vis the target scenario and select the geographical scope of the outcome to be assessed. Describe how the project/programme will contribute towards the target scenario. Refer to a case example in the accompanying guidance to complete this section.

IRMF Core Indicators (5-8) ³	Baseline context (Description)	Rating for current state (Baseline)	Target scenario (Description)	How the project will contribute	Coverage
<u>Core Indicator 5: Degree to which GCF investments contribute to strengthening institutional and regulatory frameworks for low emission climate-resilient development pathways in a country-driven manner</u>	<i>Institutional frameworks for climate and water information management in Yemen are fragmented, with overlapping mandates among agencies (MoWE, CAMA, NWRA, MAIF) and limited coordination. Regulatory instruments for climate risk governance and early warning systems are outdated or absent, and national adaptation planning lacks operational mechanisms for data-driven decision-making. However, the Climate Change Unit (CCU) under the Ministry of Water and Environment (MoWE) already demonstrates strong ownership of climate adaptation initiatives and has been actively engaging with GCF during the concept development process. This provides a solid foundation for institutional strengthening.</i>	<u>medium</u>	<i>A unified governance framework for CWIMEWS is established, anchored in the Climate Change Unit (CCU) under MoWE, supported by the System Management Unit (SMU) and Technical Coordination Committee (TCC). Standard operating procedures (SOPs), data-sharing protocols, and institutional roles are formalized, integrated into national adaptation and disaster risk management policies.</i>	<i>The project will institutionalize CWIMEWS governance, develop regulatory instruments for climate services, and embed coordination mechanisms across national and subnational levels. It will strengthen country ownership through capacity building and integration of O&M costs into recurrent budgets, ensuring sustainability beyond the project lifecycle.</i>	<u>National level (one country)</u>
<u>Core Indicator 6: Degree to which GCF investments contribute</u>	<i>Yemen's hydrometeorological infrastructure is severely degraded, with over 70% of stations non-operational and no integrated digital</i>	<u>low</u>	<i>Deployment of modern telemetry-enabled meteorological and hydrological stations,</i>	<i>The project will finance technology upgrades, introduce advanced forecasting models, and</i>	<u>National level (one country)</u>

³ The IRMF Indicators are set out in the [Integrated Results Management Framework](#)

<u>to technology deployment, dissemination, development or transfer and innovation</u>	<i>platform for climate and water data. Technology for real-time monitoring, forecasting, and early warning is largely absent, and innovation in data analytics and dissemination is minimal.</i>		<i>integration of satellite and ground data into a unified Climate & Water Information Management System (CWIMS), and operationalization of impact-based multi-hazard early warning systems. Innovative features include GIS-enabled dashboards, mobile alert platforms, and automated risk mapping tools.</i>	<i>establish digital platforms for real-time data sharing. It will also promote innovation through modular system design, enabling scalability and replication in other basins and fragile contexts.</i>	
Core indicator 8: Degree to which GCF investments contribute to effective knowledge generation and learning processes, and use of good practices, methodologies and standards	<i>Knowledge generation on climate risks in Yemen is limited, with fragmented data archives, weak analytical capacity, and minimal documentation of lessons learned. There is no systematic approach for applying international standards or sharing best practices across institutions.</i>	<u>low</u>	<i>A robust knowledge management system is established, integrating data analytics, standardized methodologies for risk assessment, and continuous learning processes. Good practices and lessons learned are documented and disseminated nationally and regionally, supporting adaptive management and replication.</i>	<i>The project will embed knowledge generation into CWIMEWS operations, train technical staff and decision-makers, and produce guidance materials aligned with international standards (e.g., WMO protocols). It will facilitate peer learning through technical coordination committees and regional knowledge exchanges.</i>	<u>National level (one country)</u>

3. Project/programme specific indicators (project outcomes and outputs)

Project/programme results (outcomes/ outputs)	Project/programme specific Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final	
Outcome 1: Developing, Establishing and Operationalizing a Climate and Water Information Management System (CWIMS)						
Output 1.1: Integrated Baseline Information, recovered datasets, Network Assessment, and National Observation System Design	% of historical climate and water records digitized, quality-controlled, and integrated into CWIMS; integrated basin-level	CWIMS repository metrics; QA/QC checklists; integrated baseline reports; network assessment and design report	Historical records in heterogeneous formats across multiple institutions; no national inventory; ~70% of	≥60% of priority variables and sites digitized; integrated baseline datasets compiled for	≥90% of national archive digitized with standardized metadata; integrated	Access to legacy archives secured; scanning and curation budgets in place; cooperation of NWRA, CAMA, MAIF secured

	<i>baseline datasets compiled; national observation network assessment and redesign completed</i>		<i>monitoring stations non-functional; no integrated basin baselines</i>	<i>priority basins and wadies; network assessment completed</i>	<i>hydrometeorological and socio-economic baselines finalized for all selected basins; national observation network redesign finalized and costed</i>	
<i>Output 1.2: Expanded and Modernized Hydro-Meteorological and Hydrological Monitoring Infrastructure</i>	<i># of monitoring stations rehabilitated or newly installed with real-time telemetry, disaggregated by type (AWS, surface water/wadi flow, groundwater); QA/QC and maintenance procedures established</i>	<i>SMU station dashboard; calibration logs; station uptime records; TPMA field reports; QA/QC procedures documentation</i>	<i>Many stations non-operational or decommissioned; no real-time telemetry; fragmented and inadequate spatial coverage across priority basins and wadies</i>	<i>≥20 AWS, ≥16 surface water/wadi flow stations, and ≥40 groundwater stations rehabilitated or installed and operational in priority basins; QA/QC and maintenance procedures drafted</i>	<i>~40 AWS, ~32 surface water/wadi flow stations, and ~80 groundwater stations operational; 70–90 legacy stations rehabilitated; standardized QA/QC and preventive maintenance procedures adopted across MWE, NWRA, and CAMA</i>	<i>Repair-first approach adopted; supply chain access maintained; O&M budget secured; institutional cooperation of MWE, NWRA, and CAMA sustained</i>
<i>Output 1.3: National Climate and Water Information Management System Operationalized</i>	<i>CWIMS operational as a unified national platform hosted by MWE; # of agencies connected via interoperable APIs; automated data processing and QA/QC workflows in place; data-sharing agreements formalized</i>	<i>CWIMS system logs; API registry; signed MoUs; access logs; automated workflow records</i>	<i>No unified national platform; NWRMIS dormant; no automated data processing or QA/QC workflows; no formalized data-sharing agreements across institutions</i>	<i>CWIMS platform operational with automated ingestion and QA/QC workflows; ≥3 agencies connected; data from priority basins integrated</i>	<i>CWIMS fully operational with national coverage; ≥6 agencies connected under formalized data-sharing agreements; additional basins and decision support tools integrated</i>	<i>Legal and data-sharing framework approved; SMU staffed and operational; institutional buy-in from MWE and key agencies secured</i>
Outcome 2: Implementing Climate-Resilient Decision-Making and Early Warning						

Output 2.1: Climate- Risk Monitoring and Forecasting Systems operational	# of hazard-specific monitoring and forecasting models developed and operationalized (flood and flash flood, drought and water stress, heatwave, groundwater depletion, coastal hazards); # of real-time risk mapping products generated and disseminated	CWIMS analytical module logs; model validation reports; risk product catalog; user access records	No operational multi-hazard forecasting models; no interactive risk maps; hazard analysis reactive and ad hoc; no integration of ground-based and remote sensing data streams	≥2 hazard-specific models operational and embedded in workflows; real-time risk maps generated for priority basins; integrated CWIMS–remote sensing workflows established	≥4 hazard-specific models operationalized with defined indicators, thresholds, and forecasting time horizons; real-time risk maps and analytical products disseminated to all key national and subnational stakeholders	CWIMS data flows established and reliable; technical staff trained in model application; remote sensing data access maintained
Output 2.2: National Multi-Hazard Early Warning System (MH-EWS) established and linked with Governorate-Level Systems	% of priority governorates receiving CAP-compliant early warnings within agreed lead times; # of governorate-level operation rooms integrated with the national MH-EWS; SOPs for warning generation, validation, and coordinated response developed and formally adopted	AE/EE alert logs; CAP gateway analytics; broadcast delivery records; governorate operation room commissioning reports; approved SOPs	Fragmented, non-standardized alerts; no centralized early warning platform; no governorate-level operation rooms linked to a national system; no formal SOPs for warning issuance	Centralized MH-EWS platform established and linked to CWIMS and forecasting models; ≥40% of targeted governorates receiving timely CAP-compliant warnings; ≥2 governorate operation rooms integrated; SOPs drafted	MH-EWS fully operational and integrated with all targeted governorate-level operation rooms; ≥100% of targeted governorates receiving CAP-compliant warnings within agreed lead times; SOPs formally adopted across all relevant institutions	Governorate-level operation rooms established and functional; communication infrastructure maintained; civil defense and local authorities engaged
Output 2.3: Climate Services and Advisory Products developed and disseminated	# of tailored climate service products developed and regularly updated (seasonal outlooks, drought bulletins, water stress advisories, flood alerts, heat-health warnings); # of dissemination channels established; # of community and sectoral preparedness	Product catalog; dissemination channel records; community and sectoral reach surveys; usage analytics; approved preparedness and response plans	Few tailored bulletins; no sector-specific climate services; no operational multi-channel dissemination system; no community or sectoral preparedness plans informed by climate services	≥3 tailored climate service products developed and disseminated; ≥3 dissemination channels (SMS, digital, radio) established; preparedness and response plans developed for pilot	≥6 tailored climate service products regularly updated and disseminated; multi-channel dissemination system fully operational; preparedness and response plans in place	Sectoral partnerships established; community communication networks functional; Ministry of Telecommunications and media partnerships in place

	and response plans developed			communities and ≥2 priority sectors	for all priority communities and sectors including water, food security, health, and urban planning	
Outcome 3: Strengthening the Enabling Environment for Effective Climate and Water Information Services						
Output 3.1: National Climate and Water Information and Early Warning Center established	National Climate and Water Information and Early Warning Center established and operational within MWE; # of governorate-level operation rooms established and linked to the national center; ICT infrastructure, data servers, and communication systems in place	MWE hosting agreement; center commissioning report; institutional mandate document; ICT inventory; governorate operation room setup reports	No dedicated national center for CWIMEWS; no governorate-level operation rooms; no dedicated ICT infrastructure for integrated climate and water information management	National Climate and Water Information and Early Warning Center established within MWE with defined mandate and staffing; ICT infrastructure in place; ≥2 governorate operation rooms established and linked	National center fully operational; all targeted governorate operation rooms established, equipped, and integrated into the national system	Institutional buy-in from MWE; operational and recurrent budget for center secured; access to governorate locations maintained
Output 3.2: Coordination Mechanisms and Governance Protocols for Climate and Water Information Management formalized	# of national coordination mechanisms formalized; data-sharing protocols and interoperability standards adopted; institutional mandates and SOPs for warning issuance and response coordination defined; alignment with Sendai Framework documented; loss and damage monitoring protocols established	Signed MoUs; approved data-sharing protocols; interoperability standards documentation; institutional mandate documents; approved SOPs; Sendai Framework alignment report; loss and damage monitoring protocols	Limited inter-agency coordination; no formal data-sharing protocols or interoperability standards; no clearly defined institutional mandates or SOPs for warning issuance; no alignment with DRR/DRM frameworks	≥2 coordination mechanisms established and operational; data-sharing protocols drafted; institutional mandates and SOPs defined for pilot agencies; DRR/DRM alignment assessment completed	≥6 agencies participating in formalized coordination under signed MoUs; data-sharing protocols and interoperability standards adopted nationally; institutional mandates and SOPs formally endorsed; governance framework aligned with Sendai Framework; loss and damage monitoring	Political will and sustained partner engagement; legal framework for data sharing in place; DRM institutions engaged

					<i>protocols operational</i>	
<i>Output 3.3: Business Models and Investment Plans for CWIMS/EWS Sustainability developed</i>	<i>Existence of completed life-cycle cost assessment; approved long-term business and financing model; national investment and scale-up plan developed and endorsed by key stakeholders</i>	<i>Approved business model document; life-cycle cost assessment report; national investment and scale-up plan; stakeholder endorsement records</i>	<i>No formal business model; no life-cycle cost assessment; no national investment plan; ad hoc and entirely donor-dependent financing</i>	<i>Life-cycle cost assessment completed; business and financing model drafted and under review; investment plan for expansion across 9 basins developed</i>	<i>Business and financing model approved and implementation initiated; sustainable financing mechanisms including public-private partnerships identified and operationalized; national scale-up investment plan endorsed by MWE and key stakeholders</i>	<i>Institutional buy-in from MWE and key agencies; private sector and development partner interest in partnership; sufficient political stability for long-term planning</i>
<i>Output 3.4: Institutional and technical capacity strengthened</i>	<i># of technical and managerial staff trained across data management, hydrology, modeling, forecasting, GIS, remote sensing, CWIMS operation, QA/QC, and O&M (disaggregated by gender and institution); # of CWIMEWS operational manuals and guidelines developed and formally institutionalized; capacity needs assessments completed</i>	<i>Training completion records; competency assessments; capacity needs assessment reports; operational manuals and guidelines; adoption endorsement records</i>	<i>Human resources thin across the hydromet system; few trained staff with advanced technical skills; no institutionalized manuals or operational guidelines; no systematic capacity needs assessment conducted</i>	<i>Capacity needs assessments completed for all key agencies; ≥100 technical and managerial staff trained (≥30% women); CWIMEWS operational manuals drafted; training programmes for hydrology, forecasting, GIS, and O&M underway</i>	<i>≥300 technical and managerial staff trained across all participating agencies (≥40% women); CWIMEWS operational manuals and guidelines formally adopted and institutionalized across MWE, CAMA, NWRA, MAIF, and governorate authorities</i>	<i>Funding for training secured; access to trainees maintained; MWE and partner agencies engaged throughout implementation; gender-sensitive training design applied</i>
Project/programme co-benefit indicators						
Environmental co-benefits	<i>Strengthened environmental management and risk reduction strategies</i>	<i>Impact-based forecasts and advisories for environmental hazards; reports from SMU/MWE</i>	<i>Limited integration of climate risk information into environmental</i>	<i>Strengthen capacities of technical staff (MWE, NWRA,</i>	<i>MWE, NWRA, MAIF, CAMA have capacity to generate</i>	<i>Government, sectors, and communities are committed to mainstreaming climate and disaster risk information into</i>

	<i>based on climate information</i>		<i>management strategies</i>	<i>MAIF, CAMA) to access, understand, and use climate risk information</i>	<i>impact-based forecasts and advisories for environmental hazards</i>	<i>decision-making and planning</i>
Social co-benefits (including health impacts)	<i>Improved understanding of the health impacts of climate change; improved health and wellbeing outcomes due to climate-informed decision-making</i>	<i>Surveys conducted among project beneficiaries; PMU/SMU reports; input from Ministry of Health and sectoral partners</i>	<i>Limited awareness of climate-related health risks; weak integration of health considerations in early warning and disaster preparedness strategies</i>	<i>At least 60% of surveyed stakeholders report increased awareness of climate-related health risks; two priority sectors report integration of health considerations into preparedness plans</i>	<i>At least 80% of surveyed stakeholders report increased awareness; all priority sectors report integration of health considerations into preparedness plans</i>	<i>Sectors are committed to mainstreaming climate and disaster risk information; sectors are willing to utilize climate information and early warnings to improve resilience</i>
Economic co-benefits	<i>Reduced economic losses of climate-sensitive sectors due to improved early warning and climate services</i>	<i>Surveys conducted among stakeholders in climate-sensitive sectors; economic loss data from national disaster databases; CWIMS analytics</i>	<i>Limited access to actionable climate information for economic planning and disaster risk reduction in key sectors</i>	<i>At least 60% of surveyed stakeholders in climate-sensitive sectors report improved access and use of climate information for decision-making</i>	<i>At least 80% of surveyed stakeholders in climate-sensitive sectors report improved access and use of climate information, leading to tangible economic benefits/avoidance of losses</i>	<i>Sectors are committed to mainstreaming climate and disaster risk information; sectors are willing to utilize climate information and early warnings to make operations more efficient and resilient</i>

4. Project/programme activities and deliverables

Output	Activities	Description	Deliverables
<i>Output 1.1: Integrated Baseline Information, Data Recovery, Network Assessment, and Conceptual Design of a National Observation System</i>	<i>1.1.1 Recover, digitize, quality-control, and harmonize historical hydro-climatic, hydrological, and water datasets for the selected areas and priority basins and wadies</i>	<i>Archive legacy records from NWRA, CAMA, MWE, MAIF, and other relevant institutions including datasets embedded in legacy systems such as NORMIS; digitize paper archives and disconnected digital files; apply QA/QC and harmonize to standardized formats to enable integration into CWIMS</i>	<i>Digitized and harmonized historical climate and water datasets; quality-controlled national data repository integrated into CWIMS; recovered datasets from legacy systems and institutional archives; standardized metadata catalog; data audit report</i>

	<i>1.1.2 Compile integrated hydrometeorological and socio-economic baseline information for selected basins and wadies</i>	<i>Gather and consolidate hydrometeorological information with data on water resources, land use, agriculture and livelihoods including fisheries, ecosystems and biodiversity, infrastructure, health, population distribution, and socio-economic exposure across 9 priority basins and wadies</i>	<i>Integrated basin- and wadi-level baseline datasets; harmonized exposure and socio-economic layers linked to climate and water data; baseline profiles supporting climate risk assessment for selected areas and priority basins</i>
	<i>1.1.3 Assess existing observation networks and redesign a national monitoring architecture aligned with CWIMS and EWS requirements</i>	<i>Map and evaluate spatial coverage, functionality, data quality, institutional responsibilities, and operational sustainability of existing hydro-meteorological and hydrological stations; identify gaps, redundancies, and priority needs; design a redesigned national monitoring architecture with standardized specifications, interoperability requirements, and a phased investment roadmap</i>	<i>Network assessment report on existing hydro-meteorological and hydrological networks; conceptual design of an integrated national monitoring architecture; costed phased investment roadmap</i>
<i>Output 1.2: Expansion and Modernization of Hydro-Meteorological and Hydrological Monitoring Infrastructure</i>	<i>1.2.1 Rehabilitate and expand hydro-meteorological and hydrological monitoring stations in selected priority areas</i>	<i>Restore non-operational and partially functional stations owned and operated by MWE, NWRA, and CAMA; install additional AWS, surface water/wadi flow, and groundwater stations in priority basins and wadies where critical data gaps exist, in line with the redesigned national monitoring architecture</i>	<i>List of rehabilitated, restored, and operational monitoring stations; expanded spatial coverage in selected areas and priority basins and wadies; station commissioning reports</i>
	<i>1.2.2 Install and upgrade monitoring sensors and real-time telemetry systems</i>	<i>Equip rehabilitated and newly installed stations with modern sensors to measure key climate and water parameters; establish real-time telemetry systems to enable continuous, automated data transmission to CWIMS and forecasting platforms</i>	<i>Installed and upgraded climate and hydrological sensors; functional real-time data transmission to CWIMS; telemetry installation reports; real-time data transmission records; system connectivity logs</i>
	<i>1.2.3 Calibrate, test, and establish QA/QC and maintenance procedures for monitoring infrastructure</i>	<i>Calibrate, test, and validate all installed monitoring equipment; develop and institutionalize standardized quality assurance, maintenance, and inspection procedures to support long-term operational performance and data quality across networks managed by MWE, NWRA, and CAMA</i>	<i>Calibrated and validated monitoring equipment; QA/QC procedures manual; O&M plan; calibration certificates; service-level agreements</i>
<i>Output 1.3: Design and Operationalization of the Climate and Water Information</i>	<i>1.3.1 Design the CWIMS system architecture and data management</i>	<i>Define platform architecture, databases, data standards, interoperability protocols,</i>	<i>Operationalized CWIMS system architecture design; data governance and</i>

Management System (CWIMS)	framework	user access levels, and security arrangements; establish CWIMS as the central national platform hosted by MWE; ensure compatibility with monitoring networks, EWS, and sectoral information systems	management framework; hosting and security arrangements documentation
	1.3.2 Integrate ground-based observation, remote sensing, and climate data into CWIMS	Develop and operationalize automated data ingestion workflows to integrate hydro-meteorological observations, satellite and remote sensing products, groundwater and wadi-flow information, and climate projections into the unified national platform	Data integration protocols; automated ingestion pipelines; interoperability standards documentation; integrated national climate and water datasets
	1.3.3 Develop automated data processing, QA/QC, and data management workflows within CWIMS	Build and operationalize automated processing pipelines, validation rules, data storage protocols, access management, and dissemination mechanisms to ensure near real-time data availability, consistency, reliability, and traceability of incoming data	Operational CWIMS platform with functional dashboards and analytics tools; automated QA/QC workflows; data access and dissemination mechanisms; cybersecurity policy documentation; API registry; signed MoUs
Output 2.1: Climate-Related Risk Monitoring and Forecasting Systems	2.1.1 Develop and operationalize climate-related multi-hazard monitoring and forecasting models	Develop and operationalize hazard-specific analytical and forecasting models for floods and flash floods, drought and water stress, heatwaves, groundwater depletion, and climate-related coastal hazards using CWIMS data; define hazard indicators, thresholds, and forecasting time horizons; embed models in operational workflows supporting early warning and anticipatory decision-making	Operational multi-hazard climate risk monitoring and forecasting models (≥ 4 hazard types); defined hazard indicators, thresholds, and forecasting products; model validation reports; technical documentation
	2.1.2 Integrate CWIMS data and remote sensing inputs to generate real-time climate risk analysis, mapping, and forecasting workflows.	Combine ground-based climate and water observations managed through CWIMS with satellite and remote sensing data to enable real-time risk analysis, spatial risk mapping, and continuous monitoring of evolving climate conditions and hazards	Integrated CWIMS–remote sensing workflows; real-time climate risk maps and analytical outputs; GIS dashboards; remote sensing integration protocols; usage analytics
Output 2.2: Establishment and Operationalization of a Centralized Multi-Hazard Early Warning System (MH-EWS) Integrated with Governorate-Level Systems	2.2.1 Establish and configure a centralized national early warning system linked to CWIMS and forecasting systems	Build and operationalize the centralized national MH-EWS platform linked to CWIMS and climate risk forecasting models; configure alert generation based on predefined hazard thresholds, indicators, and forecast triggers; support multi-hazard monitoring and real-time situational awareness for national institutions	Operationalized early warning platform linked to CWIMS and forecasting systems; CAP-compliant alert profiles; technical configuration documentation

	2.2.2 Integrate the centralized early warning system with governorate-level operation rooms and local response systems	Connect the national MH-EWS platform with governorate-level operation rooms; enable vertical flow of early warning information, hazard status updates, and situational awareness between national and subnational levels, strengthening consistency and reliability of early warning operations	Functional integration between national early warning system and governorate-level operation rooms; governorate operation room commissioning reports; integration protocols; alert delivery chain documentation
	2.2.3 Develop and operationalize SOPs for warning generation, validation, and coordinated response	Define technical workflows, institutional roles, decision thresholds, and quality control processes for warning production, validation, authorization, updating, and coordinated response across national and subnational institutions; test and validate SOPs through simulation exercises and preparedness drills	Standard operating procedures for warning generation, validation, and coordinated response; defined technical workflows and decision thresholds; drill calendar; after-action review (AAR) reports
Output 2.3: Development and Dissemination of Climate Services and Advisory Products	2.3.1 Develop and tailor climate services and advisory products based on CWIMS data and early warning outputs	Develop and tailor a suite of climate services including seasonal outlooks, drought bulletins, water stress advisories, flood alerts, and heat-health warnings; define user requirements, formats, lead times, and thresholds adapted to national institutions, governorate authorities, Civil Defense, water agencies, agricultural services, health institutions, and local administrations	Tailored climate services and advisory products operationalized for institutional and local decision-making; climate service product catalog; sector-specific bulletins; seasonal outlook reports; usage analytics
	2.3.2 Establish communication channels for dissemination of climate services and advisories	Establish and operationalize multi-channel dissemination systems through SMS, digital platforms, radio, television, social media, mosques, and other locally appropriate channels in coordination with the Ministry of Telecommunications, CAMA, and media outlets to ensure wide coverage and accessibility	Operational communication channels for climate services (SMS, media, digital platforms); dissemination channel setup reports; community reach surveys; dissemination logs; media partnership agreements
	2.3.3 Develop preparedness and response plans informed by climate services and early warning	Develop preparedness and response plans in coordination with Civil Defense, local authorities, and sectoral institutions; define triggers, roles, and actions for extreme events and long-term sectoral climate risks including water, food security, health, and urban planning; enable timely and coordinated anticipatory action	Preparedness and response plans for climate-related extreme events; sectoral response plans for line ministries; defined triggers and action protocols; community consultation records; approved preparedness plan documentation
Output 3.1: Establishment of a National Climate and Water Information and Early	3.1.1 Establish a national Climate and Water Information and Early Warning	Set up the dedicated institutional anchor within MWE for long-term CWIMEWS	National Climate and Water Information and Early Warning Center established and

Warning Center	Center to host and operate CWIMEWS	management, including institutional mandate, staffing, organizational structure, and operational protocols; ensure the center provides a single, authoritative national platform for climate and water information services	operational; MWE hosting agreement; institutional mandate document; staffing plan; center commissioning report
	3.1.2 Equip the national center with required ICT infrastructure, data servers, and communication systems, and operational facilities.	Procure and install data servers, backup and storage systems, networking and communication equipment, power supply and redundancy solutions, and operational workspaces to ensure secure, reliable, and uninterrupted functioning of CWIMEWS	ICT infrastructure, servers, communication systems, and operational facilities installed; ICT procurement and installation records; server and communication system commissioning reports
	3.1.3 Establish governorate-level operation rooms and strengthen local response systems linked to the national early warning center	Set up and technically connect governorate-level operation rooms to the national center to strengthen subnational capacities for receiving, interpreting, and operationalizing early warning information, and to improve vertical integration across administrative levels	Governorate-level operation rooms established and linked to the national center; connectivity and integration documentation; governorate operation room setup reports
Output 3.2: Establishment of Coordination Mechanisms and Governance Protocols for Climate and Water Information Management	3.2.1 Establish national coordination mechanisms for climate and water information management among relevant ministries, agencies, and local authorities	Create formal inter-agency coordination platforms enabling structured collaboration, information exchange, and joint decision-making among MWE/CCU, CAMA, NWRA, EPA, line ministries, DRM entities, and governorate authorities, reducing institutional fragmentation and ensuring alignment of roles and responsibilities	National coordination mechanisms established; inter-institutional coordination framework; coordination platform Terms of Reference (ToRs); meeting minutes; action trackers
	3.2.2 Develop and formalize data-sharing protocols, interoperability standards, and information exchange arrangements	Develop and adopt legally binding protocols defining data formats, access rules, data governance principles, and technical interoperability requirements governing how climate and water data are shared, exchanged, and integrated across institutions and systems	Signed MoUs; data-sharing protocols; interoperability standards documentation
	3.2.3 Define institutional roles, mandates, and SOPs for climate information management, warning issuance, and response coordination	Clarify and formalize institutional mandates and operational responsibilities across the CWIMEWS governance chain; establish SOPs for warning generation and coordinated response; formalize arrangements through MOUs delineating roles, responsibilities, and coordination mechanisms among relevant ministries and agencies	Institutional mandate documents; approved SOPs for warning issuance and response coordination; signed MOUs; Sendai Framework alignment report
	3.2.4 Align governance mechanisms with	Align national coordination and governance	DRR/DRM-aligned governance framework;

	<i>DRR/DRM frameworks under the Sendai Framework</i>	<i>arrangements with the Sendai Framework for Disaster Risk Reduction; establish standardized reporting protocols and data flows for loss and damage tracking from local to national levels; define institutional responsibilities for risk governance, documentation, and reporting</i>	<i>loss and damage monitoring and reporting arrangements; standardized reporting protocols</i>
<i>Output 3.3: Development of Business Models and Investment Plans for CWIMS/EWS Sustainability</i>	<i>3.3.1 Assess long-term operational, maintenance, and hosting costs for CWIMEWS</i>	<i>Conduct a comprehensive life-cycle cost assessment covering CWIMS infrastructure, early warning platforms, data storage, system upgrades, staffing, and recurrent operational expenses; identify areas where efficiencies, shared services, or partnerships can reduce long-term costs</i>	<i>Long-term operational, maintenance, and hosting cost assessment report; O&M cost projections</i>
	<i>3.3.2 Develop sustainable business and financing models for the operation and maintenance of CWIMEWS services.</i>	<i>Design and validate financing models exploring public financing, service-based models, public-private partnerships, cost-sharing arrangements with telecom operators, technology providers, and utilities, and value-added climate information services, ensuring core early warning and public climate services remain publicly accessible</i>	<i>Approved sustainable business and cost-recovery model; financing model documentation including partnership options</i>
	<i>3.3.3 Prepare a national investment and scale-up plan for expanding CWIMEWS nationwide beyond the project lifetime</i>	<i>Develop a costed national plan defining pathways for phased CWIMEWS expansion across all governorates and priority basins; identify investment needs, financing sources, and strategic partnerships with development partners and the private sector to support replication and long-term sustainability</i>	<i>National investment and scale-up plan for CWIMEWS; stakeholder endorsement records</i>
<i>Output 3.4: Capacity Building for Climate and Water Information Management, Forecasting, and Early Warning</i>	<i>3.4.1 Conduct capacity needs assessments for climate and water information management and early warning</i>	<i>Assess existing technical, institutional, and operational capacity gaps in skills, systems, staffing, and coordination related to data management, forecasting, early warning, and system operation at national and governorate levels across MWE, CAMA, NWRA, MAIF, and other relevant institutions</i>	<i>Capacity needs assessment reports disaggregated by institution and gender</i>
	<i>3.4.2 Deliver technical and operational training programmes for CWIMEWS</i>	<i>Deliver targeted training on climate and water data management, QA/QC, hydrology, modeling and forecasting, remote sensing, GIS, CWIMS operation, and early warning workflows for technical</i>	<i>Technical and operational training programmes delivered; training completion records; competency assessments; training modules</i>

		<i>and managerial staff of MWE/CCU, CAMA, NWRA, MAIF, and other relevant institutions</i>	
	<i>3.4.3 Strengthen institutional capacity for climate risk communication and early warning operations</i>	<i>Strengthen institutional structures, internal coordination, communication protocols, and operational readiness for interpreting climate information and managing early warning operations at national and governorate levels, enhancing the ability of institutions to manage early warning information consistently and effectively</i>	<i>Risk communication training records; operational readiness assessment reports; strengthened institutional capacity documentation</i>
	<i>3.4.4 Build technical capacity for system maintenance and operational sustainability</i>	<i>Train national technical staff on routine system maintenance, troubleshooting, system updates, and long-term operational management of CWIMS and early warning infrastructure to ensure service continuity without reliance on external support</i>	<i>Technical capacity for system maintenance and sustainability established; maintenance capacity assessment reports; training completion records</i>
	<i>3.4.5 Develop and institutionalize manuals and operational guidelines for CWIMEWS</i>	<i>Produce and formally adopt comprehensive manuals and operational guidelines covering system operation, maintenance, data management, forecasting, early warning procedures, governance arrangements, and coordination mechanisms across institutions and administrative levels, ensuring knowledge retention and standardization</i>	<i>CWIMEWS operational manuals and guidelines developed and formally adopted; institutional guidelines; adoption endorsement records</i>

5. Monitoring, reporting and evaluation arrangements (max. 300 words)

Monitoring, Evaluation, and Reporting Framework

The Monitoring, Evaluation, and Reporting (MER) Framework for CWIMEWS will be developed in full alignment with GCF's monitoring and accountability requirements, as well as World Bank and UNDP institutional standards for results-based management. The framework is designed not merely as a compliance mechanism, but as an operational tool that will actively inform the development, calibration, and continuous improvement of the CWIMEWS system itself throughout implementation.

The MER Framework will serve three interconnected functions. First, it will provide the structured basis for reporting against the project's results framework, tracking progress from activities through outputs to outcomes and impact across all three components. Second, it will be fully integrated into the technical development and operation of CWIMEWS, meaning that monitoring data — including station functionality rates, data transmission reliability, forecast lead times, and user uptake of early warning products — will feed directly back into system design and operational adjustments rather than being collected solely for external reporting purposes. Third, it will support institutional learning, enabling the Project Implementation Unit and its partners to identify what is working, what requires recalibration, and where additional support or course correction is needed as the project progresses through Yemen's challenging operating environment.

Responsibility for MER implementation will be distributed across the project's governance structure to ensure both technical rigor and institutional accountability. The Ministry of Water and Environment (MWE), through the Climate Change Unit (CCU), will provide overall strategic oversight of the results framework and ensure alignment between project reporting and national climate and water sector priorities. The Joint Project Implementation Unit (JPIU), established by UNDP, will be responsible for day-to-day monitoring, data collection, and consolidation of progress reporting across all components, drawing on inputs from technical partner institutions including CAMA/YMS, NWRA, CDA, and MAIF.

UNDP, as Executing Entity, will retain overall fiduciary and results accountability, consolidating reporting for submission to the World Bank and ensuring that MER activities are adequately resourced and staffed. The World Bank, as Accredited Entity, will provide fiduciary oversight, technical quality assurance, and will conduct regular Implementation Support Missions to verify progress and support course correction where needed.

Third-Party Monitoring (TPM) will play an important and distinct role within this architecture, given the access and security constraints that characterize Yemen's operating environment. An independent Third-Party Monitoring agent will be contracted to provide verification of results, physical site monitoring, and beneficiary-level data collection in locations where direct World Bank or UNDP access may be constrained. TPM findings will be systematically incorporated into the project's monitoring and reporting cycle, providing an independent verification layer that complements secondary data sources and strengthens the overall credibility and reliability of results reporting. The specific mechanisms through which TPM data will feed into indicator verification, including the frequency of TPM missions and the indicators subject to independent verification, will be detailed in the M&E Plan developed during inception.

Recognizing that a fully developed M&E system requires more granular design than is feasible at the funding proposal stage, the detailed M&E system for CWIMEWS will be developed during the project inception phase. This inception-phase process will include the careful selection and refinement of quantifiable output-level indicators to ensure that the logframe captures tangible, measurable results at each stage of the results chain, rather than moving directly from activities to higher-level outcome indicators. It will also involve the setting of realistic, evidence-based targets, informed by baseline data collection and grounded in the operational realities of Yemen's fragile and conflict-affected context — recognizing that data availability constraints require carefully calibrated ambition rather than aspirational targets disconnected from feasibility.

To support this process and provide a credible foundation for the eventual detailed M&E system, an initial M&E Plan has been prepared and is attached to this Funding Proposal as Annex 15. This initial plan outlines the proposed monitoring architecture, indicator framework, data collection responsibilities, and reporting timelines that will be further elaborated and operationalized during inception. It is intended to demonstrate the AE's and EE's shared commitment to a robust, adaptive, and evidence-based approach to results monitoring, and to provide GCF with visibility into the trajectory of MER system development between funding approval and full inception.