Funding Proposal

SAP074: Yemen Climate Water Information Management & Early Warning Systems (CWIMEWS)

Yemen | International Bank for Reconstruction and Development and International Development Association (WorldBank) | Decision B.46/04

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This section provides a list of mandatory documents that should be submitted with the funding proposal as well as optional documents and references as deemed necessary to supplement the information provided in the funding proposal.

Notes to accredited entities on the use of the SAP funding proposal template

- The Simplified Approval Process Pilot Scheme (SAP) supports projects and programmes with a GCF contribution of up to USD 25 million with minimal to no environmental and social risks. Projects and programmes are eligible for SAP if they are ready for scaling up and have the potential for transformation, promoting a paradigm shift to low-emission and climate-resilient development.
- This template is for the SAP funding proposals and is different from the funding proposal template under the standard project and programme cycle. Distinctive features of the SAP funding proposal template are:
  - *Simpler documents*: key documents have been simplified, and presented in a single, up-front list;
  - *Fewer pages*: A shorter form with significantly fewer pages. The total length of funding proposals should **not exceed 20 pages,** annexes can be used to provide details as necessary;
  - *Easier form-filling*: fewer questions and clearer guidance allows more concise and succinct responses for each sub-section, avoiding duplication of information.
- Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other funding proposal documents such as project appraisal document, pre-feasibility studies, term sheet, legal due diligence report, etc.
- Submitted SAP Pilot Scheme funding proposals will be disclosed simultaneously with submission to the Board, subject to the redaction of any information which may not be disclosed pursuant to the GCF Information Disclosure Policy.
- For more information on how to develop Funding Proposals under the SAP please refer to the Simplified Approval Process (SAP) Funding proposal guidelines.

Please submit the completed form through the GCF Digital Proposal Submission Platform (DPS)[1]

[1] See the DPS user guide for further information on how to access and submit proposals.

A. PROJECT/PROGRAMME SUMMARY

A.1. Has this FP been submitted as a SAP CN before?			Yes ☒ No ☐		
A.2. Is the Environmental and Social Safeguards Category C or I-3?			Yes ☒ No ☐		
A.3. Project or programme	*Indicate whether this FP refers to a combination of several projects (programme) or one project.* ☒ Project ☐ Programme	**A.4. Public or private sector**	☒ Public sector ☐ Private sector	**A.5. RfP**	Choose an item.

A.6. Result area(s)

Check the applicable GCF result area(s) that the overall proposed project/programme targets. For each checked result area(s), indicate the estimated percentage of GCF and Co-financers' budget devoted to it. The total of the percentages when summed should be 100% for GCF and Co-financers' contribution respectively.

	GCF Contribution	**Co-financers' contribution[2]**
Mitigation total	Enter number %	Enter number %
☐ Energy generation and access	Enter number %	Enter number %
☐ Low emission transport	Enter number %	Enter number %
☐ Buildings, cities and industries and appliances	Enter number %	Enter number %
☐ Forestry and land use	Enter number %	Enter number %
Adaptation total	100 %	100 %
☒ Most vulnerable people and communities	40 %	40 %
☒ Health and well-being, and food and water security	40 %	40 %
☒ Infrastructure and built environment	20 %	20 %
☐ Ecosystem and ecosystem services	Enter number %	Enter number %

A.7.1. Expected mitigation outcome *(Core indicator 1: GHG emissions reduced, avoided or removed / sequestered)*	N/A	**A.7.2 Expected adaptation outcome** *(Core indicator 2: direct and indirect beneficiaries reached)*	*Indicate total number of direct and indirect beneficiaries*	
			Direct Beneficiaries 9.2 M (Male: 4.66 M, Female: 4.54 M)	*Indirect Beneficiaries 40.6 M (Male: 20.6 M, Female: 20 M)*
			22.6% of total population	*100% of total population*
A.8.1. Total investment (GCF + co-finance[3])	Amount: _28.377 M__ USD	**A.8.2 Total GCF funding requested** (max USD 25M)	Amount:_24.730 M__ USD	

[2] Co-financer's contribution means the financial resources required, whether Public Finance or Private Finance, in addition to the GCF contribution (i.e. GCF financial resources requested by the Accredited Entity) to implement the project or programme described in the funding proposal.

[3] Refer to the Policy on Co-financing of the GCF.

A.9. Type of financial instrument requested for the GCF funding	*Mark all that apply.* ☒ Grant ☐ Loan[4] ☐ Equity ☐ Guarantees ☐ Others:		
A.10. Implementation period (months)	*60 Months*	**A.11. Total project/ programme lifespan (years)**	*15 Years (parallel-financing project: I-WISE). The program is also part of a broader Multiphase Programmatic Approach (MAP) for 10 years by 2036.*
A.12. Expected date of internal approval	*10/30/2026*	**A.13. Has Readiness or PPF support been used to prepare this FP?**	Yes ☐ No ☒
A.14. Is this FP included in the entity work programme?	Yes ☐ No ☒	**A.15. Is this FP included in the country programme?**	Yes ☒ No ☐
A.16. Executing Entity information	*UNDP*		

A.17. Scalability and potential for transformation (max. 100 words)

1. The GCF-funded activity complements the i-WISE project, which has already mobilized US$150 million in IDA financing as parallel financing and US$3.647 million in trust fund resources as co-financing. However, the i-WISE project is only the first phase of a broader multiphase programmatic approach targeting a US$600 million investment to drive transformative, climate-resilient development. The i-WISE program is inherently scalable through its multiphase programmatic approach and basin-based model, allowing investments to expand geographically and be reprioritized as conditions evolve, with Phase 3 explicitly designed to replicate and scale proven interventions across additional basins. Its adaptive, learning-driven design and phased transition to local institutions enable a systemic shift from externally delivered services to locally owned, sustainable water management systems, creating durable institutional transformation. By integrating data systems (CWIMS), climate-resilient infrastructure, and private sector participation, the project lays the foundation for long-term sector modernization, improved water security, and scalable service delivery models in fragile contexts.

2. CWIMEWS is the critical enabler of this trajectory. It drives a fundamental shift in how Yemen manages climate and water risk from fragmented, agency-specific monitoring toward a unified, anticipatory, impact-based system governed by shared data protocols and a permanent national authority. By formalizing inter-agency data sharing and institutionalizing the System Management Unit within the Ministry of Water and Environment, CWIMEWS creates the enabling architecture for evidence-based water governance that no single agency could build unilaterally. The institutional frameworks and technical infrastructure will provide the governance foundation on which subsequent I-WISE phases and future climate investments in Yemen.

3. The scalability of CWIMEWS is further strengthen by its direct linkage to an active external financing pipeline (e.g., CREWS). The 22nd Meeting of the CREWS Steering Committee confirmed Yemen among the countries with a project under preparation. A dedicated CREWS project for Yemen, once approved, would layer directly onto the institutional and technical foundations that CWIMEWS establishes. This positions CWIMEWS as a standalone investment that will serve as the first layer of a multi-financier early warning architecture and multiplying the development impact.

A.18. Project/Programme rationale, objectives and approach (max. 300 words)

[4] Senior loans and subordinated loans.

4. Yemen faces rapidly intensifying climate hazards—prolonged droughts, extreme heat, destructive floods, cyclones, and severe groundwater depletion—interacting with one of the world's most acute water crises and deeply weakened institutions. Hydrometeorological networks have largely collapsed, data systems are fragmented, and forecasting capacity is limited, leaving the country unable to anticipate climate shocks or manage water scarcity.

5. Yemen is caught in a compound fragility trap: climate shocks destroy infrastructure and livelihoods faster than post-conflict recovery can rebuild them, and without reliable climate information, neither government agencies nor humanitarian actors can anticipate, reduce, or efficiently recover from those shocks. Each missed warning deepens dependence on humanitarian response rather than building domestic resilience. Breaking this cycle requires not incremental improvements to individual agencies, but the construction of a unified, institutionalized climate information architecture.

6. The proposed CWIMEWS project is part of a broader US$600 million Multiphase Programmatic Approach (MPA). This GCF-financed operation builds on the first phase of the I-WISE project, which has already mobilized US$150 million in IDA financing as parallel financing and US$3.647 million in trust-fund as co-financing. CWIMEWS aims to restore Yemen's climate- and water-information systems and operationalize multi-hazard early warning capacities across priority basins. Currently, Component 1 of I-WISE is under development with a targeted focus on establishing foundational Climate and Water Information Management (CWIM) systems. CWIMEWS brings a critical new dimension to this baseline by adding and operationalizing multi-hazard early warning systems (EWS) across priority basins. By bridging the gap between data management and proactive disaster response (EWS), CWIMEWS translates hydrometeorological data into actionable, life-saving alerts. This addition significantly enhances the complementarity and overall climate resilience of the broader Yemen programmatic portfolio.

7. The project will deliver measurable improvements in Yemen's climate-risk management capacity. These include expanded monitoring networks (weather, rainfall, groundwater, wadi-flow, and coastal sensors); the national Climate and Water Information Management System (CWIMS); more accurate forecasting, longer lead times for multi-hazard early warnings, and significant reductions in disaster-related losses. Enhanced drought monitoring and groundwater-stress analytics will strengthen water allocation and preparedness, while expanded observation networks will support more reliable, climate-informed decision-making across sectors. By unifying fragmented data systems and strengthening institutional coordination, CWIMEWS enables Yemen to shift from reactive crisis response to proactive, anticipatory climate governance at national and basin levels.

8. GCF support is essential given Yemen's extreme climate vulnerability, severely degraded monitoring infrastructure, and extremely limited fiscal space. The country lacks the resources to rebuild hydrometeorological systems, operationalize early warning services, or sustain climate-information platforms without concessional financing. GCF investment fills this structural gap by financing public-good climate services that cannot be funded through domestic budgets or cost-recovery mechanisms. It also complements ongoing IDA and trust-fund resources and strategically positions Yemen to mobilize additional climate financing from CREWS. In Yemen's FCV context—where institutions are fragile and climate impacts are acute—a grant instrument is the only appropriate modality to ensure service continuity, national ownership, and long-term resilience.

B. PROJECT/PROGRAMME DETAILS

B.1. Context and baseline (max. 500 words)

9. Yemen faces acute climate vulnerabilities, ranking among the world's most water-scarce and climate-affected countries. Since the 1970s, Yemen has experienced a warming rate of approximately 0.42°C per decade, with more frequent and severe heatwaves, erratic rainfall, and chronic droughts. Annual precipitation has declined in key regions, while extreme rainfall events and flash floods have become more common, causing significant damage to infrastructure, agriculture, and urban areas. These hazards are compounded by Yemen's fragile socio-economic context, ongoing conflict, and institutional fragmentation, which have severely degraded hydrometeorological infrastructure and limited the country's capacity to anticipate and respond to climate risks.

10. The trajectory ahead is severe. By mid-century under high-emission scenarios, the number of days exceeding 35 degrees Celsius will increase by 28 days nationally, reaching 109 heat-stress days per year. The Standardized Precipitation-Evapotranspiration Index (SPEI) confirms a persistent drying trend since the 1970s, with national average rainfall declining at 6.25 millimeters per decade and precipitation is simultaneously becoming more episodic and intense, concentrated in shorter and more destructive events. For example, 2020-2022 flood sequence affected 182 districts and 73,000 households with damages estimated between USD 336 million and USD 811 million.

11. With an HDI of 0.424 (186th globally in 2022) and nearly 74 percent of the population living in poverty, the country has virtually no fiscal buffer against climate shocks. Real GDP per capita has declined by 54 percent since 2015. Some 23.4 million people, nearly 70 percent of the population, currently require humanitarian assistance. Yemen is ranked the 28th most climate-affected country globally, and without adaptation, combined climate impacts are projected to reduce annual GDP by a further 4 percent by 2050. This is not a country managing climate risk at the margins. It is a country where climate shocks and institutional collapse are mutually reinforcing in a cycle that humanitarian financing alone cannot break.

    Currently, over 70% of Yemen's hydrometeorological stations are non-operational[5], and data archives are fragmented and largely inaccessible. Forecasting capacity is limited, with short lead times and unreliable communication channels. Vulnerable populations—especially women, female-headed households, Internally Displaced Persons (IDPs), persons with disabilities, older persons, youth, children, and people living in rural and remote areas—face escalating risks to health, food security, livelihoods, and access to timely early warning. The baseline scenario is characterized by reactive crisis management, insufficient data for decision-making, and limited institutional coordination. Without intervention, Yemen will remain exposed to recurrent climate shocks, with high human and economic costs.

    Table 1. Installed Meteorological Observation Stations in Yemen

Institution	# Weather Stations	# Rainfall Stations
Civil Aviation and Meteorology Authority (CAMA)	35	
National Water Resources Authority (NWRA)	20	63
Ministry of Agriculture and Irrigation (MAI) – Northern Irrigation Project	10	45
MAI – Tihama Development Authority	7	
MAI – Agricultural Research and Extension Authority	9	
Civil Defence Authority (CDA) – Al-Sailah/Sana'a	7	7
CDA – Shibam/ Hadramout	2	9
Total	90	124

12. Responsibility for EWS functions is spread across several agencies, including the Civil Aviation and Meteorology Authority, the National Water Resources Authority, the Civil Defence Authority and the Ministry of Agriculture and Irrigation each operating largely in isolation, with no formal coordination framework and outdated legal mandates ill-suited to anticipatory risk management. On the technical side, the absence of weather radar and upper-air observations severely constrains precipitation

5 The meteorological network comprises approximately 214 installed climate observation stations across CAMA/YMS, CDA, MAI, and NWRA, blending weather and rainfall stations, with a mix of manual and automatic instruments. Within CAMA/YMS specifically, there are 35 weather stations, of which 28 are reportedly operational. NWRA's historical network was much larger.—432 stations between 1995 and 2010. Currently only 84 are still functional: rainfall (63), weather (20), and only one groundwater station. All wadi flow stations are reportedly non-operational. MAI holds historical records for approximately 149 sites, but regular monitoring reportedly lapsed for many stations since 2011; a recent integration connected 17 automatic MAI stations to CAMA's system for near real-time sharing, other stations of MAI are reported as not operating. . CDA's localized flash-flood networks in Sana'a and Shibam comprise 7 weather and 7 rainfall stations in Sana'a's Al-Sailah wadi and 11 stations in Shibam (9 rainfall and 2 weather), all feeding real-time data to CDA servers and linked to siren systems for immediate public alerts. CAMA/YMS operates insuffiecient calibration infrastructure limited to facilities in Aden and Sana'a, requiring sensors to be sent abroad for servicing and causing extended operational downtime.

forecasting, while calibration infrastructure is limited to two calibration facilities in Aden and Sana'a. Geographically, siren-based alert systems exist only in a handful of urban flash-flood hotspots, leaving rural and displaced populations with no reliable warning coverage.

13. A critical vulnerability in Yemen's current climate resilience architecture is the gap in 'last-mile' dissemination. As identified in the project's pre-feasibility study, while national institutions retain limited forecasting capabilities, the continuity and reach of traditional communication channels have been severely degraded by ongoing conflict, leaving vulnerable end-users without actionable warnings. CWIMEWS directly addresses this barrier by establishing multi-channel dissemination pathways ensuring that early warning forecasts are translated into locally relevant advisories for agriculture, water management, and civil protection. By coupling technical modernization at the national level with localized, community-anchored preparedness, the program moves Yemen from reactive crisis management toward proactive, anticipatory climate risk governance that reaches the most vulnerable populations.

14. The World Bank's I-WISE parent project[6] (approved in June 2026) provides a foundational framework for water management and climate resilience, with CWIMEWS integrated as additional financing. While several analytics and ongoing initiatives are relevant to this funding proposal, gaps remain in integrated climate and water information systems. The proposed CWIMEWS project complements these efforts by focusing on system-wide modernization, data integration, and multi-hazard early warning, leveraging lessons learned and existing partnerships.
15. Women and other vulnerable groups face differentiated barriers in accessing and acting on climate information and early warnings. Women may have lower access to mobile phones, restricted mobility, and limited participation in public meetings. Persons with disabilities may face communication and mobility barriers during emergencies, while older persons may depend on family or community networks for information. IDPs are often located in informal settlements exposed to flooding and other climate-related hazards. These barriers will be addressed through gender-sensitive consultations, accessible communication channels, female facilitators where appropriate, and community-based dissemination arrangements.

16. Yemen's climate vulnerability is driven by a combination of fiscal, regulatory, technological, financial, ecological, and institutional barriers:
    - **Fiscal and Financial:** Yemen's fiscal collapse is total and structural. There are no dedicated public budget lines for hydromet operations, maintenance, or calibration anywhere in the national budget. Since 2015, real GDP per capita has declined by 54 percent, public revenues have contracted to a fraction of pre-conflict levels, and the Yemeni Rial has depreciated severely, eroding the real value of any residual institutional financing. What little climate-related funding reaches national agencies is channeled through humanitarian actors on short programming cycles, which reduces long-term institutional ownership and creates dependency without building recurrent capacity. In this environment, the routine requirements of a functional hydromet system (e.g., sensor calibration, spare parts procurement, connectivity costs, and staff retention) cannot be met from domestic resources, making the case for GCF grant financing not only appropriate but structurally unavoidable.
    - **Regulatory and Institutional:** The legal and institutional architecture governing Yemen's early warning functions has not been updated to reflect contemporary risk management practice. The Civil Defence Law -- the primary legal instrument for emergency response -- does not recognize anticipatory action, impact-based forecasting, or multi-hazard early warning as distinct public functions with defined responsibilities. No national hydromet policy exists to delineate which agency holds which mandate, what open data standards apply, or how inter-agency data sharing is governed. The result is overlapping and competing mandates among CAMA, NWRA, MAIF, and CDA, with no enforceable coordination protocol and no accountability for gaps in the warning chain. Inter-agency data sharing, where it occurs at all, is encumbered by complex bureaucratic procedures and informal personal arrangements rather than institutionalized agreements.
    - **Technological:** The technological baseline is one of near-total collapse. Over 70 percent of Yemen's historical hydrometeorological monitoring network is non-operational. Yemen has no weather radar and no upper-air radiosonde observation capacity, both of which are prerequisites for reliable precipitation forecasting and severe weather tracking. Large volumes of historical hydrological and meteorological records remain in hardcopy or legacy digital formats, incompatible with modern forecasting models and vulnerable to permanent loss. Telemetry-enabled real-time data transmission is virtually absent outside a handful of stations, meaning that the data that is collected arrives too late and through too many intermediary steps to support operational early warning.
    - **Ecological:** Yemen's ecological degradation compounds every other vulnerability and narrows the window for effective adaptation. Renewable freshwater availability has fallen below 90 cubic meters per capita per year, less than one-fifth of the absolute scarcity threshold, against a national annual demand that exceeds double the renewable supply. Groundwater tables are declining at 2 to 6 meters per year across key agricultural basins, with wells in the Sana'a and Dhamar highlands now reaching depths approaching 1,000 meters, at which point extraction costs become prohibitive for smallholder farmers and the risk of aquifer collapse increases materially.

6 https://projects.worldbank.org/en/projects-operations/project-detail/P505562

Table 2. Gap-Need Matrix

Essential EWS Element	Current Gap	Project Response	Lead Output
Community connection & response	Limited community preparedness and use of local risk knowledge.	Community Early Action Plans, drills, and feedback mechanisms.	2.3, 3.4
Institutional arrangements	Fragmented mandates and coordination.	Governance framework, SOPs, coordination mechanisms, and CWIMEWS Center.	3.1, 3.2
Earth observation	Monitoring networks degraded and telemetry limited.	Station rehabilitation, telemetry, and expanded observation network.	1.2
Data & information collection	Historical records fragmented and at risk of loss.	Data recovery, digitization, standardization, and CWIMS repository.	1.1, 1.3
Hazard detection	Limited real-time hazard detection capability.	Automated data processing, QA/QC, and hazard monitoring workflows.	1.3, 2.1
Hazard assessment	Limited risk mapping and exposure analysis.	Multi-hazard risk analysis and mapping products.	2.1
Impact-based forecasting & warning	Forecasts not linked to impacts or decisions.	Impact-based forecasting models and decision-support products.	2.1
Warnings & products	No standardized warning generation process.	MH-EWS platform, alert generation, validation, and SOPs.	2.2
Dissemination & notification	Inconsistent last-mile communication.	Multi-channel dissemination and CAP-compliant alerts.	2.2, 2.3
Risk communication & preparedness	Limited drills and preparedness planning.	Climate services, EAPs, training, and capacity building.	2.3, 3.4

17. Reflecting the four pillars of the Early Warnings for All (EW4All) framework, the assessment finds mutually reinforcing gaps across CWIMEWS. Risk knowledge is constrained by dispersed datasets, weak archiving, and limited after-action learning. Observation suffers from degraded networks, scarce telemetry, no radar or upper-air capability, and a lead time of only about 48 hours. Communication lacks national SOPs, consistent SMS, full broadcast coverage, and complete CAP uptake. Preparedness is held back by limited local DRM capacity, temporary response structures, scarce equipment, and infrequent drills. Addressing these in an integrated way is essential, since stronger data and observation underpin credible warnings, which in turn depend on reliable communication and prepared communities to translate alerts into timely protective action.

18. Addressing these root causes requires a transformative, conflict-aware intervention that builds institutional capacity, modernizes technical systems, and fosters inclusive, community-based adaptation. Yemen's compound fragility trap is structural: fiscal collapse, legal fragmentation, technical degradation, and ecological depletion are mutually reinforcing and cannot be resolved through incremental agency-level reforms. CWIMEWS responds to this reality by simultaneously restoring the national monitoring network, establishing a unified data management platform, formalizing inter-agency coordination through legally binding data-sharing agreements, and delivering impact-based early warnings to the most exposed communities through structured Early Action Plans. Anchored in Yemen's National Adaptation Plan and aligned with the CREWS 2030 Strategy, the project is designed to overcome these barriers, catalyze complementary financing from CREWS, SOFF, and subsequent MPA phases, and deliver sustainable climate resilience for the 9.2 million people in the nine priority basins who currently face recurrent climate shocks without reliable warning or institutional support.

B.2.1. Project/Programme description (max. 1,000 words)

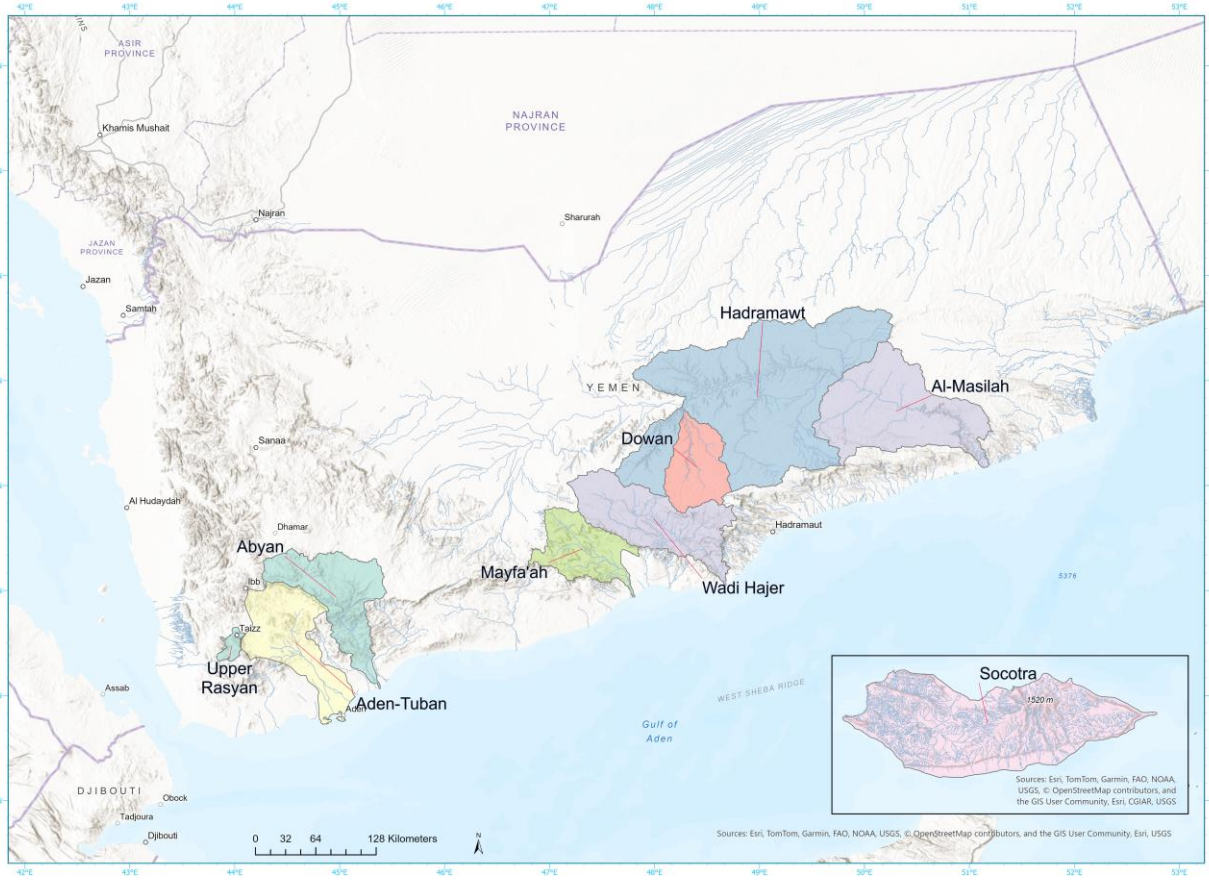
19. The objective of the Project is to strengthen Yemen's climate and water information management system and enhance climate resilient decision-making and institutional capacity for climate and water information services in selected basins.

20. The Project is currently expected to focus on a set of priority basins, which may include nine basins across eight governorates. The final geographic scope and basin coverage will be confirmed during project preparation and implementation in consultation with relevant stakeholders and based on operational considerations. These basins were identified as potential areas of intervention due to their exposure to flood and drought risks, groundwater stress, and the concentration of rural and displaced populations outside major urban centers.

21. The nine priority basins—Aden-Tuban, Wadi Hajer, Abyan, Upper Rasyan, Mayfa'ah, Hadramawt, Dowan, Al-Masilah, and Socotra were selected through a systematic Multi-Criteria Analysis (MCA)[7] conducted between April 2025 and February 2026, combining technical scoping, stakeholder consultations, and scored ranking sessions. The process involved three sequential steps: a desk review of available climate risk data, hydrological studies, and vulnerability assessments; bilateral consultations and workshops with MWE, CAMA/Yemen Meteorological Service (YMS), NWRA, MAIF, UN agencies, and NGOs to validate criteria and rankings; and structured MCA scoring sessions with technical specialists applying weighted criteria to generate ranked basin tables, cross-checked against climate risk, water stress, and population-at-risk data. The final selection combined MCA scores with project feasibility, complementarity with I-WISE parent investments, and national priorities.

22. The CWIMEWS project will be processed by the Accredited Entity as Additional Financing into Component 1 of the broader I-WISE project. Consequently, the activities described below represent a direct scaling-up and expansion of the existing I-WISE Component 1 activities. Nevertheless, no element of the GCF Funded Activity is legally, operationally or financially conditional upon the implementation, continuation, extension or cancellation of activities financed outside the Funded Activity.

Figure 1: Priority basins and target areas for CWIMEWS.



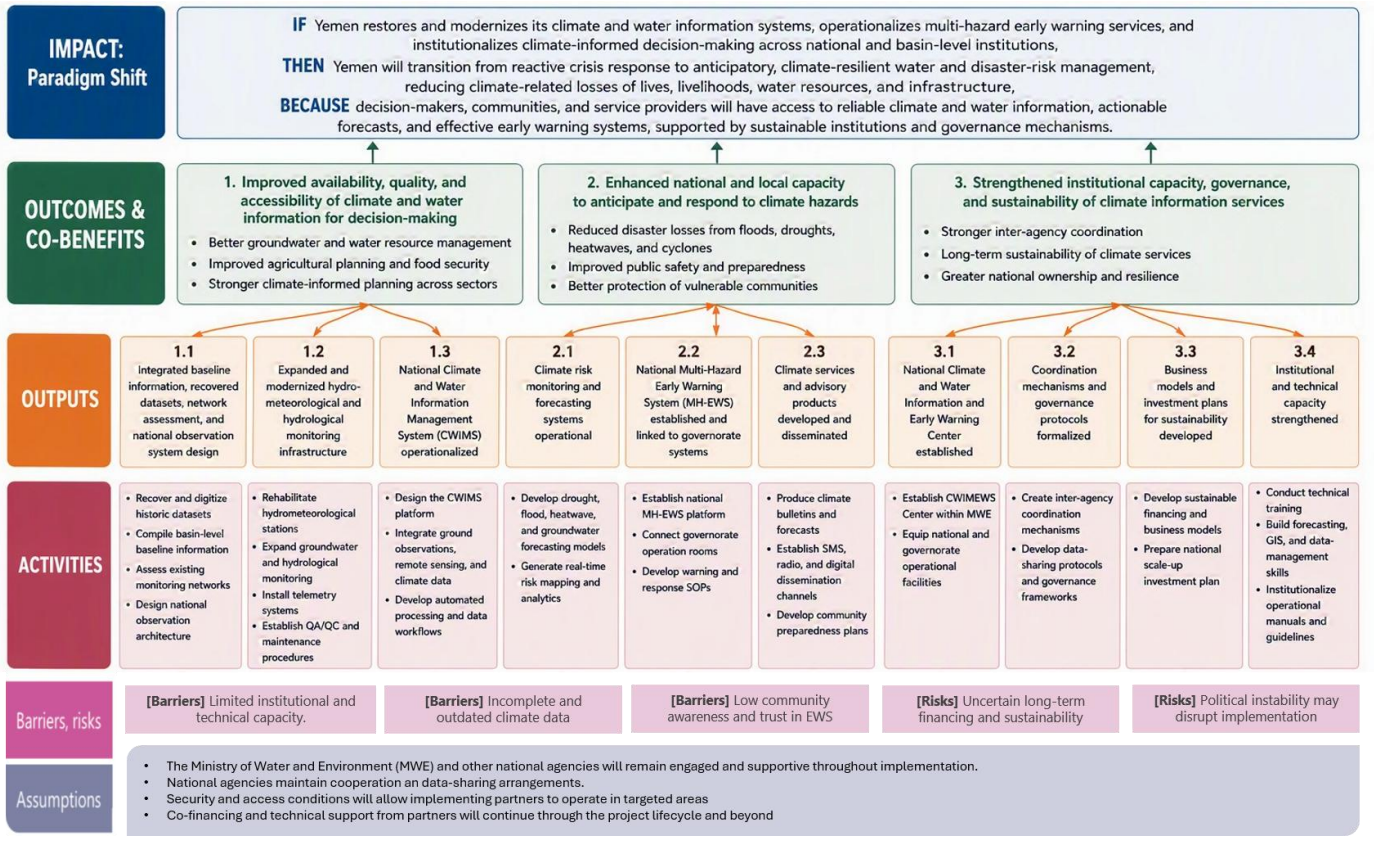
7 Basins were evaluated against eight weighted criteria: hydrological importance (20 percent); water stress and climate hazard exposure (15 percent); agricultural and socioeconomic importance (15 percent); accessibility and security (15 percent); sustainability of investment, including presence of local institutions and O&M capacity (15 percent); ecosystem and environmental importance (10 percent); data availability and gap prioritization (5 percent); and gender equality and inclusive participation (5 percent). For governorate-level Early Warning System prioritization, weights shifted toward exposure and severity of climate hazards (20 percent) and population at risk including internally displaced persons (20 percent).

23. The project achieves the objective through three components: (i) establishing and operationalizing a national Climate and Water Information Management System (CWIMS) through the recovery and integration of climate and water data, modernization of monitoring infrastructure, and development of a scalable information platform[8]; (ii) strengthening climate-resilient decision-making and multi-hazard early warning capabilities through improved risk monitoring, forecasting systems, early warning services, and dissemination of actionable climate information; and (iii) strengthening the enabling environment for sustainable climate and water information services through institutional coordination, governance frameworks, capacity building, and long-term sustainability planning. Together, these interventions aim to enhance Yemen's ability to anticipate, prepare for, and respond to climate and water-related risks through integrated, evidence-based decision-making. The project components compose an integrated EWS value chain fully aligned with GCF's EWS principles rather than three sequential activity blocks. Thus, Component 1 strengthens risk knowledge, data and information collection, earth observation, hazard detection, and monitoring; Component 2 converts this information into forecasting and analysis, warning generation, dissemination, and preparedness or early action; and Component 3 provides the institutional arrangements, mandates, coordination protocols, capacity building, sustainability planning, and feedback mechanisms needed to keep the full warning chain operational and learning over time.

24. The project implementation period is five years, covering procurement, installation, capacity building, and institutional strengthening. The physical infrastructure financed under this project (e.g., automatic weather stations, surface-water gauges, groundwater monitoring networks, the CWIMS platform, and associated ICT systems) is specified and designed to a minimum operational horizon of 15 years, consistent with WMO standards for hydrometeorological infrastructure investment.

25. Theory of Change (Figure 2) sets out how restoring and modernizing Yemen's climate and water information systems can shift the country from reactive crisis response. It holds that if Yemen restores and modernizes its climate and water information systems, operationalizes multi-hazard early warning, and institutionalizes climate-informed decision-making, then it can shift from reactive crisis response to anticipatory, climate-resilient water and disaster-risk management, reducing losses to lives, livelihoods, and infrastructure. It pursues this through three mutually reinforcing outcomes, namely better climate and water information for decision-making, stronger national and local capacity to anticipate and respond to hazards, and more sustainable institutions and governance, delivered through ten outputs spanning recovered data, modernized monitoring, an operational early warning system, and tailored climate services. Realizing this pathway depends on overcoming barriers such as limited capacity, weak data, and low community trust, managing risks around financing and political instability, and sustaining the engagement, access, and partner support assumed throughout implementation.

Figure 2. Theory of Change



8 Component 1 represents a scale-up and consolidation of climate and water information activities initiated under Component 1 of the I-WISE Project.

Component 1. Climate and Water Information Management System (CWIMS)

26. Yemen currently operates no unified national platform for climate and water data. Observations collected by CAMA, NWRA, MAIF, and CDA exist in incompatible formats, are held in institutional silos, and are largely inaccessible to the agencies and communities that need them most. Component 1 addresses this foundational gap by restoring, consolidating, and modernizing Yemen's hydrometeorological monitoring infrastructure and establishing the CWIMS platform as the authoritative national repository for real-time climate and water data. It does so through a deliberate sequence: first assessing the existing network and recovering historical records; then rehabilitating and expanding station coverage across the nine priority basins with telemetry-enabled, solar-powered sensors for weather, rainfall, surface-water, groundwater, and coastal parameters; and finally integrating all data streams into a single cloud-hosted platform governed by standardized protocols and open-data principles. All equipment specifications, data formats, and exchange procedures comply with WMO standards, including Global Basic Observing Network requirements, positioning Yemen for reintegration into real-time global meteorological data exchange and eligibility for SOFF and related international financing. Within the EWS value chain, this component strengthens risk knowledge, monitoring, data and information collection, and hazard detection. Its investments in historical data recovery, baseline information, network assessment, modernized observation infrastructure, telemetry, QA/QC, and the CWIMS platform provide the evidence base required for impact-based forecasting, warning generation, and later feedback into system improvement.

Sub-component 1.1. Integrated Baseline Information, Data Recovery, Network Assessment & Conceptual Design

(a) Recovering, digitizing, quality-controlling, and harmonizing historical hydro-climatic, hydrological, and water datasets from paper archives and disconnected digital files held by key national institutions, including inter alia the National Water Resources Authority (NWRA), the Civil Aviation and Meteorology Authority (CAMA), the Ministry of Water and Environment (MWE), and the Ministry of Agriculture, Irrigation and Fisheries (MAIF).

(b) Compiling integrated hydrometeorological and socio-economic baseline information for selected basins, encompassing water resources, land use, agriculture, health, and population distribution data, and, where feasible, sex- and vulnerability-disaggregated data to support inclusive targeting and monitoring.

(c) Assessing existing observation networks and redesigning a national monitoring architecture aligned with CWIMS and Early Warning System (EWS) requirements.

Sub-component 1.2. Expansion and Modernization of Monitoring Infrastructure

(a) Rehabilitating and expanding hydro-meteorological and hydrological monitoring stations in priority areas to restore and extend national observational coverage.

(b) Installing and upgrading monitoring sensors and real-time telemetry systems to enable automated data transmission and continuous data flows.

(c) Calibrating and testing monitoring equipment and establishing quality assurance and quality control (QA/QC) and maintenance procedures to ensure data reliability and long-term system sustainability.

Sub-Component 1.3. Design and Operationalization of the CWIMS Platform

(a) Designing and operationalizing the CWIMS system architecture and data management framework, initially hosted by the Executing Entity, and designed for long-term sustainability through institutional ownership, capacity building, and scalable financing[9].

(b) Integrating ground-based observation, remote sensing, and climate data into the platform to provide a comprehensive and interoperable national data environment.

(c) Developing automated data processing, quality control, and data management workflows to ensure broad access, data security, and integration of additional water basins and decision support tools.

Component 2. Climate-Resilient Decision-Making and Multi-Hazard Early Warning

27. Component 2 operationalizes the data foundation established under Component 1 by developing and deploying a Multi-Hazard Early Warning System (MH-EWS) that addresses Yemen's five priority hazards: flash flooding, drought, extreme heat, groundwater depletion, and cyclones and coastal flooding. The component applies an impact-based forecasting methodology -

9 To ensure long-term sustainability and independent operation, the transition to MWE ownership incorporates: (i) inter-agency data sharing protocols and data ownership rights with robust safeguards against unauthorized access; (ii) transfer of full technical documentation, system architecture, database schemas, user manuals, and the source code repository to enable independent operation and future development by MWE via the SMU and CCU; and (iii) a defined period of continued UNDP post-handover technical assistance to prevent service disruption.

- translating consolidated hydrometeorological data into hazard-specific risk products calibrated to the decision-making needs of government agencies, sector ministries, and community-level structures -- rather than producing technical parameters that require specialist interpretation. Flood forecasting models will apply WRF-based numerical weather prediction coupled with basin-level hydrological routing, fed by real-time telemetry from the network established under Component 1. Drought monitoring will draw on standardized indices, including the Standardized Precipitation-Evapotranspiration Index and the Palmer Drought Severity Index, generated automatically within CWIMS. Heat-health advisories will be integrated with Ministry of Public Health and Population protocols at defined meteorological thresholds, consistent with WHO guidance. Warning dissemination will comply with WMO Common Alerting Protocol standards, operationalized through national standard operating procedures, formal agreements with telecommunications providers, and Community Early Action Plans anchored in designated community structures across the nine priority basins. The measurable operational target is to extend flash-flood warning lead times from the current approximately 48 hours to 72 hours or more, while establishing functional drought monitoring and heat-health advisory services where none currently exist. Within the EWS value chain, this component links monitoring to forecasting and analysis, warning generation, dissemination, preparedness, and early action. The component is therefore designed not only to produce hazard models and alerts, but also to translate them into validated, actionable warnings and climate services that reach decision-makers and at-risk communities through agreed SOPs, multi-channel dissemination pathways, and Community Early Action Plans.

Sub-component 2.1. Climate-Related Risk Monitoring and Forecasting Systems

(a) Developing and operationalizing multi-hazard monitoring and forecasting models[10], including inter alia flood, drought, heatwave, groundwater depletion models, and climate-related coastal hazard using CWIMS data to inform timely and evidence-based risk management decisions.

(b) Integrating CWIMS data with remote sensing to generate real-time risk analysis and mapping products for use by national and local stakeholders.

Sub-component 2.2. Establishment and Operationalization of a Centralized Multi-Hazard Early Warning System (MH-EWS)

(a) Establishing and configuring a centralized national Multi-Hazard Early Warning System (MH-EWS) linked to CWIMS, providing an integrated operational platform for hazard monitoring and alert generation.

(b) Integrating the national MH-EWS platform with governorate-level operation rooms and local response systems to ensure warnings reach decision-makers at all levels.[11]

(c) Developing and operationalizing Standard Operating Procedures (SOPs) for warning generation, validation, and coordinated response across national and subnational institutions.

Sub-component 2.3. Development and Dissemination of Climate Services

(a) Developing and tailoring climate services, including inter alia seasonal outlooks, drought bulletins, and flood advisories, based on the assessed needs of government, community, and sector users.

(b) Establishing multi-channel communication pathways, including SMS, digital platforms, radio, community networks, female facilitators, and locally appropriate oral, audios, and visual formats, to ensure last-mile accessibility, timely and inclusive dissemination of warnings and climate information to women, IDPs, persons with disabilities, older persons, youth, and rural and remote communities.

(c) Developing preparedness and response plans for priority communities and sectors, informed by climate services and early warning outputs, and aligned with national disaster risk reduction frameworks[12].

10 Flood forecasting will use WRF-based numerical weather prediction coupled with HEC-HMS or equivalent basin-level hydrological routing models, fed by real-time telemetry from the expanded station network. Drought monitoring will draw on standardized indices including the Standardized Precipitation-Evapotranspiration Index (SPEI) and the Palmer Drought Severity Index (PDSI), generated automatically within CWIMS. All models will use open-source frameworks to eliminate software licensing costs and enable national agencies to maintain and adapt them without proprietary vendor dependence.

11 Governorate-level operation rooms and local response systems vary in existence and capacity across the priority basins. Their status will be assessed during the inception phase and documented in the POM. Where they exist, CWIMEWS integrates through standardized protocols; where they do not, the project supports their establishment in coordination with CDA and governorate authorities..

12 Priority community and sector selection methodology will be developed under Output 2.3 during the inception phase, grounded in the latest available data on hazard exposure, population vulnerability, gender-differentiated risk, displacement concentration, and institutional readiness across the nine priority basins. Selection criteria, prioritization framework, and eligibility thresholds will be established and approved by the Technical Coordination Committee, with final decision-making authority resting with UNDP's JPIU.

Component 3. Strengthening the Enabling Environment for Climate and Water Information Services

28. Component 3 supports the long-term sustainability and institutional anchoring of climate and water information services in Yemen. Building on the investments under Components 1 and 2, it strengthens the enabling environment required for the effective operation, coordination, and continued development of the Climate and Water Information Management System (CWIMS) and the Multi-Hazard Early Warning System (MH-EWS). Activities include the establishment of a national operational center, strengthening coordination mechanisms among relevant institutions, development of data-sharing protocols and governance arrangements, preparation of sustainability and scale-up plans, and delivery of targeted capacity-building programs for national and subnational stakeholders. The component also supports the development of operational procedures, technical guidance, and institutional capacities needed to enhance climate and water information services and promote their long-term sustainability. As part of these efforts, the Project will assess opportunities to leverage additional technical and financial support for future expansion and sustainability, including, where appropriate, engagement with international initiatives such as the Systematic Observations Financing Facility (SOFF), the Climate Risk and Early Warning Systems (CREWS) initiative, and other relevant partners. Capacity-building activities will encourage inclusive participation, including by women, and support the development of approaches that strengthen the accessibility and effectiveness of climate information and early warning services for diverse user groups. Within the EWS value chain, this componnet strengthens the enabling elements that allow each technical function to operate as a coherent service, including institutional arrangements, mandates, roles and responsibilities, interagency collaboration, concept of operations, governance protocols, capacity building, sustainable financing, and feedback loops from users, communities, drills, and post-event reviews.
29.

Sub-component 3.1. Establishment of a National CWIMEWS Center[13]

(a) Establishing a dedicated national CWIMEWS Center within MWE to host and operate the system, serving as the institutional anchor for long-term management, designed for sustainability through defined operational mandates and scalable financing.

(b) Equipping the national center with ICT infrastructure, data servers, and operational facilities, and establishing governorate-level operation rooms to support decentralized coordination and response.

Sub-component 3.2. Coordination Mechanisms and Governance Protocols

(a) Establishing national coordination mechanisms among relevant ministries and local authorities to support coherent and collaborative governance of CWIMEWS, including gender representation requirements and consultation with women's organizations, female technical staff, and female community representatives where appropriate.

(b) Developing and formalizing data-sharing protocols, interoperability standards, and institutional roles and SOPs for warning issuance and response coordination, including gender-responsive provisions and consultation with women's organizations, female technical staff, and female community representatives where appropriate.

(c) Aligning the governance framework with international frameworks, including inter alia the Sendai Framework for Disaster Risk Reduction, to ensure coherence with global standards and obligations.

Sub-component 3.3. Business Models and Investment Plans for Sustainability

(a) Assessing long-term operational, maintenance, and hosting costs and exploring feasible pathways for gradual resource mobilization, including an estimate of the O&M requirements, assessments of which services will require sustained public financing or have potential to be supported through cost-sharing or service agreements, as well as an analysis of the anchor user institutions to determine financial and institutional responsibilities post project-closure.

(b) Preparing a national investment and scale-up plan to guide phased expansion of CWIMEWS coverage to additional basins, Early Warning Systems (EWS), and decision support tools nationwide.[14]

13 The CWIMEWS Center is established within existing MWE premises; no new construction or land acquisition is required. All physical assets, ICT infrastructure, data servers, and associated equipment, are owned by the Government of Yemen, represented by the Ministry of Finance, and registered in the national asset registry. MWE serves as operational custodian. Asset transfer instruments are executed by UNDP at each handover milestone under terms detailed in the POM.

14 Activity 3.3.(b) is exclusively forward-looking. It produces a costed national investment and scale-up plan providing a strategic roadmap for extending CWIMEWS coverage to additional basins and hazard types beyond the current GCF grant scope. The plan is a planning instrument, not a commitment to expanded activities, and is intended to inform future financing decisions -- including potential Phase 3 of the I-WISE MPA and engagement with other development partners (e.g., SOFF, CREWS).

Sub-component 3.4 Capacity Building [15][16]

(a) Conducting institutional capacity needs assessments and delivering technical and operational training for national and subnational stakeholders, including inter alia training on hydrological and climate modeling, forecasting, GIS, and operation and maintenance of monitoring equipment.

(b) Strengthening institutional capacity for risk communication and system maintenance, and developing and institutionalizing operational manuals and guidelines to embed system knowledge within national institutions and ensure continuity beyond the project period.

30. Table 3 maps the causal logic linking Yemen's principal climate hazards to the project's adaptation response. For each of five hazards, it traces the impact pathway through which the hazard drives losses to water security, livelihoods, health, and life, and identifies the vulnerability factors that amplify exposure, including conflict-degraded infrastructure, collapsed monitoring networks, and the absence of operational forecasting or early warning services. It then sets out the project interventions across three components, namely monitoring and the CWIMS platform, hazard-specific forecasting and early warning products, and institutional capacity and coordination, and links each to its intended adaptation effect. Across all hazards, the common causal mechanism is that timely, hazard-specific information enables anticipatory action, whether in water allocation, planting, evacuation, or protective health measures, thereby reducing mortality, economic losses, and food insecurity before conditions peak.

Table 3. Climate Hazard Impact Pathways and Project Adaptation Logic

Climate Hazard	Impact Pathway	Vulnerability Factors	Project Intervention (Components)	Adaptation Effect (Causality)
Drought	Prolonged rainfall deficits reduce surface water availability and river base flows, drive aquifer overexploitation, reduce agricultural yields, and trigger food insecurity and displacement.	Over half the labor force is employed in agriculture; conflict has disabled irrigation infrastructure; no operational drought monitoring or seasonal forecast service; rural communities lack adaptive capacity or early-season information to shift cropping decisions.	C1: Rehabilitation of AWS and surface water stations; CWIMS platform integrating multi-source hydro-climatic data. C2: Drought forecasting model covering priority basins; tailored agro-meteorological bulletins for MAIF and FSNIS. C3: Capacity building for MWE/NWRA water allocation decision-making; inter-agency coordination protocols.	Seasonal and sub-seasonal drought outlooks enable anticipatory water allocation, early planting adjustments, and pre-positioning of humanitarian supplies — reducing livelihood losses and food insecurity before drought conditions peak.
Groundwater Depletion	Over-abstraction — compounded by reduced recharge from declining and erratic rainfall — causes water table decline of 2–6 m/year in many basins. Aquifer collapse removes the principal climate buffer for rural and peri-urban populations, raising extraction costs and triggering conflict over remaining sources.	No operational groundwater monitoring network; NWRA's station count has fallen from 432 to ~84 functional sites; no legal or technical mechanism to regulate abstraction in real time; displaced populations in areas like Marib exert extreme additional demand.	C1: Installation of 80 new groundwater monitoring stations with telemetry; integration of groundwater data into the CWIMS platform. C2: Groundwater depletion model producing basin-level trend alerts and recharge forecasts. C3: Regulatory protocols for NWRA; capacity building on groundwater governance and sustainable yield estimation.	Real-time monitoring and depletion alerts enable NWRA to enforce abstraction limits before critical thresholds are breached, extending aquifer life and protecting the water security of dependent communities.

15 Partner institutions will be encouraged to nominate female staff for project-supported technical training, and participation will be monitored through sex-disaggregated records. Gender-responsive training materials and communication guidelines will be incorporated into relevant project-supported capacity-building activities, and their use will be monitored through the project M&E system

16 Training beneficiary selection criteria, eligibility thresholds, and prioritization framework will be documented in the POM, based on institutional role and capacity gaps identified during the inception phase needs assessment.

	Flooding (Pluvial & Fluvial)	Intense convective rainfall causes rapid surface runoff and flash floods in steep wadis (pluvial); prolonged or upstream rainfall causes wadi overflow and inundation of downstream settlements (fluvial). The 2008 floods alone cost approximately 6% of GDP. Over 150 fatalities were recorded from flood events in 2024–2025.	Urban expansion in floodplains without drainage infrastructure; collapse of embankments and water structures during conflict; current alert lead times limited to ~48 hours; siren-based warning coverage confined to a handful of urban hotspots; no community early action plans in rural or IDP-hosting areas.	C1: 32 new surface water / wadi-flow stations; telemetry-enabled real-time discharge monitoring in 9 priority basins. C2: Flood forecasting and inundation modelling across all nine basins; MH-EWS integrated with governorate operation rooms; Community Early Action Plans (EAPs) for 30+ communities; multi-channel dissemination (SMS, radio, sirens). C3: SOPs for inter-agency flood response; training of CDA and local civil defence staff.	Extended lead times (target: ≥72 hours) and last-mile dissemination trigger pre-emptive evacuation and asset protection, directly reducing mortality and economic losses from flash floods and wadi overflow events.	
	Extreme Heat	Rising temperatures and increasing frequency of days above 35°C intensify health risks (heat stroke, cardiovascular stress), reduce agricultural and outdoor labor productivity, and compound water demand at a time of peak scarcity. Some regions are projected to see nearly 50 additional "very hot days" per year by mid-century.	Limited public health warning infrastructure; no national heatwave alert service; rural and IDP populations lack access to cooling or reliable health messaging; health systems are severely degraded by conflict.	C1: AWS network provides high-frequency temperature, humidity, and heat index data in real time across target governorates. C2: Heat-health early warning model producing actionable advisories for health sector and communities; integration with WHO/MoPHP heat-health action protocols. C3: Capacity building for health authorities on heat-health warning interpretation and protective action.	Timely heat-health advisories allow vulnerable populations and health facilities to take protective action — reducing heat-related morbidity and mortality during extreme heat episodes.	
	Cyclones, Storm Surge & Salinization	Intensifying Arabian Sea cyclones (e.g., Mekunu, Tej) bring extreme winds, storm surge, coastal inundation, and intense inland rainfall. Storm surge and seawater intrusion salinize coastal agricultural land and freshwater lenses, with long-term productivity losses. Al-Mahrah, Socotra, Hadramout, and Aden-Tuban are particularly exposed.	Coastal communities rely on fishing and rain-fed agriculture with no alternative livelihoods; no operational storm surge or coastal flood warning system; coastline monitoring is entirely absent from the current hydromet network; no community EAPs for cyclone response in most exposed areas.	C1: Coastal and island station coverage included in the expanded AWS and surface water network; integration of global cyclone track data into CWIMS. C2: Cyclone and storm surge advisory products linked to the MH-EWS; multi-channel dissemination reaching coastal and island communities; EAPs developed for cyclone-exposed areas including Socotra. C3: Coordination protocols with CDA and coastal line ministries for cyclone response.	Advance cyclone advisories and storm surge warnings — where currently none exist — give coastal communities and fishers actionable lead time to evacuate, shelter, and protect livelihoods, reducing casualties and supporting post-event recovery planning.	

Increased Hydroclimatic Variability	Greater inter-annual and intra-seasonal variability in rainfall — including more frequent transitions between flood and drought conditions — undermines the predictability on which water management, agriculture, and humanitarian planning depend. This variability also degrades the performance of infrastructure designed under historical climatic assumptions.	Entire national water management system is designed around historical averages that are no longer reliable; humanitarian agencies plan seasonal operations without access to sub-seasonal outlooks; no probabilistic forecasting capacity exists; data gaps prevent detection of shifting baselines.	C1: Recovery and digitization of long-term historical hydro-climatic records to establish robust baselines; continuous real-time data ingestion from the expanded monitoring network into CWIMS. C2: Probabilistic seasonal forecasting products; scenario-based hydrological models that account for non-stationarity; decision-support tools for water allocation under uncertainty. C3: Capacity building on climate-informed planning for MWE, NWRA, MAIF and humanitarian partners; national investment plan incorporating climate projections.	By providing probabilistic, scenario-based forecasts rather than single-value predictions, the project enables adaptive water management and humanitarian planning under uncertainty — reducing maladaptation risk and building institutional resilience to a less predictable hydroclimate.

31. Effective early warning requires more than accurate forecasting. Early Action Plan (EAP) preparation will include women's associations and representatives of vulnerable groups, including IDPs, persons with disabilities, older persons, youth, and female-headed households, to ensure that local preparedness measures reflect differentiated needs and access constraints. CWIMEWS addresses this through EAP co-designed with communities in three to five high-risk locations per basin. Each EAP is developed participatorily and includes localized risk maps, evacuation signage, and pre-scripted alert messages, validated through regular drills testing the complete warning chain from hazard detection to community response. At the basin level, Water User Associations, basin committees, and local councils serve as the primary institutional anchors for community preparedness, with gender-balanced representation explicitly required to ensure women, who are central to household water management but historically excluded from formal warning chains, are embedded in local response structures. The Community Early Action Plans will also include practical feedback mechanisms, including after-action reviews of drills and events, community reporting channels, and periodic updates to risk maps, alert messages, and local response protocols, so that lessons from preparedness and early action are fed back into CWIMS, MH-EWS SOPs, and future warning products.

32. Warning dissemination adopts a redundant mix of channels calibrated to Yemen's low-connectivity context: SMS, USSD, WhatsApp, and Interactive Voice Response for populations with mobile access; radio and television broadcast slots for wider reach; and mosque loudspeakers and sirens for high-risk corridors, building on pilots already operational under CDA in Sana'a and Shibam. A national Common Alerting Protocol gateway standardizes alert formats across all channels. Channel selection in each community is informed by gender-sensitive consultation to ensure accessibility for women, IDPs, persons with disabilities, older persons, and other groups with limited device access or mobile constraints. Priority community selection criteria will be based on hazard exposure, socioeconomic vulnerability, gender composition, and concentration of internally displaced persons.

Monitoring, Evaluation, and Reporting Framework

33. Project monitoring operates through a four-layer system designed for Yemen's fragile and conflict-affected context. At the primary layer, the Joint Project Implementation Unit's (JPIU) dedicated M&E Specialist manages day-to-day data collection, output tracking, and results reporting, using a standardized format adopted across all CWIMEWS implementing entities to ensure consistency. At the verification layer, an independent Third-Party Monitoring Agent, contracted within 60 days of the Effective Date, conducts quarterly field-level verification of activity delivery, procurement integrity, and output achievement.

34. At the oversight layer, the World Bank reviews semi-annual progress reports and quarterly Interim Financial Reports submitted by UNDP. TPM data constitutes a primary means of verification for output-level indicators in the Logical Framework; the Means of Verification column specifies which indicators are verified by TPM, which by JPIU internal monitoring, and which by World Bank supervision. A dedicated M&E budget line covers JPIU M&E staffing, TPMA contracting, baseline and endline surveys. The detailed M&E framework including indicator definitions, baseline values, data collection methods, reporting frequencies, and institutional responsibilities will be fully elaborated in the Project Operations Manual, and confirmed during preparation of the GCF Additional Financing project paper of i-wise.

35. The M&E system will also track implementation of the Gender Action Plan, including sex-disaggregated data on training, consultations, governance structures, community warning committees, early-warning reach, and institutional participation. Progress against Gender Action Plan (GAP) actions and indicators will be reported through the project's Annual Performance Reports submitted to the GCF. Any major changes to the GAP, including changes to targets, activities, or budget allocations, will be documented and reported to the GCF.

B.2.2. Outcome mapping to GCF results areas and co-benefits categorization

Outcome number	GCF Mitigation Results Area (MRA 1-4)				GCF Adaptation Results Area (ARA 1-4)			
	MRA 1 Energy generation and access	**MRA 2** Low-emission transport	**MRA 3** Building, cities, industries, appliances	**MRA 4** Forestry and land use	**ARA 1** Most vulnerable people and communities	**ARA 2** Health, well-being, food and water security	**ARA 3** Infrastructure and built environment	**ARA 4** Ecosystems and ecosystem services
Outcome 1	☐	☐	☐	☐	☒	☒	☒	☐
Outcome 2	☐	☐	☐	☐	☒	☒	☒	☐
Outcome 3	☐	☐	☐	☐	☒	☒	☒	☐

If any co-benefits have been identified in section D.3, fill in the co-benefit table below to map each co-benefit to the corresponding category as defined in the FP guidance note.

Co-benefit number	Co-benefit					
	Environmental	**Social**	**Economic**	**Gender**	**Adaptation**	**Mitigation**
Co-benefit 1	☒	☒	☒	☒	☐	☐
Co-benefit 2	☐	☐	☐	☐	☐	☐
Co-benefit 3	☐	☐	☐	☐	☐	☐
Co-benefit …	☐	☐	☐	☐	☐	☐

B.3. Implementation / institutional arrangements (max. 750 words)

36. CWIMEWS is structured as Additional Financing and Restructuring to Component 1 of the Yemen Improved Water Management and Irrigation for Sustainability and Efficiency Project (I-WISE), approved by the World Bank Board on June 4, 2026. For GCF purposes, it is a standalone SAP Funding Proposal. The governing legal instruments are: (i) the Accreditation Master Agreement (AMA) and the Funded Activity Agreement (FAA) between the GCF and the World Bank, under which the World Bank will administer GCF resources, supervise implementation, report, and ensure that relevant GCF requirements flow down to the EE fl; (ii) the Financial Management Framework Agreement (FMFA) between the World Bank and the United Nations, which governs fiduciary oversight, audit arrangements, and dispute resolution; (iii) Grant Agreement between the World Bank and UNDP for the USD 3.647 million Yemen Resilience. Recovery and Reconstruction Trust Fund (I-WISE window), which constitutes the project co-financing.

37. The project operates under a two-tier institutional arrangement between the World Bank as Accredited Entity (AE) and the United Nations Development Programme (UNDP) as Executing Entity (EE), consistent with the Financial Management Framework Agreement (FMFA) governing World Bank financing to UN entities and the Alternative Procurement Arrangements (APA) under which UNDP applies its own procurement regulations, assessed by the World Bank as consistent with its Core Procurement Principles..

38. The World Bank (AE) holds overall accountability to GCF for fiduciary oversight, environmental and social safeguards compliance, results monitoring, and reporting. It reviews and approves budgets, and procurement plans; reviews quarterly Interim Financial Reports (IFRs) submitted by UNDP. The World Bank conducts regular implementation support missions including remote and reverse missions given Yemen's access constraints.

39. **UNDP** (EE) serves as grant executing entity, responsible for end-to-end project delivery including technical implementation, procurement, financial administration, safeguards compliance, and coordination with Yemeni institutions at national and governorate levels. All financial management and accountability rest with UNDP under its own Financial Regulations and Rules, as governed by the Financial Management Framework Agreement (FMFA) between the UN and the World Bank.

40. The Project will establish a Steering Committee (SC) to provide oversight, strategic guidance, and progress review across the Project, operating outside the day-to-day implementation structure of the Joint Project Implementation Units. The SC will be chaired by UNDP. Membership will include representatives of the local implementing partners engaged under the Project and other relevant national/local institutions as detailed in the Project Operations Manual together with representatives of selected Yemeni government ministries relevant to the Project's sectors. This composition is intended to ensure that both the operational partners delivering activities on the ground and the government counterparts responsible for sector policy have a direct channel of engagement and visibility into Project performance, while UNDP, as chair, retains responsibility for coordinating the committee's functioning and ensuring alignment with the Legal Agreement and FMFA.

41. The SC's mandate will be to provide overall oversight and strategic guidance and advise to the Project and to review the progress of the JPIUs' implementation of Project activities, including monitoring achievement of results, identifying implementation bottlenecks, and advising on any adjustments needed to keep the Project on track. Unlike an approving authority over budgets or work plans, the SC's role is consultative and coordinative. The SC will meet at least twice a year, with additional meetings convened as needed to address implementation challenges or emerging issues requiring higher-level attention.

42. The **Joint Project Implementation Unit (JPIU)**[17], established by UNDP in Aden, fully operationalized within 30 days of the Effective Date and operational throughout Project implementation, manages day-to-day project execution. The Urban Water Supply and Sanitation Project Management Unit (UWSS-PMU) serves as a key Yemen Partner within the JPIU framework, engaged through partnership or service contract arrangements to facilitate implementation of specific project activities, sustain and build local capacity, and ensure compliance with Environmental and Social Standards. The JPIU is staffed by specialists in water resources, hydrometeorology, software systems, procurement, financial management, safeguards, and M&E. A dedicated Social and Gender Safeguards (SGS) specialist, environmental specialist, and social specialist must be in place no later than 60 days after the Effective Date, consistent with ESCP commitments. The JPIU coordinates all implementation tasks, oversees contracting and procurement, manages technical quality, and prepares progress reports for the World Bank.

43. The **Technical Coordination Committee (TCC)** is an advisory body with no binding decision-making authority over GCF proceeds or project activities. Decision-making authority rests with UNDP's JPIU for operational matters and with the Project Steering Committee for strategic matters. The TCC, to be established by UNDP and operational throughout Project Implementation will be chaired by Ministry of Water and Environment (MWE), through its Climate Change Unit (CCU), and will serve as the primary inter-agency technical governance body for CWIMEWS. Where feasible, the TCC and related technical consultations will include female technical staff and representatives able to reflect gender-responsive climate information and early warning needs. It provides technical quality assurance, guides data protocols and system design standards, and ensures interoperability across participating agencies. TCC members include CAMA/YMS, NWRA, GSMRB, MAIF, and research institutions. The TCC reviews technical deliverables, advises on system architecture decisions, and ensures that CWIMS outputs meet international standards — functioning as the institutional bridge between UNDP-led implementation and national agency ownership.

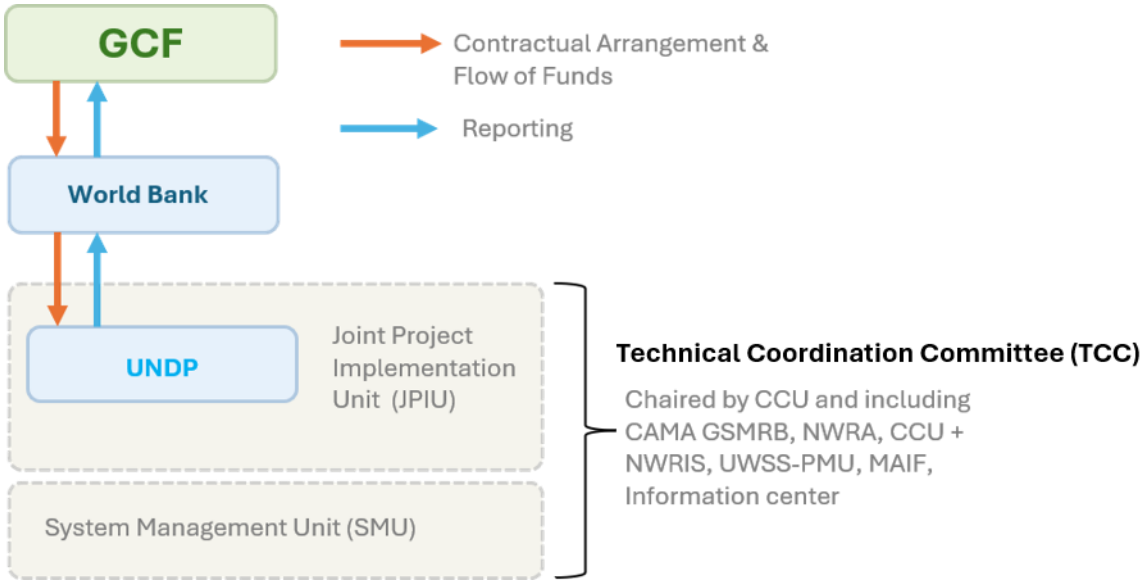
44. The **System Management Unit (SMU)** is hosted within the MWE, specifically within the CCU, and serves as the operational center for the CWIMS platform. It manages daily data integration, quality control, and climate-service product development, and serves as the primary institutional interface between the platform and its users across national agencies, governorates, and basins. UNDP provides sustained technical support to the SMU throughout the project period, with a phased handover beginning in Year 3 so that the SMU assumes full operational and financial responsibility by project closure — anchored by institutionalized O&M frameworks and formalized MoUs among key agencies. Consistent with the Gender Action Plan, the SMU will include at least one senior female staff member in its core team, where feasible, and will support gender-responsive data management and climate-service delivery

45. **Yemen Partners**[18]**: NWRA** and **CAMA/YMS** serve as key national technical partners, supporting field data collection, station operations and maintenance, and dissemination of climate-service products. **MAIF** contributes to agrometeorological data collection and community-level outreach. These agencies receive no direct project funding but benefit from targeted capacity building, equipment, and technical assistance delivered through the project.

17 The JPIU is not a separate legal entity; it is an internal implementation unit established within UNDP, staffed by UNDP staffs and supported by UNDP"s own procurement, financial management, and administrative systems. Accordingly, all contracts, procurement documents, and expenditure approvals under the Project will be entered into and approved by UNDP in its own name, acting through the JPIU. This is consistent with standard Bank practice, under which PIUs are established within the Executing Entity and carry out operational functions on its behalf while the Implementing Entity retains full legal and fiduciary responsibility.

18 UNDP is the sole agency responsible for managing the projects. With regard to implementation and partnerships with national entities, UNDP conducts capacity assessments of these entities. Based on the level of risk identified, UNDP enters into a partnership arrangement with the relevant entities, which operate under UNDP's responsibility and in accordance with its policies and regulations.

Figure 3. Implementation structure



Note: Implementation agreements will be in form and substance satisfactory to the Bank and impose obligations no less stringent than the Legal Agreement (including procurement, FM, safeguards and reporting).

C. FINANCING INFORMATION

C.1. Total financing

(a) Requested GCF funding (i + ii + iii + iv + v + vi)		Total Amount: 24.730		Currency: million USD ($)	
GCF Financial Instrument		**Amount**	**Currency**	**Tenor & grace**	**Pricing**
(i)	Senior loans	Enter amount	Options	Enter years	Enter %
(ii)	Subordinated loans	Enter amount	Options	Enter years	Enter %
(iii)	Equity	Enter amount	Options		Enter % equity return
(iv)	Guarantees	Enter amount	Options	Enter years	
(v)	Reimbursable grants	Enter amount	Options		
(vi)	Grants	24.730	million USD ($)		
(b) Co-financing information[19]		**Total amount**		**Currency**	
		3.647		million USD ($)	
Name of institution		**Financial instrument**	**Amount**	**Currency**	**Tenor & Grace**	**Pricing**	**Seniority**

[19] If the co-financing is provided in different currency other than the GCF requested, please provide detailed financing information and a converted figure in the GCF requested currency in the comment box. Please refer to the date when the currency conversion was performed and the reference source.

World Bank Yemen Resilience. Recovery and Reconstruction Trust Fund	Grant	3.647	million USD ($)	Enter years Enter years	Enter %	Options
Click here to enter text.	Options	Enter amount	Options	Enter years Enter years	Enter %	Options
Click here to enter text.	Options	Enter amount	Options	Enter years Enter years	Enter %	Options

(c) Total investment (c) = (a)+(b)	**Amount**	**Currency**
	28.377	million USD ($)
(d) Co-financing ratio (d) = (b)/(a)	14.86%	
(e) Other financing arrangements for the project/programme (max ½ page)		

C.2. Financing by component

Component	Output	Indicative cost Options	GCF financing		Co-financing		
			Amount Options	Financial Instrument	Amount Options	Financial Instrument	Name of Institutions
Component 1 – Climate and Water Information Management System (CWIMS)	Sub-component 1.1: Integrated Baseline Information, Data Recovery, Network Assessment & Conceptual Design	1.888 M	0.428 M	Grants	1.46 M	Grants	World Bank Yemen Resilience. Recovery and Reconstruction Trust Fund
	Sub-component 1.2: Expansion and Modernization of Monitoring Infrastructure	8.675M	7.375 M	Grants	1.3	Grants	World Bank Yemen Resilience. Recovery and Reconstruction Trust Fund
	Sub-component 1.3: Design and Operationalization of the CWIMS Platform	2.893 M	2.6	Grants	0.293	Grants	World Bank Yemen Resilience. Recovery and Reconstruction Trust Fund

Component 2 – Climate-Resilient Decision-Making and Multi-Hazard Early Warning	Sub-component 2.1: Climate-Related Risk Monitoring and Forecasting Systems	2.44 M	2.44 M	Grants	Enter amount	Choose an item.	Click here to enter text.
	Sub-component 2.2: Establishment and Operationalization of a Centralized Multi-Hazard Early Warning System (MH-EWS)	3.65 M	3.65 M	Grants	Enter amount	Choose an item.	Click here to enter text.
	Sub-component 2.3: Development and Dissemination of Climate Services	2.048 M	2.048 M	Grants	Enter amount	Choose an item.	Click here to enter text.
Component 3 – Strengthening the Enabling Environment for Climate and Water Information Services	Sub-component 3.1: Establishment of a National CWIMEWS Center	2.026 M	2.026 M	Grants	Enter amount	Choose an item.	Click here to enter text. Click here to enter text.
	Sub-component 3.2: Coordination Mechanisms and Governance Protocols	0.84 M	0.84 M	Grants	Enter amount	Choose an item.	Click here to enter text. Click here to enter text.
	Sub-component 3.3: Business Models and Investment Plans for Sustainability	0.35 M	0.35 M	Grants	Enter amount	Choose an item.	Click here to enter text.

	Sub-component 3.4: Capacity Building	1.018 M	1.018 M	Grants	Enter amount	Choose an item.	Click here to enter text.
	Monitoring & Evaluation (M&E)	1.097M	1.05	Grants	0.047	Grants	World Bank Yemen Resilience. Recovery and Reconstruction Trust Fund
	Project Management Cost (PMC)	1.451M	0.904	Grants	0.547	Grants	World Bank Yemen Resilience. Recovery and Reconstruction Trust Fund
Indicative total cost (USD)		28.377 M	24.73 M		3.647 M		

C.3 Capacity Building and Technology development/transfer

If the project/programme is envisaged to support capacity building and technology development/transfer, please specify the total requested GCF amount for these activities respectively in this section.

C.3.1 Does GCF funding finance Capacity building activities?	Amount:_2.75 M___ USD
C.3.2. Does GCF funding finance Technology development/transfer?	Amount:_7 M___ USD

C.4. Justification for GCF funding request (max. 500 words)

46. Yemen faces one of the world's most acute combinations of climate vulnerability, institutional fragility, and water scarcity. Decades of conflict have severely degraded the country's hydrometeorological infrastructure, eroded institutional capacity, and left public finances unable to sustain even basic monitoring or early-warning functions. More than 70 percent of climate-monitoring stations are non-functional, national data systems such as NWRMIS have collapsed, and agencies responsible for climate and water management operate with constrained budgets, limited staffing, and fragmented mandates..

47. Yemen's macroeconomic context renders all market-based and debt financing instruments structurally inapplicable. The country carries no sovereign credit rating, has recorded a 54 percent decline in real GDP per capita since 2015, and operates with public revenues insufficient to meet basic recurrent expenditures. Currency depreciation has further eroded the real value of residual institutional financing. No national agency currently holds a dedicated budget line for hydromet operations, sensor calibration, or network maintenance. These conditions are not transitory project risks; they are structural characteristics of Yemen's conflict-affected fiscal environment that preclude any reliance on domestic resource mobilization, cost-recovery mechanisms, or concessional borrowing as financing modalities for public climate services.

48. National hydrometeorological infrastructure and multi-hazard early warning systems constitute public goods in the technical sense -- non-excludable, non-rival, and incapable of generating the direct revenue streams required to service debt or attract private investment. No commercial return accrues from the provision of flood alerts, drought advisories, or groundwater depletion monitoring in Yemen's current context. However, the absence of immediate revenue generation does not preclude longer-term financial sustainability; it defers it. A functional, government-institutionalized CWIMS platform constitutes the data asset base upon which progressively revenue-generating services can be developed: aviation weather service fees recoverable under CAMA's existing mandate, cost-sharing arrangements with humanitarian and development actors whose operational planning depends systematically on climate and water data, and tailored agrometeorological advisory services for agriculture programmes. These revenue streams are conditional on the prior existence of a functioning national system. GCF grant financing establishes that prerequisite condition; the sustainability financing strategy under Output 3.3 operationalizes the transition from grant-dependent public good provision to a diversified, partially self-sustaining service model.

49. Several development partners already provide critical humanitarian and emergency support in Yemen—UNDP, UNOPS, UNICEF, FAO, the Netherlands, Germany, the U.S., IsDB, and others—but none finance the establishment of an integrated national climate-information and early-warning system at the required scale and technical sophistication. Consultations with donors during PAD preparation confirmed that while partners support localized monitoring rehabilitation and early-action pilots, no entity other than GCF offers the long-term grant financing required to rebuild a nationwide climate-service backbone aligned with WMO standards and interoperable across government agencies. The CWIMEWS project is therefore designed to complement—not duplicate—IDA investments under I-WISE, which focus on watershed, irrigation, WASH, and basin-level water security. IDA resources do not finance national climate-information systems or multi-hazard early-warning capabilities, leaving a critical gap that GCF support is intended to fill.

50. GCF financing addresses key structural barriers:
    - Collapse of observational capacity, requiring capital-intensive restoration of meteorological, hydrological, groundwater, and coastal monitoring networks;
    - Fragmented information architecture, requiring investment in CWIMS, digital infrastructure, data recovery, and interoperability protocols;
    - Weak institutional capacity, requiring sustained training, governance strengthening, and establishment of the System Management Unit;
    - Limited community preparedness, requiring investments in early-action protocols, risk communication, and local resilience systems.

51. Without GCF support, Yemen would be unable to rebuild its climate-information infrastructure, leaving millions without timely warnings for floods, cyclones, droughts, and heatwaves—hazards that are increasing in both frequency and severity. The CWIMEWS investment is therefore not only justified but indispensable for safeguarding human lives, protecting water resources, and supporting climate-resilient recovery in one of the world’s most fragile environments.

C.5. Exit strategy (max. 300 words)

52. The project implementation period is five years. The physical infrastructure financed under this project such as automatic weather stations, surface-water gauges, groundwater monitoring networks, the CWIMS platform, and associated ICT systems -- is specified to a minimum operational horizon of 15 years, consistent with WMO standards for hydrometeorological infrastructure investment. All O&M frameworks, asset management plans, and sustainability financing arrangements described below are calibrated to this 15-year horizon.

53. The CWIMES project adopts a phased exit strategy that ensures long term sustainability through institutional ownership and financially viable service delivery. Technical functions, financial, and governance functions progressively transition from World Bank / UNDP to national counterparts, including the Ministry of Water and Environment (MWE), its Climate Change Unit (CCU), and the newly established System Management Unit (SMU), while embedding mechanisms to recover at least O&M costs.

54. Output 3.3 will additionally assess progressively revenue-generating service models to reduce long-term dependence on government budget allocations. This output includes an estimate of the O&M requirements, assessments of which services will require sustained public financing or have potential to be supported through cost-sharing or service agreements, as well as an analysis of the anchor user institutions to determine financial and institutional responsibilities post project-closure. Potential revenue streams include aviation weather service fees recoverable under CAMA's existing mandate, cost-sharing arrangements with humanitarian and development actors whose operational planning depends on systematic climate and water data, and tailored agrometeorological advisory services for agriculture programmes in priority basins. These streams are not projected to cover full O&M costs within the project period; their purpose is to establish the institutional precedent, pricing framework, and service agreements that make partial cost recovery progressively achievable in subsequent years.

55. Climate and water information services will be institutionalized as core public sector functions, integrated into national planning frameworks and budget processes. Cost recovery for O&M will be achieved through a dual approach: (i) government budget allocations to sustain essential public goods such as data systems and early warning services, and (ii) service-based cost sharing, whereby sector agencies, basin authorities, and water utilities using CWIMS outputs contribute to recurring costs through formalized inter-agency agreements and service-level arrangements.

56. The project will establish asset management plans, O&M protocols, calibration routines, and service-level agreements to formalize responsibilities, ensure predictable financing, and maintain system performance over time. Physical investments -- including rehabilitated hydrometeorological and groundwater stations, digital infrastructure, and the CWIMS platform -- are specified for low-cost O&M, with solar-powered telemetry-enabled sensors and cloud-based hosting reducing dependence on in-country technical supply chains. Capacity building will explicitly include financial planning, budgeting, and cost tracking, and national technicians will be trained on hardware maintenance, telemetry, ICT security, and troubleshooting, enabling the SMU and partner institutions to manage O&M expenditures independently beyond project closure.

C.6. Financial management/procurement (max. 300 words)

57. Financial management and procurement for the CWIMEWS project will follow the fiduciary, operational, and reporting standards of the Accredited Entity (AE), the World Bank, and the Executing Entity (EE), UNDP, consistent with their respective accreditation with the GCF.

58. The World Bank will require adherence to its fiduciary standards through oversight of all project disbursements, periodic financial reporting, approval of annual work plans and procurement plans, and compliance checks aligned with its Investment Project Financing (IPF) policies. Disbursements from the AE to UNDP will follow a tranche-based approach linked to the approval of financial and procurement documentation, in compliance with the AMA and the Financial Management Framework Agreement (FMFA) governing UN entities.

59. UNDP will manage project accounting, procurement, contract management, and financial reporting in accordance with its Financial Regulations and Rules, which are consistent with international public sector accounting standards (IPSAS-based). UNDP maintains dedicated project accounts, internal controls, segregation of duties, and audit trails to ensure transparent and accountable management of GCF resources. Procurement will be conducted using UNDP's established procedures—ensuring open competition, value for money, and conflict-of-interest safeguards—with details provided in Annex 8.

60. Financial reporting will include quarterly Interim Financial Reports (IFRs) submitted by UNDP to the World Bank, detailing expenditures by component, commitments, disbursements, asset registers, and variance analyses. The AE will review and validate IFRs before consolidating reporting to the GCF.

61. The project will undergo an annual external audit conducted under UNDP's audit arrangements, with audit results shared with the World Bank and GCF to verify that funds were used for intended purposes and to ensure compliance with all covenants. Additionally, Third-Party Monitoring (TPM) will provide independent verification of procurement integrity, delivery of goods and services, and financial propriety at the field level.

62. Together, these measures ensure rigorous, transparent, and compliant financial management and procurement throughout the project lifecycle.

D. EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

D.1. Impact potential (max. 300 words)

63. The CWIMEWS project delivers high-impact, nationally relevant adaptation benefits aligned with the GCF's core result areas on strengthened climate-resilient development and reduced climate-related losses of lives and livelihoods. Building on the I-WISE program's systems approach, CWIMEWS strengthens the country's capacity to anticipate, prepare for, and respond to climate shocks by operationalizing a national CWIMS, restoring and expanding hydrometeorological, surface-water, and groundwater monitoring, and integrating early warning functionality into routine sector decision-making.

64. The project targets 9.2 million direct beneficiaries across nine priority basins (22.6 percent of Yemen's population) concentrated in the country's most flood-prone, drought-exposed, and groundwater-stressed catchments. The primary impact pathway is the extension of flash-flood early warning lead times from the current approximately 48 hours to 72 hours or more, providing the window for effective anticipatory action that currently does not exist. For drought, the project establishes the first operational monitoring and advisory system in Yemen's history, enabling agricultural contingency planning before crop losses become irreversible. For extreme heat, integration of meteorological triggers with Ministry of Public Health and Population protocols creates a heat-health alert pathway that currently has no operational data foundation. Across all hazards, the shift from reactive crisis response to anticipatory governance is the primary mechanism through which CWIMEWS reduces loss of life, protects livelihoods, and lowers the cost of humanitarian response.

65. CWIMEWS improves the availability, quality, and usability of climate and water data for basin-level planning, drought and flood risk management, and service continuity. Under Output 1.1, the project rebuilds foundational datasets through data recovery, integration, and network assessment, while Output 1.2 restores and modernizes monitoring infrastructure to enable reliable and continuous data flows. Through Output 1.3, CWIMS is designed and operationalized as an integrated national platform combining ground observations, remote sensing, and automated data processing. These outputs jointly strengthen the evidence base for climate-informed decision-making.

66. Building on this foundation, Output 2.1 supports the development of multi-hazard monitoring and forecasting systems, while Output 2.2 establishes a centralized MH-EWS integrated with governorate-level systems and operational protocols. Output 2.3 ensures the dissemination of actionable climate services, advisory products, and early warnings, strengthening preparedness, response capacity, and risk-informed decision-making at all levels.

67. The economic impact of early warning investment in comparable fragile-state contexts is well documented. Benefit-to-cost ratios for hydromet and early warning systems in low-income and conflict-affected environments range from 4:1 to 10:1, driven primarily by avoided loss of life, protected agricultural livelihoods, and reduced emergency response costs. Without adaptation, combined climate impacts are projected to reduce Yemen's annual GDP by a further 4 percent by 2050. CWIMEWS directly interrupts this trajectory by providing the information infrastructure that enables evidence-based water allocation, anticipatory agricultural planning, and timely disaster response functions that currently cannot be performed regardless of the resources invested in any single agency, because the data foundation does not exist.

68. Mitigation co-benefits arise indirectly through improved resource planning and more energy-efficient water operations, including improved groundwater management and reduced pumping inefficiencies. The deployment of solar-powered, telemetry-enabled systems further contributes to a low-emission operational footprint.

69. CWIMEWS drives a paradigm shift by institutionalizing anticipatory governance through Outputs 3.1–3.4, including the establishment of a national operational center, formalized coordination and data-sharing protocols, sustainable financing models, and strengthened institutional capacity. These measures embed climate information into national and basin-level planning, disaster preparedness, and water management, ensuring sustained national ownership and long-term operation of climate services.

70. The impact of CWIMEWS extends beyond Yemen's nine priority basins through two reinforcing scalability pathways. Within Yemen, the basin-based design and the national CWIMS architecture are explicitly structured for progressive geographic expansion under subsequent I-WISE MPA phases, with Phase 3 designed to replicate proven interventions across additional basins using the institutional frameworks and data protocols CWIMEWS establishes

D.2. Paradigm shift potential (max. 300 words)

71. The CWIMEWS project catalyzes a structural shift in Yemen's climate-risk governance by transforming the country from a reactive, crisis-driven model to an anticipatory, data-driven system for managing climate and water risks. The project's theory of change is built on a clear results chain: (i) rebuild foundational hydrometeorological and groundwater information systems, (ii) convert data into actionable multi-hazard early warnings and climate-service products, and (iii) institutionalize their use across national agencies and vulnerable communities. Through this sequence, CWIMEWS contributes directly to the GCF paradigm-shift objective of establishing sustainable climate-resilient development pathways in highly vulnerable contexts.

72. The project's core investments—CWIMS, rehabilitated monitoring networks, standardized data-sharing protocols, and impact-based forecasting models—provide the technical backbone for long-term replication and scale-up. CWIMS is specifically designed as a modular, expandable national platform that can integrate additional basins, hazard models, and climate-service components beyond the initial eight governorates. The establishment of the System Management Unit (SMU) and the inter-agency Technical Coordination Committee (TCC) embeds climate-information governance within national institutions and ensures continuity well beyond project financing.

73. CWIMEWS also generates systemic enabling conditions for broader change: unified climate data standards, trained national technical cadres, interoperable digital infrastructure, and strengthened coordination across MWE, CAMA, NWRA, GSMRB, MAIF, basin authorities, and local responders. These mechanisms support replication across remaining basins and alignment with the broader I-WISE program as well as Yemen's National Adaptation Plan, CCDR, and National Water Sector Strategy.

74. The technology choices embedded in CWIMEWS are themselves transformational in Yemen's context. Solar-powered, telemetry-enabled sensors eliminate dependence on grid electricity and manual data collection—preconditions for reliable monitoring in a low-connectivity, conflict-affected environment. Cloud-based data hosting removes dependence on in-country server infrastructure vulnerable to power outages and physical damage. Open-source impact-based forecasting frameworks eliminate software licensing costs and allow national agencies to maintain and adapt models without proprietary vendor dependence.

75. Knowledge-generation and learning are central to the paradigm shift. Open-access climate dashboards, GIS tools, and routine dissemination of early-warning products will equip government agencies, utilities, farmers, humanitarian partners, and communities to make climate-informed decisions. The project also introduces community-based early-action models that can be replicated nationwide through local councils, WUAs, and basin committees.

76. By establishing a durable, country-owned climate-information ecosystem, CWIMEWS positions Yemen to scale climate-resilient decision-making across sectors and territories, anchoring a long-term shift toward anticipatory adaptation in one of the world's most fragile environments.

D.3. Sustainable development (max. 300 words)

77. The CWIMEWS project generates significant sustainable-development benefits across environmental, social, economic, and gender dimensions, directly contributing to Yemen's progress toward the SDGs—particularly SDG 6 (Clean Water and Sanitation), SDG 11 (Resilient Cities), SDG 13 (Climate Action), and SDG 2 (Food Security).

Environmental co-benefits

78. CWIMEWS strengthens Yemen's ability to manage climate and water resources sustainably by restoring degraded hydrometeorological and groundwater monitoring networks and generating real-time data for drought, flood, and water-stress management. Improved climate analytics reduce unsustainable groundwater extraction, inform catchment conservation, and support risk-informed land and water planning. Early warning systems help prevent environmental degradation from uncontrolled flooding and climate-related disasters.

Social co-benefits

79. By providing accessible, reliable multi-hazard early warnings—SMS alerts, bulletins, GIS tools—the project reduces climate-related mortality and improves community preparedness. It enhances safety for households in flood-prone wadis, protects health systems through heat and disease surveillance, and strengthens social resilience in marginalized and conflict-affected communities. Localized early-action plans increase community cohesion and reduce vulnerability for IDPs, women, elderly persons, and remote rural populations.

80. The social impact of early warning systems in Yemen's specific context extends beyond immediate hazard protection. With Community Early Action Plans across nine priority basins pre-define who does what, with what resources, when a specific alert threshold is reached—converting warning lead time into organized protective action rather than uncoordinated individual response. In flood-prone urban corridors, integration of sirens and mosque loudspeakers ensures alerts reach communities with weak mobile or internet connectivity, including internally displaced persons concentrated in informal settlements. Heat-health advisories linked to Ministry of Public Health and Population protocols provide the meteorological trigger for cooling center activation and clinical preparedness. Malaria, dengue, and diarrheal disease early warning following flood events are an additional public health co-benefit..

Economic co-benefits

81. Reliable climate information supports climate-smart decisions in agriculture, water utilities, transport, and disaster management. Reduced flood and drought losses directly lower public and household expenditure on emergency response. Enhanced forecasting supports farmers in crop selection and irrigation timing, improving yields and reducing economic losses. Improved water-resource planning also decreases costly groundwater over-abstraction and infrastructure failures.

Gender-sensitive development benefits

82. Women and girls—often disproportionately affected by water scarcity, climate hazards, and information gaps—benefit from inclusive early-warning dissemination, tailored risk communication, and targeted capacity-building. The project will also consider the differentiated needs of IDPs, persons with disabilities, older persons, youth, female-headed households, and people living in rural and remote areas in consultation, outreach, and warning dissemination. The project ensures women's participation in training, community committees, and climate-service co-design. The Gender Action Plan mandates female inclusion in the System Management Unit, women's leadership in basin-level platforms, gender-responsive alerting methods, and safeguards to reduce GBV risks during community engagement. These measures advance gender equality consistently with the objectives of the GCF Gender Policy.

D.4. Needs of recipient (max. 300 words)

83. Yemen is one of the most climate-vulnerable and water-insecure countries globally, facing extreme fragility, protracted conflict, institutional fragmentation, and widespread poverty. More than 74% of Yemen's 40.6 million people live in poverty, and 17 million face acute food and water insecurity. Communities across the country—particularly in flood-prone wadis, drought-affected highlands, cyclone-exposed coasts, and groundwater-depleted basins—experience recurrent climate shocks without reliable early-warning systems or climate-risk information. These conditions place Yemeni households among the most exposed populations in the world.

84. CWIMEWS directly supports 9.2 million people in targeted governorates while indirectly benefiting the entire population of 40.6 million Yemenis. By establishing a national Climate and Water Information Management System (CWIMS) and restoring critical monitoring networks, the project provides the foundational tools needed for nationwide hazard forecasting, risk communication, and water-resource decision-making. Even households outside the initial basins benefit indirectly through improved national preparedness, better disaster-response coordination, strengthened groundwater management, and more resilient national-level planning.

85. Economically, Yemen lacks any capacity to finance climate-information infrastructure. Since 2015, the country has experienced sharp economic contraction, revenue collapse, currency fragmentation, and limited public-sector payroll. Government institutions cannot fund hydrometeorological stations, ICT systems, or O&M, nor can they borrow due to debt distress and absence of functioning capital markets. Climate-information systems generate public goods without revenue streams, making them unsuitable for private-sector investment. Thus, GCF grant financing is the only viable option to rebuild national climate-risk governance infrastructure.

86. Institutional capacity needs are acute. MWE, CAMA, NWRA, GSMRB, MAIF, governorate agencies, and universities all require substantial technical support to operate monitoring systems, manage climate data, coordinate alerts, and translate warnings into action. CWIMEWS addresses these gaps by establishing the System Management Unit (SMU), strengthening basin-level institutions, and supporting communities to develop early-action plans.

87. By filling urgent data, capacity, and financing gaps that Yemen cannot address on its own, CWIMEWS directly responds to the profound climate-risk and development needs of the Yemeni population.

D.5. Country ownership (max. 500 words)

88. The CWIMEWS project is fully anchored in Yemen's national climate and water-sector priorities and demonstrates strong ownership from the National Designated Authority (NDA), the Ministry of Water and Environment (MWE), and its Climate Change Unit (CCU). The project directly responds to the strategic directions outlined in Yemen's National Adaptation Programme of Action (NAPA), the NDC, the National Water Sector Strategy and Investment Program (NWSSIP), the National Environmental Action Plan, the draft NAP, and the Country Climate and Development Report (CCDR 2024). These national frameworks unanimously identify climate-information systems, early-warning services, drought and flood management, groundwater sustainability, and institutional strengthening as immediate national priorities. CWIMEWS is designed to deliver exactly these outcomes.

Leadership of the NDA (MWE) and CCU

89. MWE has played an active and leading role throughout the formulation of the funding proposal. The CCU, acting on behalf of the NDA, guided the project's scope, institutional design, and implementation arrangements. MWE chaired technical consultations, validated the prefeasibility assessment, defined the information-system architecture, and ensured full alignment with sectoral and climate strategies. The project embeds country ownership structurally by establishing the System Management Unit (SMU) directly within MWE/CCU, making it the long-term custodian of the Climate and Water Information Management System (CWIMS) and multi-hazard early-warning services. The SMU's mandate, staffing, training, and budget integration were all developed in coordination with MWE to ensure a sustainable government-led system after project closure.

Accredited Entity and Executing Entity experience

90. The World Bank (AE) has more than two decades of operational experience in Yemen, including leadership of major water-resource, climate-resilience, and FCV-context interventions. Its recent work—the CCDR, Water Security Diagnostic, and I-WISE MPA—provides the analytical foundation for CWIMEWS. The Bank's strong fiduciary, safeguards, and technical oversight capacity fosters alignment with GCF standards as set out in the AMA and effective supervision in a complex environment.

91. UNDP (EE) has an extensive presence in Yemen and a demonstrated track record implementing climate-adaptation, hydromet, digital data, and disaster-risk-reduction programs in FCV contexts. UNDP's partnerships with NWRA, CAMA, GSMRB, MAIF, and academic and basin-level institutions ensure localized implementation and progressive transition of responsibilities to national counterparts. During the inception phase, the Gender Assessment will be further validated through culturally appropriate

consultations with women, men, youth, IDPs, persons with disabilities, older persons, and rural and remote communities, including separate women's consultations and female facilitators where appropriate

Stakeholder consultations and participatory design

92. The project benefited from broad multi-stakeholder engagement, coordinated by MWE/CCU. Consultations included national ministries, governorate water and agriculture offices, basin authorities, technical agencies (CAMA, NWRA, GSMRB), universities, local councils, WUAs, farmers, women's associations, humanitarian partners, and communities in the nine priority basins. Activity selection relied on technical suitability, climate-risk severity, institutional readiness, and gender-responsive criteria. Women's groups and community committees—often excluded from climate-information planning—were specifically engaged to shape risk communication channels, early-action planning, and training needs. The NDA validated the proposal structure and provided feedback incorporated into the final design; the no-objection letter will formalize government endorsement.

Embedding long-term ownership

93. By housing CWIMS within MWE, institutionalizing the SMU, strengthening CCU leadership, and integrating basin-level actors, CWIMEWS ensures that climate-information governance becomes a core national function. These measures secure long-term sustainability and reinforce Yemen's pathway toward anticipatory climate-resilient development.

D.6. Efficiency and effectiveness

D.6.1. Estimated cost per t CO_2 eq, defined as total investment cost / expected lifetime emission reductions (Mitigation and Cross-cutting)	(a) Total project financing	US$_____
	(b) Requested GCF amount	US$_____
	(c) Expected lifetime emission reductions	_____ tCO_2eq
	(d) Estimated cost per tCO_2eq (d = a / c)	US$_____ / tCO_2eq
	(e) Estimated GCF cost per tCO_2eq removed (e = b / c)	US$_____ / tCO_2eq
D.6.2. Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (Mitigation and Cross-cutting)	(f) Total finance leveraged	US$_____
	(g) Public source finance leveraged	US$_____
	(h) Private source finance leveraged	US$_____
	(i) Total Leverage ratio (i = f / b)	_____
	(j) Public source leverage ratio (j = g / b)	_____
	(k) Private source leverage ratio (k = h / b)	_____

D.6.3. Describe how the financial structure is adequate and reasonable in order to achieve the proposal's objective(s), including addressing existing bottlenecks and/or barriers; providing the minimum concessionality; and without crowding out private and other public investment. (max. 500 words)

94. Climate-information systems, multi-hazard early warning services, Hydromet stations, data platforms, and hazard models generate zero direct revenue streams and cannot sustain cost-recovery. Yemen's public sector is unable to fund capital expenditures or recurrent O&M due to a collapsed fiscal base, fragmented administration, and severe salary arrears across key agencies. The country's financial institutions lack liquidity and do not support infrastructure lending; capital markets are non-existent; and private investors cannot engage where returns depend on public-good service provision. A grant modality is therefore the only viable form of climate finance, meeting the GCF's principle of minimum concessionality.

95. Without a grant, the project would not proceed, as debt financing—even at highly concessional rates—would be untenable given Yemen's debt distress and inability to assume new liabilities. The beneficiaries of concessionality are the entire population of 40.6 million Yemenis, with 9.2 million directly served in targeted basins and all Yemenis indirectly benefiting from national early-warning coverage.

96. The proposed financial structure channels GCF resources strategically toward:
    - capital-intensive rehabilitation of hydromet and groundwater networks;
    - development and deployment of CWIMS using best-available WMO-aligned technology;
    - long-term institutional capacity-building through the System Management Unit;
    - risk-communication systems, community early-action plans, and localized preparedness.

97. These investments unlock sustained adaptation benefits by addressing bottlenecks—data fragmentation, collapsed monitoring capacity, weak institutional coordination, and lack of early-warning systems. The project prioritizes cost-efficient technologies (telemetry-enabled sensors, cloud-based systems, modular architecture, solar-powered stations) aligned with international best practices and optimized for FCV environments.

98. Because climate-information systems have no commercial return and Yemen's public sector lacks financing capacity, GCF support does not crowd out private or public investment. Instead, it fills a structural financing void and complements parallel IDA investments under I-WISE, enabling greater efficiency, targeting, and coordination across Yemen's water and climate-resilience sectors.

E. ANNEXES

E.1. Mandatory annexes

☒	Annex 1	NDA No-objection Letter(s) (Template)
☒	Annex 2	Pre-feasibility (or feasibility) study (Guidance)
☒	Annex 2a	Logical Framework (Template)
☒	Annex 2b	Timetable (Template)
☒	Annex 3	Budget plan that provides breakdown by type of expense including AE fees (Template)
☒	Annex 4	Gender assessment and action plan (Template)
☒	Annex 5	Co-financing commitment letter if applicable (Template)
☒	Annex 6	Term sheet including a detailed disbursement schedule and, if applicable, repayment schedule
☒	Annex 7	Risk assessment and management (Template)
☒	Annex 8	Procurement plan model (Template)
☒	Annex 9a	Legal Due Diligence (regulation, taxation and insurance) (Template)
☐	Annex 9b	Legal Opinion/Certificate of Internal Approvals (Template)

E.2. Other annexes to be submitted when applicable/requested

☐	Annex 10	Economic and/or financial analysis (Guidance) (mandatory for private-sector proposals)
☐	Annex 11	Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project
☒	Annex 12	Environmental and Social Management Framework (ESMF)
☐	Annex 13	Operations manual for EDA projects (guidance)
☐	Annex 14	Assessment of GHG emission reductions and their monitoring and reporting (for mitigation and cross cutting-projects)[20]
☒	Annex 15	M&E Plan
☒	Annex 16	Stakeholder Engagement Plan (SEP)

***** Please note that a funding proposal will be considered complete**

[20]Guidance on GHG emission reduction calculations for GCF projects/programmes is available on the GCF Programming Guidance (https://www.greenclimate.fund/sites/default/files/document/gcf-programming-manual.pdf), Box 12 "How to estimate greenhouse gas emission reductions for GCF". This annex is mandatory for Mitigation and Cross-cutting projects

only upon receipt of all the applicable supporting documents. *