Annexes to the Final Report 2026

Climate information and early warning systems

Independent evaluation of the GCF's approach to and Portfolio of Climate Information and Early Warning System Interventions (CIEWS2025)

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Independent Evaluation of the GCF's Approach to and Portfolio of Climate Information and Early Warning System Interventions

ANNEXES TO THE FINAL REPORT

03/2026

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TABLES

FIGURES

ABBREVIATIONS

ADB	Asian Development Bank
AE	Accredited entity
AfDB	African Development Bank
APR	Annual performance report
CIEWS	Climate information early warning system
CIS	Climate information services
CREWS	Climate risk early warning system
CSO	Civil society organization
DWA	Department of Women Affairs, Bangladesh
EWS	Early warning system
FGD	Focus group discussion
FP	Funding proposal
GCF	Green Climate Fund
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoB	Government of Bangladesh
ICC	Investigación sobre Cambio Climático, Guatemala
IDB	Inter-American Development Bank
IEU	Independent Evaluation Unit
IFAD	International Fund for Agricultural Development
IFRC	International Federation of Red Cross and Red Crescent Societies
ISCAD	International Strategic Center for Agri-food Department
ITU	International Telecommunication Union
IUCN	International Union for Conservation of Nature
KII	Key informant interview
Lao PDR	Lao People's Democratic Republic
LGED	Local Government Engineering Department, Bangladesh
LLM	Large language model
MAGA	Ministerio de Agricultura, Ganadería y Alimentación, Guatemala
MDMC	Municipal Disaster Management Committee, Timor-Leste
MHEWS	Multi-hazard early warning system
NAP	National Adaptation Plan
NDA	National Designated Authority

NDC	Nationally determined contribution
PAP	Proposal approval process
PIDACC	Programme for integrated development and adaptation to climate change, Nigeria
PPF	Project Preparation Facility
RPSP	Readiness and Preparatory Support Programme
SOFF	Systematic Observations Financing Facility
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WMO	World Meteorological Organization

ANNEXES

Annex 1. EVALUATION MATRIX

SCOPE	GCF EVALUATION CRITERIA	NO.	EVALUATION QUESTIONS AND SUBQUESTIONS	METHODS	KEY DATA SOURCES AND LITERATURE	LINKAGE WITH CIEWS TOC
Approach	Coherence and complemen-tarity	1	To what extent has the GCF been able to enhance international cooperation to promote and strengthen CIEWS both within countries and at international forums?	Desk review, KII, FGD	External and GCF data and information sources, and published documents	GCF inputs 3
		1.1	To what extent has the GCF collaborated with key/main global CIEWS actors, such as WMO, UNDRR, ITU, IFRC, CREWS, WB-GFDRR and SOFF, to synergize its support and/or channel finances into CIEWS?	Desk review, benchmarking study, KII and/or FGD with CIEWS actors	External and GCF data sources on CIEWS actors	GCF inputs 3
		1.2	To what extent has the GCF collaborated with climate funds (i.e. Adaptation Fund, CIF, GEF, and FRLD), to promote or strengthen CIEWS within target countries, regionally and globally?	Desk review, benchmarking study, KII and/or FGD with climate funds, United Nations agencies and other stakeholders	External and GCF data sources on CIEWS actors	GCF inputs 3
		1.3	To what extent has the GCF collaborated with international AEs (as implementing/technical agencies) including United Nations agencies (i.e. UNDP, UNEP, WFP, and IFAD) and other international stakeholders (e.g. international NGOs, private sector, meteorological agencies, climate research institutions, and technology providers) to promote or strengthen CIEWS within target countries, regionally and globally?	Desk review, benchmarking study, KII and/or FGD with climate funds, United Nations agencies and other stakeholders	External and GCF data sources on CIEWS actors	GCF inputs 3
		1.4	How has the GCF contributed to the generation and sharing of CIEWS knowledge among CIEWS stakeholders?	Desk review, systematic review, KII with GCF stakeholders	GCF data and published documents	GCF input 3

Scope	GCF evaluation criteria	No.	Evaluation questions and subquestions	Methods	Key data sources and literature	Linkage with CIEWS ToC
		1.5	To what extent and in which way has the GCF contributed to discussions at the UNFCCC COP level on strengthening CIEWS including through the WimExcom?	Desk review, KII and/or FGD with UNFCCC/COP and GCF stakeholders	UNFCCC documents, GCF data and reports to the UNFCCC/COP	GCF inputs 3
		1.6	To what extent have the "pilot GCF SAP—CREWS Scaling-up Framework for early warning" (signed in 2023) and the "Framework for Collaboration between the SOFF and CIF, CREWS initiative, GEF, and GCF" (signed in 2023) demonstrated potential or shown early positive/negative signs for scaling-up or catalysing synergies in CIEWS work?[1]	Desk review, benchmarking study, KII and FGD with framework stakeholders	External and GCF data and information on these frameworks	GCF inputs 3
		1.7	What are the remaining gaps in coherence and complementary efforts among CIEWS actors?	Desk review, benchmarking study, portfolio data analysis and mapping, KII and FGD with CIEWS stakeholders, policy meta-review	GCF and CIEWS stakeholders, funding/investment data (including OECD database and WMO/UNDRR Global Observatory)	GCF inputs 3
	Efficiency	2	To what extent is GCF leveraging its programmatic approaches and funding windows (e.g. RPSP, PPF and PAP versus SAP) to support CIEWS?	Desk review, portfolio analysis, KII and FGD with GCF stakeholders	GCF-funded activities, RPSP, PPF data	GCF inputs 1 and 2
		2.1	To what extent is the GCF leveraging its programmatic approaches, such as DAEs versus IAEs, public versus private sector engagement, single-country versus multi-country programming, and sector-based versus results-area based approaches, to achieve efficiency in attaining CIEWS results?	Desk review, portfolio analysis, KII and FGD with GCF stakeholders	GCF portfolio data on Funded Activities, GCF stakeholders	GCF inputs 1 and 2

[1] Systematic Observations Financing Facility, "Signed Framework for Collaboration for enhancing Systematic Observation," 2023, https://www.un-soff.org/document/signed-framework-for-collaboration-for-enhancing-systematic-observation/.

Scope	GCF evaluation criteria	No.	Evaluation questions and subquestions	Methods	Key data sources and literature	Linkage with CIEWS ToC
		2.2	To what extent does the Readiness Programme, both the previous strategy up to 2023 and the transitional arrangement to the new Readiness Strategy 2024–2027 during 2024–2025, facilitate the creation of an enabling environment for CIEWS programming?	Desk review, qualitative scenario assessment, KII and FGD with RPSP stakeholders (NDA and delivery partners), and RPSP RRMF data analysis	Samples of RPSP grant proposals and APRs, and RPSP stakeholders	GCF input 1
		2.3	To what extent does the PPF window facilitate CIEWS programming?	Desk review, KII and FGD with PPF stakeholders (AEs, and roster of technical consultants), and PPF data analysis	Samples of PPF grant proposals and APRs, and PPF stakeholders	GCF input 1
		2.4	To what extent and how is the "pilot GCF SAP—CREWS scaling-up framework for early warning" helping countries to reduce transaction costs and time to access funding for CIEWS?	Desk review, KII and FGD with SAPCREWS stakeholders, SAP data analysis	SAP pipeline and portfolio data, SAP stakeholders	GCF input 2
		2.5	To what extent and how does the GCF's new organizational structure along with the "Efficient GCF" initiatives, facilitate efficient support and investment in CIEWS across regions?	KII and FGD with GCF stakeholders	GCF stakeholders	GCF input 1
		2.6	How well are financial and technical resources utilized vis-à-vis intended outcomes?	Desk review, portfolio data analysis, KII and FGD with GCF stakeholders	GCF portfolio and financial data, FPs and APRs	GCF inputs 1 and 2
Portfolio	Relevance	3	To what extent do CIEWS interventions align to needs and gaps recognized by governments (i.e. national NMHS, NDMAs and subnational governments) within target countries?	KII and FGD with GCF stakeholders in target countries	Country visits, country-level GCF stakeholders	Short- and medium-term outputs 1 and 2
		3.1	To what extent are GCF support and investments in CIEWS aligned with the NDCs and NAPs of the countries being supported?	Desk review, external and RPSP data analysis	UNFCCC NDC and NAP registry, NDC tracker, RPSP RRMF data	Short- and medium-term output 1
		3.2	To what extent are CIEWS interventions meeting the needs of communities?	Desk review, KII and FGD with GCF stakeholders, non-	FPs, APRs and GCF stakeholders (AEs and	Short- and medium-

Scope	GCF evaluation criteria	No.	Evaluation questions and subquestions	Methods	Key data sources and literature	Linkage with CIEWS ToC
				participatory observations in countries	GCF beneficiaries) in countries	term output 2
		3.3	To what extent are CIEWS interventions meeting the needs of historically underserved populations such as women and Indigenous Peoples, disabled persons?	Desk review, KII and FGD with GCF stakeholders, non-participatory observations in countries	FPs, APRs, interim and final evaluations, and GCF stakeholders (AEs and GCF beneficiaries) in countries	Short- and medium-term outputs 1 and 2
		3.4	How have CIEWS interventions incorporated and leveraged on Indigenous traditional knowledge?	Desk review, KII and FGD with GCF stakeholders, non-participatory observations in countries	FPs, APRs, IEU-IP evaluation data set, GCF LLCA data set, GCF stakeholders (AEs and GCF beneficiaries) in countries, interim and final AE-led evaluations, previous IEU evaluations	Short- and medium-term outputs 1 and 2
		3.5	To what extent are CIEWS interventions locally led (hence relevant to local contexts)?	Portfolio data analysis, KII and FGD with GCF stakeholders, non-participatory observations in countries	LLCA GCF data set, and GCF stakeholders (AEs and GCF beneficiaries) in mission countries	Short- and medium-term outputs 1 and 2
	Effectiveness	4	To what extent has the CIEWS portfolio been successful or unsuccessful in terms of: • Enhancing or making CIS available to users • Making impact-based MHEWS available, accessible and responsive • Improving and leveraging CIEWS for investments?	Desk review, cluster/thematic study by analytical framework with scorecards, portfolio data analysis, in-country or online-based KII and FGD with GCF stakeholders, and non-participatory observations	FPs, APRs, interim and final AE-led evaluations, and GCF stakeholders	Short- and medium-term outputs 1, 2 and 3
		4.1	What are the key factors that have facilitated or hindered the progress or achievements of the CIEWS interventions by cluster type (i.e. notable common emerging successes/good practice and/or challenges/lessons per cluster)?	Desk review, cluster/thematic study, portfolio data analysis, in-country or online-based KII and FGD with GCF stakeholders; and non-	FPs, APRs, interim and final AE-led evaluations, and GCF stakeholders	Short- and medium-term outputs 2 and 3

Scope	GCF evaluation criteria	No.	Evaluation questions and subquestions	Methods	Key data sources and literature	Linkage with CIEWS ToC
				participatory observations		
		4.2	To what extent have there been effective cross-sectoral planning and decision-making mechanisms at regional, national, subnational, and local/community settings to address their climate information and disaster preparedness needs and priorities?	Desk review, cluster/thematic study, portfolio data analysis, in-country or online-based KII and FGD with GCF stakeholders, non-participatory observations	FPs, APRs, and GCF stakeholders	Short- and medium-term output 2
		4.3	How effectively is the GCF portfolio of CIEWS interventions addressing the appropriate range of climate hazards and vulnerabilities?	Desk review, portfolio data analysis and mapping (by climate hazards), KII/FGD with GCF stakeholders	FPs, APRs and GCF stakeholders	Short- and medium-term output 2
		4.4	What are the observable CIEWS-related results?	Portfolio data analysis, KII/FGDs, country missions	FP, APR, interim and final AE-led evaluations, and CIEWS results data reported against PMFs and IRMF	Short- and medium-term outputs 2 and 3
	Impact	5	What are the key changes in knowledge and behaviours of individuals within target communities following CIEWS interventions?	Data analysis including impact evaluation, KII and FGD with GCF stakeholders, non-participatory observations in countries	FPs, APRs, interim and final evaluations, baseline, midline and endline household survey data available from IEU LORTA programme, and GCF stakeholders	Long-term outcome 3
		5.1	Have CIEWS interventions enhanced the adaptive capacity of the communities they support?	Desk review, data analysis, KII and FGD with GCF stakeholders in countries, non-participatory observations	FP, APR, interim and final evaluations, LORTA reports on CIEWS projects, GCF stakeholders	Long-term outcomes 1 and 3
	Sustainability and country ownership	6	Are the results achieved from GCF-funded CIEWS projects sustainable without reliance on external support?	Desk review, KII and FGD with GCF stakeholders in countries, and non-	FP, APRs, interim and final AE-led evaluations, and GCF stakeholders	Long-term outcome 3

Scope	GCF evaluation criteria	No.	Evaluation questions and subquestions	Methods	Key data sources and literature	Linkage with CIEWS ToC
				participatory observations		
		6.1	What mechanisms, such as national funding, local capacity, and institutional arrangements, have enabled or limited, or have the potential to support the continued operation of CIEWS without external assistance?	Desk review, KII and FGD with GCF stakeholders in countries, and non-participatory observations	FP, APR, interim and final AE-led evaluations, and GCF stakeholders	Long-term outcomes 1, 2 and 3
	Gender equity	7	To what extent have CIEWS interventions fostered women's participation and leadership? What key factors have driven gender equality results?	Desk review, KII and FGD with GCF stakeholders, and non-participatory observations	FP, APR, interim and final AE-led evaluations, and GCF stakeholders	Long-term outcome 3
	Replication and scalability	8	Are there indications that the results achieved from GCF-funded CIEWS projects are, or will be scalable or replicated beyond intervention locations and stakeholder groups?	Desk review, KII and FGD with GCF stakeholders in countries, and non-participatory observations	FP, APR, interim and final evaluations, and GCF stakeholders	Long-term outcome 2
	Unexpected results, both positive and negative	9	What are some unexpected positive and negative results observed in CIEWS interventions?	Desk review, cluster/thematic study, KII and FGD with GCF stakeholders, non-participatory observations	FP, APR, interim and final evaluations, and GCF stakeholders	Short- and medium-term outputs and long-term outcomes
		9.1	Are there examples within the GCF portfolio where CIEWS projects have contributed to addressing non-climate-related hazards (e.g. epidemic or conflict)?	Desk review, cluster/thematic study, KII and FGD with GCF stakeholders, non-participatory observations	FP, APR, interim and final AE-led evaluations, and GCF stakeholders	Short- and medium-term outputs and long-term outcomes
Cross-cutting	Innovativeness	10	Have CIEWS interventions supported by the GCF leveraged on innovative approaches, practices and technologies?	Desk review, KII and FGD with GCF stakeholders in countries, non-participatory observations	FP, APR, interim and final AE-led evaluations, GCF stakeholders	Cross-cutting across GCF inputs and short-term/medium-term outputs

Scope	GCF evaluation criteria	No.	Evaluation questions and subquestions	Methods	Key data sources and literature	Linkage with CIEWS ToC
		10.1	To what extent has the GCF de-risked private investments in CIEWS (e.g. the deployment of financial instruments)?	Desk review, KII and FGD with GCF stakeholders (CIEWS and private sector experts)	FP, APR, interim and final AE-led evaluations, GCF stakeholders	GCF inputs 1, 2 and 3
		10.2	Have there been examples of blending the returns from public benefits (availability of climate information, EWS) and private income streams to increase or strengthen CIEWS (e.g. increased revenues from climate-informed financial products)?	Desk review, KII and FGD with GCF stakeholders (CIEWS and private sector experts), non-participatory observations	FP, APR, interim and final AE-led evaluations, GCF stakeholders	Short- and medium-term output 2
		10.3	Have there been advanced technologies (e.g. AI, remote sensing, data analytics) being applied or transferred to target countries to increase efficiency and reduce costs in CIEWS?	Desk review, KII and FGD with GCF stakeholders, non-participatory observations	FP, APR, interim and final AE-led evaluations, and GCF stakeholders	Short- and medium-term outputs 3
		10.4	Have nature-based solutions been applied to promote or strengthen CIEWS?	Desk review, KII and FGD with GCF stakeholders, non-participatory observations	FP, APR, interim and final AE-led evaluations, and GCF stakeholders	Short- and medium-term output 3

Source: CIEWS approach paper.
Notes: GCF = Green Climate Fund; CIEWS = climate information and early warning system; ToC = theory of change; KII = key informant interview; FGD = focus group discussion; CIS = climate information services; WMO = World Meteorological Organization; UNDRR = United Nations Office for Disaster Risk Reduction; ITU = International Telecommunication Union; IFRC = International Federation of Red Cross and Red Crescent Societies; CREWS = Climate Risk and Early Warning Systems; WB-GFDRR = World Bank Global Facility for Disaster Reduction and Recovery; SOFF = Systematic Observations Financing Facility; CIF = Climate Investment Funds; GEF = Global Environment Facility; FRLD = Fund for Responding to Loss and Damage; UNDP = United Nations Development Programme; UNEP = United Nations Environment Programme; WFP = World Food Programme; IFAD = International Fund for Agricultural Development; NGO = non-governmental organization; UNFCCC = United Nations Framework Convention on Climate Change; COP = Conference of the Parties; SAP = simplified approval process; OECD = Organisation for Economic Cooperation and Development; RPSP = Readiness and Preparatory Support Programme; MHEWS = multi-hazard early warning system; PPF = Project Preparation Facility; PAP = proposal approval process; DAE = direct access entity; IAE = international accredited entity; NDA = National Designated Authority; RRMF = readiness results management framework; APR = annual performance report; AE = accredited entity; FP = funding proposal; NMHS = national meteorological and hydrological services; NDMA = national disaster management authority; NDC = nationally determined contribution; NAP = national adaptation plan; IP = Indigenous Peoples; LLCA = locally led climate adaptation; IEU = Independent Evaluation Unit; PMF = performance measurement framework; IRMF = integrated results management framework; LORTA = Learning-Oriented Real-Time Impact Assessment Programme; AI = artificial intelligence.

Annex 2. LIST OF STAKEHOLDERS INTERVIEWED

LAST NAME	FIRST NAME	POSITION/TITLE	AFFILIATION
Abedin	Joynal	Safeguard Specialist	United Nations Development Programme (UNDP Bangladesh), GCF project
Abilio Nunez	Nelson	Staff	Municipal Disaster Management Committee (MDMC), Baucau (Timor-Leste)
Adaje	Patience	Senior Officer, Nature-Based Solutions	International Federation of Red Cross and Red Crescent Societies (IFRC Nigeria)
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Agboma	Patrick	Consultant, Agricultural and Agro-industry Department	African Development Bank (AfDB)
Ahmed	Moheuddin	Deputy Director	Department of Women Affairs (DWA) (Bangladesh)
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Akter	Mosammat Hasina	Deputy Secretary of Government of Bangladesh (GoB)	Maritime Organisation of West and Central Africa (Bangladesh)
Akut	Stephanie	Chief of Staff to the Directors-General	National Council on Climate Change (Nigeria)
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Álvarez	Antonio	Technical Staff	Palo Blanco (Guatemala)
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Amirakieva	Elvira	Secretary-General	IFRC (Uzbekistan)
Ammour	Tania	Regional Direction Senior Advisor	International Union for Conservation of Nature (IUCN Guatemala)
Araujo Duarte	Felisberto	President	Nationally Designated Authority (Timor-Leste)
Araya	Kanokpan	Country Director	Asian Development Bank (ADB Uzbekistan)
Arkantayeva	Diana	Environmental Specialist	International Strategic Center for Agri-food Department (ISCAD Uzbekistan)

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Awojemila	Kunle	Deputy Director, Flood Forecasting Monitoring	Ministry of Environment (Nigeria)
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Barbosa	Clementino P.	Director, MDMC	Baucau (Timor-Leste)
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Belo	Leao F.	Staff, MDMC	Baucau (Timor-Leste)
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Braz	Januario	Chief of Department of Dissemination, MDMC	Baucau (Timor-Leste)
Cáceres	Sergio	Technical Staff	Agriteq (Guatemala)
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Chonoko	Ishaya	Director, DRR	National Emergency Management Agency (Nigeria)
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Chunga	Chitembo Kawimbe	Lead, Climate Smart Cities Program	CIF
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LAST NAME	FIRST NAME	POSITION/TITLE	AFFILIATION
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Gonzales	Marculino	Meteorologist	FAO (Timor-Leste)
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González	Óscar	Project Coordinator	ICC (Guatemala)
Gramajo	Eva	Technical Staff	INSIVUMEH (Guatemala)
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Annex 3. METHODOLOGY FOR ESTABLISHING THE PORTFOLIO OF CIEWS PROJECTS

To conduct a comprehensive portfolio evaluation, establishing a definitive list of CIEWS projects and programmes was essential. This annex describes the systematic approach used to identify and validate the CIEWS portfolio for this evaluation.

Initial framework and Secretariat classification

The GCF Secretariat has conducted a comprehensive exercise to classify and tag existing GCF projects and programmes according to the paradigm-shifting pathways outlined in each sectoral guide. This tagging work, technically overseen by sectoral experts in the CIEWS sector, is described in an internal Secretariat working document titled "How to tag approved portfolios under 10 sectors and allocate sectoral percentages to generate sectoral data analysis".

During the inception phase, the evaluation team conducted an extensive desk review of the CIEWS data created by the Secretariat, along with other available documents, to assess the data's completeness and usability for this evaluation. This review revealed that while the Secretariat's list provided a good foundation, additional analysis was needed to capture the full scope of CIEWS interventions across the portfolio.

Comprehensive portfolio identification process

The evaluation team employed a multi-step approach to establish a comprehensive list of CIEWS projects:

- **Integration of existing Secretariat exercises:** The evaluation team identified that the Secretariat had undertaken several exercises to identify and tag CIEWS-related projects up to B.34. Through reviewing the Secretariat's work, three additional data sets were discovered: agriculture projects (CIS) and insurance, insurance projects in the agricultural sector, and a data insurance dashboard. Analysis of these files yielded 13 additional projects requiring review for CIEWS components.
- **Complementary AI-assisted analysis:** To address inherent challenges in identifying cross-cutting CIEWS interventions across multiple results areas, the evaluation team conducted a comprehensive analysis of the entire GCF portfolio using the institutional GPT-4o API. For projects approved after B.34 (not covered in the Secretariat's tagging supplementary exercise) and a review of the pre-B.34 portfolio, the team applied the CIEWS definition developed for this evaluation[2] with a temperature setting of 0 to ensure consistent and deterministic results. This analysis focused specifically on project outputs and outcomes, identifying 19 additional projects with CIEWS elements (including FP192 from the pre-B.34 portfolio).
- **Human verification and validation:** The combined analysis yielded the final 141 projects containing CIEWS components (100 from the Secretariat's original identification, 41 based on additional review by the evaluation team). A final human verification process was conducted to validate each project's CIEWS relevance.

[2] A set of systems designed to understand, anticipate and manage risks related to the effects of climate change with the aim of protecting lives, livelihoods, assets and investment. For populations, communities, governments, and both public and private organizations, CIEWS rely on the collection, monitoring, and analysis of weather and climate data to enable understanding of historical and present trends and prediction of future conditions (i.e. CIS), as well as warning, communication and dissemination networks (i.e. EWS). These systems facilitate the making and sharing of evidence-based decisions that lead to preparedness and timely actions to reduce climate risks and increase adaptive capacity to climate change.

Final portfolio composition

Through this comprehensive methodology, the evaluation team established a final list of 141 projects containing substantive CIEWS components. This validated portfolio formed the basis for all data analyses presented in Chapter 3 of the final report. The complete list of the 141 CIEWS-tagged projects is provided in Annex 4.

Annex 4. LIST OF CIEWS PROJECTS

APPROVED REFERENCE	PROJECT NAME	BOARD MEETING	CIEWS WEIGHT
FP002	Scaling up the use of Modernized Climate information and Early Warning Systems in Malawi	B.11	0.5000
FP004	Climate Resilient Infrastructure Mainstreaming (CRIM)	B.11	1.0000
FP012	Africa Hydromet Program – Strengthening Climate Resilience in Sub-Saharan Africa: Mali Country Project	B.13	0.5000
FP013	Improving the resilience of vulnerable coastal communities to climate change related impacts in Viet Nam	B.13	0.4600
FP016	Strengthening the resilience of smallholder farmers in the Dry Zone to climate variability and extreme events through an integrated approach to water management	B.13	0.1150
FP018	Scaling-up of Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan	B.14	0.3700
FP021	Senegal Integrated Urban Flood Management Project	B.14	0.2100
FP024	Empower to Adapt: Creating Climate-Change Resilient Livelihoods through Community-Based Natural Resource Management (CBNRM) in Namibia	B.14	0.2600
FP026	Sustainable Landscapes in Eastern Madagascar	B.14	0.3438
FP034	Building Resilient Communities, Wetland Ecosystems and Associated Catchments in Uganda	B.15	0.3500
FP035	Climate Information Services for Resilient Development Planning in Vanuatu (Van-CIS-RDP)	B.15	0.1600
FP037	Integrated Flood Management to Enhance Climate Resilience of the Vaisigano River Catchment in Samoa	B.15	0.0700
FP041	Simiyu Climate Resilient Project	B.16	0.4040
FP048	Low Emissions and Climate Resilient Agriculture Risk Sharing Facility	B.18	0.2690
FP049	Building the climate resilience of food insecure smallholder farmers through integrated management of climate risk (R4)	B.18	0.4373
FP050	Bhutan for life	B.18	0.1614
FP053	Enhancing climate change adaptation in the North coast and Nile Delta Regions in Egypt	B.18	1.0000
FP056	Scaling up climate resilient water management practices for vulnerable communities in La Mojana	B.18	0.1100
FP066	Pacific Resilience Project Phase II for RMI	B.19	0.5900
FP067	Building climate resilience of vulnerable and food insecure communities through capacity strengthening and livelihood diversification in mountainous regions of Tajikistan	B.19	0.6348
FP068	Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia	B.19	0.4850
FP069	Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity	B.19	0.4900

Approved reference	Project name	Board meeting	CIEWS weight
FP072	Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia	B.19	0.2000
FP073	Strengthening Climate Resilience of Rural Communities in Northern Rwanda	B.19	0.1300
FP074	Africa Hydromet Program – Strengthening Climate Resilience in Sub-Saharan Africa: Burkina Faso Country Project	B.19	0.4000
FP075	Institutional Development of the State Agency for Hydrometeorology of Tajikistan	B.19	1.0000
FP076	Climate-friendly Agribusiness Value Chains Sector Project	B.19	0.2365
FP078	Acumen Resilient Agriculture Fund (ARAF)	B.19	0.3495
FP087	Building livelihood resilience to climate change in the upper basins of Guatemala's highlands	B.21	0.4300
FP089	Upscaling climate resilience measures in the dry corridor agroecosystems of El Salvador (RECLIMA)	B.21	0.2722
FP092	Programme for integrated development and adaptation to climate change in the Niger Basin (PIDACC/NB)	B.21	0.2600
FP094	Ensuring climate resilient water supplies in the Comoros Islands	B.21	0.2000
FP101	Resilient Rural Belize (Be-Resilient)	B.22	0.5150
FP107	Supporting Climate Resilience and Transformational Change in the Agriculture Sector in Bhutan	B.23	0.5000
FP108	Transforming the Indus Basin with Climate Resilient Agriculture and Water Management	B.23	0.2500
FP109	Safeguarding rural communities and their physical and economic assets from climate induced disasters in Timor-Leste	B.23	0.7500
FP112	Addressing Climate Vulnerability in the Water Sector (ACWA) in the Marshall Islands	B.23	0.1900
FP113	TWENDE: Towards Ending Drought Emergencies: Ecosystem Based Adaptation in Kenya's Arid and Semi-Arid Rangelands	B.23	0.5000
FP114	Program on Affirmative Finance Action for Women in Africa (AFAWA): Financing Climate Resilient Agricultural Practices in Ghana	B.23	0.1932
FP124	Strengthening Climate Resilience of Subsistence Farmers and Agricultural Plantation Communities residing in the vulnerable river basins, watershed areas and downstream of the Knuckles Mountain Range Catchment of Sri Lanka	B.25	0.3300
FP125	Strengthening the resilience of smallholder agriculture to climate change-induced water insecurity in the Central Highlands and South-Central Coast regions of Vietnam	B.25	0.5000
FP127	Building Climate Resilience of Vulnerable Agricultural Livelihoods in Southern Zimbabwe	B.25	0.5000
FP133	Resilience to hurricanes in the building sector in Antigua and Barbuda	B.26	0.2500
FP139	Building resilience in the face of climate change within traditional rain-fed agricultural and pastoral systems in Sudan	B.26	0.3357

Approved reference	Project name	Board meeting	CIEWS weight
FP141	Improving Adaptive Capacity and Risk Management of Rural communities in Mongolia	B.27	0.3800
FP145	RELIVE – REsilient LIVElihoods of vulnerable smallholder farmers in the Mayan landscapes and the Dry Corridor of Guatemala	B.27	0.5200
FP147	Enhancing Climate Information and Knowledge Services for resilience in 5 island countries of the Pacific Ocean	B.27	1.0000
FP157	Coastal Resilience to Climate Change in Cuba through Ecosystem Based Adaptation – "MI COSTA"	B.28	0.1100
FP160	Monrovia Metropolitan Climate Resilience Project	B.28	1.0000
FP161	Building Regional Resilience through Strengthened Meteorological, Hydrological and Climate Services in the Indian Ocean Commission (IOC) Member Countries	B.28	1.0000
FP162	The Africa Integrated Climate Risk Management Programme: Building the resilience of smallholder farmers to climate change impacts in 7 Sahelian Countries of the Great Green Wall (GGW)	B.28	0.5200
FP165	Building Climate Resilient Safer Islands in the Maldives	B.29	0.7500
FP170	Enhancing climate resilience in Thailand through effective water management and sustainable agriculture	B.30	0.4859
FP171	Enhancing Early Warning Systems to build greater resilience to hydro-meteorological hazards in Timor-Leste	B.30	0.5000
FP175	Enhancing community resilience and water security in the Upper Athi River Catchment Area, Kenya	B.30	0.3000
FP179	Tanzania Agriculture Climate Adaptation Technology Deployment Programme (TACATDP)	B.30	0.4765
FP182	Climate-smart initiatives for climate change adaptation and sustainability in prioritized agricultural production systems in Colombia (CSICAP)	B.31	0.0900
FP183	Inclusive Green Financing Initiative (IGREENFIN I): Greening Agricultural Banks & the Financial Sector to Foster Climate Resilient, Low Emission Smallholder Agriculture in the Great Green Wall (GGW) countries - Phase I	B.31	0.0400
FP184	Vanuatu community-based climate resilience project (VCCRP)	B.32	0.0900
FP185	Climate change: The new evolutionary challenge for the Galapagos	B.32	0.0100
FP192	The R's (Reduce, Reuse and Recycle) for Climate Resilience Wastewater Systems in Barbados (3R-CReWS)	B.34	0.4375
FP197	Green Guarantee Company ("GGC")	B.34	0.1667
FP199	Public-Social-Private Partnerships for Ecologically-Sound Agriculture and Resilient Livelihood in Northern Tonle Sap Basin (PEARL)	B.35	0.3000
FP201	Adapting Philippine Agriculture to Climate Change (APA)	B.35	0.2500
FP202	Upscaling Ecosystem Based Climate Resilience of Vulnerable Rural Communities in the Valles Macro-region of the Plurinational State of Bolivia (RECEM-Valles)	B.35	0.1500

APPROVED REFERENCE	PROJECT NAME	BOARD MEETING	CIEWS WEIGHT
FP203	Heritage Colombia (HECO): Maximizing the Contributions of Sustainably Managed Landscapes in Colombia for Achievement of Climate Goals	B.35	0.0200
FP205	Infrastructure Climate Resilient Fund (ICRF)	B.35	1.0000
FP206	Resilient Homestead and Livelihood support to the vulnerable coastal people of Bangladesh (RHL)	B.36	0.6300
FP207	Recharge Pakistan: Building Pakistan's resilience to climate change through Ecosystem-based Adaptation (EbA) and Green Infrastructure for integrated flood risk management	B.36	0.5000
FP214	Thai Rice: Strengthening Climate-Smart Rice Farming	B.37	0.1525
FP215	Community Resilience Partnership Program	B.37	0.1300
FP216	Scaling up climate resilient flood risk management in Bosnia and Herzegovina	B.37	0.0800
FP217	Building Resilience of Vulnerable Communities to Climate Variability in Rwanda's Congo Nile Divide through Forest and Landscape Restoration	B.37	0.2188
FP219	Staple Crops Processing Zone (SCPZ): Promoting Sustainable Agricultural Value Chains	B.37	0.1421
FP222	Renewable Energy Performance Platform (REPP 2)	B.37	0.1000
FP223	Project GAIA ("GAIA")	B.37	0.0350
FP227	Increase Resilience to Climate Change of Smallholders Receiving the Services of the Inclusive Agricultural Value Chains Programme (DEFIS +)	B.38	0.2164
FP228	Cambodian Climate Financing Facility	B.38	0.2860
FP232	Jordan Integrated Landscape Management Initiative (JILMI)	B.39	0.1992
FP233	Community-based Agriculture Support Programme "plus" (CASP+)	B.39	0.2554
FP234	Tonga Coastal Resilience	B.39	0.5000
FP236	Basin Approach for Livelihood Sustainability through Adaptation Strategies (BALSAS)	B.39	0.2500
FP238	Ecosystems-based Adaptation for resilient Watersheds and Communities in Malawi (EbAM)	B.39	0.1496
FP239	Building Climate Resilience for Food and Livelihoods in the Horn of Africa (BREFOL)	B.39	0.1521
FP240	Collaborative R&DB Programme for Promoting the Innovation of Climate Technopreneurship	B.39	0.1310
FP242	Caribbean Net-Zero and Resilient Private Sector	B.39	0.2500
FP244	Climate Resilient Health and Well-Being for Rural Communities in southern Malawi (CHWBRC)	B.40	0.3687
FP246	Climate Resilient Agriculture in Somalia (Ugbaad)	B.40	0.1680
FP247	Local Climate Adaptive Living Facility Plus (LoCAL+) – West Africa (Burkina Faso, Ivory Coast, Mali and Niger)	B.40	0.6250

Approved reference	Project name	Board meeting	CIEWS weight
FP249	Strengthening climate Resilience of Vulnerable Agriculture Livelihoods in Iraq (SRVALI)	B.40	0.8946
FP250	Achieving emission reduction in the Central Highlands and South Central Coast of Viet Nam to support National REDD+ Action Programme goals (RECAF)	B.40	0.1466
FP252	Acumen Resilient Agriculture Fund II	B.40	0.3328
FP255	Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya	B.41	0.3450
FP256	Intensification of Agriculture and Agroforestry Techniques (IAAT) for Climate Resilient Food and Nutrition Security: Tombouctou, Gao, Mopti, Koulikoro and Segou regions of Mali	B.41	0.2071
FP258	Multi-country Project Advancing Early Warnings for All (EW4All)	B.41	0.7123
FP259	Adapting Tuna-Dependent Pacific Island Communities and Economies to Climate Change	B.41	0.3330
FP261	Improving Climate Resilience by Increasing Water Security in the Amazon Basin	B.41	0.0800
FP262	Green Climate Finance Facility for Fostering Climate-Smart Agriculture in Senegal	B.41	0.2047
FP267	Scaling up ecosystem-based approaches to managing climate-intensified disaster risks in vulnerable regions of South Africa (“Eco-DRR”)	B.42	0.5000
FP268	Scaling-Up Resilience in Africa’s Great Green Wall (SURAGGWA)	B.42	0.3330
FP270	Climate Adaptive Irrigation and Sustainable Agriculture for Resilience (CAISAR) in Cambodia	B.42	0.0667
FP272	Protecting livelihoods and assets at risk from Glacial Lake Outburst Floods (GLOFs) and climate change-induced flooding in glacial river basins of Nepal	B.42	0.5000
FP276	GCF’s investment into the Global Green Bond Initiative (GGBI) (previously known as Green and Resilience Debt Platform (GRDP))	B.42	0.0330
FP279	Enhancing Climate Resilience in Flood-Prone Areas in Northwestern South Sudan (ECRF)	B.43	0.3459
FP283	Glaciers to Farms (G2F) Regional Program: Advancing Climate Resilience & Sustainable Development in Central and West Asia	B.43	0.1334
SAP001	Improving rangeland and ecosystem management practices of smallholder farmers under conditions of climate change in Sesfontein, Fransfontein, and Warmquelle areas of the Republic of Namibia	B.19	0.5000
SAP002	Climate services and diversification of climate sensitive livelihoods to empower food insecure and vulnerable communities in the Kyrgyz Republic	B.21	0.8000
SAP003	Enhancing climate resilience of the water sector in Bahrain	B.21	0.3435

Approved reference	Project name	Board meeting	CIEWS weight
SAP007	Integrated Climate Risk Management for Food Security and Livelihoods in Zimbabwe focusing on Masvingo and Rushinga Districts	B.23	0.6000
SAP008	Extended Community Climate Change Project-Flood (ECCCP-Flood)	B.24	0.5000
SAP010	Multi-Hazard Impact-Based Forecasting and Early Warning System for the Philippines	B.24	1.0000
SAP011	Climate-resilient food security for women and men smallholders in Mozambique through integrated risk management	B.24	0.5593
SAP018	Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)	B.27	1.0000
SAP020	Climate resilient food security for farming households across the Federated States of Micronesia (FSM)	B.28	0.4500
SAP022	Enhancing Multi-Hazard Early Warning System to increase resilience of Uzbekistan communities to climate change induced hazards	B.28	1.0000
SAP025	Adaptation of agricultural production systems in Coastal Areas of Northwest Guinea-Bissau	B.34	0.3941
SAP026	Extended Community Climate Change Project-Drought (ECCCP-Drought)	B.36	0.2891
SAP027	Solomon Islands Knowledge-Action-Sustainability for Resilient Villages (SOLKAS) Project	B.36	0.5000
SAP028	Women-Adapt: Enhancing the climate change adaptive capacity of smallholder farmer communities in the Poro Region, focusing on vulnerable women and youth	B.36	0.6000
SAP030	Strengthening Climate Resilience of the Lao People's Democratic Republic (PDR) Health System	B.37	0.2500
SAP033	Enhancing Climate Information Systems for Resilient Development in Sierra Leone	B.37	0.1000
SAP034	Akamatutu'anga To Tatou Ora'anga Meitaki (ATOM): Building a healthy and resilient Cook Islands Community – one block at a time	B.38	0.6667
SAP036	Sierra Leone Coastal Resilience Project (SLCRP)	B.38	0.3265
SAP038	Climate Adaptation, Resilience and Engagement in Local Governments (CARE-LG)	B.39	0.1250
SAP039	Integrated climate risk management for strengthened resilience to climate change in Buner and Shangla Districts of Khyber Pakhtunkhwa Province, Pakistan	B.39	0.5000
SAP040	Climate Adaptation and Resilience in Thua Thien Hue Province Vietnam (CARe Hue)	B.39	0.2000
SAP041	ALBAdapt – Climate Services for a Resilient Albania	B.39	0.5000
SAP042	Building climate resilience by linking climate adaptation and social protection through decentralised planning in Mozambique (LINK)	B.39	0.3855
SAP043	Upscaling "Naatangue" integrated family and village farms for a resilient agriculture in Senegal	B.39	0.2951

Approved reference	Project name	Board meeting	CIEWS weight
SAP046	Strengthening Climate Information and Multi-Hazard Early Warning Systems for Increased Resilience in Azerbaijan	B.40	0.7000
SAP048	Strengthening the resilience of vulnerable communities within high climatic and disaster risk areas in Togo	B.41	0.9000
SAP049	Sustainable Communities for Climate Action in the Yucatán Peninsula (ACCIÓN)	B.41	0.3000
SAP050	Toward Risk-Aware and Climate-resilienT communities (TRACT) - Strengthening climate services and impact-based multi-hazard early warning in Maldives	B.42	1.0000
SAP051	Increasing resilience to the health risks of climate change in the Federated States of Micronesia	B.42	0.3000
SAP055	Strengthening the Health Resilience of Communities Vulnerable to Climate Change in Benin's ABD (Adjohoun, Bonou and Dangbo) Zone	B.43	0.6630
SAP056	Climate Resilience in the Guiriko Region	B.43	0.3500
SAP058	Local Governments and Climate Change III (LGCC-3)	B.43	0.7500
SAP060	Promoting Climate Resilient Livelihoods for Food Insecure People in Southern Iraq	B.43	0.3000
SAP062	Dominica Community Resilience Enhancement Project (DOMCREP)	B.43	0.3000
SAP063	Scaling up of Caribbean Hydrometeorological and Multi-hazard Early Warning Services (CREWS) in Belize and Trinidad and Tobago	B.43	0.7211
SAP065	Harnessing Insurance for Climate Resilience in Indian Agriculture	B.43	0.4395

Source: As categorized and compiled by the evaluation team as per the methodology explained in the final report.

Annex 5. AI-ASSISTED PATHWAY CLASSIFICATION METHODOLOGY FOR CIEWS PROJECTS AND CLUSTER ASSESSMENTS

1. Executive summary

This annex describes the technical methodology employed for classifying CIEWS projects into three paradigm-shifting pathways. The classification system utilizes OpenAI's GPT-4o (version: GPT-4o via Azure OpenAI Service, API version 2025-01-01-preview) in a structured, multi-stage approach with arithmetic consensus mechanisms and human verification to ensure accuracy and consistency.

2. Pathway classification framework

2.1. CIEWS definition

The evaluation adopted the following definition for CIEWS "A set of systems designed to understand, anticipate, and manage risks related to the effects of climate change with the aim of protecting lives, livelihoods, assets and investments."

2.2. Three paradigm-shifting pathways

2.2.1. Pathway 1: Strengthening climate information services

- *Focus*: Generating science-based climate information for policy and investment decisions
- *Key components*: Implementation of the Global Framework for Climate Services and its sectoral applications (agriculture, water, health, energy)
- *Primary beneficiaries*: government institutions, sectoral decision makers

2.2.2. Pathway 2: Promoting impact-based MHEWS and early action

- *Focus*: People-centred early warning systems and community preparedness
- *Key components*: Four pillars of MHEWS (risk knowledge, detection/monitoring, preparedness, warning dissemination)
- *Primary beneficiaries*: Vulnerable communities, local populations

2.2.3. Pathway 3: Improving CIEWS for investment and financial decisions

- *Focus:* Climate information for financial sector and investment decisions
- *Key components:* Risk transfer mechanisms, investment analysis, financial instruments
- *Primary beneficiaries:* Financial sector, insurance industry, investment planners

3. Technical methodology

3.1. Data-processing pipeline

The classification system employed a three-stage pipeline:

3.1.1. Stage 1: Data extraction

- *Source*: Raw project descriptions extracted from funding proposals

- *Format*: Plain text files (.txt) containing detailed project information
- *Processing*: UTF-8 encoding with error handling for special characters

3.1.2. Stage 2: AI-powered analysis

- *Rationale generation*: Each project underwent 2–4 iterations of comprehensive analysis using GPT-4o with temperature setting of 0.3 for consistency
- *Pathway testing*: Independent evaluation against each pathway definition with 5–10 voting iterations at temperature 0.2 for deterministic results
- *Consensus-building*: Arithmetic (non-large language model (LLM)) aggregation of votes to determine final classification

3.1.3. Stage 3: Quality assurance

- Automatic flagging of edge cases (consensus below 70 per cent)
- AI verification with Claude Opus 4 for quality assurance
- Human verification of flagged projects
- Cross-validation through multiple independent runs

3.2. Consensus mechanism

The methodology implemented an arithmetic consensus approach rather than LLM-based consensus. For each project:

3.2.1. Generate multiple independent classifications (5–10 iterations)

3.2.2. Count votes for each pathway

3.2.3. Calculate formula: $consensus\ percentage = (\frac{max\_votes}{total\_votes}) \times 100$

3.2.4. Determine confidence level:

- High: ≥80 per cent consensus with majority high-confidence votes
- Medium: 60–79 per cent consensus
- Low: <60 per cent consensus

3.2.5. Flag for review if consensus <70 per cent or confidence is low

3.3. Classification rules and thresholds

3.3.1. Primary pathway selection

- Projects classified based on primary purpose and main activities
- Pathway 1 and 2 require 4/5 votes (80 per cent) for positive classification
- Pathway 3 requires 5/5 votes (100 per cent) due to its specialized nature
- Projects DO NOT need to meet all criteria of a pathway, only demonstrate clear alignment with core objectives

3.3.2. Secondary pathway identification

- Enabled identification of multiple pathways per project
- Stricter thresholds applied to avoid over-classification

- Each pathway evaluated independently to identify all relevant components

3.4. *Subsector classification (Pathway 1)*

For projects classified under Pathway 1, an additional subsector analysis was performed:

- Agriculture and food security
- Water resources
- Health systems
- Energy infrastructure

Each subsector underwent three independent evaluations with majority voting determining final classification.

4. Implementation details

4.1. *Technical parameters*

4.1.1. API configuration

- Model: GPT-4o (Azure OpenAI Service)
- Max tokens: 8,000 per request
- Temperature: 0.2–0.3 (optimized for consistency)
- Top-p: 1.0
- Frequency penalty: 0
- Presence penalty: 0

4.1.2. Processing controls

- Retry logic: Maximum three retries with exponential backoff
- Rate limiting: 0.3–0.5 second delays between API calls
- Error handling: Comprehensive exception management with fallback mechanisms

4.2. *Adaptive voting system*

The system implemented an intelligent voting mechanism:

- Initial voting round (5 iterations)
- Early stopping if unanimous high-confidence consensus achieved
- Expansion to 10 votes if disagreement detected
- Rationale caching to ensure consistency across multiple runs

5. Quality control and validation

5.1. *Multi-run validation*

Three independent classification runs were performed with comparison analysis:

- Inter-run agreement rate calculated
- Projects with differing classifications flagged for review
- Combined vote tallies used for final determination

5.2. *Human verification process*

5.2.1. Verification criteria

- All projects flagged by the algorithm (consensus <70 per cent)
- Projects with pathway disagreements across runs
- Random sample of 10 per cent high-confidence classifications

5.2.2. Verification process

- Expert review of project description
- Assessment against pathway definitions
- Validation or correction of AI classification
- Documentation of decision rationale

5.3. Edge case management

Projects identified as edge cases received additional scrutiny:

- Split decisions (e.g. equal votes for multiple pathways)
- Low confidence classifications
- Projects with no clear pathway alignment
- Projects potentially fitting multiple pathways equally

6. Results and performance metrics

6.1. Classification distribution

The methodology successfully classified projects across all three GCF sectoral guide pathways, with Pathway 1 (climate information services) and Pathway 2 (MHEWS and early action) representing the majority of operational climate projects, while Pathway 3 (investment and financial decisions) captured specialized financial instruments as expected.

6.2. Consensus metrics

- Average consensus percentage: >75 per cent across all classifications
- High-confidence classifications: Approximately 65 per cent of projects
- Projects requiring human review: 15–20 per cent of total portfolio

6.3. Consistency measures

The use of low temperature settings (0.2–0.3) and rationale caching resulted in:

- High reproducibility across multiple runs
- Consistent classifications for identical inputs
- Reduced variability in edge cases

7. Methodological advantages

- *Transparency*: All voting records preserved for audit
- *Scalability*: Capable of processing large project portfolios efficiently
- *Consistency*: Arithmetic consensus eliminates LLM-based variability
- *Adaptability*: Thresholds and parameters adjustable based on requirements
- *Human-in-the-loop*: Critical decisions verified by domain experts

8. Limitations and considerations

- *Pathway overlap*: Some projects naturally span multiple pathways; the methodology captures this through secondary pathway identification

- *Context dependency*: Classification accuracy depends on quality and completeness of project descriptions
- *Threshold sensitivity*: Results sensitive to voting thresholds, particularly for Pathway 3
- *Language limitations*: Analysis limited to English-language project descriptions

9. Recommendations for future application

- *Continuous refinement*: Regular updating of pathway definitions based on evolving climate finance landscape
- *Expanded validation*: Increase human verification sample size for high-stakes decisions
- *Cross-validation*: Compare AI classifications with independent expert assessments
- *Performance monitoring*: Track classification accuracy over time to identify improvement opportunities

10. Conclusion

The AI-assisted pathway classification methodology provides a robust, scalable, and transparent approach to categorizing CIEWS projects. The combination of GPT-4o's analytical capabilities, arithmetic consensus mechanisms, and other AI models such as Claude Opus 4 and human verification ensures both efficiency and accuracy in project classification. This approach successfully balances automation with human oversight, making it suitable for large-scale portfolio analysis while maintaining the nuance required for complex climate finance projects.

The methodology's emphasis on primary purpose classification, strict thresholds for specialized pathways, and comprehensive quality control measures ensures that projects are appropriately categorized according to their core objectives and activities, supporting evidence-based decision-making in climate finance evaluation.

Annex 6. IMPUTING INVESTMENT WEIGHTS

We evaluated three modelling approaches to predict missing CIEWS weights for 41 projects:

1. **Budget quantiles model (Baseline model)**: The projects were divided into four groups according to quantiles of total GCF funding (in USD million):

- Quantile 1: $Budget \in (5, 17.76]$
- Quantile 2: $Budget \in (17.76, 25.22]$
- Quantile 3: $Budget \in (25.22, 40.86]$
- Quantile 4: $Budget \in (40.86, 253.76]$

For each group, **the average project weight** in the training set was calculated and then assigned to the corresponding target projects.

2. **Probability-based classifier**: All training projects were divided into three groups based on CIEWS weight:

- Group 1, "Low" CIEWS: $Weight \in (0,0.25]$
- Group 2, "Medium" CIEWS: $Weight \in (0.25,0.5]$
- Group 3, "High" CIEWS: $Weight \in (0.5,1.0]$

A classifier model is trained to predict the probability that a project belongs to each group. The final predicted weight for a project is then computed as a **weighted sum of the class probabilities multiplied by the group average weights:**

$$w_{pred} = \sum_{g=1}^{3} p_g \cdot \bar{w}_g$$

where:

w_{pred} - predicted weight for a project

p_g - predicted probability that the project belongs to group g

$\bar{w}_g$ - average weight of group g

3. **Non-linear regression model (CatBoost regressor)** predicting continuous weights directly, rather than classifying into groups.

3.1. Feature selection

We prepared a training data set consisting of **100 CIEWS-related projects** tagged by the Secretariat. After removing less informative features, only the following remained to train models #2 (classifier) and #3 (regressor):

- **RA_VC:** Score of *ARA1: Livelihoods of people and communities* result area, sourced from GCF Projects API.
- **RA_HW:** Score of *ARA2: Health, food and water security* result area, sourced from GCF Projects API.
- **RA_IB:** Score of *ARA3: Infrastructure and built environment* result area, sourced from GCF Projects API.
- **NormTermCount:** A normalized text-based metric calculated from each project's FP document:

$$NormTermCount = \frac{TermsOccurrenceCount}{WordsCount} \times 1000$$

where:

$TermsOccurrenceCount$ – the number of words in the document matching any of the following terms: ["early warning systems", "ews", "ciews", "climate information", "climate data", "forecasting", "multihazard"].

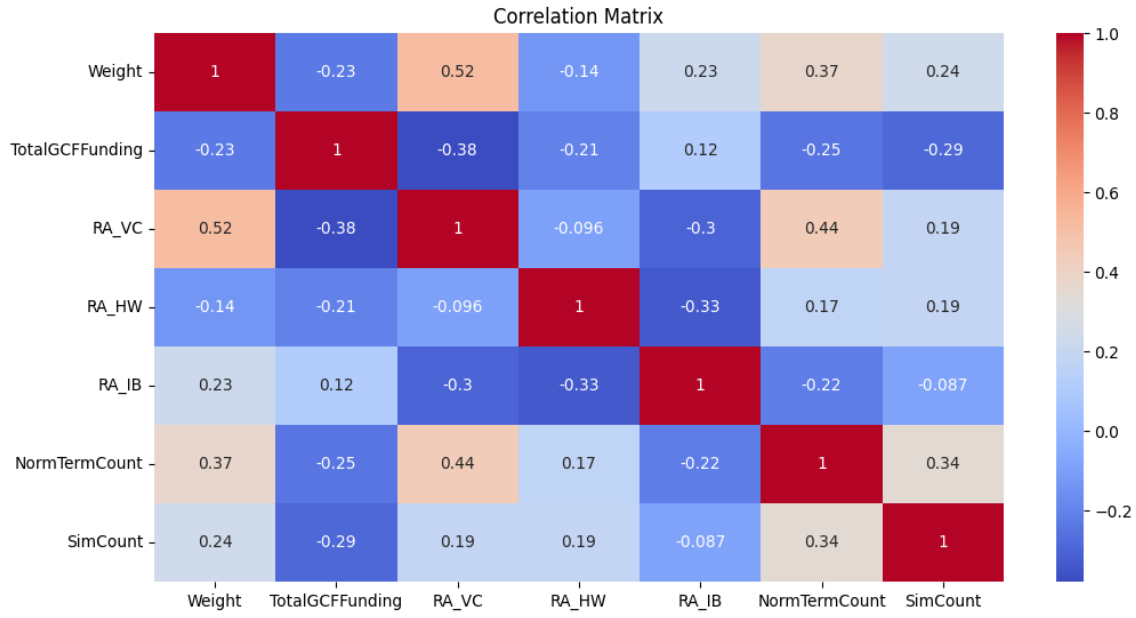
$WordsCount$ – the total number of words in the document.

- **SimCount:** A semantic similarity metric based on the *ProjectTags* table from the *FundedActivities General* semantic model, which contains taxonomy of project-related tags. Each tag was embedded using the *all-mpnet-base-v2* sentence-transformer model. The cosine similarity between each tag and the reference phrase "early warning systems and climate information services" was computed. **SimCount** is defined as the number of tags with similarity score > 0.4.
- **AccessModality:** A categorical feature indicating the project's access modality, identifying whether a project is an FP or SAP.

Additionally, the variable **TotalGCFFunding** was sourced from the GCF Projects API and used exclusively in Model #1 (Baseline).

The figure below shows the Pearson correlation coefficients between the target variable and each feature, providing an overview of their linear relationships.

Figure A – 1. Pearson correlation matrix between target and features



Source: Funded activity semantic model and the author's elaboration.

3.2. Model evaluation

We evaluated the models using three widely used regression metrics:

Mean absolute error (MAE) – average absolute difference between predictions and true values:

$$MAE = \frac{1}{n}\sum|y_i - \hat{y}_i|$$

Lower values indicate more accurate predictions.

Root mean squared error (RMSE) – measures the square root of the average squared differences between predicted and actual values:

$$RMSE = \sqrt{\frac{1}{n}\sum(y_i - \hat{y}_i)^2}$$

RMSE penalizes larger errors more heavily than MAE.

Coefficient of determination (R^2) – indicates the proportion of variance in the target variable explained by the model:

$$R^2 = 1 - \frac{SS_{res}}{SS_{tot}}$$

where:

SS_{res} = variance not explained by the model

SS_{tot} = total variance in the data

An R^2 value close to 1 indicates strong explanatory power, while values near 0 mean little to no explanatory strength

Table A – 1 summarizes the evaluation results for all three models. Results are reported as the average across a **5-fold cross-validation** procedure, where the training data set is split into five equally sized folds. In each iteration, four folds are used for training and one fold for validation, rotating until every fold has been used once. This approach reduces sensitivity to random splits and provides a more reliable estimate of model performance.

Table A – 1. Overall model evaluation results

Model	*MAE*	*RMSE*	R^2
Baseline	0.2129	0.2669	0.0560
Classifier	0.1938	0.2427	0.2243
Regressor	0.1578	0.2012	0.4244

Source: Compiled by the evaluation team.

Additionally, Table A – 2 presents results across all individual folds for models #2 and #3.

Table A – 2. Model performance across 5 cross-validation folds

Fold	*MAE*		*RMSE*		R^2	
	Class.	Regr.	Class.	Regr.	Class.	Regr.
1	0.2482	0.1272	0.2910	0.1549	0.2683	0.7926
2	0.1755	0.1971	0.2282	0.2451	0.2313	0.1131
3	0.1653	0.1492	0.2298	0.2037	0.1826	0.3580
4	0.1770	0.1177	0.2028	0.1377	0.1882	0.6258
5	0.2031	0.1978	0.2615	0.2648	0.2512	0.2326

Source: Compiled by the evaluation team.

The baseline model performs worse on all three metrics. It shows larger errors ($MAE = 0.2129$, $RMSE = 0.2669$) and explains almost no variance in the data ($R^2 = 0.0560$). This confirms that both the classifier and the regressor models provide a substantial improvement over the baseline.

Between the two, the regressor demonstrates more consistent performance across different folds, suggesting stronger generalization capability. On average, it also outperforms the classifier on all key metrics and in nearly every fold. For this reason, the regressor was selected as the final model.

As the final step, the regressor model was fine-tuned to further improve its performance. Table A – 3 shows the comparison between the original model and its tuned version.

Table A – 3. Comparison of original and fine-tuned regressor

FOLD	*MAE*		*RMSE*		R^2	
	Orig.	Fine-tuned	Orig.	Fine-tuned	Orig.	Fine-tuned
1	0.1272	0.1380	0.1549	0.1615	0.7926	0.7747
2	0.1971	0.1831	0.2451	0.2272	0.1131	0.2377
3	0.1492	0.1543	0.2037	0.1998	0.3580	0.3824
4	0.1177	0.1207	0.1377	0.1461	0.6258	0.5791
5	0.1978	0.1870	0.2648	0.2484	0.2326	0.3248
Mean	0.1578	0.1566	0.2012	0.1966	0.4244	0.4598

Source: Compiled by the evaluation team.

The improvements are small but consistent: all three evaluation metrics have shifted in the right direction. This indicates that hyperparameter tuning successfully contributed to better predictive performance.

3.3. Interpretation of fine-tuned model results

On average, the tuned regression model explains about 46 per cent of the variance in project weights ($R^2 = 0.4598$).

In the best fold, it explained up to 77 per cent of the variance ($R^2 = 0.7747$).

The mean absolute error ($MAE = 0.1566$) indicates that, on average, predicted weights are off by about ± 0.157 from the true values on the $[0,1]$ scale.

The root mean squared error ($RMSE = 0.1966$) suggests that no extreme outliers dominate the errors.

Further improvements are likely only achievable through additional feature engineering or better data.

Finally, the missing weights for the 41 non-tagged projects were imputed using the fine-tuned regression model.

Annex 7. CLUSTER ASSESSMENT TEMPLATE

Synopsis

Aim: to compile lessons and good practices for each cluster to inform future refinements and promotion of CIEWS in GCF.

Categorization: The final set of CIEWS projects identified for this evaluation will be categorized into three clusters based on paradigm-shifting pathways, determined by the project's primary objective. The evaluation team will use AI to categorize the list of CIEWS projects. Following this, the lists of samples for each pathway will be selected, explaining the criteria and process/methodology.

Application of analytical framework and assessment: FP samples for each cluster will be analysed using approved nested frameworks tailored to the specific pathway. Total sample size for each cluster should be 15–20 FPs. The components of each nested analytical framework will serve as indicators to evaluate the effectiveness of the interventions, through the examination of proposals, APRs and other documents available per case. Each FP will receive a score.

Gap filling – additional online interviews with AEs: To be conducted as needed to fill missing information on sampled FPs.

Extraction of lessons and synthesis: The assessment will enable the team to extract preliminary lessons and good practices for each cluster/theme. The team will produce a synthesis of findings, triangulated with field observations and additional data/information gathered in country missions.

Steps for each cluster

1. Assign one evaluator per cluster.
2. Compile the documents from the sample (produced in categorization above).
3. Use the cluster analysis sheets below to conduct/structure the desk phase of the pathway assessment.
4. Score each FP individually after reviewing each.
5. Update and refine the analysis, confirm gaps.
6. If there are important gaps, conduct interviews with AEs.
7. Write up a synthesis in a five-page report with technical annexes.
8. Curate key assessment findings into the main evaluation report and use them to help inform the recommendations.

Cluster ONE

Pathway 1: Strengthening climate information services

Sample details

- Framework: Global Framework for Climate Services (GFCS)
- Related documents: GFCS official website[3]
- Priority areas (agriculture, health, water, DRR, and energy) are the main fields where these services are applied to support decision-making, planning, and resilience-building inside each FP. Pillars are the five foundational elements that enable the effective creation, management, and use of climate services – essentially, the "how" of delivering climate information, the climate service infrastructure and processes that underpin all GFCS activities.[4] The value chains used below are not an official feature but add value, as documented in the WMO-2024 "State of climate services" report.[5]

Table A – 4. Pathway 1 assessment criteria

VALUE CHAIN: AS VISIBLE IN THE PROJECT	HIGHLY EFFECTIVE (3)	MEDIUM (2)	LOW (1)
Value chain 1. Basic systems and observations to ensure the continuous and reliable collection of climate data as may be crucial for climate monitoring and prediction. FOCUS ON COLLECTION.	The basic systems and observation networks are comprehensive, well-maintained, and operate continuously with minimal downtime. Coverage is sufficient to meet national and sectoral climate monitoring and prediction needs. Equipment is modern, calibrated, and regularly serviced, ensuring high data integrity and reliability. There are established protocols for rapid repair, maintenance, and quality control, resulting in consistently high-quality, uninterrupted data streams.	The observation systems provide generally reliable and continuous data, but there are occasional gaps in coverage or temporary outages due to equipment or maintenance issues. Some stations or instruments may be outdated or in need of calibration, leading to periodic data quality concerns. Maintenance and quality control protocols exist but are not always fully implemented, resulting in mostly – but not consistently – reliable data collection.	The basic systems and observation networks are limited in coverage, frequently experience outages, or suffer from prolonged maintenance lapses. Equipment is often outdated, poorly maintained, or non-functional, leading to significant gaps and inconsistencies in data collection. There is little evidence of systematic maintenance, calibration, or quality control, resulting in unreliable data for climate monitoring and prediction.
Value chain 2. Research, modelling and prediction: Driving advancements in scientific methods and predictive models to enhance forecast accuracy and support proactive climate risk management. (Examples of	The system demonstrates cutting-edge advancements in climate modelling and prediction, with peer-reviewed research consistently published in high-impact journals. Climate models exhibit high spatial resolution, reduced uncertainty in projections, and seamless	The system produces credible research and incremental improvements to climate models, but advancements are slower or limited in scope. Peer-reviewed publications are occasional, and models may lack integration of	The system relies on outdated models or methods with minimal scientific innovation. Peer-reviewed research is rare, and models exhibit high uncertainty, low resolution, or poor validation against observational data.

[3] See https://gfcs.wmo.int/site/global-framework-climate-services-gfcs/about-gfcs.
[4] See https://wmo.int/activities/climate-services/more-climate-services.
[5] See https://library.wmo.int/records/item/69061-2024-state-of-climate-services-five-year-progress-report-2019-2024.

VALUE CHAIN: AS VISIBLE IN THE PROJECT	HIGHLY EFFECTIVE (3)	MEDIUM (2)	LOW (1)
indicators: number of peer-reviewed publications on climate modelling, prediction, or applied climate science; development/improvement of climate models (e.g. higher spatial resolution, reduced uncertainty in projections) or integration of interdisciplinary research (e.g. social sciences, hydrology) into climate services).	integration of interdisciplinary approaches (e.g. social sciences, hydrology). Predictive tools are validated against observational data and proactively updated to reflect new scientific insights. The system drives innovation, such as novel methods for downscaling global models or quantifying climate risks and actively collaborates with stakeholders to ensure research aligns with practical climate service needs.	interdisciplinary insights or higher spatial resolution. Predictive tools are updated periodically but may lag behind scientific advancements. Collaboration with stakeholders or other disciplines exists but is inconsistent, resulting in partial alignment between research priorities and user needs.	Predictive tools are static, with no evidence of updates or interdisciplinary integration. Research priorities are siloed, lacking collaboration with stakeholders or alignment with climate service requirements.
Value chain 3. Climate Services Information System (CSIS): The mechanism through which climate data and information are processed and disseminated. FOCUS ON PRODUCTS.	The CSIS efficiently processes climate data into high-quality, user-oriented products (e.g. forecasts, bulletins, alerts) that are accurate, timely, and tailored to sectoral needs. Dissemination mechanisms are robust, ensuring products are reliably delivered through multiple, accessible channels. Product updates and system outputs are consistent, with strong quality assurance and user feedback loops supporting continuous improvement.	The system processes and disseminates climate information products that are generally reliable and relevant, though some products may lack full customization or experience occasional delays. Dissemination channels cover most key users, but there are gaps in accessibility or timeliness. Quality assurance is present but not comprehensive, and user feedback informs only some product improvements.	The system's processing and dissemination of climate information products is inconsistent or limited. Products are often generic, outdated, or lack relevance for users. Dissemination is restricted, with products not reaching many intended recipients or arriving too late to be useful. There is little evidence of systematic quality assurance or integration of user feedback into product or system improvements.
Value chain 4. User engagement/User Interface Platform (UIP): A structured means for users, climate researchers, and climate information providers to interact at all levels. FOCUS ON USER.	The UIP is intuitive, accessible, and actively facilitates two-way engagement among users, climate researchers, and information providers. It supports real-time communication, feedback, and collaboration through features such as forums, live chats, webinars, and customizable dashboards. User needs and preferences are regularly solicited and incorporated, resulting in high levels of user participation, satisfaction,	The platform provides basic tools for user interaction and engagement, such as comment sections, periodic surveys, or scheduled Q&A sessions. While users and providers can communicate, opportunities for real-time or in-depth engagement are limited. Some user feedback is collected and occasionally used to refine platform features,	The platform offers minimal or no structured opportunities for user engagement or interaction. Communication is largely one-way, with limited or no mechanisms for users to provide input, ask questions, or collaborate with providers and researchers. User feedback is rarely solicited or acted upon, resulting in low user

VALUE CHAIN: AS VISIBLE IN THE PROJECT	HIGHLY EFFECTIVE (3)	MEDIUM (2)	LOW (1)
	and co-development of services. The platform demonstrates continuous quality improvement and responsiveness to user input.	but overall engagement is moderate, with periodic updates and improvements to the interface.	participation and satisfaction, and little evidence of platform adaptation or quality improvement.
Value chain 5. Capacity development: Supports the systematic development of institutions, infrastructure, and human resources needed for effective climate services.	Capacity development initiatives are comprehensive, ongoing, and strategically aligned with the needs of climate service delivery. Institutions are well-resourced and demonstrate strong leadership and coordination. Infrastructure is modern and sufficient to support all core functions. Human resources benefit from regular, targeted training programmes, professional development opportunities, and knowledge exchange, resulting in a skilled workforce with up-to-date expertise. There is clear evidence of institutional learning, retention of trained staff, and continuous quality improvement.	Capacity development efforts are present but somewhat fragmented or periodic. Institutions and infrastructure meet most operational needs but may face occasional resource or coordination gaps. Training and professional development are available but not systematic or tailored to all roles. Some staff demonstrate enhanced skills, but turnover or limited follow-up may reduce overall impact. Institutional learning and quality improvement occur but are not fully embedded.	Capacity development is limited, ad hoc, or absent. Institutions lack adequate resources, infrastructure is outdated or insufficient, and human resources receive little or no training. There are significant skill gaps, high staff turnover, and minimal evidence of institutional learning or quality improvement. The system struggles to deliver effective climate services due to persistent capacity constraints.
Value chain 6. Governance for effective coordination with NMHS playing the key coordination role.	Governance is robust, with clearly defined roles and responsibilities, strong coordination led by NMHS, and seamless collaboration among all stakeholders. Regular, inclusive stakeholder engagement and formalized processes ensure transparency, accountability, and continuous improvement, with climate services well-integrated into national and sectoral decision-making.	Governance structures are established but may have gaps or ambiguities, leading to occasional coordination issues and moderate collaboration. Stakeholder engagement and evaluation occur but are inconsistent, and integration of climate services into policy is partial, with NMHS involvement.	Governance is weak or unclear, with poor coordination, minimal stakeholder engagement, and little to no formal evaluation or adaptation. NMHS play a limited role, collaboration is fragmented, and climate services are rarely integrated into decision-making, resulting in limited effectiveness.

Source: Compiled by the evaluation team.

Table A – 5. Pathway 1 assessment entry form

FP SAMPLE (AND DOCS FP|APR|CS)	A. RATIONALE FOR ALL SCORES AND OTHER NOTES	PRIORITY AREA(S)	VC1	VC2	VC3	VC4	VC5	VC6
1. FP#								
2. FP#								
3. FP#								
4. FP#								
5. FP#								
6. FP#								
7. FP#								
8. FP#								
9. FP#								
10. FP#								
11. FP#								
12. FP#								
13. FP#								
14. FP#								
15. FP#								
B. Factors across the set of FPs (to note as evaluator examines each FP)								
B1. Theory of change: Which trends are visible in the set to demonstrate the ToC elements at each level or links between them?								
B2. Good practice: What methodology, approach, etc., has regularly demonstrated successful, measurable results or sustainable impact across the set? How do countries take ownership and sustain CIS when the external/GCF funds run out?								
B3. Lessons to learn: What specific insights or understanding surfaces from the set – positive or negative?								
B4. Recommendations: What gaps are visible? What can be improved?								
B5. Cross-cutting dynamics: What other dynamics surface from the set regarding, for example, gender, Indigenous, innovativeness, other?								

Source: Compiled by the evaluation team.

Cluster TWO

Pathway 2: Promoting impact-based MHEWS

Sample details

- Framework: EW4All four pillars
- Related documents: Early Warnings for All (2026)[6]

Table A – 6. Pathway 2 assessment criteria

PILLAR: AS VISIBLE IN THE PROJECT	HIGHLY EFFECTIVE (3)	MEDIUM (2)	LOW (1)
1. **Disaster risk knowledge** (UNDRR): Focuses on systematic risk assessments, data collection, and integration of hazard/vulnerability mapping into national policies.	Comprehensive, multi-hazard risk assessments are regularly conducted, aligned with national strategies (NDCs, NAPs), engaging diverse stakeholders, and supported by open-access risk data platforms. Must be **multi-hazard**.	Risk assessments are conducted at appropriate levels but have data gaps or limited stakeholder input, and integration with national strategies is incomplete.	Risk knowledge is minimal, with no systematic assessments or integration into national strategies.
2. **Detection, observations, monitoring, analysis and forecasting** (WMO): Strengthens technical capacity for hazard detection (e.g. weather stations, satellite systems) and forecasting accuracy.	Advanced, real-time multi-hazard monitoring infrastructure is in place, using interoperable systems and modern forecasting tools integrated with global networks.	Monitoring infrastructure is moderate, with partial hazard coverage or reliance on external data sources.	Detection and monitoring are basic, with outdated technology and significant coverage gaps.
3. **Warning dissemination and communication** (ITU): Ensures timely delivery of actionable warnings via trusted channels (e.g. mobile networks, community radios).	Warnings are delivered through multiple, inclusive channels in a relevant format that is useful for managing climate risks? (SMS, apps, sirens), ensuring marginalized groups are reached and feedback is collected, with impact-based messaging. Must be **impact-based**.	Warnings use limited channels with inconsistent reach, especially to remote or vulnerable populations.	Warning systems are centralized, with last-mile connectivity issues and limited accessibility.
4. **Preparedness** (IFRC): Builds community and institutional capacity to act on warnings (e.g. evacuation plans, drills, anticipatory funding).	Annual drills, pre-arranged financing, and community-led, tested SOPs ensure readiness and coordinated response to warnings. Anticipatory action is a visible and well-developed feature.	Preparedness is ad-hoc, with limited coordination and sporadic activities. Anticipatory action is moderately developed as a feature.	There is no formal planning or training, and responses are reactive. Anticipatory action is not mentioned.
Governance required to promote end-to-end (and back) and last mile	Governance is strong, with clear mandates for NDMA and NHMS partnerships,	Governance frameworks exist but are inconsistently	Governance is weak or absent, with fragmented

[6] Early Warnings for All, "The Early Warnings for All (EW4All) initiative," accessed October 2025; International Federation of Red Cross and Red Crescent Societies, "Early Warnings for All," accessed October 2025; United Nations Office for Disaster Risk Reduction, "Early Warnings for All," accessed October 2025. In case there are any discrepancies in approach among the three sources, EW4All should be considered the most authoritative and up-to-date reference.

Pillar: as visible in the project	Highly effective (3)	Medium (2)	Low (1)
MHEWS through national and decentralized NDMAs and partnerships with NHMS, etc.	supporting decentralized, end-to-end, and last-mile MHEWS through formal policies and regular coordination.	applied or lack clarity in roles, limiting effective coordination and last-mile reach.	responsibilities and poor coordination, hindering end-to-end and last-mile MHEWS delivery.

Source: Compiled by the evaluation team.

Table A – 7. Pathway 2 assessment entry form

FP SAMPLE (AND DOCS FP|APR|CS)	A. RATIONALE FOR ALL SCORES AND OTHER NOTES	HAZARDS	P1	P2	P3	P4	GOV
1. FP#							
2. FP#							
3. FP#							
4. FP#							
5. FP#							
6. FP#							
7. FP#							
8. FP#							
9. FP#							
10. FP#							
11. FP#							
12. FP#							
13. FP#							
14. FP#							
15. FP#							
B. Factors across the set of FPs (to note as evaluator examines each FP)							
B1. Theory of change: Which trends are visible in the set to demonstrate the ToC elements at each level or links between them (e.g. inputs, outputs, outcomes, vision, assumptions)?							
B2. Good practice: What methodology, approach, etc., has regularly demonstrated successful, measurable results or sustainable impact across the set? How do communities take ownership and sustain EWS when the external/GCF funds run out?							
B3. Lessons to learn: What specific insights or understanding surfaces from the set – positive or negative?							
B4. Recommendations: What gaps are visible? What can be improved?							
B5. Cross-cutting dynamics: What other dynamics surface from the set regarding, for example, gender, Indigenous, innovativeness (use of private sector resources and/or nature-based solutions, other?							

Source: Compiled by the evaluation team.

Cluster THREE

Pathway 3: Improving CIEWS for investment and financial decisions

Sample details[7]

- Risk-informing decision-making: CIEWS improves long-term investment and financial decisions by better understanding climate risks and considering these insights in (risk-informing) decision-making. Risk layering allows for efficient strategizing between reducing risks and different mechanisms for improving preparedness in the financial sector.
- Mitigating climate risks: Considering long-term climate risks in public and private investment decision-making and planning prevents the creation of new risks and promotes risk reduction investments.
- Increasing preparedness in the financial sector: The risk layer approach uses climate information to implement financial mechanisms to reduce climate risk impact according to frequency and severity.

The criteria reflect this in the following ways:

- Climate risk analysis used for decision-making (C1) and the tools used (C2)
- Climate risk-informing strategies in terms of how comprehensively climate risks are reflected in the strategies (C3) and the long-term financial planning of the strategy (C4)
- Consideration of benefits of climate-risk reduction initiatives in decision-making (C5)

[7] Global Shield, "A toolbox of tailored CDRFI instruments for the Global Shield," accessed May 30, 2025; S. Hochrainer-Stigler, and K. Reiter, "Risk-Layering for Indirect Effects," *International Journal of Disaster Risk Science* 12, 770–778; Inter-American Development Bank, "Disaster Risk Reduction Investment Profile: Cost-Benefit Analysis of Public Investment for Vulnerability Reduction in Terms of Future GDP Growth – Technical Framework and Methodology Report."

Table A – 8. Pathway 3 assessment criteria

CRITERIA: AS VISIBLE/DESCRIBED IN THE PROJECT	HIGHLY EFFECTIVE (3)	MEDIUM (2)	LOW (1)
C1. Climate analytics integration: Level of climate analytics (e.g. integrating climate projections into financial models, using real-time data for investment decisions) are a core expectation.	Robust integration of climate projections and real-time data into financial models and investment decisions.	Basic climate risk screening or partial use of climate data in financial analysis.	No climate analytics used in financial decision-making; relies only on historical data.
C2. Decision support tools: Decision support tools, such as dashboards, risk modelling tools, and scenario analysis platforms, used to implement the climate analytics.	Advanced, dynamic tools (e.g. AI dashboards, asset-level climate stress testing) accessible to key financial stakeholders.	Static or basic tools (e.g. standard reports) with limited interactivity or stakeholder access.	No dedicated decision support tools; generic or manual reporting only.
C3. Risk-informed strategy: Considering multiple risk layers combined (e.g. insurance, contingency funds, structural measures) with clear thresholds and private sector engagement. The concept of optimizing combinations integrates risk mitigation measures (like infrastructure) with financial instruments (insurance, contingent credit, reserve funds).	Multiple risk layers combined (e.g. insurance, contingency funds, structural measures) with clear thresholds and private sector engagement.	Limited risk layering (one or two instruments) or unclear thresholds; limited private sector involvement.	No risk layering; relies solely on public funds or single risk management approach.
C4. Ensure long-term financing: Considering long-term climate scenarios in the finance resilient strategy, including blended public and private finance and long-term maintenance budgets to ensure resources in the long term.	Blended finance with significant private capital mobilization and long-term sustainability plans (≥10 years).	Mostly grant-funded or short-term financing (≤3 years); limited sustainability planning.	No clear financing strategy; no risk transfer or sustainability mechanisms.
C5. Impact measurement: The triple dividends concept – measuring direct, indirect, and co-benefits of climate-risk reduction investments.	Tracks both financial return on investment and resilience dividends (e.g. reduced losses, economic and social co-benefits) with outcome-based metrics.	Monitors basic outputs (e.g. number of systems installed) but lacks comprehensive outcome or impact metrics.	No monitoring or evaluation of financial or resilience impacts.

Source: Compiled by the evaluation team.

Table A – 9. Pathway 3 assessment entry form

FP SAMPLE (AND DOCS FP|APR|CS)	A. RATIONALE FOR ALL SCORES AND OTHER NOTES	LAYER/FINANCE MODALITY	C1	C2	C3	C4	C5
1. FP#							
2. FP#							
3. FP#							
4. FP#							
5. FP#							
6. FP#							
7. FP#							
8. FP#							
9. FP#							
10. FP#							
11. FP#							
12. FP#							
13. FP#							
14. FP#							
15. FP#							
B. Factors across the set of FPs (to note as evaluator examines each FP)							
B1. Theory of change: Which trends are visible in the set to demonstrate the ToC elements at each level or links between them?							
B2. Good practice: What methodology, approach, etc., has regularly demonstrated successful, measurable results or sustainable impact across the set?							
B3. Lessons to learn: What specific insights or understanding surfaces from the set – positive or negative?							
B4. Recommendations: What gaps are visible? What can be improved?							
B5. Cross-cutting dynamics: What other dynamics surface from the set regarding, for example, gender, Indigenous, other?							

Source: Compiled by the evaluation team.

Annex 8. METHODOLOGY FOR EW4ALL PILLAR FUNDING ALLOCATION

OVERVIEW OF METHODOLOGY[8]

This analysis employs a weighted allocation methodology to distribute the total portfolio funding of USD 6,520 million (M) across five EWS pillars, accounting for the reality that projects often address multiple pillars simultaneously. The methodology addresses a fundamental challenge in climate finance analysis: the attribution problem – when a project addresses multiple objectives, how should its funding be allocated across those objectives?

DATA FOUNDATION

Primary data points

Total portfolio: 381 unique projects with USD 6,520M in EWS funding

Pillar coverage: Each project is tagged with one or more of five pillars (P1 – P4 and cross-pillar)

Project complexity categories:

- Exclusive projects (97 total): Address only one pillar
- Comprehensive projects (62 total): Address all five pillars
- Multi-pillar projects (222 total): Address two to four pillars

Known funding anchors

Reported pillar sums: Total funding reported against each pillar (with overlaps):

- *P1*: USD 5,743M (293 projects)
- *P2*: USD 5,443M (282 projects)
- *P3*: USD 3,965M (145 projects)
- *P4*: USD 4,365M (161 projects)
- *CP*: USD 4,007M (133 projects)

ALLOCATION METHODOLOGY

Three-tier allocation framework

The methodology employs differentiated allocation weights based on project complexity.

Tier 1: Exclusive projects (single pillar)

Allocation weight: 100 per cent of project funding to the single pillar

Calculation: For each pillar, exclusive projects × average funding per project

Tier 2: Comprehensive projects (All five pillars)

Allocation weight: 20 per cent to each pillar (equal distribution)

Rationale: Projects addressing all pillars are assumed to distribute effort/funding relatively evenly

Calculation: 62 projects × average funding × 0.20 per pillar

[8] This methodology represents a pragmatic approach to a complex attribution challenge. While imperfect, it provides actionable insights for readers seeking to optimize EWS investments. Future research should focus on obtaining project-level pillar budgets to validate and refine these estimates.

Tier 3: Multi-pillar projects (two to four pillars)

Allocation weight: 33 per cent average (assuming typical project addresses three pillars)

Calculation: (total projects in pillar – exclusive – comprehensive) × average funding × 0.33

Note: This is a simplification; actual distribution varies by project.

Mathematical framework and calculations

Notation and variables

Portfolio-level variables:

- T = Total portfolio funding = USD 6,520M
- N = Total number of projects = 381
- P = Set of pillars = {P1, P2, P3, P4, CP}

For each pillar $i \in P$:

- N_i = Total number of projects addressing pillar i
- R_i = Reported funding sum for pillar i (with overlaps)
- E_i = Number of exclusive projects for pillar i
- C = Number of comprehensive projects (all five pillars) = 62
- S_i = Number of shared projects = $N\_i - E\_i - C$

Allocation weights:

- $w\_exclusive$ = 1.00 (100 per cent allocation)
- $w\_comprehensive$ = 0.20 (20 per cent allocation per pillar)
- w_shared = 0.33 (33 per cent allocation, assuming three pillars average)

Step-by-step calculation process

***Step 1*:** Calculate average funding per project for each pillar

For each pillar i:

$$AFP_i = R_i / N_i$$

where:

AFP_i = average funding per project in pillar i

R_i = reported sum for pillar i

N_i = number of projects in pillar i

Example for P1: AFP_P1 = USD 5,743.29M/293 = USD 19.60M per project

***Step 2*:** Calculate funding from exclusive projects

For each pillar i:

$$F\_exclusive(i) = E\_i \times AFP\_i \times w\_exclusive$$

Example for P1:

$F\_exclusive(P1)$ = 32 × USD 19.60M × 1.00 = USD 627.20M

***Step 3*:** Calculate funding from comprehensive projects

For each pillar i:

$$F\_comprehensive(i) = C \times AFP\_i \times w\_comprehensive$$

where C = 62 for all pillars

Example for P1:

$$F\_comprehensive(P1) = 62 \times \text{USD } 19.60\text{M} \times 0.20 = \text{USD } 243.04\text{M}$$

***Step 4*:** Calculate funding from shared multi-pillar projects

For each pillar i:

$$S\_i = N\_i - E\_i - C$$

$$F\_shared(i) = S\_i \times AFP\_i \times w\_shared$$

Example for P1:

$$S\_P1 = 293 - 32 - 62 = 199$$

$$F\_shared(P1) = 199 \times \text{USD } 19.60\text{M} \times 0.33 = \text{USD } 1{,}287.34\text{M}$$

***Step 5*:** Sum components for initial allocation

For each pillar i:

$$A\_initial(i) = F\_exclusive(i) + F\_comprehensive(i) + F\_shared(i)$$

Example for P1:

$$A\_initial(P1) = \text{USD } 627.20\text{M} + \text{USD } 243.04\text{M} + \text{USD } 1{,}287.34\text{M} = \text{USD } 2{,}157.58\text{M}$$

Normalization procedure

***Step 6*:** Calculate total initial allocation

$$T\_initial = \sum_{i \in P} A\_initial(i)$$

Example: $T\_initial = \text{USD } 2{,}157.58\text{M} + \text{USD } 1{,}516.09\text{M} + \ldots = \text{USD } 7{,}259.47\text{M}$

***Step 7*:** Calculate scaling factor

$$\lambda = T/T\_initial$$

where:

λ *(lambda)* = scaling factor

T = known total funding (USD 6,520M)

$T\_initial$ = sum of initial allocations

Example: $\lambda = \text{USD } 6{,}520\text{M} / \text{USD } 7{,}259.47\text{M} = 0.8982$

***Step 8*:** Apply scaling to get final allocations

For each pillar i:

$$A\_final(i) = A\_initial(i) \times \lambda$$

$$Percentage(i) = (A\_final(i)/T) \times 100\%$$

Example for P1:

$$A\_final(P1) = \text{USD } 2{,}157.58\text{M} \times 0.8982 = \text{USD } 1{,}938.54\text{M}$$

$$Percentage(P1) = (\text{USD } 1{,}938.54\text{M} / \text{USD } 6{,}520\text{M}) \times 100\% = 29.7\%$$

Confidence bounds calculation

Lower bound (conservative estimate):

For each pillar i:

$$L\_i = F\_exclusive(i) + (N\_i - E\_i) \times AFP\_i \times w\_min$$

where:

w_min = 0.15 (15 per cent minimum allocation for shared projects)

Upper bound (optimistic estimate):

For each pillar i:

$$U\_i = min(R\_i \times 0.90, F\_exclusive(i) + (N\_i - E\_i) \times AFP\_i \times w\_max)$$

where:

w_max = 0.50 (50 per cent maximum allocation for shared projects)

0.90 factor prevents unrealistic allocations

***Normalized bounds**:*

$$L\_final(i) = L\_i \times \lambda$$
$$U\_final(i) = U\_i \times \lambda$$

Verification checks

Sum constraint:

$$\sum A\_final(i) = T$$

where:

T must equal USD 6,250M within rounding error

Bounds constraint for all i:

$$L\_final(i) \leq A\_final(i) \leq U\_final(i)$$

Percentage check:

$$\sum Percentage(i) = 100\% \ (within\ 0.1\%\ rounding)$$

Complete example: P3 calculation

Given data for P3:

- *N_P3* = 145 projects
- *R_P3* = USD 3,965.33M
- *E_P3* = 3 exclusive projects
- *C* = 62 comprehensive projects
- *S_P3* = 145 – 3 – 62 = 80 shared projects

Calculations:

AFP_P3 = USD 3,965.33M / 145 = USD 27.35M

F_exclusive(P3) = 3 × USD 27.35M × 1.00 = USD 82.05M

F_comprehensive(P3) = 62 × USD 27.35M × 0.20 = USD 339.14M

F_shared(P3) = 80 × USD 27.35M × 0.33 = USD 722.04M

A_initial(P3) = USD 82.05M + USD 339.14M + USD 722.04M = USD 1,143.23M

A_final(P3) = USD 1,143.23M × 0.8982 = USD 1,026.89M

Percentage(P3) = (USD 1,026.89M / USD 6,520M) × 100 per cent = 15.8 per cent

GCF-specific adjustments

For GCF portfolio, the same methodology applies with:

T_GCF = USD 2,209.25M

N_GCF = 85 projects

E_GCF = {P1, P2, P3, P4, CP}

C_GCF = 17 comprehensive projects

The calculation follows identical steps with GCF-specific parameters.

Sensitivity analysis formula

To test robustness, vary w_shared from 0.25 to 0.40:

$$\Delta A(i) = S\_i \times AFP\_i \times (w\_shared\_new - w\_shared\_base) \times \lambda$$

This shows how allocation changes with different assumptions about multi-pillar project weights.

Additional note on formula interpretation

Key insight: The fundamental challenge this methodology addresses is the decomposition problem:

$$R\_i = \sum_{j \in Projects\_i} Budget\_j \times Allocation\_j, i$$

where:

Budget_j = total budget of project j

Allocation_j,i = unknown fraction of project j allocated to pillar i

Since $Allocation_j, i$ is unknown, we estimate it using project complexity classes:

- If j is exclusive to i: $Allocation_j, i = 1.00$
- If j is comprehensive: $Allocation_j, i = 0.20$
- If j is multi-pillar: $Allocation_j, i \approx 0.33$

This transforms an underdetermined system (more unknowns than equations) into a solvable estimation problem with quantifiable uncertainty bounds.

Normalization process

Since the sum of allocated amounts typically does not equal the known total (USD 6,520M), a proportional scaling factor is applied:

$$Scaling\_factor = \frac{USD\ 6{,}520M}{\sum Initial\_allocation}$$

$$Final\_allocation[pillar] = Initial\_alllocation[pillar] \times Scaling\_factor$$

Confidence bounds

Minimum bound assumes conservative allocation from shared projects (15 per cent weight).

Maximum bound assumes generous allocation from shared projects (50 per cent weight) but capped at 90 per cent of reported sum.

KEY ASSUMPTIONS

Equal distribution for comprehensive projects assumes projects addressing all five pillars distribute funding equally (20 per cent each). Reality may vary based on project specifics.

Average pillar count for multi-pillar projects assumes multi-pillar projects typically address three pillars (33 per cent allocation each). Actual distribution is two to four pillars with varying combinations.

Uniform funding within categories uses average funding per project within each pillar. Actual project sizes vary significantly.

Additive allocation assumes funding can be cleanly separated by pillar. In practice, many activities serve multiple pillars simultaneously (e.g. a monitoring system that also disseminates warnings).

LIMITATIONS AND CAVEATS

Data limitations

Overlap challenge: Projects do not report pillar-specific budget breakdowns, only total project funding tagged to relevant pillars.

Reporting inconsistency: Institutions may use different criteria for pillar tagging.

Temporal factors: Analysis is cross-sectional. It does not account for multi-year funding profiles.

Methodological limitations

Simplified weights: The 33 per cent allocation for multi-pillar projects is an approximation; actual allocations likely follow a power law distribution.

Independence assumption: The methodology treats pillars as independent, though synergies and dependencies exist.

Scale effects: The methodology does not account for economies of scale in multi-pillar projects.

Quality versus quantity: The analysis focuses on funding amounts, not implementation quality or outcomes.

Interpretive caveats

"Shared projects" column: Represents projects addressing this pillar plus others (not exclusively), calculated as residual after accounting for exclusive and comprehensive projects.

Ranking sensitivity: Small changes in allocation weights can shift relative rankings, particularly for P3, P4, and CP which have similar funding levels.

GCF comparison: Differences between GCF and portfolio may reflect strategic choices or portfolio maturity rather than gaps.

VALIDATION AND SENSITIVITY

Internal validation

Sum constraint: Verified that allocations sum to exactly USD 6,520M (portfolio) and USD 2,209M (GCF).

Bounds check: All allocations fall within calculated minimum/maximum bounds.

Sensitivity analysis

The analysis tested allocation weights of 25 per cent – 40 per cent for multi-pillar projects:

- Results robust for upstream/downstream gap (varies by ±3 percentage points).
- P1 consistently receives highest allocation.
- P3 and P4 consistently underfunded relative to P1 and P2.

IMPLICATIONS FOR INTERPRETATION

This methodology provides directionally accurate estimates suitable for:

- Identifying systematic patterns (e.g. upstream/downstream imbalance)
- Comparing institutional portfolios
- Highlighting critical gaps (e.g. few P3/P4 exclusive projects)

The estimates should not be interpreted as:

- Exact funding amounts per pillar

- Prescriptive targets for future allocation
- Performance metrics for individual projects

METHODOLOGICAL CONTRIBUTION

This approach advances climate finance analysis by:

- Explicitly addressing the multi-objective attribution problem
- Using actual project-level data rather than top-down estimates
- Providing transparent, replicable calculations
- Quantifying uncertainty through confidence bounds
- Enabling systematic comparison across institutions

The methodology could be refined with:

- Project-level budget breakdowns by pillar
- Machine learning classification of project documents
- Time series analysis of funding flows
- Outcome-based weighting schemes

Annex 9. LIST OF CIEWS-RELATED READINESS GRANTS

#	Agreement reference	Project title	Approved date	Readiness type	Country
1	AFR-RS-011	Strengthening the institutional capacities of the African Island States Climate Commission (AISCC) member states to manage climate risks and bolster resilience	30/03/24	Standard Readiness	Seychelles
2	AGO-RS-002	Strengthening Institutional Information Services to support decision-making for Climate Change in the AFOLU sector in Angola	15/12/20	Standard Readiness	Angola
3	ARG-RS-003	Readiness for the National Adaptation Plan Process	04/12/18	NAP	Argentina
4	ARG-RS-006	Innovation for climate resilience of Patagonian grasslands of Argentina: minimizing climate vulnerability of rural inhabitants, increasing capacities for range and soil regeneration, and conserving biodiversity	20/04/22	Standard Readiness	Argentina
5	BHS-RS-005	Developing a climate resilient health system in The Bahamas	21/12/20	Standard Readiness	Bahamas
6	BTN-RS-006	Strengthening capacities and enhancing climate data and services in Bhutan to scale-up climate financing from multiple sources	29/11/23	Standard Readiness	Bhutan
7	COM-RS-002	Support The Union of Comoros to enhance access to Climate Finance under the Green Climate Fund (GCF): enhancing the decision-making process through better mainstreaming science-based information	09/11/22	Standard Readiness	Comoros (the)
8	CPV-RS-001	Enhance capacities of Cabo Verde in addressing the effects of climate change in key sectors of the Blue Economy	03/12/21	Standard Readiness	Cabo Verde
9	ETH-RS-003	Building Capacity to Facilitate the Integration of the National Adaptation Planning Process in Ethiopia	21/05/21	NAP	Ethiopia
10	GIN-RS-002	Supporting the Achievement of National Development Policies by Building Climate Adaptive Capacity and Planning in Guinea	02/03/20	NAP	Guinea
11	GIN-RS-003	Strengthening technical and institutional capacity of NDA and national stakeholders for climate finance and enhancing the Country Programming process in Guinea	30/12/21	Standard Readiness	Guinea

#	Agreement reference	Project title	Approved date	Readiness type	Country
12	JOR-RS-004	Enhancing the resilience of Jordan's most vulnerable communities through strengthening capacity to understand and project the impact of climate change related hazards on the most vulnerable, on water resources, and on water and sanitation services	31/12/21	Standard Readiness	Jordan
13	KAZ-RS-003	Institutionalization of adaptation planning and integration of climate risks into Kazakhstan's development planning processes to enable implementation of adaptation measures as part of coherent National Adaptation Planning (NAP) policies	21/11/23	NAP	Kazakhstan
14	KNA-RS-004	Capacity Building to Facilitate Climate Resilience in Disaster Risk Management and Private Sector Access to Climate Financing in St. Kitts and Nevis	25/02/22	Standard Readiness	Saint Kitts and Nevis
15	LAC-RS-006	CDEMA Early Warning Systems Readiness Proposal	24/12/19	Standard Readiness	Antigua and Barbuda
16	LAC-RS-017	Strategic Actions for advancing climate action in CARICOM Member States	30/12/21	Standard Readiness	Jamaica
17	LAO-RS-010	Enhancing Lao PDR National Capacity and Coordination in Health and Climate Change	11/12/21	Standard Readiness	Lao PDR
18	LBR-RS-005	Develop a renewable energy investment framework and conceptualization of a funding proposal to increase the share of renewable energy-based electricity generation to achieve Liberia's NDC commitments	02/09/22	Standard Readiness	Liberia
19	LCA-RS-004	Improving the Capacity of the Fisheries Sector in Saint Lucia to build/enhance resilience to Climate Change	03/11/21	NAP	Saint Lucia
20	LKA-RS-002	Strengthen the Process and Capacity of Implementation of National Adaptation Plan of Sri Lanka	31/07/20	NAP	Sri Lanka
21	MDV-RS-003	Advancing the National Adaptation Plan of the Maldives	23/09/22	NAP	Maldives
22	MKD-RS-006	Support the decarbonization process of North Macedonia through integrated management of forest fires and strengthening climate information sharing	19/03/25	Standard Readiness	North Macedonia
23	MUL-RS-003	Scaling-up public private co-investments for climate action in agrifood systems	28/03/24	Standard Readiness	Zambia

#	Agreement reference	Project title	Approved date	Readiness type	Country
24	MUS-RS-005	Strengthening science-based and climate-informed decision-making processes in Mauritius climate-sensitive sectors for impactful and cost-effective climate change programming	04/11/22	Standard Readiness	Mauritius
25	NIU-RS-002	Niue GCF Readiness 2 - Strengthening of the NDA and Niue's Access to Climate Finance	31/12/21	Standard Readiness	Niue
26	OMN-RS-002	Building Resilient Environment and Sustainable Agriculture and Water	22/11/21	Standard Readiness	Oman
27	PER-RS-007	Development of an effective governance framework for the implementation of a multi-hazard early warning system in Peru	09/02/24	Standard Readiness	Peru
28	PER-RS-009	Integrating key stakeholders for the effective implementation of a multi-hazard early warning system in Peru	01/12/24	Standard Readiness	Peru
29	PRY-RS-003	Readiness Support for Paraguay's Enhanced Access to Climate Finance	03/12/20	Standard Readiness	Paraguay
30	PRY-RS-008	Strengthening the National Designated Authority, Candidate Direct Access Entity, National Programming Process and Development of Strategic Frameworks for Low Carbon Development in Paraguay	17/03/25	Standard Readiness	Paraguay
31	PSE-RS-006	Building a climate-resilient and low carbon health system in Palestine	02/03/23	Standard Readiness	State of Palestine
32	RWA-RS-003	National Adaptation Readiness and Preparatory Support for Building Flood Resilience Capacities in Rwanda	26/01/20	NAP	Rwanda
33	SLE-RS-002	Enhancing the Resilience of Health Systems to Climate Change and Emerging Outbreak/Pandemics in Sierra Leone	31/05/23	Standard Readiness	Sierra Leone
34	SLE-RS-003	Accelerating Action Towards Effective Climate Risk Management in Key Sectors in Sierra Leone	30/05/25	NAP	Sierra Leone
35	SYR-RS-003	Strengthening the capacity of the Water, Sanitation and Hygiene WASH sector to assess and address the impacts of climate change on the provision of water and sanitation services and to build the project pipeline for water and sanitation projects in the Syrian Arab Republic	31/03/23	Standard Readiness	Syrian Arab Republic
36	THA-RS-010	Enhancing Thailand's Capacity for Climate Adaptation through Risk-informed Anticipatory Actions to Flood and Drought	19/02/25	Standard Readiness	Thailand

#	Agreement reference	Project title	Approved date	Readiness type	Country
37	TJK-RS-005	Strengthening Tajikistan's capacity to manage the climate finance process and prepare quality projects	20/01/23	Standard Readiness	Tajikistan
38	TLS-RS-006	Development of capacity to implement a national climate change plan and strategy in Timor-Leste	21/03/24	Standard Readiness	Timor-Leste
39	TTO-RS-004	Building climate resilience into Trinidad and Tobago's Healthcare System	30/12/20	Standard Readiness	Trinidad and Tobago
40	TUV-RS-002	Development of Tuvalu's National Adaptation Plan (NAP) to advance medium and long-term adaptation planning	18/01/21	NAP	Tuvalu
41	UGA-RS-002	Strengthening Adaptation Planning in Uganda	22/06/21	NAP	Uganda
42	YEM-RS-006	Building Capacity for the National Adaptation Planning Process in Yemen	15/04/25	NAP	Yemen

Source: Compiled by the evaluation team.

Annex 10. LIST OF CIEWS-RELATED PPF GRANTS AND APPROVED FUNDING PROPOSALS

FP	PPF	PROJECT NAME	ENTITY
FP073	PPF001	Strengthening Climate Resilience of Rural Communities in Northern Rwanda	Ministry of Environment, Rwanda
FP171	PPF002	Enhancing Early Warning Systems to build greater resilience to hydro-meteorological hazards in Timor-Leste	UNEP
FP160	PPF007	Monrovia Metropolitan Climate Resilience Project	UNDP
FP232	PPF011	Jordan Integrated Landscape Management Initiative (JILMI)	UNEP
FP182	PPF020	Climate-smart initiatives for climate change adaptation and sustainability in prioritized agricultural production systems in Colombia (CSICAP)	Corporación Andina de Fomento (CAF)
FP192	PPF022	The R's (Reduce, Reuse and Recycle) for Climate Resilience Wastewater Systems in Barbados (3R-CReWS)	Caribbean Community Climate Change Centre (CCCCC)
FP217	PPF030	Building Resilience of Vulnerable Communities to Climate Variability in Rwanda's Congo Nile Divide through Forest and Landscape Restoration	Ministry of Environment, Rwanda
FP207	PPF034	Recharge Pakistan: Building Pakistan's resilience to climate change through Ecosystem-based Adaptation (EbA) and Green Infrastructure for integrated flood risk management	World Wildlife Fund
FP179	PPF036	Tanzania Agriculture Climate Adaptation Technology Deployment Programme (TACATDP)	CRDB Bank Plc.
FP183	PPF038	Inclusive Green Financing Initiative (IGREENFIN I): Greening Agricultural Banks & the Financial Sector to Foster Climate Resilient, Low Emission Smallholder Agriculture in the Great Green Wall (GGW) countries - Phase I	IFAD
SAP034	PPF039	Akamatutu'anga To Tatou Ora'anga Meitaki (ATOM): Building a healthy and resilient Cook Islands Community – one block at a time	Ministry of Finance and Economic Management, Cook Islands
FP240	PPF042	Collaborative R&DB Programme for Promoting the Innovation of Climate Technopreneurship	Korea Development Bank (KDB)
SAP051	PPF043	Increasing resilience to the health risks of climate change in the Federated States of Micronesia	Pacific Community (SPC)

FP	PPF	PROJECT NAME	ENTITY
FP199	PPF044	Public-Social-Private Partnerships for Ecologically-Sound Agriculture and Resilient Livelihood in Northern Tonle Sap Basin (PEARL)	FAO
FP197	PPF045	Green Guarantee Company ("GGC")	MUFG Bank
FP267	PPF046	Scaling up ecosystem-based approaches to managing climate-intensified disaster risks in vulnerable regions of South Africa ("Eco-DRR")	South African National Biodiversity Institute
FP259	PPF049	Adapting tuna-dependent Pacific Island communities and economies to climate change	Conservation International Foundation
FP205	PPF050	Infrastructure Climate Resilient Fund (ICRF)	Africa Finance Corporation
FP262	PPF052	Green Climate Finance Facility for Fostering Climate-Smart Agriculture in Senegal	La Banque Agricole
SAP049	PPF053	Sustainable Communities for Climate Action in the Yucatán Peninsula (ACCIÓN)	Fondo Mexicano para la Conservación de la Naturaleza A.C.
FP276	PPF061	GCF's investment into the Global Green Bond Initiative (GGBI) (previously known as Green and Resilience Debt Platform (GRDP))	European Investment Bank
SAP058	PPF063	Local Governments and Climate Change III (LGCC-3)	National Committee for Sub-National Democratic Development
FP258	PPF071	Multi-country Project Advancing Early Warnings for All (EW4All)	UNDP
SAP050	PPF081	Toward Risk-Aware and Climate-resilienT communities (TRACT) - Strengthening climate services and impact-based multi-hazard early warning in Maldives	UNEP
FP283	PPF091	Glaciers to Farms (G2F) Regional Program: Advancing Climate Resilience & Sustainable Development in Central and West Asia	ADB
SAP025	PPF-TA001	Adaptation of agricultural production systems in Coastal Areas of Northwest Guinea-Bissau	Sahara and Sahel Observatory
SAP043	PPF-TA010	Upscaling "Naatangue" integrated family and village farms for a resilient agriculture in Senegal	Centre de Suivi Écologique

Source: Compiled by the evaluation team.

Annex 11. DATA CORRECTIONS COMPENDIUM: IMPACT DATA QUALITY ASSURANCE DOCUMENTATION

Overview

This annex documents corrections made to the APR result data set during the data validation process. All corrections are traceable to original source documents and can be verified against the referenced APR reports.

Scope:

- Reporting years: CY2020–CY2024
- Total corrections: 27
- Projects affected: 11

Summary of all corrections

#	Project	Indicator	Report year	Original value	Corrected value	Correction type
1	FP012	A1.1 Economic Cumulative	2024	356,280,000	4,080,000	Calculation error
2	FP012	A1.1 Economic Cumulative	2022	360,000,000	360,000	Transcription error
3	FP012	A1.1 Economic Baseline	2020	[Baseline]	0	Ex-ante removal
4	FP012	A1.1 Economic Cumulative	2020	[Reported]	0	Empty source field
5	FP012	A1.1 Economic Cumulative	2020 Hist.	[Reported]	0	Empty source field
6	FP012	A7.1 Unit	2021 Hist.	Businesses	Individuals	Unit reclassification
7	FP016	A7.1 Unit	2021 Hist.	Households	Individuals	Unit reclassification
8	FP035	A1.1 Persons Cumulative	2024	[Deaths counted in APR]	0	Indicator misapplication
9	FP069	A7.1 Unit	2021 Hist.	Households	Individuals	Unit reclassification
10	FP069	A7.1 Cumulative	2020 Hist.	57,737	0	Double-count removal
11	FP074	A1.1 Persons Cumulative	2021	1,750,000	0	Ex-ante removal
12	FP074	A1.1 Economic Cumulative	2021	1,300,000,000	0	Ex-ante removal
13	FP074	A1.1 Persons Cumulative	2021 Hist.	1,750,000	0	Ex-ante removal
14	FP074	A1.1 Economic Cumulative	2021 Hist.	1,300,000,000	0	Ex-ante removal

#	Project	Indicator	Report year	Original value	Corrected value	Correction type
15	FP074	A1.1 Persons Cumulative	2022	1,750,000	0	Ex-ante removal
16	FP074	A1.1 Economic Cumulative	2022	1,300,000,000	0	Ex-ante removal
17	FP074	A1.1 Persons Cumulative	2023	1,750,000	0	Ex-ante removal
18	FP074	A1.1 Economic Cumulative	2023	1,300,000,000	0	Ex-ante removal
19	FP074	A1.1 Persons Cumulative	2024	1,750,000	0	Ex-ante removal
20	FP074	A1.1 Economic Cumulative	2024	1,300,000,000	0	Ex-ante removal
21	FP078	A7.1 Unit	2021 Hist.	Businesses	Individuals	Unit reclassification
22	FP133	A1.1 Economic Cumulative	2024	6,600,000,000	0	Ex-ante removal
23	FP165	A1.1 Economic Cumulative	2024	[Estimate in APR]	0	Indicator misapplication
24	SAP022	A1.1 Economic Annual	2024	[Baseline in APR]	0	Ex-ante removal
25	SAP022	A1.1 Economic Cumulative	2024	[Baseline in APR]	0	Ex-ante removal

Source: Compiled by the evaluation team.
Note: Hist. = Historical.

Detailed correction records

1) FP012

Table A – 10. Correction 1.1

Field	Detail
Variable	2.4.2 impact ind-a1.1-unit economic-cumulative
Source document	Annual performance report CY2024
Original value	356,280,000
Corrected value	4,080,000
Error type	Calculation error

Source: Compiled by the evaluation team.

Basis for correction:

- CY2023 cumulative value: 360,000
- CY2024 annual reporting value: 3,720,000
- Correct cumulative: 360,000 + 3,720,000 = 4,080,000

- Original value appears to represent programme duration total rather than incremental cumulative

Table A – 11. Correction 1.2

FIELD	DETAIL
Variable	2.4.2 impact ind-a1.1-unit economic-cumulative
Source document	Annual performance report CY2022
Original value	360,000,000
Corrected value	360,000
Error type	Transcription error

Source: Compiled by the evaluation team.

Basis for correction: Value inconsistent with APR CY2021 (360,000) and APR CY2023 (360,000). The factor of 1,000 discrepancy indicates transcription error.

Table A – 12. Correction 1.3

FIELD	DETAIL
Variable	2.4.2 impact ind-a1.1-unit economic-baseline
Source document	Annual performance report CY2020
Original value	[Baseline figure in APR]
Corrected value	0
Error type	Ex-ante data removal

Source: Compiled by the evaluation team.

Basis for correction: Baseline data incorrectly entered as achieved result.

Table A – 13. Correction 1.4

FIELD	DETAIL
Variable	2.4.2 impact ind-a1.1-unit economic-cumulative
Source documents	Annual performance report CY2020; CY2020 historical ex-post results
Original value	[Reported figure in APR]
Corrected value	0
Error type	Empty source field

Source: Compiled by the evaluation team.

Basis for correction: Verification against original APR2020 document confirmed the cumulative field was empty.

Table A – 14. Correction 1.5

Field	Detail
Variable	2.4.2 outcome ind-a7.1-unit num businesses-cumulative
Source document	Annual performance report CY2021 historical ex-post results
Original value	36,199
Original unit	Businesses
Corrected unit	Individuals
Error type	Unit reclassification

Source: Compiled by the evaluation team.

Basis for correction: APR narrative states: "In 18 villages SCAP-RU, with 36,199 inhabitants, have been put in place for the dissemination of early warning information." The term "inhabitants" denotes individuals, not businesses.

2) FP016

Table A – 15. Correction 2.1

Field	Detail
Variable	2.4.2 outcome ind-a7.1-unit num households-cumulative
Source document	Annual performance report CY2021 historical ex-post results
Original value	568,558
Original unit	Households
Corrected unit	Individuals
Error type	Unit reclassification

Source: Compiled by the evaluation team.

Basis for correction: APR states: "Current value: 568,558 (of which women are 285,643)." Gender disaggregation indicates individual-level measurement; households cannot be disaggregated by gender.

3) FP035

Table A – 16. Correction 3.1

Field	Detail
Variable	2.4.2 impact ind-a1.1-unit persons-cumulative
Source document	Annual performance report CY2024
Original value	[Number of deaths from natural disasters in APR]
Corrected value	0
Error type	Indicator misapplication

Source: Compiled by the evaluation team.

Basis for correction: APR reported deaths caused by natural disasters. Indicator A1.1 measures reduction in loss of life (lives saved), not total deaths. The reported value represents the inverse of the indicator definition.

4) FP069

Table A – 17. Correction 4.1

Field	Detail
Variable	2.4.2 outcome ind-a7.1-unit num households-cumulative
Source document	Annual performance report CY2021 historical ex-post results
Original value	57,737
Original unit	Households
Corrected unit	Individuals
Error type	Unit reclassification

Source: Compiled by the evaluation team.

Basis for correction: APR states: "Baseline: 57,737 (50.2 per cent women)" and references "245,516 direct (50.2 per cent of whom are female)" as final target. Gender percentage breakdown confirms individual-level measurement.

Table A – 18. Correction 4.2

Field	Detail
Variable	2.4.2 outcome ind-a7.1-unit num households-cumulative
Source document	Annual performance report CY2020 historical ex-post results
Original value	57,737
Corrected value	0
Error type	Double-count removal

Source: Compiled by the evaluation team.

Basis for correction: Identical figure (57,737) appears in both CY2020 historical (households) and CY2024 reports (individuals). To avoid double-counting in aggregation, the earlier entry was set to zero.

5) FP074

Table A – 19. Corrections 5.1–5.10

Field	Detail
Variables	2.4.2 impact ind-a1.1-unit persons-cumulative
	2.4.2 impact ind-a1.1-unit economic-cumulative
Source documents	APR CY2021, CY2021 Historical, CY2022, CY2023, CY2024
Original values	1,750,000 (persons); 1,300,000,000 (economic)
Corrected value	0 (all instances)
Error type	Ex-ante data removal

Source: Compiled by the evaluation team.

Basis for correction: Review of the 2022 interim evaluation established that reported values represent model-based projections, not verified achievements.

From interim evaluation (p. 16):

> "A partial update of the model indicated a (model simulated) reduction of 2.5% of the population affected by drought. This results in a yet incomplete model-based analysis, whereas evidence-based feedback on the effectiveness of the agrometeorological services is not yet available."

From interim evaluation (p. 14):

> "Due to the volatile security situation in Burkina Faso a detailed baseline survey was not conducted at the inception phase of the project and instead proxy data were used. While an operational flood forecasting system has not yet been established..."

From interim evaluation (p. 19):

> "A model-based analysis was prepared in 2020 on which the data are based... However, the results for the population affected by floods are not yet viable..."

Conclusion: Data represents ex-ante model projections from 2020, not measured impact.

Table A – 20. Records corrected

Report	Persons original	Persons corrected	Economic original	Economic corrected
CY2021	1,750,000	0	1,300,000,000	0
CY2021 Hist.	1,750,000	0	1,300,000,000	0
CY2022	1,750,000	0	1,300,000,000	0
CY2023	1,750,000	0	1,300,000,000	0
CY2024	1,750,000	0	1,300,000,000	0

Source: Compiled by the evaluation team.

6) FP078

Table A – 21. Correction 6.1

Field	Detail
Variable	2.4.2 outcome ind-a7.1-unit num businesses-cumulative
Source document	Annual performance report CY2021 historical ex-post results
Original value	203,020
Original unit	Businesses
Corrected unit	Individuals
Error type	Unit reclassification

Source: Compiled by the evaluation team.

Basis for correction: APR describes: "Number of farmers reporting increased adaptive capacity (or means to it e.g. reduced risk, more stable incomes)." These are individual farmers, not business entities.

7) FP133

Table A – 22. Correction 7.1

Field	Detail
Variable	2.4.2 impact ind-a1.1-unit economic-cumulative
Source document	Annual performance report CY2024
Original value	6,600,000,000
Corrected value	0
Error type	Ex-ante data removal

Source: Compiled by the evaluation team.

Basis for correction:

From APR2024:

> "Midterm targeted reduction in losses of lives and economic assets of US$1.5 billion calculated as a percentage of total baseline losses of US$6.6 billion = 22.7%"
> "Final targeted reduction in losses of lives and economic assets of US$3.34 billion calculated as a percentage of total baseline losses of US$6.6 billion = 50.6%"
> "Midterm target not met as project has experienced implementation delays which have affected the project timeline."

The reported value (USD 6.6 billion) represents baseline losses, not achieved reduction. APR confirms targets were not met.

8) FP165

Table A – 23. Correction 8.1

Field	Detail
Variable	2.4.2 impact ind-a1.1-unit economic-cumulative
Source document	Annual performance report CY2024
Original value	[Baseline/target/10-year estimate in APR]
Corrected value	0
Error type	Indicator misapplication

Source: Compiled by the evaluation team.

Basis for correction: The APR uses baseline values, final targets, and 10-year period estimates as cumulative achievement. The methodology reports current losses rather than losses avoided. This reflects a misunderstanding of indicator A1.1, which measures reduction in losses attributable to project interventions.

9) SAP022

Table A – 24. Corrections 9.1–9.2

Field	Detail
Variables	2.4.2 impact ind-a1.1-unit economic-annual
	2.4.2 impact ind-a1.1-unit economic-cumulative
Source document	Annual performance report CY2024
Original value	[Baseline figures]
Corrected value	0 (both)
Error type	Ex-ante data removal

Source: Compiled by the evaluation team.

Basis for correction: Baseline values were entered as both annual and cumulative achievement figures. No supporting evidence of actual achievement in APR.

Error classification summary

By error type

Error type	Count	Description
Ex-ante data removal	14	Model projections, baselines, or targets reported as achievements
Unit reclassification	5	Incorrect measurement unit (households/businesses versus individuals)
Calculation error	2	Arithmetic errors in cumulative totals
Indicator misapplication	2	Fundamental misunderstanding of indicator definition
Empty source field	2	Data reported but source document field was blank
Double-count removal	1	Same value reported across multiple periods
Transcription error	1	Data entry error (magnitude discrepancy)

Source: Compiled by the evaluation team.

By indicator

Indicator	Corrections
A1.1 Economic (Cumulative)	16
A1.1 Persons (Cumulative)	6
A1.1 Economic (Annual)	1
A1.1 Economic (Baseline)	1
A7.1 (Unit corrections)	5

Source: Compiled by the evaluation team.

By reporting year

Report year	Corrections
CY2024	10
CY2023	2
CY2022	3
CY2021	2
CY2021 historical ex-post	6
CY2020	2
CY2020 historical ex-post	2

Source: Compiled by the evaluation team.

Variable reference

VARIABLE CODE	DESCRIPTION
2.4.2 impact ind-a1.1-unit persons-cumulative	Change in expected losses of lives (cumulative)
2.4.2 impact ind-a1.1-unit persons-annual	Change in expected losses of lives (annual)
2.4.2 impact ind-a1.1-unit economic-cumulative	Change in expected losses of economic assets (cumulative)
2.4.2 impact ind-a1.1-unit economic-annual	Change in expected losses of economic assets (annual)
2.4.2 impact ind-a1.1-unit economic-baseline	Baseline economic losses
2.4.2 outcome ind-a7.1-unit num businesses-cumulative	Number of physical assets strengthened (businesses)
2.4.2 outcome ind-a7.1-unit num households-cumulative	Number of physical assets strengthened (households)
2.4.2 outcome ind-a7.1-unit num individuals-cumulative	Number of physical assets strengthened (individuals)

Source: Compiled by the evaluation team.

Source document reference

All corrections can be verified against the following source documents:

PROJECT	SOURCE DOCUMENTS
FP012	APR CY2020, CY2021, CY2022, CY2023, CY2024; CY2020 historical ex-post; CY2021 historical ex-post
FP016	APR CY2021 historical ex-post results
FP035	APR CY2024
FP069	APR CY2020 historical ex-post; CY2021 historical ex-post
FP074	APR CY2021, CY2022, CY2023, CY2024; CY2021 historical ex-post; 2022 interim evaluation
FP078	APR CY2021 historical ex-post results
FP133	APR CY2024
FP165	APR CY2024
SAP022	APR CY2024

Source: Compiled by the evaluation team.

Annex 12. EVALUABILITY OF CIEWS PROJECTS

This annex provides a summary of evaluability analysis done for CIEWS-tagged projects. The evaluability analysis examined the extent to which the CIEWS portfolio is designed to credibly measure and report on its results. The evaluation team conducted a comparative evaluability analysis between the available 118 CIEWS-tagged projects and 168 non-CIEWS projects,[9] across four key dimensions: theory of change quality, measurement of causal change, implementation fidelity, and data-collection and reporting.

Overall, CIEWS projects demonstrate stronger evaluability characteristics compared to non-CIEWS projects, **performing better in 70 per cent of the assessment areas** (14 out of 20 questions analysed). The average risk differential across all dimensions was **4.1 percentage points lower for CIEWS projects**, suggesting that the CIEWS portfolio is generally better positioned to credibly report on its impacts and effectiveness.

Theory of change quality: CIEWS projects show notably stronger performance in articulating their theories of change, with an average risk differential of **9.6 percentage points lower than non-CIEWS projects**. Particularly significant improvements were observed in the identification of unintended consequences (14.1 percentage points lower risk) and the robustness of causal linkages informed by high-quality evidence (11.5 percentage points lower risk).

Measurement of causal change: CIEWS projects also demonstrate stronger measurement frameworks, with an average risk differential **of 5.6 percentage points lower than non-CIEWS projects.** Notably, CIEWS proposals were more likely to provide additional impact indicators beyond standard GCF requirements (10.5 percentage points lower risk), indicating greater attention to capturing the specific outcomes relevant to early warning and climate information services.

Implementation fidelity: While CIEWS projects perform marginally better overall in this dimension (0.4 percentage points lower risk), this area reveals important challenges. CIEWS projects show higher risk in measuring paradigm shift potential (3.3 percentage points higher) and impact potential (2.8 percentage points higher).

Data-collection and reporting: This dimension shows the smallest differential between CIEWS and non-CIEWS projects (0.7 percentage points lower risk for CIEWS). Notably, CIEWS projects face slightly higher risk regarding the potential quality of data for impact evaluations (2.5 percentage points higher).

[9] Data as of 31 December 2024. See Baek et al., "The Fourth Evaluability Assessment of the Green Climate Fund's Funding Proposals," Independent Evaluation Unit, Green Climate Fund, 2026, https://ieu.greenclimate.fund/sites/default/files/document/fourth-evaluability-assessment.pdf.

Table A – 25. Comparative evaluability analysis of CIEWS versus non-CIEWS projects

Evaluation dimension	Average risk differential	Key strengths (CIEWS)	Key challenges (CIEWS)
Theory of change	-9.6 pp	Identification of unintended consequences (-14.1 pp) Robustness of causal linkages (-11.5 pp) Quality of programme logic (-9.6 pp)	—
Measurement of causal change	-5.6 pp	Additional impact indicators beyond GCF requirements (-10.5 pp)	—
Implementation fidelity	-0.4 pp	Eligibility and targeting criteria (-8.9 pp) Efficiency criteria (-5.5 pp)	Paradigm shift measurability (+3.3 pp); Impact potential measurability (+2.8 pp)
Data-collection and reporting	-0.7 pp	M&E requirements for evaluations (-5.6 pp)	Data quality for impact evaluations (+2.5 pp)
Overall	**-4.1 pp**	**14 of 20 areas (70%)**	**6 of 20 areas (30%)**

Source: Baek et al., "The Fourth Evaluability Assessment." FPs as of 31 December 2024.
Note: N = 286 projects. Negative values (−) indicate CIEWS projects perform better (lower risk or higher evaluability); positive values (+) indicate non-CIEWS projects perform better. pp = percentage points.

These evaluability findings have several implications for the GCF's CIEWS portfolio. First, the stronger theoretical foundations of CIEWS projects provide a solid basis for results-based management and adaptive learning during implementation. Second, the challenges in measuring paradigm shift and impact potential suggest a need for more sophisticated evaluation approaches that can capture systemic changes in early warning capabilities over time. Third, the relatively weaker data-collection characteristics indicate opportunities for strengthening monitoring and evaluation frameworks specifically tailored to CIEWS interventions, particularly for capturing outcomes at the community level.