SCALING UP EARLY WARNING SYSTEMS – IMPLEMENTATION ROADMAP

CAMBODIA 2024 - 2028

1. BACKGROUND

The Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction 2015-2030 identify robust early warning systems (EWSs) as a critical component towards building societies that are more resilient to climate shocks and stresses, and thereby contributing to sustainable development.

EWSs are a key element of disaster risk reduction and climate change adaptation as they help reduce or avoid the detrimental impacts of hazardous events and can provide a tenfold return on investment. To be effective, EWSs need to be risk-informed, target communities most at risk, disseminate messages and warnings efficiently, ensure preparedness and support early action. EWSs must rely on a sound scientific and technical basis and focus on the most vulnerable people and sectors. This implies the adoption of a system-based approach incorporating all relevant risk factors, whether arising from climate hazards or social vulnerabilities, and from short-term or long-term processes.

EWSs include four pillars:

- Pillar 1: Disaster Risk Knowledge
- Pillar 2: Detection, Monitoring, Analysis, and Forecasting
- Pillar 3: Warning Dissemination, and Communication
- Pillar 4: Preparedness to Respond to Warnings

Other key aspects of an EWS ecosystem include cross-sectoral and multi-stakeholder coordination; involvement of communities at risk; institutional and legislative enabling environment; clear roles and responsibilities; and adequate operational capacities.

Early Warnings for All (EW4All) is a special initiative announced by the UN Secretary General, which aims at spearheading action to ensure every person on Earth is protected by EWSs by 2027. The EW4All initiative comprises the four foundational pillars of people-centred, end-to-end, and multi-hazard EWS. Under the umbrella of EW4All, Cambodia aims to build on past and ongoing efforts and strengthen national EWSs.

Cambodia is vulnerable to a range of climate-related shocks with floods (3.5m people, or 21% of the total population), droughts (5.2m or 31%; WFP) and storms being the main natural hazards. The latest INFORM Risk Index ranks Cambodia 61st out of 191 countries due to high exposure and vulnerability (DRMKC, 2023). An estimated 2.6m people (17%

of the total population), live in poverty (World Bank, 2022). Without proper adaptation and mitigation measures, climate change is expected to lead to an increased frequency, intensity and severity of disasters, and cost up to 9% of Cambodia's GDP by 2050 while increasing the poverty rate by up to 6% by 2040 (World Bank, 2023).

Climate change significantly impacts vulnerable populations, including persons with disabilities, women, children, and those living in poverty, making them more susceptible to disasters. This exacerbates existing social inequalities and challenges, necessitating inclusive early warning systems that cater to diverse needs. These systems should provide clear, accessible information in various formats, consider the extra time required for preparation by the elderly, those with young children, and persons with disabilities, ensure barrier-free evacuation routes, and engage with communities to address specific requirements effectively. Prioritizing inclusive design in early warning systems can enhance the resilience of vulnerable populations and mitigate the impact of climate-related disasters on those most at risk (UNDRR, WHO, 2023).

Cambodia's EWS and the government's preparedness and response capabilities to cope with the impact of natural hazards are crucial, yet face challenges stemming from a limited infrastructure, funding constraints and gaps in technical expertise. Therefore, establishing reliable EWS mechanisms operating through risk-informed processes is imperative to enhance preparedness for hazardous events in the future.

1.1 Legal and Policy Framework

Cambodia has an established legal and policy framework to enhance disaster risk management in the country, including early warning systems. **The Law on Disaster Management (2015)** provides a comprehensive legal foundation for disaster risk reduction and management, outlining roles and responsibilities of different government agencies at both national and sub-national level across various aspects of disaster management.

The Sub-Decree on the Establishment and Functioning of the NCDM further formalizes NCDM's role as the central coordinating body for disaster management, followed by a subsequent Sub-Decree in 2019 on the formation and functioning of NCDM at the sub-national levels.

The National Action Plan for Disaster Risk Reduction (NAP-DRR) 2024-28 is a five-year strategic document providing long-term strategic vision, priorities and objectives for strengthening disaster preparedness and response, EWS, related capacity-building and public awareness initiatives, and ensuring that disaster risk reduction is integrated into development planning at all levels.

NAP-DRR 2024-28 contributes to the government's **Pentagonal Strategy-Phase I** which sets Cambodia's long-term national development priorities across all sectors. In particular, the Strategy's fourth pillar "Resilient, Sustainable and Inclusive Development" aims to enhance environmental sustainability and readiness to respond to climate change with early warning systems as an important climate tool to achieve these objectives.

Key policies also aligned with this implementation roadmap are the **Cambodia Climate Change Strategic Plan (CCCSP) 2014-2023,** and **Cambodia's Nationally Determined Contributions (NDC)**. The CCCSP emphasizes enhancing Disaster Risk Management (DRM) by strengthening disaster risk reduction and management systems, enabling better preparation and response to climate-related disasters. This commitment to DRM is one of its nine strategic priorities to build resilience against climate impacts while promoting sustainable development.

Cambodia is a signatory to the **Association of Southeast Asian Nations (ASEAN) Agreement on Disaster Management and Emergency Response (AADMER)** and the **Sendai Framework for Disaster Risk Reduction 2015-2030**. These agreements promote regional cooperation and sharing of best practices in EWS and disaster management, aligning Cambodia's efforts with global standards and enhancing its disaster response capabilities.

2. PURPOSE AND OBJECTIVES

The national EW4All Implementation Roadmap (or, Roadmap) 2024-28 serves as a strategic guide to drive EWS initiatives spanning national to local levels and to channel investments towards enhancing and scaling EWS as part of Cambodia's disaster management systems. Organizations with existing or anticipated programming in EWS are encouraged to incorporate these actions into their strategic planning, operational frameworks and workplans.

The primary objective of this Roadmap is to provide the national and local governments with a **structured framework for strengthening people-centered EWS in Cambodia**. It also presents a set of **recommended actions designed to prioritize investments in EWS and DRR**, in accordance with Target G of the Sendai Framework

for DRR[1], Cambodia's Law on Disaster Management 2015, the National Action Plan for Disaster Risk Reduction (NAP-DRR) 2024-28, and other relevant policies.

Based on inputs from the EW4All consultation workshops, the Roadmap was developed by NCDM with support from the UN Resident Coordinator Office (RCO); the World Food Programme (WFP) (designated UN focal agency for EW4All in the country); and the EW4All global pillar leads including the United Nations Office for Disaster Risk Reduction (UNDRR) (Pillar 1), World Meteorological Organization (WMO) (Pillar 2), International Telecommunication Union (ITU) (Pillar 3) and International Federation of Red Cross and Red Crescent Societies (IFRC); and the Cambodian Red Cross (CRC) (Pillar 4). Significant inputs were contributed by the lead ministries, namely MoWRAM, MoE, Ministry of Post and Telecommunications (MPTC) and CRC, along with other government and non-government stakeholders.

The recommendations presented herein are based on identified national gaps, priorities and needs, and cover the four core pillars mentioned above. The interpillar section includes recommended actions in areas such as governance, stakeholder coordination, advocacy, monitoring and evaluation and financing for early warning systems. This comprehensive approach aims to create a well-rounded plan to enhance Cambodia's early warning infrastructure.

3. METHODOLOGY & GUIDING PRINCIPLES

This Roadmap was developed based on the recommended procedures of the EW4All initiative for country-specific roll-out and execution, including the global EW4All Executive Action Plan 2023-27 and the EW4All Programmatic Framework for Country Level Implementation. The process involved in-depth desk research, stakeholder mapping, expert consultations and several stakeholder workshops.

The **stakeholder mapping** engaged a diverse range of key organizations encompassing most government bodies, national and international non-government organizations, research institutes, and private sectors. The aim was to map out primary actors with a footprint in EWS in Cambodia across the four pillars. This was followed by the **inaugural National Consultation Workshop** in October 2023 serving as a platform to cultivate

[1] Target G under the Sendai Framework for Disaster Risk Reduction aims to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030. This target emphasizes the importance of ensuring that communities are well-informed and prepared for various types of hazards, enhancing their resilience and ability to respond effectively. UNFCCC, 2022.

a collective understanding of the EW4All initiative and charting strategic pathways for the roadmap's development. This workshop also identified key strengths, challenges, opportunities, and priority technical areas embedded in the roadmap.

The Gap Analysis of EWS used the Minimum Core Capability Checklist as part of the roll-out toolkit developed for the EW4All initiative to systematically assess core EWS capabilities, identify gaps and provide general programming recommendations. This approach has been designed to ensure that the Roadmap is both comprehensive and tailored to Cambodia's unique context, enhancing the effectiveness and sustainability of EWS.

The Gap Analysis process included desk research and consultations with lead agencies, including the national government lead agencies (NCDM, MoWRAM, MoE, MPTC), the National Red Cross Society (CRC), global and regional pillar leads, UN agencies, international organizations, and sectoral experts. The Gap Analysis validation workshop took place in Phnom Penh on May 17, 2024. See Annex 1 for complete results of the Gap Analysis.

The Roadmap table with expected outcomes and outputs per pillar also includes budgetary requirements based on known needs, information derived from ongoing EWS projects or planned investments. For some activities, funding sources remain unidentified with the Roadmap designed in a way so that needs across the pillars are consolidated into a list of recommended actions making it easier for prospective donors to align their programmatic strategies and investment priorities. This Roadmap remains a live document which will evolve through regular updates informed by the monitoring and evaluation framework detailed in Section 5.

4. NATIONAL IMPLEMENTATION ROADMAP TOWARDS SCALING UP EARLY WARNING SYSTEMS

PILLAR 1: DISASTER RISK KNOWLEDGE

Objective: Enhance hazard, exposure, and vulnerability mapping and risk assessments across all major climate-related hazards, such as floods, droughts, storms, and heatwaves, with a focus on the most vulnerable populations, including women, children, the elderly, persons with disabilities, and marginalized communities.

Relevant government policies and priorities: National Action Plan for Disaster Risk Reduction 2024-28; Cambodia Climate Change Strategic Plan 2024-2033; Nationally Determined Contributions

Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget USD	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
Intermediary Result 1.1: Enhanced capability to produce quality, timely, and contextualized risk and disaster (losses and damages) information, through inclusive and participatory approaches											
1.1 Disaster losses and damages data are not systematically collected and recorded, particularly with respect to gender, age, disability, and other social vulnerabilities.	1.1 Enhanced disaster risk analytics and core risk knowledge capabilities for EWS, with disaggregated data by gender, age, disability, and other social vulnerabilities.	Improved national loss & damage information system is operational and integrated into national disaster management systems with disaggregated data collection mechanisms (e.g., sex, age, disability); Number of tools and methodologies to estimate the losses and damages; Number of innovative upgrades integrated into PRISM that enhance national climate risk analytics capabilities	1.1.1. Modernize the national loss & damage tracking platform (CamDi) to enable disaggregated reporting by gender, age, disability, and social vulnerabilities to the global loss & damage database 1.1.2. Develop methodologies for quantifying losses and damages in physical and economic terms for critical economic assets endorsed by key government agencies 1.1.3 Pilot new technology and innovation for risk knowledge production through PRISM, CamDi and other relevant tools 1.1.4 Build capacities of government staff to systematically collect, analyze and report data on disaster losses and damages, with disaggregation of sex, age, and disability.	NCDM	UNDRR UNDP WFP FAO IRRC/ CRC	x	x	x	x	TBD	CREWS UNDP- GCF

			1.1.5 Provide training and technical assistance to national and local stakeholders to assess risk at community level, including risk and hazard identification, vulnerability, capacity and exposure mapping, include gender-sensitive and socially inclusive approaches, using existing tools and methodology (e.g. EVCA). 1.1.6 Conduct community risk assessments in the targeted areas, with a focus on collecting and integrating data on vulnerable populations, including women, children, the elderly, and PwDs, to complement data and information collected via other risk mappings.								
1.2 National inventory & disaggregated database of exposed population, critical infrastructure, services and assets is not available, including disaggregated data by gender, age, and disability	1.2 National inventories with exposure datasets from relevant sectors, including disaggregated data by gender, age, disability, and social vulnerabilities.	Number of key exposure datasets made available across sectors with spatial reference, disaggregated by gender, age, disability, and social vulnerabilities.	1.2.1 Map existing datasets on population, infrastructure, service and asset exposure available at different ministries and/or partner organizations, ensuring the inclusion of gender, age disability, and social vulnerability data. 1.2.2 Establish national data collection, sharing and quality assurance mechanisms/ arrangements, data (hazard, exposure, vulnerability) and metadata standards	NCDM	UNDRR MoRD MAFF MoP, NCDDS MoE WFP UNDP	x	x			TBD	UNDP-GCF

1.3 Disaster risk assessments, vulnerability profiling, past impact data are not integrated into DRM plans	1.3 NCDM's national/provincial contingency plans and EPR processes with integrated hazard, exposure, and vulnerability assessments and/or informed by past impact (losses and damages) data.	Number of national and sub-national DRM plans are informed by up-to-date vulnerability and risk assessments	1.3.1 Support the establishment of standardized national risk assessment protocols and tools tailored to the country and local context. 1.3.2 Integrate risk assessments into national and sub-national contingency plans, including costed needs for periodic updates and associated capacity-building support, ensuring that these assessments include gender-sensitive and inclusive approaches.	NCDM	UNDRR WFP UNDP MoE MoP NCDDS MoWRAM	x	x			TBD	TBD
1.4 Absence of a readily deployable post-disaster needs assessment (PDNA) methodology covering sectors commonly impacted by hazard events	1.4 PDNA processes established and streamlined in national DRM systems to facilitate timely evaluation of hazard impacts and inform early recovery efforts	Post-disaster needs assessment methodology is established and endorsed by key sectoral agencies	1.4.1 Map sectoral needs, priorities and data inputs to be collected in the aftermath of a hazard event complementary to the loss & damage data collection 1.4.2 Develop SOPs, inter-agency workflows and relevant tools to enable efficient deployment of a PDNA(s) for disasters at different spatial scales, incorporating gender and social inclusion considerations to ensure that the needs of all affected populations are addressed. 1.4.3 Streamline PDNA processes into NCDM's national and sub-national contingency plans, including adequate capacity-building and budget allocation	NCDM	UNDRR WFP UNDP MoE MoWRAM MAFF CRC MoWA MoP	x	x	x		TBD	TBD
1.5 Risk knowledge generation through targeted research related to hazard risks in	1.5 New risk knowledge products contributing to an increased understanding of multi-hazard risks are	Number of hazard-specific and/or multi-hazard maps and impact models	1.5.1 Commission research and generate evidence to enhance disaster risk knowledge in Cambodia by systematically analysing data collected through CamDi, PRISM and other available datasets	NCDM	MoWRAM UNDRR WMO UNDP WFP IFRC	x	x			TBD	TBD

Cambodia is limited	available to decision-makers		1.5.2 Develop a suite of on-demand multi-hazard risk maps and hazard impact models that incorporate gender and social inclusion considerations, ensuring that these tools reflect the differential impacts of hazards on various population groups, including women, children, the elderly, and persons with disabilities.								
Intermediary Outcome 1.2: Enhanced open access to risk information and knowledge by all relevant actors											
1.6 Limited inter-operability across active disaster and water resource management, and social protection knowledge platforms	1.6 Improved and automated data sharing between key platforms used for collecting disaggregated data on disaster risk and water resource management	% of disaster impact data collected via PRISM is transferred and uploaded in CamDi; Number of products/solutions benefiting from improved interoperability between PRISM, EWS1294 and IDPoor; Number of products/solutions benefiting from improved data exchange between DRR and water-related information platforms	1.6.1 Carry out comprehensive mapping of data sources, including gender-disaggregated and social vulnerability data, to guide investments into improving data interoperability across sectors relevant to EWS 1.6.2. Design an appropriate IT and operational solution to enable seamless transfer of NCDM's ground-level disaster impact data collected via PRISM into central loss & damage database (CamDi) (link to 1.1)	NCDM	MoWRAM MRC CNMC UNDRR WMO UNDP WFP	x	x			TBD	TBD

PILLAR 2: DETECTION, OBSERVATION, MONITORING, ANALYSIS AND FORECASTING OF HAZARDS

Objective: Strengthened capacities in the areas of detection, observation, monitoring, analysis, and forecasting of hazards. By enhancing these critical capabilities, significant improvements have been made in the accuracy and timeliness of weather forecasts and early warning information dissemination to the public

Relevant government policies and priorities: MoWRAM's Action Plan for 2024

Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget USD	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
Intermediary Result 2.1: Increased availability of quality observation data to assess and monitor priority hazards											
2.1.1 Some stations managed by DoM are currently not functional and insufficiently automated, as well as lack of full coverage of the country	2.1.1 More than 80% of the Automatic weather Stations (AWS) are operational and functional as well as expansion of observation network coverage through installation of new AWS	More than 80% of stations are operational and well-maintained, at all times; Essential data is shared (GBON requirements fulfilled); Number of new AWS installed	2.1.1.1 Purchase spare parts and extra sets of spare sensors to operationalize the stations and keep them fully functional (develop a comprehensive hydro-met network plan for the country, indicating the minimum to optimal number of stations and their locations, expansion/improvement plans, O&M, financial sustainability as well as requirements from user sectors, donors and implementing partners 2.1.1.2 Source basic equipment and provide capacity building for instrument maintenance and calibration 2.1.1.3 Installation of new AWS	MoWRAM	WMO	x	x	x	x	Estimated investment needs for DOM and DHRW detailed in the Investment Plan prepared by the World Bank Group under CREWS	SOFF (GBON) & ADB
2.1.2 Some stations managed by DHRW are currently not functional and insufficiently automated as	2.1.2 More than 80% of the Hydrological Stations are operational and functional as well as expansion of network coverage through	More than 80% of stations are operational and well-maintained at all times; Number of new automated	2.1.2.1 Purchase spare parts and extra sets of spare sensors to operationalize the stations and keep them fully functional (develop a comprehensive hydro-met network plan for the country, indicating the minimum to optimal number of	MoWRAM	WMO & WB		x	x	x	See 2.1.1	ADB

well as some provinces not well covered by automated hydrometric stations (Ratanakiri, Mondulkiri, Tboung Khmom and Svay Rieng)	installation of new automated hydrometric stations	hydrometric stations installed	stations and their locations, expansion/improvement plans, O&M, financial sustainability as well as requirements from user sectors, donors and implementing partners 2.1.2.2 Source basic equipment and provide capacity building for instrument maintenance and calibration 2.1.2.3 Installation of new automated hydrometric stations								
2.1.3 Limited availability of marine hazard observation data	2.1.3 Marine buoy network established to detect and monitor marine and related hydro-meteorological and geophysical hazards, with data collection efforts that include the impacts on vulnerable coastal populations, including women and marginalized groups.	Wave and ocean current observations available, and include data relevant to the safety and livelihoods of vulnerable coastal communities, including women and marginalized groups	2.1.3.1 Establish a marine observation buoy network with a focus on areas that are critical to the livelihoods and safety of vulnerable coastal populations, ensuring that data collected is disaggregated by gender and social vulnerabilities.	MoWRAM	WMO	x	x	x	x	See 2.1.1	SOFF
2.1.4 DOM does not operate any upper-air (balloon and radiosonde) observation station	2.1.4 Functioning upper-air (balloon and radiosonde) observation station providing 500km resolution for upper air observations in Cambodia with data shared internationally	Upper-air (balloon and radiosonde) observation station well-functioning and managed	TBD (SOFF implementation plan)	MoWRAM	WB WMO ADB	x	x	x	x	See 2.1.1	SOFF ADB (data center)
Intermediary Result 2.2: Enhanced data exchange and access for forecasting and warning systems											

2.2.1 Data sharing (regionally and globally) is limited	2.2.1 Meteorological instruments are improved to more effectively exchange data regionally and globally 2.2.2 Develop formal data sharing policy	More than 50% of meteorological instruments are exchanging data regionally and globally New formal data sharing policy is adopted	TBD (SOFF implementation plan)	MoWRAM	WMO & WB	x	x	x	x	See 2.1.1	SOFF ADB
2.2.3 Limited availability of remote sensing data (i.e. not for all priority hazards)	2.2.3 Current radar network functional and expanded	Weather radar network down time reduced to less than 10% per annum	2.2.3.1 Repair and maintain current radar network 2.2.3.2 Install additional Radar in Siem Reap International Airport	MoWRAM	WMO & ADB	x	x	x	x	TBD	ADB
2.2.4 Limited data rescue and digitisation of hydrological and meteorological data	2.2.4 Digital archive of historical and current data made available in one location	Digital archive of historical and current data made available in one location	2.2.4.1 Digitalization of data conducted by MoWRAM 2.2.4.2 Staff trained on Climate Database Management Systems and able to continue digitalizing data	MoWRAM	WMO	x	x	x	x	TBD	CREWS
2.2.5 Limited access to data from global and regional centres (ECMWF, JMA, etc.)	2.2.5 Data and products from global and regional centres are accessed and utilized	Agreements / licences in place for accessing global and regional data and products	2.2.5.1 Licenses and agreements provided as we as training to operational forecasters	MoWRAM	WMO and Regional Centres	x	x	x	x	TBD	CREWS & SOFF
2.2.6 Data in different databases/systems and from different sources not interoperable	2.2.6 Setup new or integrate existing database management system/tool that integrates data from different sources	New data management center at MoWRAM constructed; New water resource information system integrating databases from different observation networks set up	2.2.6.1 Identification of data sources and its collation 2.2.6.2 Evaluation and shortlisting of optimal tool for data management 2.2.6.3 Co-designing of the system and setup	MoWRAM		x	x	x		TBD	ADB
Intermediary Result 2.3: Increased capabilities to forecast all priority hazards											

2.3.1 Insufficient number of trained forecasters to provide early warning services	2.3.1 Enhancing and refreshing the capacity of staff for the interpretation of Numerical Weather Prediction products	Improved forecasting of weather and extreme events	2.3.1.1 Organize refresher training programmes to operational forecasters,	MoWRAM	UNDP	x	x	x	x	TBD	GCF
2.3.2 Improve and sustain capacities for water resources assessment and management through implementation of hydrological status and outlook system	2.3.2 Development of hydrological status and outlook products at national level	Hydrological status and outlooks are published on dashboard/platform	2.3.2.1 Setup dashboard for publishing of hydrological information 2.3.2.2 Selection of hydrological parameters/variable (water level, streamflow, soil moisture etc.) 2.3.2.3 Development of the hydrological products (status and outlook) 2.3.2.4 Setting up of national level hydrological outlook forum	MoWRAM	WMO	x	x	x	x	TBD	CREWS
2.3.3 Limited capacity to analyse forecast skills and to report on it	2.3.3 Forecast skills, are analysed and evaluated	Enhanced level of forecaster skills as measured against international standards, such as the WMO BIP-M and WMO Competency Frameworks.	2.3.3.1 Training Needs Analysis, followed by the preparation of a fully-resourced training plan.		UNDP & WMO	x	x	x		TBD	GCF & CREWS
Intermediary Result 2.4: Impact-based forecasts and warnings produced for all priority hazards											
2.4.1 No impact-based forecast and warning services produced or provided by the NMHS	2.4.1 Establishment of Impact Based Flood and Drought Early Warning System	Number of pilot IBF projects testing the new warning services/products with key user sectors; Roadmap for scaling IBF nationally established	2.4.1.1 Review existing work and capacity development on impact-based flood and drought Early Warning System 2.4.1.2 Make impact information (incl. across sectors) and post-disaster analytics from relevant stakeholders accessible	MoWRAM	WMO ADB	x	x	x	x	TBD	CREWS, GCF ADB

			2.4.1.3 Pilot IBF activities building a proof of concept for subsequent nationwide scaling of the system 2.4.1.4 Deploy software tools to produce impact-based forecasts and warnings (incl. training)								
Intermediary Result 2.5: Strengthened governance structures, institutional arrangements, and collaboration mechanisms to enhance the management of hazards											
2.5.1 No specific hydro-meteorological policy	2.5.1 Endorsed legislation on (Hydro) Meteorology/ MHEWS	Meteorology and Hydrology Acts passed	2.5.1.1 Expertise to support MoWRAM in the drafting of the legislation provided 2.5.1.2 Development a 5-year development strategy for DoM and DHRW	MoWRAM	WMO	x	x	x	x	TBD	CREWS, GCF
2.5.2 No specific strategy / development plan for DoM and DHRW	2.5.2 5-year strategy for DoM and DHRW endorsed and under implementation that would guide DoM and DHRW in areas such as hydro-meteorological observation network improvement, expansion and maintenance; Data policy; Monitoring, forecasting and interpretation for users; and Resource mobilization and financial sustainability that would ensure sustained and effective provision of early warning and	5-year development strategy for DoM and DHRW guiding the development of institutions	2.5.2.2 Development a 5-year development strategy for DoM and DHRW	MoWRAM	WMO	x	x	x	x	TBD	CREWS

	climate services to priority sectors										
2.5.3 No National Framework for Climate Services (NFCS) in Cambodia	2.5.3 NFCS endorsed and under implementation	NCOF operational leading to enhanced provision and use of climate services in planning and decision making to reduce threats of climate variability and change to the achievement of development goals	2.5.3.1 Development of a NFCS, and ensure the availability, delivery, and use of climate services in agriculture, DRM, water resource, health, energy, etc.	MoWRAM	WMO	x	x	x	x	TBD	CREWS
2.5.4 Limited meteorology, hydrology and climatology curriculums at local universities	2.5.4 Basic curriculum for meteorology, hydrology and climatology provided at the local universities and long-term programmes for engaging young professionals in place	New meteorology and hydrology curriculums and long-term programs at local universities set up and sufficiently resourced	2.5.4.1 Partnership between MoWRAM and local Universities to establish basic curriculum for meteorology, hydrology and climatology 2.5.4.2 Established partnerships between MoWRAM and Aviation, Marine and Agriculture Sectors to further develop curriculums around meteorology, hydrology and climatology and create long term programmes for engaging young professionals	MoWRAM	UNDP & WMO	x	x	x	x	See 2.2.1	GCF & CREWS
2.5.5 Limited human resources and capacity development programmes to develop and sustain minimum capacities of staff	2.5.5 Comprehensive human resource development plan comprised of capacity building program from basic to mid- and high-level courses on forecasting, IT, equipment O&M, etc.	Comprehensive human resource development plan available	2.5.5.1 Technical support to develop the HR plan 2.5.5.2 Capacity building plan drawing on gaps and priorities identified in the HR plan	MoWRAM	UNDP & WMO	x	x	x	x	See 2.2.1	GCF & CREWS

PILLAR 3: WARNING DISSEMINATION AND COMMUNICATION

Objective: Ensure early warnings are communicated effectively and reach all segments of the population, especially vulnerable groups (rural areas, disabled individuals, etc.).

Relevant government policies and priorities: National Action Plan for Disaster Risk Reduction 2024-28; National Policy on Digital Sector Development 2023; Cambodia Climate Change Strategic Plan 2024-2033; Nationally Determined Contributions

Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget USD	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
Intermediary Result 3.1: Current status of warning dissemination and communication systems reviewed and documented, including gaps, priorities, needs and existing institutional arrangements											
3.1 National strategy on using information and communication technologies (ICT) in the context of disaster management is not available	3.1 National emergency telecommunications plan (NETP) under MPTC developed	NETP is designed in line with NAP-DRR 2024-28 and adopted as a new policy document at the national level	3.1.1 Technical support to the design and validation of NETP as per global ITU standards	MPTC	ITU	x	x			TBD	TBD
			3.1.2 Set up a national coordination mechanism for emergency telecommunications drawing on support from the global emergency telecommunications cluster (ETC)	MPTC	ITU		x	x	x	TBD	TBD
3.2 Multi-hazard early warning system (MHEWS) SOPs are yet to be implemented	3.2 Existing SOPs for MHEWS revised and operationalized	Current SOPs for MHEWS have been revised, adopted and systematically applied by key agencies along the EPR cycle	3.2.1 Technical support to assess the current legislative and regulatory framework on warning dissemination and communication SOPs; identification of operational and capacity barriers for cross-sectoral uptake and design of a management plan to support implementation	MoWRAM	NCDM WMO UNDP WFP	x	x			TBD	GCF
			3.2.2 Carry out simulation exercises to test SOPs in alignment with NCDM's preparedness activities ahead of a flood/drought season				x	x	x	TBD	TBD

3.3 Unclear reach of existing dissemination channels and last-mile connectivity to EWS	3.4.1 Reach of existing warning dissemination channels for exposed and vulnerable populations, assessed 3.4.2 Community perspectives and gender-specific and socially inclusive behavioral dimensions of Early Warning Dissemination and Communication researched and learning documented	Number of assessments and learning products contributing to an increased availability, inclusivity and resilience of EW dissemination and communication channels, with a focus on vulnerable groups such as women, persons with disabilities, and marginalized communities.	3.4.1 Conduct a comprehensive country-level assessment on the availability, resilience, coverage and inclusivity of mobile networks (including using Disaster Connectivity Maps, DCM), access/ownership of mobile devices, and other existing disseminations, including the feedback mechanism in place, to identify gaps and priorities. 3.4.2 Roll out research to identify locally relevant early information and actions within exposed and vulnerable populations, with a focus on gender-specific and socially inclusive behavioral determinants which influence information uptake and the decisions to take actions 3.4.3 Deploy Community Trust Index for Early Warning to measure levels of community trust in early warning information/stakeholders, and early action measures 3.4.4 Develop a gender-sensitive and socially inclusive risk communication strategy at national and sub-national levels (Linked to development of MHEWS SOPs under 3.2) (3.4.2 & 3.4.3 can be led by ETC once established) 3.4.5. Develop a two-way feedback mechanism to monitor and assess end-user reception rates, and improve overall impact of warning messages	MoWRAM NCDM	MPTC ITU WMO UNDRR WFP UNDP IFRC/ CRC I/NGOs	x	x	x	x	TBD	GCF

Intermediary Result 3.2: Technical advice provided on how to implement next steps on warning dissemination and communication											
3.4 Location-based SMS and cell broadcasting systems covering large portions of at-risk population are yet to be developed	3.5.1 Regulatory and operational infrastructure to enable a greater use of mobile technology in early warning dissemination developed 3.5.2 National cell broadcasting strategy available and measures taken to set the system up nationally	National frameworks for cell broadcasting and/or location-based SMS service are adopted and the nationwide population coverage by the new mobile EWS solutions increases	3.5.1 Feasibility study and technical guidance on setting up cell broadcast 3.5.2 National cell broadcasting framework/strategy is created defining roles, responsibilities, required technical capabilities and expectations from mobile network operators 3.5.3 Technical assistance for countries to set up cell broadcast (e.g. tendering; technical assessment; costing; market analysis; coordination) 3.5.3 Adoption of a national regulation mandating importers of telecommunications equipment to comply with cell broadcasting CA 3.5.4 Preferred mobile EWS solutions are tested and piloted laying groundwork for a nationwide scale, with a focus on ensuring that the system is accessible and effective for all population groups, including women, persons with disabilities, and marginalized communities.	MPTC	MoWRAM ITU I/NGOs Mobile network operators	x	x	x		TBD	GCF
3.5 Common Alerting Protocol (CAP) not standardized for government's warning	3.5 CAP adopted into national early warning systems	CAP standards have been adopted, tailored and used in official warning dissemination channels	3.5.1 Development of national CAP standards and their integration into the MHEWS SOPs (**see 3.2**)	MoWRAM	WMO ITU UNDP	x	x			TBD	GCF
			3.5.2 On-demand review and re-design of existing warning messages to meet CAP standards	MoWRAM	WMO ITU UNDP	x	x			TBD	GCF

messages across different dissemination channels			3.5.3 Tailored trainings on CAP application at national and sub-national levels	MoWRAM	WMO ITU UNDP	x	x	x	x	TBD	GCF
Intermediary Result 3.3: Strengthened national capacity to coordinate and implement roadmap actions for warning dissemination and communication											
3.6 Degree of trust among at-risk communities in various warning alerts, products and dissemination channels is unclear	3.6 Population's knowledge and skills, with a focus on vulnerable groups, in understanding and acting on warning alerts and perceived trustworthiness of official alert messages increased	% of exposed communities receiving EW alerts report increased understanding and readiness to act on the alert messaging	3.6.1 Support capacity building by providing training and organizing drills that include gender-sensitive and socially inclusive approaches for relevant government staff, media, communities, and other stakeholders from project countries.	MoWRAM	WMO ITU UN/ INGOs UNDP	x	x	x	x	TBD	TBD
Intermediary Result 3.4: Enhanced national capacities for warning dissemination and communication											
3.7 Warning messages are not co-designed with key sectoral agencies	3.7 Design a suite of tailored climate services that meet the needs of priority sectors and provide actionable advice on how to mitigate identified hazard risks	Climate services provided by MoWRAM are translated into relevant sectoral guidance and recommended mitigation actions for all anticipated climate hazard events	3.7.1 Develop functional templates for warning messages together with key sectors (link to the development of national framework for climate services under pillar 2) 3.7.2 Integrate the process of generating and sharing impact-based warning messages into existing contingency plans, simulation exercises and anticipatory action protocols	MoWRAM	MPTC ITU WMO NCDM WFP UNDP	x	x			TBD	GCF

PILLAR 4: PREPAREDNESS AND RESPONSE CAPABILITIES

Objective: Strengthen the preparedness and response capacities of national and local institutions and communities to act upon early warnings

Relevant government policies and priorities: NAP-DRR 2024-28, National Disaster Risk Financing Strategy

Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget USD	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
Intermediary Result 4.1: Strengthened enabling environment for response to warnings											
4.1 Fragmented legislative, policy and regulatory system for DRR/CCA limits harmonization of EPR systems between NCDM and relevant line ministries	4.1 Enabling environment for a more effective response to warnings	Comprehensive stock-take of DRR/CCA enabling environment with targeted recommendations to enhance Cambodia's EPR systems is available	4.1.1 Undertake baseline assessment study of existing national legal and regulatory frameworks related to DRM/DRR/CCA, as well as relevant sectoral policies under MoE, MoRD and others, to identify gaps and entry points for EWEA, 4.1.2 Organize Stakeholder consultations based on the legal mapping findings to produce informed solutions/relevant mechanisms (i.e. financing mechanisms or coordination mechanisms, etc.). 4.1.3 For any proposed changes, develop legislative advocacy plans and strategies, and roll out advocacy campaign with relevant national stakeholders (e.g. government, parliamentarians) on the importance of integrating provisions for EWEA (triggers for action, roles/responsibilities and agreed anticipatory actions) into national DRM and climate change legal frameworks (plans, policies,	NCDM	MoE, MoRD MAFF GS-NSPC MOP CRC IFRC WFP UNDP FAO UNICEF UNDRR	x	x			TBD	TBD

			strategies, etc.), linked where possible to pre-arranged finance. 4.1.4 Update and/or develop new plans, policies and laws to ensure clear provisions for early action and preparedness to respond to warnings (roles and responsibilities for all actors, coordination mechanisms, etc.). 4.1.5 Support the revision or development of province/district level DRM regulations and plans (e.g. contingency plans) to integrate clear specifications for EWEA								
4.2 Anticipatory action is yet to be institutionalized and used in the government's EPR processes	4.2 Anticipatory action protocols for priority hazards aiming to improve community resilience and coping mechanisms, especially among vulnerable groups such as women, persons with disabilities, and marginalized communities, are designed, piloted and scaled	Number of anticipatory action protocols activated, with specific measures to ensure the inclusion and protection of vulnerable populations. Number of impact evaluations of AA responses available	4.2.1 Establish a National AA coordination mechanism with active government engagement 4.2.2 Design, piloting and scaling of AA protocols, including forecast-based thresholds and triggers for action, with a focus on evaluating the impact on vulnerable populations, particularly women and persons with disabilities 4.2.3 Anticipatory action is incorporated into national and sub-national preparedness and contingency plans	NCDM	MoWRAM CRC GS-NSPC NSAF MAFF WFP FAO UNDP	x	x	x	x	TBD	GCF CREWS
4.3 Existing social protection system is not sufficiently shock-responsive	4.3 Design solutions to make existing social protection programmes and delivery mechanisms more shock-responsive, with specific provisions to	Select social assistance programmes are revised and/or new emergency cash transfer programme is developed to provide an added layer of protection to poor and	4.3.1 Design and adopt the scalability framework as part of the implementation of the national shock-responsive social protection framework (SRSP), ensuring that it includes mechanisms to support vulnerable populations, particularly	GS-NSPC	NSAF NCDM MoWRAM MoP CRC WFP UNICEF WMO	x	x	x	x	TBD	GCF

	protect and support vulnerable groups, including women, children, and persons with disabilities.	vulnerable households, particularly those led by women or including persons with disabilities, exposed to climate shocks	women and persons with disabilities. 4.3.2 Provide targeted and long-term systems strengthening and capacity-building support to key institutions and actors along the main SRSP building blocks with a focus on gender-sensitive and socially inclusive approaches 4.3.3 Design, pilot and scale a business process for a new emergency cash transfer programme supporting poor and vulnerable households impacted by climate shocks 4.3.4 National emergency social assistance mechanisms adopt anticipatory action approaches as a viable option to support vulnerable communities drawing on existing government budgets		UNDRR						
Intermediary Result 4.2: Preparedness capacities are increased at the local level, enabling first responders to act quickly and effectively based on early warning alerts											
4.4 Preparedness capacities at the local level remain limited due to operational and budgetary constraints	4.4 Local capacities to effectively respond to sudden-onset hazard events are increased, with a focus on ensuring inclusivity and responsiveness to the needs of all population groups, particularly vulnerable populations.	Number of assessments, SIMEXs, public campaigns and other initiatives led by government authorities, with specific measures to ensure participation and protection of vulnerable groups, including women and persons with disabilities.	4.4.1 Assess the national, provincial and local preparedness systems and capacities, including an evaluation of how well these systems address the needs of vulnerable populations 4.4.2 Develop and roll out a comprehensive capacity-strengthening programme at national, provincial and local levels for public institutions and CSOs, ensuring that the programme is gender-sensitive and socially	NCDM	IFRC CRC WFP UNDP Caritas	x	x	x		TBD	GCF

			inclusive, in line with NAP-DRR 2024-28 priorities 4.4.3 Strengthen operational capacities by upgrading supply chain management, HR management, fleet management, etc. for EWEA at national, provincial and local levels. 4.4.4. Update and disseminate contingency plans and related SOPs at all levels to ensure they provide gender-sensitive and socially inclusive guidance on preparedness to respond to warnings, including roles and responsibilities of relevant stakeholders, chain of command, thresholds for activation, and types of early action to be undertaken at all levels in the end-to-end MHEWS. 4.4.5 Carry out regular, multi-stakeholder, inclusive and cross-sectoral SIMEXs as part of existing EPR structures, ensuring the participation of organizations representing vulnerable groups, including women and persons with disabilities & conduct after-action reviews and systems/skill development recommendations 4.4.6 Support NCDM/PCDMs in public awareness and on what actions to take once warnings are received including through campaigns, informal education, participatory learning and school-based interventions are gender-sensitive and socially inclusive,								

			addressing the specific needs of vulnerable groups.								
4.5 No existing multi-sectoral contingency plans for common hazards	4.5 Develop multi-sectoral contingency plans for floods, drought and storms defining roles and responsibilities of line ministries as per Disaster Management Law of 2015	Available contingency plans are multi-hazard and multi-sectoral expanding the scope of current national contingency plan for floods under NCDM	4.5.1 Set up an inter-ministerial working group to provide recommendations for developing the multi-sectoral contingency plan	NCDM	MoE MoP GS-NSPC MoWRAM UNDRR WFP CRC	x	x			TBD	TBD
4.6 No multi-hazard risk assessments conducted as part of national emergency preparedness mechanisms	4.6 Design a methodology for multi-hazard risk assessment for integration into existing EPR processes with specific measures to assess the risks faced by vulnerable groups, including women, children, persons with disabilities, and the elderly.	System in place to periodically conduct multi-hazard risk assessments with a pre-defined methodology involving all key sectors including gender and social inclusion considerations.	4.6.1 Assess existing vulnerability data across different line ministries and design a methodology for multi-hazard risk assessment that incorporates the specific vulnerabilities of different population groups 4.6.2 Integrate multi-hazard risk assessments into existing national and sub-national disaster management plans ensuring that these assessments address the vulnerabilities of women, children, persons with disabilities, and other marginalized groups. 4.6.3 Carry out periodic updates of the vulnerability risk index to inform EPR processes (e.g. evacuations, safe site management etc)	NCDM	MoE MoP GS-NSPC MoWRAM UNDRR WFP UNDP	x	x	x	x	TBD	GCF
4.7 Vulnerable groups (i.e. women, children, PwD, elderly)	4.7 Design and implement community-based actions to increase	At-risk communities report having improved capacity to	4.7.1 Design or adapt existing tools to train staff and volunteers from CCDMs, CSOs, CRC, as well as community representatives to set	NCDM	CRC WFP UNDP I/NGOs	x	x	x	x	TBD	UNDP-GCF

continue to face difficulties accessing warning messages affecting their ability to take timely action	vulnerable groups' ability to effectively and efficiently respond to warning alerts, ensuring that these actions are tailored to the specific needs of women, children, persons with disabilities, and the elderly.	respond to warning alerts	up community EWS (CEWS) that are connected to national EWS and endeavour to reach the most vulnerable groups. 4.7.2 As part of the CEWS process, support targeted communities to develop Community alert response plans (CARP) that incorporate gender-sensitive and socially inclusive forecasts, triggers and early action for priority hazards based on community risk assessments (Pillar 1). 4.7.3 Support targeted communities in conducting regular inclusive drills and simulation exercises to test CARPs and update them as needed.								
Intermediary Result 4.3: Financing and delivery mechanisms are connected to effective anticipatory action plans, for action ahead of predicted hazards and crises											
4.8 No financing mechanisms for anticipatory action available in national budgets	4.8 New climate adaptation financing mechanisms contributing to EWS/DRR include resources for anticipatory action	Number of new climate and disaster risk financing investment projects that allocate resources for anticipatory action	4.8.1 Advocacy and capacity building for governments to integrate anticipatory action into new or existing disaster risk financing mechanisms 4.8.2 Create new/ scale up partnerships with private sector entities, including the insurance sector, to promote engagement and scale-up of anticipatory action and preparedness activities.	NCDM MEF	CRC Line ministries Specialized UN agencies IFRC	x	x	x	x	TBD	TBD

INTER-PILLAR: GOVERNANCE, COORDINATION, ADVOCACY M&E AND FINANCING FOR EWS

Objective: Coordinated efforts across various pillars, sectors, and stakeholders to achieve comprehensive Multi-Hazard Early Warning System (MHEWS) coverage

Gap Identified	Associated Output	Output indicator	Activities	Responsibility		Implementation Timeline				Budget USD	Budget Source
				Lead	Support	Year 1	Year 2	Year 3	Year 4		
Intermediary Outcome 1.3: Strengthened application of risk information along the EWS value chain											
5.1 No inter-agency protocols for sharing data relevant to EWS	5.1 Data-sharing mechanisms among sectoral agencies involved in EWS	Data sharing and coordination across pillars is improved through new data exchange solutions; Number of improved inter-agency data-sharing and coordination mechanisms	5.1.1 Inter-agency working group under the EW4All coordination platform (see 5.2) is set up to provide guidance on data exchange options across pillars	NCDM	MoWRAM MoE MoP GS-NSPC NSAF UNDRR WMO ITU IFRC WFP UNDP FAO CRC	x	x	x	x	TBD	GCF
			5.1.2 Existing data/information management platforms, such as PRISM or CamDi, are upgraded to facilitate enhanced data sharing in priority areas such as Shock Responsive Social Protection, forecast generation/ monitoring, vulnerability risk assessments, losses and damages, etc							TBD	GCF
			5.1.3 Strengthen sub-national and community-level data exchange and coordination practices in key DRM/EWS processes, such as rapid needs assessment, IDPoor beneficiary list updates and early warning alerts							TBD	GCF

5.2 Absence of an EW4All coordination mechanism	5.2 A functional national EW4All coordination mechanism led by NCDM is established	Number of multi-stakeholder coordination platform sessions to monitor progress of EW4All and advice on investment priorities with documented participation from organizations representing persons with disabilities and women's associations; % of local government having a plan to act on early warnings in the form of local disaster management planning or contingency planning"	5.2.1 Set up a two-tier coordination system for (a) high-level decision-making and (b) technical level involving both government and non-government entities across all pillars 5.2.2. Organize regular meetings and steer the implementation of EW4All at national level 5.2.3 Add EW4All into local disaster management planning ensuring implementation of national priorities at the local level,	NCDM	Line ministries involved in EWS EW4All global pillar leads RCO WFP CRC UNDP	x	x	x	x	TBD	GCF
Intermediary Outcome: 1.4: Enhanced capacities to monitor and report on the coverage and effectiveness of early warning systems and apply learning to improve approaches											
5.3 No mechanism to monitor and evaluate the effectiveness and impact of EWS	5.3 Well-defined objectives and indicators to measure the impact of EWS investments under EW4All	M&E framework for NCDM's NAP-DRR 2024-28 is aligned with the outcomes and outputs in the EW4All Roadmap; Degree/quality of reporting by NCDM on Sendai Framework Global Target G, in line with the national priorities	5.3.1 Technical support to setting up M&E framework for NAP-DRR includes indicators against the EW4All Implementation Roadmap, in line with Sendai Framework Target G, endorsed by NCDM 5.3.2 Periodic progress of EWS indicators is recorded in line with the M&E framework 5.3.3 M&E reports are discussed at the national multi-stakeholder EW4All coordination platform and actions are taken to strengthen EW4All implementation across all pillars	NCDM	WFP UNDRR UNDP	x	x	x	x	$50,000	BHA GCF

5. IMPLEMENTATION STRUCTURE AND APPROACH

5.1 Coordination Mandate

The overall coordination of this Roadmap is led by the National Committee of Disaster Management (NCDM) with the support of the designated UN focal agency for EW4All, the World Food Programme (WFP) and the organizations leading the execution of activities under each pillar of the initiative including MoE for Pillar 1, MoWRAM for Pillar 2, MPTC for Pillar 3, and NCDM and CRC for Pillar 4. Lead representatives and alternate representatives will be designated from the institutions leading each pillar to ensure effective coordination.

A National Technical Working Group for EW4All (NTWG-EW4All or NTWG) will be established, comprising members from the pillar-lead agencies, relevant UN agencies, development partners, and the private sector (Figure 1). Regular coordination among NTWG members and relevant partners will be managed by a Secretariat within NCDM, led by the designated National Focal Point for EW4All.

Quarterly coordination meetings between the pillar leads and relevant activity lead agencies will be organized and chaired by NCDM, with the support from WFP or UNRC as needed.

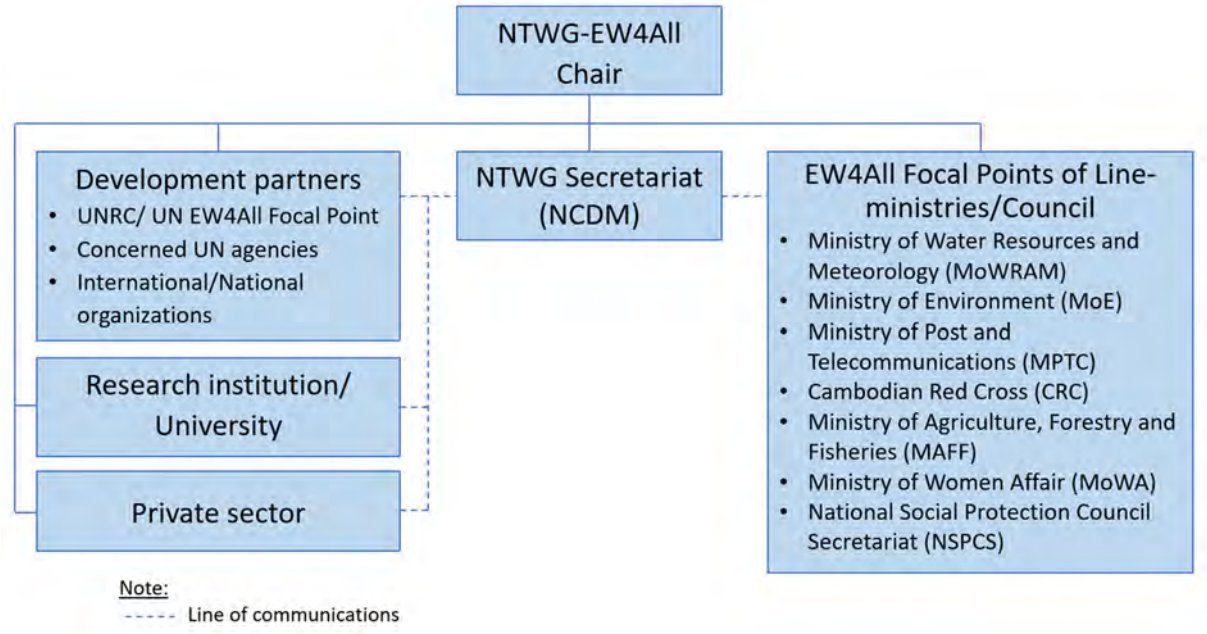

Figure 1. Coordination structure of the NTWG-EW4All

5.2 Co-Leads and Implementing Entities

The **co-leads for the initiatives** are:

- The National Committee of Disaster Management
- United Nations Resident Coordinator, and the World Food Programme

The **main implementing entities for the Roadmap** are the institutions leading each pillar, and the co-leads of the programme, as following:

- Ministry of Water Resources and Meteorology (MoWRAM)
- Ministry of Environment (MoE)
- Ministry of Post and Telecommunications (MPTC)
- Cambodian Red Cross (CRC)
- Relevant UN entities
- International Federation of Red Cross and Red Crescent Societies (IFRC)
- Relevant International and National Non-Government Organizations

Additional **key implementing partners** vital for the effective execution of the EW4All Roadmap include:

- National Social Protection Council (NSPC)
- Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Ministry of Rural Development (MRD)
- Ministry of Women Affairs (MoWA)
- Ministry of Planning – National Institute of Statistics
- Ministry of Interior (MoI) – National Committee for Sub-National Democratic Development Secretariat (NCDD-S)

5.3 Investment and Funding Arrangements

This section highlights key ongoing and pipeline projects for the four pillar leads of the EW4All initiative and relevant partners. It provides an overview of programming focus, financial commitments and timeline for each initiative.

5.3.1 Ministry of Water Resources and Meteorology

1. **Climate Risks and Early Warning Systems (CREWS) for Cambodia and Lao PDR**
   Donor: CREWS Initiative; Duration: 2022-2025 (CREWS 2.0: mid-2025-29); Budget: US$ 5m and additional US$ 7 million under CREWS 2.0 for both countries
   The project aims to strengthen and streamline regional and national systems and capacities related to weather forecasting, hydrological services, multi-hazard impact-based warnings and service delivery for enhanced decision-making. CREWS 2.0 will focus on capacity building, infrastructure development, and the integration of early warning systems with disaster risk management plans. The project is by MoWRAM, UNDRR and World Bank, with MoWRAM and NCDM as the main executive partners in Cambodia.

2. **Improved Global Basic Observation Network (GBON) in Cambodia**
Donors: Systematic Observation Financing Facility (SOFF); Duration: 2023-2028; Budget: USD 5 million

The project aims to enhance Cambodia's compliance with the Global Basic Observation Network (GBON) by rehabilitating automatic weather stations, upgrading data storage systems, and improving operations and maintenance. It also includes providing IT training for MoWRAM staff and other relevant technicians. This includes upgrading infrastructure, ensuring efficient data management, and equipping personnel with the necessary skills to manage and utilize technology effectively.

3. **Increasing Investments in Early Warning Systems to Strengthen Climate and Disaster Resilience**
Donor: Asian Development Bank - Technical Assistance Special Fund; Duration: 2023-2026; Budget: USD 725,000

This regional project, implemented in 10 countries including Cambodia, aims to strengthen early warning systems (EWS) and increase investments in EWS across ADB's developing member countries. Key operational priorities include tackling climate change, enhancing climate and disaster resilience, improving governance and institutional capacity, and fostering regional cooperation and integration.

4. **Cambodia Water Security Improvement Initiative**
Donor: World Bank; Duration: 2024-2030; Financial commitment: US$ 145 million

The project aims to build the foundation for improved water security in Cambodia and increase agricultural productivity in selected River Basins and to provide an immediate and effective response in case of an Eligible Crisis or Emergency. Main activities include enhancing agro-met forecasting, with the establishment of eight new automatic meteorological stations and repairing the existing ones in the target provinces.

5.3.2 National Committee for Disaster Management

1. **Joint Activities for Crisis Management and Disaster Risk Reduction**
Donor: World Food Programme; Duration: 2024-2025; Financial commitment: US$ 142,000

The project aims to strengthen national and local capacities to address the impacts of climate shocks and disasters. The focused areas of the assistance include (i) Disaster preparedness and response plans and procedures; (ii) Anticipatory Action and EWS; (iii) Disaster management information systems - Platforms for Real-time Information Systems (PRISM); (iv) Humanitarian coordination; and (v) Monitoring and evaluation. The estimated beneficiaries include 30 NCDM officials, 32 line ministries, 75 PCDM officials, 132 DCDM officials from 44 districts, 352 CCDM officials from 352 communes, and 3,000 community members.

5.3.3 Ministry of Environment

1. **Marine Habitats Management in the South China Sea and Gulf of Thailand**

   Donors: Global Environment Facility (GEF); Duration: 2021-2025; Budget: US$ 5m

   This regional project, implemented in six countries: Cambodia, China, Indonesia, Philippines, Thailand and Vietnam, aims to enhance the management and conservation of marine habitats to mitigate climate change impacts. Key activities include habitat assessments, management plan development, and promoting sustainable practices among coastal communities to protect vital ecosystems and improve local livelihoods. In Cambodia the project is implemented by MoE's General Director of Nature Protected Areas and the Department of Fisheries Conservation.

2. **Climate Adaptation and Resilience in Cambodia's Coastal Fishery Dependent Communities (FSP)**

   Donors: Green Climate Fund (GCF); Duration: 2021-2025; Budget: US$ 4.35m

   The project aims to support coastal fishery-dependent communities in Cambodia in adapting to the impacts of climate change. It focuses on two main objectives: strengthening the resilience of coastal ecosystems and enhancing the adaptive capacity of local livelihoods. Key activities include promoting ecosystem-based approaches to improve the health and sustainability of coastal environments and implementing adaptive practices to reduce the vulnerability of communities dependent on fisheries.

5.3.4 Ministry of Post and Telecommunications

1. **Bridging the Digital Divide through Digital Literacy and Digital Skills Trainings**

   Donors: Smart Axiata; Duration: 2023-2025; Budget: USD 140,000

   The project aims to train 38,400 students and the public in digital and digital literacy skills, with a focus on marginalized communities. Key activities include supporting 700 students with disabilities in 16 primary schools across Phnom Penh, Kandal, Kampong Speu, and Siem Reap, and providing 1,200 girls from 10 provinces with training in ideation, coding, entrepreneurship, and artificial intelligence through the Technovation Girls program.

2. **Improving Connectivity and Sustainability**

   Donors: Smart Axiata; Duration: 2023-2025; Budget: USD 90.7 million

   This pledge commits (i) to equipping 200 mobile towers with renewable solar energy as a supplementary source to improve reliability for existing customers, and (ii) to enhance connectivity and reduce the digital divide in the country through building 400 new 4G mobile towers and transmission backbone in 2024 and 200 additional sites by the end of 2025.

5.3.5 Cambodian Red Cross

1. **Community Based Resilience Project**

   Donors: Red Cross Society of China; Duration: 2024-2025; Budget: USD 142,000

The project aims to enhance community resilience by improving the well-being of vulnerable populations in Rolea Bier district, Kampong Chhnang province. It focuses on improving disaster risk reduction (DRR) and health knowledge and practices at the community level and strengthening the Kampong Chhnang Red Cross Branch's capacity for disaster response. It focuses on two main outcomes: (i) Enhancing disaster risk reduction (DRR) and health knowledge and behavior practices at the community level through effective DRR and health interventions; (ii) Strengthening the capacity of the Kampong Chhnang Red Cross Branch to prepare for and respond to local disasters, including health emergencies, thereby ensuring a more robust response to recurrent disasters.

2. **Catalyzing Climate Action and Early Warning Early Action for Climate-related Hazards in National Red Cross and Red Crescent Societies (CCA-EWEA)**

   Donors: IFRC Country Cluster Delegation in Bangkok; Duration: 2024-2025; Budget: USD 100,000

   The project focuses on scaling up climate action and people-centered early warning and early/anticipatory action (EWEA) for climate-related hazards. It aims to build the capacity of 60 Cambodian Red Cross staff and volunteers on climate action, preparedness, and community early warning systems. The activities focus on preparedness for effective response (PER), enhanced vulnerability and capacity assessment (EVCA) and community early warning system (CEWS).

5.3.6 UN Entity and Multi-lateral Projects

1. **Multi-country Project Advancing Early Warnings for All**

   Donors: Green Climate Fund (GCF); Managed by UNDP; Duration: 2025-2030; Budget: USD 10-13 million per country

   The overall objective of this country project is to deliver functioning multi-hazard early warning systems (MHEWS), including early and anticipatory action (AA), focusing on the key gaps preventing the MHEWS value chain from being effective and seamless. The key anticipated executing partners include NCDM, MoWRAM, WFP and PIN.

2. **Public-Social-Private Partnerships for Ecologically Sound Agriculture and Resilient Livelihoods in Northern Tonle Sap Basin (PEARL)**

   Donors: Green Climate Fund (GCF); Managed by FAO; Duration: 2023-2029; Budget: USD 42.9 million

   The project aims to enhance climate resilience of smallholder farmers and local communities. The project is expected to directly benefit 450,000 individuals across four provinces (Oddar Meanchey, Kampong Thom, Preah Vihear, and Siem Reap), 124 farmer organizations. Key relevant component is improved agro-met services tailored to crop-specific value chains at the target provinces. PEARL is co-executed by MAFF and MoE, and with the participation of MoWRAM, Ministry of Commerce, MoWA and the Agricultural and Rural Development Bank.

3. **Promoting Climate-Resilient Livelihoods in Rice-Based Communities in the Tonle Sap Region**
   Donors: Global Environmental Facility (GEF); Duration: 2022-2027; Managed by FAO; Budget: USD 8.9 million

   The project aims to reduce their climate vulnerability and increase community resilience to climate change through an ecosystem-based, market-driven approach. The project is executed by MAFF's General Directorate of Agriculture, MoE's General Directorate of Local Community, and operated in five target provinces around the Tonle Sap Lake: Pursat, Battambang, Banteay Meanchey, Siem Reap, and Kampong Thom.

4. **Enhancing Integrated Water Management and Climate Resilience in Vulnerable Urban Areas of the Mekong River Basin**
   Donors: Ministry of Environment of the Republic of Korea; Managed by UNDP; Duration: 2021-2025; Budget: USD 1.6 million

   The project aims to strengthen the resilience of the people and communities in these climate and disaster vulnerable regions of Cambodia and Lao PDR. It focuses on (i) Completion of an inclusive assessment of water-related climate risks in the priority river basins; (ii) Strengthening of an enabling environment for gender-responsive; climate risk-informed, and integrated water resources management, and (iii) Development of a funding proposal for priority risk reduction measures. Key implementing partners include MoWRAM, NCDM, and NCDDS. The project sites in Cambodia lie in the 4Ps (Prek Preah, Prek Krieng, Prek Kampii and Prek Te) and 3Ss (Sekong, Sesan, and Sre Pok) river basins.

5. **Strengthening Climate Resilience in Mekong Sub-region**
   Donors: DFAT; Managed by Oxfam in Cambodia; Duration: 2022-2025; Budget: US$ 600,000

   The project aims to enhance resilience in Mekong River communities. It builds on Oxfam's transboundary governance efforts, focusing on social inclusion. The project's primary goal is to reduce vulnerability to climate risks and disasters for riverine communities in the Mekong sub-region, mitigating the adverse effects of climate change through improved governance, community-driven adaptation strategies, and enhanced cross-border cooperation.

6. **Nurture - Nurturing Climate Resilience in Cambodia**
   Donors: Swiss Agency for Development and Cooperation (SDC); Duration: 2022-2026; Budget: USD 4.7 million

   The project aims to enhance climate resilience and increase incomes for vulnerable smallholder farming households through climate-proofing agro-ecosystems. It targets 15,000 households across 36 communes across 12 districts in four provinces, focusing on improved irrigation access, social accountability, and adoption of agro-ecological practices. The main executing partner is MAFF.

7. **Strengthening Cooperation on Disaster Risk Management within the ASEAN**

Donors: Asian Development Bank (ADB); Managed by ADB; Duration: 2021-2025; Budget: USD 1.9 million

The project supports ASEAN member states in implementing the ASEAN Agreement on Disaster Management and Emergency Response (AADMER). It focuses on increasing regional cooperation, introducing high-level technology for transboundary risk management, and advancing interregional cooperation through capacity building and knowledge exchange. The project focuses on (i) enhancing regional cooperation on transboundary risks, (ii) introducing advanced technology to strengthen collaboration on these risks, and (iii) promoting interregional cooperation through capacity building and knowledge exchange.

8. **Advancing Early Warning Systems in Cambodia**

Donors: GSMA & UK AID; Managed by ActionAid; Duration: 2023-2025; Budget: USD 443,000

The project aims to strengthen humanitarian anticipatory action by upgrading the groundwater level monitoring sensors to transmit real-time water level data to a national-level early warning system (EWS) broadcasting platform in Cambodia. The project strengthens EWS 1294 by expanding its coverage to new disaster-prone provinces, upgrading monitoring systems, building stakeholder capacity, ensuring vulnerable groups have access to early warnings, and fostering regular coordination among ministries, disaster management bodies, and NGOs. The main implementing partners include Ministry of Rural Development and National Committee for Disaster Management.

6. MONITORING AND EVALUATION

The monitoring of the roadmap activities will be carried out through quarterly coordination meetings as described in Section 5.

Monitoring reports on the progress of the activities shall be prepared by the National Committee for Disaster Management, with the support of the UN Resident Coordinator as required.

These reports will assess progress, identify constraints, evaluate risk and inform the policy makers on the implementation progress of the Roadmap. Evaluation will be conducted at timelines determined by the respective funding modality. Evaluation of progress of the roadmap will be reviewed on an annual basis by the Chair and Pillar leads.

ANNEXES – GAP ANALYSIS

Scaling up Early Warning Systems: Checklist for Gap Analysis

Early warning is an important enabler of disaster risk reduction. It can prevent loss of life and reduce the socio-economic impacts of disasters. To be effective, early warning systems need to actively involve the people and communities at risk from a range of hazards, facilitate public knowledge and awareness of risks, disseminate messages and warnings efficiently and ensure that there is a constant state of preparedness and early action is enabled.

This Checklist is structured around the four key elements of effective early warning systems - 1) Risk Knowledge, 2) Detection, Monitoring, Analysis & Forecasting, 3) Dissemination & Communication and 4) Preparedness to Respond - as well as a cross-pillar element. The tool aims to provide a simple list of the main elements, components and products or services that national governments can refer to when developing or evaluating early warning systems, or when verifying that crucial procedures are in place. It is not intended to be a comprehensive manual, but instead a practical tool to ensure that the major elements of a functional and effective early warning system are in place within and across Pillars.

Many countries will have already conducted various types of gap analysis on early warning. Please refer to these to avoid a replication of effort. This tool is available to fill information gaps, where needed, and allow for a holistic understanding of progress against the four pillars and at the inter-pillar level.

The application of the tool would consist of the following actions:

1. Identifying the key products / services of the checklist or answering the questions of the checklist by selecting the availability level that applies.
2. Substantiating responses by providing evidence and relevant resource links where feasible.
3. Highlighting gaps based on stakeholder experience and available documentation.

It is important to ensure that the checklist is compiled based on the feedback of a diverse and inclusive group of stakeholders.

With regards to Pillar 2 on Detection, Monitoring, Analysis & Forecasting, the Checklist provides only an indicative list of questions. As Pillar lead, WMO conducts a dedicated consultation process with constituent agencies (National Hydro-meteorological Services) through which the relevant information is sourced accordingly. Therefore, the Pillar 2 checklist provided here is for demonstration purposes only and not intended to be filled in through an additional process.

Ultimately, the Pillar and Cross-pillar Checklists provide a basis to assess needs and priorities to scale-up EWS at national level, as part of a gap analysis exercise. This would then provide the basis to formulate national EW4All implementation roadmaps that outline the steps, actions, support and funding needed to bridge the gaps and implement EWS according to national priorities.

EW4ALL Pillar 1 Outcome	Risk Knowledge Component (compliant with CDEMA checklist)	Associated product, system or service	Self-assessed availability	Link to source / data (if available)
Multiple	**1. Are key hazards and related threats identified?**			**Key reports:** Cambodia: Voluntary National Report of the MTR SF, 2022 Assessment of the Capacities of DOM & DHRW, RIMES (CREWS project), 2023 MoE' Third National Communication (TNC) submitted to the UNFCCC, 2022
Outcome 1: Production of RK	1.1. Characteristics of key hazards to which the country is exposed (e.g. geographical extent, magnitude, intensity, frequency, probability), including possible cascading hazardous events, are analysed, historical data evaluated and potential future risks assessed	1.1.a. Hazard assessments based on historical data, scientific models, ILK are conducted for top 5 hazards (or hazards responsible for 90% of past L&D); no less than 5 years old.	Partially available	**NCDM** - Hazard assessments, maps and data available through DP support and accessible via CamDi, Cambodia's official loss & damage system, or rapid needs assessment and risk analytics tool 'PRISM', both managed by NCDM. Lightening also cause of significant annual human and livestock losses. https://camdi.ncdm.gov.kh/ **MoWRAM** - Hazard assessments & modeling using global products, such as NASA-Servir, are available at MRC but neither DOM nor DHRW at MOWRAM are using them. (CREWS Assessment, 2023) **MoE, NCSD** - Vulnerability index updated annually, covers 3 major hazards (floods, drought, storm), data not linked to NCDM-run systems. https://ncsd.moe.gov.kh/standard_report_visualize_final_report/d3_c_report/vulnerability?portal_id=16751&standard_report=10706
		1.1.b. Methodology and process for conducting hazard & risk assessments for top 5 hazards (or hazards responsible for 90% of past L&D)	Not available	No standardized methodology for hazard and risk assessments. NCDM and MoE maintaining separate databases on hazard, exposure, risk and vulnerability.
Outcome 1: Production of RK	1.2. Hazard maps (dynamic and multi-hazard, when possible) are developed that identify the geographical areas/people that could be affected by hazards	1.2.a. Single-hazard maps with a technical format that allows overlaying different hazard and exposure maps, e.g. GIS.; conducted for top 5 hazards, less than 5 years old	Partially available	**NCDM** - Flood hazard maps available at PRISM for quick visualization and overlays with several global/local vulnerability/exposure datasets (e.g. SERVIR Mekong, IDPoor, etc). Detailed GIS maps produced with DP support. Drought maps available at MRC but not MoWRAM. **MoE/NCSD** - Quick visualization hazard and vulnerability maps for 3 hazards (floods, drought, storm) available through the Vulnerability Index (see above) https://prism-khm.surge.sh/ http://droughtforecast.mrcmekong.org/maps
Outcome 1: Production of RK	1.3. Climate impact projections are developed (*Advanced capability, to be considered if relevant)*	1.3.a. Socio-economic and environmental impact analysis of climate projections for temperature, precipitation, wind patterns, sea-level change are developed at national and local level and updated every 5 years: e.g. impacts on health services, agri-food systems, displacement, etc. (aligned with UNFCCC reporting, NDCs, NAPs)	Available	Yes, as part of MoE' Third National Communication (TNC) submitted to the UNFCCC published in Sep 2022. Climate vulnerability analysis available at national and local level Link: https://unfccc.int/documents/611804.
Outcome 4: Monitoring & Evaluation	1.4. Disaster impact data / losses and damages are tracked and recorded systematically, aligned with Sendai and SDG targets and indicators	1.4.a. Tracking system for hazardous events and disaster losses and damages established, with data disaggregated by sex, age, disability, sector & geography	Available	Historical loss and damage data available since 1996 in CamDi. Data concentrated around death, affected people, evacuated people, damages in crop area (Ha), damages in roads. Sex, age, disability disaggreated data is not often available. Loss in economic terms not recorded systematically. New administrative units recently created need to be integrated into CamDi. http://camdi.ncdm.gov.kh/DesInventar/profiletab.jsp?countrycode=kh2&continue=y

		1.4.b. Historical disaster impact data for all priority hazards by sector (e.g. geographical extent, magnitude, intensity, frequency, etc.)	Partially available	Current CamDi data can generate frequency of particular hazard events in Province, District and Commune (to some extent) over time. However, impact data per sector not recorded not systematically generated.
		1.4.c. All priority hazardous events are recorded and connected to loss and damage reports	Available	Loss and damage in terms of human casualty, crop area, damages of road are available, recorded through PRISM post-impact data collection, but not in economic value (direct or indirect). Data are then compiled at provincial level and manually inserted into CamDi.
Multiple	**2. Are exposure, vulnerabilities, capacities and risks assessed?**			
Outcome 1: Production of RK	2.1. Assessment and quantification of exposed people, services and critical infrastructure conducted and mapped for all relevant hazards, as well as of any compounding risks, at local level in both rural and urban areas and coastlines	2.1.a. Census / survey data on exposed people: less than 5 years old, granular, disaggregated	Available	Yes, under MoE's NCDS. There is vulnerability index listing communes vulnerable to climate hazards (floods, drought & storms) as part of the national climate change M&E framework, SDG13, NSDP 2019-2023. Primary data are from Cambodia's Commune Database. Data are not synced with NCDM system and are not used for EPR planning. https://ncsd.moe.gov.kh/dcc/data-portal/vulnerability-climate-hazards
		2.1.b. Inventories & databases of exposed infrastructure: less than 10 years old; granular, disaggregated	Not available	No specific inventories or database of exposed infrastructure available.
		2.1.c. Inventories & databases of exposed agricultural land, assets, etc.: less than 10 years old; granular, disaggregated	Not available	No database with agricultural exposure data. The Cambodia Agriculture Survey 2021 collected information on crop cultivation, livestock and poultry raising, aquaculture and capture fishing, impact of external shocks on agriculture, labour, economy and more. https://microdata.nis.gov.kh/index.php/catalog/38/related-materials
		2.1.d. Inventories & databases of exposed services: less than 5 years old; granular, disaggregated	Not available	
		2.1.e. Inventories & databases of exposed ecosystem services: less than 10 years old	Not available	CAMStat has no indicators on ecosystems/ecosystem services, exposure, hazards or climate change
Outcome 1: Production of RK	2.2. Data on exposure, vulnerability, impacts (loss and damage), harvested area, and production are collected, and risks are assessed in the agri-food sector (crops, livestock, forestry, fisheries, aquaculture) for top 5 hazards (hazards responsible for 90% of past L&D in the sector)	2.2.a. Database on disaster impacts and risks assessments for the agri-food sector; data is disaggregated (by crop, livestock, etc.) for past 5 years and updated annually; risk assessments updated every 5 years;	Partially available	CamDi also available annual data (by administrative levels, commune, district, provincial and national) of flood impacts on damaged crops and lost cattle since 1996. Ministry of Agriculture, Forestry and Fisheries (MAFF) tracks disaster impact on agricultural assets
Outcome 1: Production of RK	2.3. Impacts to critical infrastructure and secondary risks associated with these impacts are evaluated, and risk management solutions considered to increase resilience	2.3.a. Impact assessment methodologies, including for the evaluation of vulnerability and coping capacity.	Not available	
		2.3.b. Analysis of potential impacts and stress-testing of critical infrastructure	Not available	
		2.3.c. Analysis of cascading risks to critical infrastructure and secondary impacts to the socio-economic system	Not available	

Outcome 1: Production of RK	2.4. Vulnerability factors such as gender, disability, access to infrastructure and services, economic diversity, societal inequalities and environmental sensitivities considered	2.4.a Census and survey data on gender, disability, economic status, livelihoods, access to services, etc.: less than 5 years old, granular and disaggregated	Available	The Cambodia Socio-Economic Survey (CSES) 2021 survey by the National Institute of Statistics of the Ministry of Planning in Cambodia. Data on the socio-economic conditions of households across the country. New iteration planned for 2024/25. IDPoor database by the Department of Identification of Poor Households. Limited to no application of this information across EPR/DRM systems
Outcome 1: Production of RK	2.5. Vulnerabilities of key economic sectors at national to local levels assessed	2.5.a Survey data, historical records of past events, loss and damage databases, PDNA: less than 5 years old, findings compiled and validated by key stakeholders	Partially available	Loss and damage (mainly of floods) data since 1996 is available in CamDi. Climate vulnerability is discussed in the Cambodia's Third National Communication submitted to UNFCCC in 2022. The key vulnerable sectors discussed include agriculture, water resources, health, and coastal areas, plus the cutting-edge sector of gender (see 1.3.a for link).
Outcome 6: ILK for Risk Knowledge	2.6. Local and Indigenous knowledge (ILK) integrated into risk assessments	2.6.a. Statistical working system in place to collect, manage and analyse risk information and incorporate local and community level data: updated every 5 years.	Not available	National Committee for Sub-National Democratic Development (NCSDD) runs the Cambodia Commune Database (CDB). Data are updated annually. CDB collects basic demographic, socio and economic information aggregated by village, commune, and district levels. It collects basic information on the number of minority/indigenous households living in different communes. There is no national system that would systematically work with this data for risk assessment or related purposes.
		2.6.b. Compilation of Indigenous / local knowledge used by local communities to identify risks	Not available	No indigenous/local knowledge systematically compiled for risk assessment purposes. See above.
Outcome 1: Production of RK	2.7. Activities that increase or compound risks (e.g. urbanization and land use) identified and evaluated *(Advanced capability, to be considered if relevant)*	2.7.a Reports assessing relevant risk drivers at national level: e.g. urbanisation, food production, infrastructure, demographics, land use patters	Not available	
Outcome 3: Use of RK for EWS	2.8. Risk assessment results integrated into local risk management plans and warning messages in a clear and easy-to-understand language with attention to how different people access information	2.8.a. National and local DRR/M plans with a quantitative section on vulnerability, exposure and historical loss	Partially available	NAP-DRR 2018-2023 has a quantitative description by drawing information from external studies. At the provincial level, number of vulnerable groups derived from the IDPoor data.
		2.8.b. Early warning systems messages, triangulated with hazard, vulnerability and exposure data	Partially available	Pre-recorded EW voice messages disseminated to certain people (subscribers) via EWS1294 through phone calls, telegram, radio or urban loudspeakers. EWS1294 is managed by NCDM and uses sonar-based river sensors. Forecasting info from MoWRAM is considered when deciding about alert dissemination but no standardized protocol is in use. In general, available flood forecasting products remain unreliable and are not impact-based with sector-specific advisories. Some non-Khmer-speaking minorities (e.g. Vietnamese communities) may have limited access to warning alerts.
Outcome 6: ILK for Risk Knowledge	2.9. Legislation and cultural norms assessed to identify gaps that may increase vulnerability	2.9.a. Risk and EWS perception studies	Available	A Third Study on Understanding Public Perception of Climate Change in Cambodia: KNOWLEDGE, ATTITUDES, AND PRACTICES, 2021 (KAP 3). Last iteration commissioned by MoE aims to generate evidence of Cambodians' experience of changes in the weather and their environment to inform future communication strategies and government interventions. Unclear whether this information is used by NCDM to inform EPR. KAP 4 study to be published in Q2-2024. https://ncsd.moe.gov.kh/resources/document/KAP3_EN

Outcome 5: Stakeholder coordination	**3. Are roles and responsibilities of stakeholders identified?**			
Outcome 5: Stakeholder coordination	3.1. Key national government agencies involved in risk assessments are identified and roles defined through official / legal mechanisms	3.1.a. Agencies have assigned mandates, roles, responsibilities and technical focal points on EW	Available	DM Law of 2015. NCDM main coordinating body; each line ministry expected to have focal point for DRR (not specifically EWS) but in practice these are often not available.
Outcome 5: Stakeholder coordination	3.2. Legislation or government policy mandating the preparation of hazard, vulnerability and capacity assessments for all areas are in place	3.2.a. Official legislation, policy documents and mandates developed and endorsed	Available	DM Law of 2015. NAP-DRR 2024-28 (pending endorsement) Cambodia Climate Change Strategic Plan (CCCSP) 2013-2023 NDC Commitments. MoWRAM's role in NDC is to "establish a national climate and food warning system, including a service center and flood emergency response plans"
Outcome 5: Stakeholder coordination	3.3. Responsibility for coordinating hazard identification and risk information assigned to one national organization with a view to consolidating approaches and monitoring linkages and cascading impacts	3.3.a. National focal agency with an official mandate on risk information	Available	NCDM as per DM Law.
Outcome 5: Stakeholder coordination	3.4. Standardised process developed for scientific and technical experts to assess and review the accuracy of risk data and information	3.4.a. Team of experts trained in the collection, production, verification, use and dissemination of risk information	Partially available	Capacities to collect post-impact information using PRISM tool, CamDi system for loss & damage. Adequate skills for monitoring flood risks and disseminating alerts via EWS1294 exist at NCDM/PCDM level. No practice of carrying out systematic risk assessments as part of preparedness activities, partly due to no budget and human resources.
Outcome 5: Stakeholder coordination	3.5. Process developed to actively engage rural and urban communities in local hazard and risk assessments taking into consideration the needs of all people (women, children, older people, people with disabilities, etc.)	(same as 2.4.a above)	Partially available	Provincial and local stakeholders involved in contingency planning exercises in priority provinces. No systematic hazard risk assessments conducted.
Multiple	**4. Is risk information consolidated?**			
Outcome 2: Open Access to Risk Information	4.1. Central standardized repository (including but not limited to a Geographic Information System) established to store all event/disaster and risk information	4.1.a. Risk information database(s), server(s) and knowledge platforms: on top 5 hazards, updated every 5 years and servers serviced annually	Partially available	**NCDM** - CamDi stores information on loss & damage; PRISM has recent historical data on flood hazard events and their impact. There is no multi-hazard IM system in the country. **MoE** - NCSD Portal: Vulnerability Index (VI) available for 3 hazard types (storm, flood and drought) from 2014 until 2022
Outcome 4: Monitoring & Evaluation	4.2. National standards (where possible following international standards) established for the systematic collection, sharing and assessment of risk information and data, related to hazards, exposures, vulnerabilities and capacities (utilising a gender responsive process when possible)	4.2.a. National progress on Target G reported in the Sendai Framework Monitor for the past 5 years	Partially available	The country has not reported on Target G on Sendai Framework Monitor yet. The process of EW4ALL gap analysis will help report on Target G. More details in Cambodia Voluntary Review report on the Sendai Framework implementation was published in Oct 2022. Link: https://sendaiframework-mtr.undrr.org/publication/cambodia-voluntary-national-report-mtr-sf
		4.2.b. Set of national statistical standards for risk information: collection, management, analysis, use and dissemination of risk data and information, updated every 5 years.	Partially available	CamDi is a product of the Sendai implementation managed by NCDM that can be considered as the national statistical standards for risk information. However, the current CamDi focuses on data records on the loss and damage of past disaster events.

Outcome 1: Production of RK	4.3. Standardized vulnerability data and information disaggregated by sex, age and disability	(same as 2.4.a. above)	Available	Cambodia has poverty-based approach to vulnerability through system called 'IDPoor' managed by MOP. Social assistance programs support prioritized IDPoor categories of populations. https://idpoor.gov.kh/en/
Outcome 1: Production of RK	4.4. Process established to maintain, regularly review, and update risk data, including information on any new or emerging vulnerabilities and hazards, with roles and responsibilities of stakeholders identified along with appropriate funding	(same as 4.2.a. above)	Not available	
Outcome 3: Use of RK for EWS	**5. Is risk information properly incorporated into the early warning system?**			
Outcome 3: Use of RK for EWS	5.1. Information on the geographical extent of hazards used to define safe areas and evacuation zones	5.1.a. Evacuation routes, maps and safe areas maps (including shelters) that use risk, vulnerability and exposure information, assessments, models, projections, and general knowledge (scientific and traditional)	Partially available	Provincial contingency plans contain a list of safe sites (typically public buildings in the area such as schools or pagodas). No national level system to keep track of available safe sites across the country. CPs also contain basic information for emergency situations, including maps. However specific assessments, models or projections are not part of the standard processes.
Outcome 3: Use of RK for EWS	5.2. Risk information on vulnerable groups (hazard, exposure, differential vulnerability) used to identify and define evacuation routes and location of temporary shelters	(same as 2.4.a. above)	Partially available	No specific plans for vulnerable groups. Temporary shelters usually identified ahead (mostly pagodas, schools) and used by all evacuated community members.
Outcome 3: Use of RK for EWS	5.3. Risk information on different types of assets, critical infrastructure, services and businesses reviewed to outline procedures to minimize damage or loss of such assets once a warning is issued	(same as 5.1.a. above)	Partially available	Information available only as part of post-impact rapid needs assessment carried out by PCDMs, and a more detailed assessment of damages by line ministries later on. Information on critical assets not integrated into preparedness activities.
Outcome 2: Open Access to Risk Information	**6. Is there open access to risk information nationally and at the local level?**			
Outcome 2: Open Access to Risk Information	6.1. Up-to-date risk information is easily accessible by relevant stakeholders at the national level	6.1.a. National open-access platforms (websites, databases, etc.) used to store, access, share and disseminate up-to-date and anonymised risk information	Available	**NCDM** - CamDi, PRISM and EWS1294 accessible to NCDM and shared with national stakeholders on request. Some level of information at PRISM, CamBi and EWS1294 is open source. Sensitive risk information not available to public. **MoE** - updated risk information available at the NCSD Portal: Vulnerability Index (VI) available for 3 hazard types (storm, flood and drought) from 2014 until 2022
Outcome 2: Open Access to Risk Information	6.2. Up-to-date local-level risk information is easily accessible by local authorities, communities and the public	6.2.a. Local open-access platforms (websites, databases, etc.) used to store, access, share and disseminate up-to-date anonymised risk information	Partially available	Above databases/websites freely accessible but with limited uptake at local levels
Outcome 7: Innovation for RK	**7. Are innovations promoted for risk knowledge scale-up and improvement?**			

Outcome 7: Innovation for RK	7.1. New or advanced technologies employed for the collection, production, analysis, dissemination and use of risk information	7.1.a. Any use of remote sensing technologies, including geographic information systems (GIS) and open-sourced satellite information, in-situ data collection technology, digital-based (e.g. mobile or tablet-based) data collection technology and storage, cloud-based computing, digital communication tools and web or mobile-based apps	Available	PRISM system is made up of KoBo-based electronic tables for rapid post-impact data collection & visualization dashboard for field reports (available to NCDM only) and global/local datasets, such as NASA-SERVIR, HydraFloods, EWS1294, IDPoor etc, using live APIs. CamDi is a digitalized database for loss & damage. EWS1294 uses sonar-based river sensors and IVR technology for alert dissemination; sms broadcasting system is currently being piloted by PIN together with Smart Axiata & NCDM.
Multiple	**8. Does risk knowledge incorporate environmental dimensions?**			
Outcome 1: Production of RK	8.1. Assessment and quantification of exposed species is conducted and mapped for relevant hazards	8.1.a. Geographic Information Systems (GIS) used to prepare vulnerability maps;	Available	
		8.1.b. Statistical working system to collect, manage and analyse data on environmental vulnerabilities (updated every 5 years);	Not available	
		8.1.c. Inventories of vulnerable species and ecosystems, updated every 5 years	Partially available	The Convention on Biological Diversity: Cambodia Country Profile on Biodiversity: Status and trends of biodiversity, including benefits from biodiversity and ecosystem services. Link: https://www.cbd.int/countries/profile?country=kh
		8.1.d. Hazard maps overlaid with biodiversity data	Not available	
Outcome 1: Production of RK	8.2. Historical data on hazards and their environmental impact has been collected	8.2.a. Digital databases of historical data on environmental impacts, covering last 20 years and updated annually	Not available	CamDi shows data on the impacts since 1996, but no information about the environmental impact.
Outcome 6: ILK for Risk Knowledge	8.3. Local and indigenous knowledge on environmental vulnerabilities is integrated into risk assessments	8.3.a. Risk assessments include local and indigenous knowledge about environmental vulnerabilities;	Available	A Third Study on Understanding Public Perception of Climate Change in Cambodia: KNOWLEDGE, ATTITUDES, AND PRACTICES, 2021. by MoE.
		8.3.b. Digital systems in place to enable communities to collect and report environmental data	Not available	
Outcome 5: Stakeholder coordination	8.4. Scientific community is engaged for analysis of environmental risks and vulnerabilities associated with climate change	8.4.a. Scientific reports and articles on the climate-biodiversity nexus are prepared	Partially available	Project-based support. Environmental Performance Index (EPI), 2022 https://epi.yale.edu/epi-results/2022/country/khm CCCA3 engaged with local universities providing grants to support specific research and PhD students on climate change. Even if nothing specific on EWS has been done yet, the good collaborations established with ITC, RUPP and NUBB could be further explored
Outcome 3: Use of RK for EWS	8.5. Identified risks are included in environmental management plans and strategies	8.5.a. Environmental management plans and strategies cover climate-related hazards and associated risks	Partially available	In the latest CCCSP 2013-2023, broad climate risks were identified. Following this CC Action Plan (CCAP) 2014-2018 was established at over 10-line ministries including agriculture, water resources, energy, rural development, public works and transport, health, education, and women's affairs, in which climate-related risks and impact were typically identified. Currently there is the National Sustainable Development Plan (NSPD) 2024 – 2028 and the new CCCSP 2024-33 ongoing update.

Outcome 5: Stakeholder coordination	8.6. Partnerships with relevant stakeholders in environmental protection are established; these stakeholders have been engaged in the development of disaster risk reduction strategies	8.6.a. Relevant stakeholders engaged in environmental protection have assigned mandates, roles, responsibilities and technical focal points on disaster risk reduction	Not available	NAP DRR 2024-28 consultation process brought together several partners active in DRR and focused on investments needed in disaster risk reduction for resilience, risk governance and enhance the preparedness, response and recovery, not environmental protections.
Outcome 2: Open Access to Risk Information	8.7. Institutional arrangements and technical capacity are in place to exchange environmental hazard data between relevant stakeholders (NMHS, environmental agencies)	8.7.a. Institutional arrangements and digital infrastructure are in place to enable data exchange between relevant stakeholders	Not available	

PLEASE NOTE: WMO IS LEADING THE DATA COLLECTION EFFORT FOR PILLAR 2 WITH WMO'S MEMBERS, THE NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES. PLEASE USE THIS SURVEY TOOL FOR INFORMATION ONLY AS ADDITIONAL ACTION WITH WMO MEMBERS COULD BE A DUPLICATION OF EFFORTS.

EWS Value Chain	#	Name	Question	Answers	Follow-up question	Hazard-based	Resource Materials	Comments
0. PILLAR CROSS-CUTTING	**0**	**Priority Hazards**	**What are the priority hazards for your country/territory?**	**Biomass burning plumes Wild land fire/Forest fire Tornado Storm surge/Coastal flood**	**What are the top 5 hazards? Tropical cyclone Riverine floods Flash floods Storm surge/Coastal flood Dry spell/Drought**	**Yes**		**I would recommend to change "Storm surge/Coastal flood" with "lightening" (As storm surge rarely occur in coastal area of Cambodia), also put Drought/Dry spell/heatwave**
a. Governance, management and institutional mechanisms	a.01	8.07 MHEWS Regulating Act	In your country or territory, is there a law, decree or other legislative act on Multi-Hazard Early Warning Systems? (e.g. national warning policy)	Law; Decree; Other legislative act; None		No	MOWRAM was created based on Proclamation NS/RKM/0699108, dated 23 June 1999; Five-Year Strategic Plan for Water Resources and Meteorology. The relevance of hydro-meteorological early warning is also highlighted in many other national policies and plans including, but not limited to, the following: - Law on Disaster Management, NS/RKM/0715/007 (2015) - National Disaster Risk Reduction Framework 2019-2030 - National Action Plan for DRR (NAP-DRR) 2019-2023 and its preceding iterations - NAP-DRR 2014-2018 and SNAP DRR 2008-2013 - Cambodia Climate Change Strategic Plan 2014-2023 - Climate Change Action Plan for Water Resources and Meteorology 2014-2018, and Climate Change Action Plan for Disaster Management Sector 2014-2018 - National Strategic Development Plan (NSDP) 2019-2023, and its preceding iteration - NSDP 2014-2018	MOWRAM was created based on Proclamation NS/RKM/0699108, dated 23 June 1999. Its duties and responsibilities include the following: Establish political and strategic position with respect to water resources availability for local development, and its sustainability at national and international scale; Carry out scientific research on the potential of underground and surface water resources; Set directions and roadmap in the short-, medium- and long-term with respect to water consumption to fulfil the needs for the country's development; Control and monitor water consumption to mitigate risks; Prepare and draft laws and regulations linked to the use and control of water Gather documents and technical data/research about climate and hydrology, as well as water use; Provide technical advise to, and raise the awareness of, the industry, NGOs, communities and populations about the development and use of water resources; Communicate and promote innovative techniques on water treatment and use; Collaborate and participate in the management of the Mekong Basin in the management of water resources, as well as in meteorology. The Ministry regularly outlines its medium-term progress, as well as plans, in its Five-Year Strategic Plan for Water Resources and Meteorology, the latest iteration of which is for the years 2019 to 2023. In the document, MOWRAM identified achievements for 2014 to 2018 as well as plans for 2019 to 2023. To date, however, there is no specific hydro-meteorological policy, strategy or action plan that would guide the DOM and DHRW in such areas as: i) hydro-meteorological network improvement, expansion and maintenance, ii) hydro-met data policy, iii) human resource development, iv) monitoring, forecasting and interpretation for users, and v) resource mobilization and financial sustainability that would ensure sustained and effective provision of early warning and climate services to priority sectors.
a. Governance, management and institutional mechanisms	a.02	SOPs and roles established among warning agencies	Are **roles and responsibilities** of all organizations generating and issuing warnings established and mandated by legislation or other authoritative instrument?	Yes		Yes		
a. Governance, management and institutional mechanisms	a.03	8.04 National committee or platform composed of ministries, agencies and other stakeholders in place at the national or sub-national levels, which coordinates Disaster Risk Reduction activities	Is there a national committee or platform composed of ministries, agencies and other stakeholders that coordinates Disaster Risk Reduction activities at the national to sub-national levels?	Yes		No	The promulgation of the Law on Disaster Management on 30 June 2015	The highest national designated institution for disaster management in Cambodia is the National Committee for Disaster Management (NCDM), which was established in 1995 with the mandate of facilitating and coordinating multi-ministry response to emergency and disaster events. The NCDM is tasked to lead, administer and coordinate all disaster management activities required to respond to either natural or human-made disasters in Cambodia. It is responsible for issuing policies, strategic plans, plans of action, regulations, guidelines, programmes and projects across the whole spectrum of disaster management from prevention, mitigation, preparedness, emergency response and recovery. Following the NCDM, committees are formed at the subnational and local levels including the Provincial Committees for Disaster Management (PCDM), District Committees for Disaster Management (DCDM), and Commune Committees for Disaster Management (CCDM). In some areas, Village Disaster Management Groups (VDMG) are also formed under the CCDM.
a. Governance, management and institutional mechanisms	a.04	8.05 NMS membership in the national DRR mechanism	If yes, is your NMS a member?	Yes		No	N/A	The NCDM meets at least once a year, and may invite representatives of ministries, institutions, public sector, private sector, development partners, and civil society to participate in the consultation meeting, and conduct research on issues associated with disaster management. In particular, the Department of Meteorology (DOM) and Department of Hydrology and River Works (DHRW) through MOWRAM are involved, being the agencies mandated to provide early warning and advisory on flood and drought management.

a. Governance, management and institutional mechanisms	a.05	NMHS officially recognized as a national alerting authority	Is your NMHS officially recognized as the national alerting authority for hydrometeorological hazards in your country or territory?	Yes		Yes	N/A	DOM is responsible for all meteorological observations and for issuance of weather forecasts, climate information products, and severe weather warnings to support disaster risk management. DOM provides weather services for roads and railways, tourism, marine, and other sectors. DHRW, on the other hand, maintains and monitors hydrological stations along the river systems of Cambodia. DHRW is also responsible for flood forecasting and for issuing forecasts of water levels for the Mekong River and the Tonle Sap Lake system (MOWRAM, 2017).
a. Governance, management and institutional mechanisms	a.06	Agreements and interagency protocols established for data exchange of monitoring systems and baseline data necessary to produce data products (e.g. bathymetric and topographic data for tsunami modelling) for all priority hazards	Are agreements and interagency protocols established for data exchange of monitoring systems and baseline data necessary to produce data products for all priority hazards?	No		No	N/A	There is no clear data sharing policy in place between MOWRAM and sectoral agencies. For mid- to long-term arrangements, related ministries and agencies may pursue an MoU or Letter of Agreement with MOWRAM for sharing of data.
a. Governance, management and institutional mechanisms	a.07	Cross-border exchange of warnings with neighbouring countries realised through bilateral/multilateral agreements for all priority hazards	Are cross-border exchanges of warnings with neighbouring countries realized through bilateral/multilateral agreements?	Yes	If yes, please specify	No	Regional Support Forecasting Centre, Ha Noi Mekong River Commission	DOM and DHRW (as NMHS) collaborate with the Mekong Region for sharing of hydro-meteorological data and products. Under the WMO forecast demonstration project, DOM receives NWP products and support in terms of data sharing, strengthening forecasting capability, and training of staff.
b. General observation capacity	b.01	Large data gaps	Are there areas of the country where observations are missing (e.g. due to geographical, political or other reasons)?	Yes	If yes, please specify	No	N/A	There are no automated hydro stations within the Ratanakiri, Mondulkiri, Tboung Khmom and Svay Rieng provinces. DHRW aims to increase their hydrological stations from 80 to 400 to cover the country's river basins. There are plans to coordinate with PDOWRAM for the proposed additional stations, but DHRW relies heavily on donors and implementing partners to fund the investment costs for new station installations. DOM currently operate 86 AWS, and plan to increase it up to one in each district (around 170)
b. General observation capacity	b.02	Average horizontal resolution in km of both synoptic surface and upper-air observations,	How many synoptic surface observation stations does your NMHS operate?	(86 AWS, 238 manual raingauges)		No	N/A	
b. General observation capacity	b.16		WIGOS-compliant surface stations	15 are WIGOS compliant & reporting to the GTS		No	N/A	
b. General observation capacity	b.03	Temporal frequency of surface observations	What is the temporal frequency of synoptic surface observations?	Hourly	If other, please specify	No	N/A	
b. General observation capacity	b.04	Upper-air observations conducted	How many upper-air observation stations does your NMHS operate in your country or territory?	None		No	N/A	
b. General observation capacity	b.05	Temporal frequency of upper-air observations	If upper-air observations are conducted, what is their temporal frequency?	N/A	If other, please specify	No	N/A	
b. General observation capacity	b.06	Stations not operable	What is the number (or percentage) of stations currently not operable in your country or territory (silent stations)?	35 met stations, 80 Hydro Station (water level)		No	N/A	
b. General observation capacity	b.07	Percentage of the surface observations that depend on automatic techniques	What percentage of your observing network has been automated?	DOM: 36%, DHRW: 70%		No	N/A	
b. General observation capacity	b.08	New automatic stations deployed over the last 5 years	In the last 5 years, how many new automatic weather stations have been deployed?	27		No	N/A	
b. General observation capacity	b.10	Near-real-time data availability	Are observational data delivered in near-real-time to the national meteorological centre (NMC)?	Yes (for automatic stations)		No	N/A	

b. General observation capacity	b.11	Regular calibration and maintenance of the observing systems	Does your NMHS have the capacity to perform regular calibration, quality control and maintenance of the observing systems in operation?	In part; No	If yes, please specify	No	N/A	
b. General observation capacity	b.12	Arrangement with Regional Instrument Centre (RIC)	Is there an arrangement with a Regional Instrument Centre (RIC) to assist you in the calibration of your observing stations?	No		No	N/A	
b. General observation capacity	b.14	Other observational data sources	Do you receive/use observational data from other data sources, e.g., from other governmental agencies, research projects, or private sector?	No	If yes, please specify	No	N/A	
b. General observation capacity	b.15	5.20 Observations not transmitted to GTS/WIS.	Does your NMHS have observations that are not transmitted to GTS/WIS for your own purpose?	Yes		No	N/A	
c. Hazard-specific observations	c.01	Adequate observation capacity	How would you rate the adequacy of your NMHS current observing capacity to monitor the most frequent and impactful hazards affecting your country?	3-Moderate; some observation gaps and data quality issues, limited access to remote sensing products and other data, moderate data coverage, temporal and spatial resolution for each priority hazard		Yes	N/A	Based on the information WMO has, 3-Moderate; some observation gaps and data quality issues, limited access to remote sensing products and other data, moderate data coverage, temporal and spatial resolution for each priority hazard Despite large investments in recent years, MOWRAM experience challenges with their observation network, please see below: Due to piecemeal investments from different donors and implementing partners, DOM faces numerous challenges in its observation network and data management infrastructure. For instance, the installation of different equipment brands and auxiliaries from three projects means that DOM staff need to be trained in the operation and maintenance of at least three different systems. In addition to this challenge, the estimated 12 staff in the equipment office have little to no understanding of English. Most equipment installers and trainings on equipment operation and maintenance are provided/conducted in English. On the other hand, DHRW maintains only one station brand and therefore does not have similar challenges as DOM when it comes to operation and maintenance as well as compatibility and interoperability of systems and data. Both DOM and DHRW have a limited number of spare sensors and other replacement parts procured together with the purchase of new stations. But when these spare parts are used up, it is relatively difficult to obtain more. There is limited funding available to support routine maintenance activities of stations, which require purchase of spare parts and substantial travel and accommodation costs of staff from Phnom Penh. DOM and DHRW indicated that provincial staff in the Hydro-Meteorology Offices of PDOWRAM have limited understanding of equipment operation and maintenance, therefore it is challenging for them to assist with troubleshooting and repair. Maintenance activities of hydrological stations are conducted by DHRW staff from Phnom Penh. In the case of DOM, the AWS operation and maintenance is currently performed by 2 IT staff who have become familiar with the systems. They diagnose the stations remotely, and when there are issues, they refer to the supplier/manufacturer for on-site repair. Both DOM and DHRW do not have a unified data management system. In addition, DOM does not have an integrated database. Data from SUTRON, ADCON, WEATHEX systems and those from manual stations are stored in separate databases, and may be viewed in different platforms
c. Hazard-specific observations	c.03		Which variables do you monitor for each hazard?	Tropical cyclone - wind s&d, pressure, precipitation; Riverine flood - precipitation, water level and discharge; Flash flood - precipitation; Storm surge / coastal flood/ Lightening - precipitation, wind; Drought/Dry spell/heatwave - precipitation, temperature, evaporation		Yes	EW4ALL rapid assessment	

c. Hazard-specific observations	c.02		What are the main gaps in your NMHS's capacity to monitor your country or territory's priority hazards?	Lack of observation stations; Insufficient automation of the observation network; Insufficient (near-) real-time access to observation data; Lack of remote sensing data; Insufficient data quality control; Lack of monitoring capacity of additional variables; insufficient of data processing and storages infrastructure and Others.	If you chose "other", please specify	Yes	EW4ALL rapid assessment	
c. Hazard-specific observations	c.04		What additional variables would you need to monitor for these particular hazards, if any?	Remote sensing data; water discharge; soil moisture; lightning sensors, buoys, tidal gauges, wave height, length, frequency etc. Some parameters for other sectors such as Agriculture, Aviation, Navigation, Marin, Industrial and so on.		Yes	EW4ALL rapid assessment	
d. Remote-sensing data	d.01	Use of satellite data to monitor hazards	Is your NMHS using satellite data to monitor priority hazards in your country or territory?	Yes		Yes	EW4ALL rapid assessment	Cloud and rainfall observation (Japanese satellite and Korean satellite)
d. Remote-sensing data	d.02	Satellite data reception stations operational in NMHS or other means of accessing satellite data used (e.g., internet)	What means do you use, if any, to access satellite data?	Satellite reception stations; Internet	If other, please specify	No	EW4ALL rapid assessment	
d. Remote-sensing data	d.03	Staff trained on remote-sensing data access and usage	Are the NMHS staff trained on remote-sensing data access and interpretation?	Yes		Yes	EW4ALL rapid assessment	Yes, for flash floods, riverine floods and tropical cyclones only
d. Remote-sensing data	d.04	Use of radar data to monitor hazards	Is your NMHS using radar data to monitor priority hazards in your country or territory?	Yes		No	'EW4ALL rapid assessment	1 radar in Phnom Penh
e. Data sharing and data management	e.01	Data rescue performed across variables and records available	Is data rescue performed across variables and records available to allow for identification of weather and climate hazards over long time series?	Yes, in part		No	'EW4ALL rapid assessment	
e. Data sharing and data management	e.02	5.08 NMS access to products provided by WMO global and regional centres	How would you classify the access your NMHS has to products provided by WMO global and regional centres?	Highly reliable access		No	'EW4ALL rapid assessment	
f. General forecasting capacity	f.01	Deterministic NWP	Do you release forecasts and warnings based on deterministic NWP?	Yes	If yes, please specify which models do you use?	No	EW4ALL rapid assessment	access to ARPEGE Model, limited products access to NOAA-GFS, GSM (JMA)
f. General forecasting capacity	f.02	Probabilistic NWP	Do you release forecasts and warnings based on probabilistic NWP?	Yes (I would say no)	If yes, please specify which models do you use?	No	EW4ALL rapid assessment	limited product access to Tokyo climate centre products for forecasting DoM release only deterministic forecast based on forecaster analysis skill
f. General forecasting capacity	f.03	5.99 NWP and ESP products	Does your NMS have the capacity to post-process Numerical Weather Prediction (NWP), including Ensemble Prediction System (EPS) products?	Yes, limited capacity		No	'EW4ALL rapid assessment	
f. General forecasting capacity	f.04	5.17 Access to forecast products from WMCs/RSMCs.	Do you use forecast products from World Meteorological Centres (WMCs)/ Regional Specialized Meteorological Centres (RSMCs) including Regional Climate Centres	Yes		No	'EW4ALL rapid assessment	DoM used the information provided from their website, no direct data transfer to our server. Except for data from ARPEGE, GSM, NOAA-GFS

			(RCCs) to assist with your service delivery? (relevant centres are: TBD per Member)					
f. General forecasting capacity	f.05	5.18 Type of WMC/RSMC products.	If yes, please select the types of products:	Gridded data; Charts; Texts		No	'EW4ALL rapid assessment	
f. General forecasting capacity	f.06	5.19 Use of grided data	If you marked "gridded data" in the above question, please select the relevant activities you use these data for.	Operating limited-area models Postprocessing		No	'EW4ALL rapid assessment	
f. General forecasting capacity	f.07	RSMCs guidance usage	Do you use the guidance products provided by the RSMCs? (only if they are covered by one)	Yes		No	'EW4ALL rapid assessment	
f. General forecasting capacity	f.08	Staff trained to access and use WMCs/RCs products and guidance for forecasting of hazards	Are NMHS staff trained to access and use WMCs/RCs products and guidance for forecasting of hazards?	Yes	If yes, please specify	No	'EW4ALL rapid assessment	Staff are trained to operate limited area model (ARPEGE) and also access to products from WMO RSMC, SWFP, TCP and Tokyo Climate Center
f. General forecasting capacity	f.09	Sufficient number of trained forecasters	Does your forecasting centre have sufficient number of trained forecasters to provide early warning services?	No		Yes	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.01	6.04 Impact-based forecast and warning services produced/provided by NMS	Does your NMHS produce/provide impact-based forecast and warning services?	No		No	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.02	Staff trained on IBF	Have your forecasters been trained in the principles, methods and application of IBF?	Few		Yes	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.03	Access to impact information	Do you have access to impact information (incl. across sectors) and post-disaster analytics from relevant stakeholders to incorporate in your IBF?	No	Please specify	No	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.04	Hazard-specific impact models	Do you use hazard-specific impact models?	No		No	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.05	Other agency responsible for impact modelling	If not, is another agency/ministry in your country/territory responsible for impact modelling? (by hazard/sector)	No		No	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.06	8.14 Hazard, exposure and vulnerability information used in country as an input into emergency planning and the development of warning messages	Does your NMHS use hazard, exposure and vulnerability information as an input into the development of warning products?	No	If yes, please specify	No	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.07	Risk information provided by relevant authority	If yes, has such information been provided by the relevant authority (e.g., the national disaster management agency) in the form of hazard/risk maps?	No	If yes, please specify	No	'EW4ALL rapid assessment	
g. Impact-based forecasting capacity	g.08	Early warning messages for all priority hazards advise on actions that can be taken to reduce risks	Do the warning messages produced by your NMHS advise on actions that can be taken to reduce risks?	Yes	If yes, please specify	No	'EW4ALL rapid assessment	

g. Impact-based forecasting capacity	g.09		Does your NMHS have sufficient software tools to produce impact-based forecasts and warnings?	No	If not, please specify:	No	'EW4ALL rapid assessment	IBF Systems (Hardware & software), analysis, studies and capacity building are needed
h. Warning services and MHEWS operations	h.01	*8.06 Multi-Hazard Early Warning System (MHEWS) in place in the country*	Does your country have a Multi-Hazard Early Warning System (MHEWS)?	No		No	EW4ALL rapid assessment	
	h.02	8.08 Multi-hazard monitoring and forecasting systems in the country	Does your country have monitoring and forecasting systems for multiple hazards occurring simultaneously or cumulatively over time?	No		No	EW4ALL rapid assessment	
	h.03	8.09 MHEWS warning of potential cascading impacts	If yes, does the MHEWS warn of any potential cascading impacts?	Yes; No		No	'EW4ALL rapid assessment	
	h.04	*8.99 Types of warning services*	Please indicate which of the following warning services your NMHS provides:	Storm surge/Coastal flood; Drought/Dry spell; Wind; Tropical cyclone; Thunderstorms/Squall lines; Rain/Wet Spell; Riverine Floods; Flashfloods		No	'EW4ALL rapid assessment	I would say only this information "Wind; Tropical cyclone; Temperature, Thunderstorms; Rain; Riverine Floods, ocean wave height"
	h.05	8.20 Time coverage of warning and alert service	Does the warning and alert service operate 24/7 all year-long?	Yes	If not, please specify:	No	'EW4ALL rapid assessment	
	h.06	Warning and forecast archival systems in place for all priority hazards.	Does your NMHS maintain a warning and forecast archival systems for all priority hazards?	Yes	If yes, please specify	No	'EW4ALL rapid assessment	Warnings are archived in website and official information early warning database of the government
h. Warning services and MHEWS operations	h.07	Monitoring data and metadata are accessible for verification, research purposes and other applications.	Are monitoring data and metadata accessible for verification of forecasts, research purposes and other applications?	Yes, in part		No	'EW4ALL rapid assessment	No automatic system to analyze the forecast skill
h. Warning services and MHEWS operations	h.08	6.13 NMS QMS	Does your NMHS implement a Quality Management System for the provision of meteorological, hydrological and climate warning services?	Yes, in part		No	'EW4ALL rapid assessment	I would say No. We don't such kind of system available
h. Warning services and MHEWS operations	h.09	NMHS that regularly review and report on the accuracy and timeliness of their forecasts	Does your NMHS regularly review and report on the accuracy and timeliness of the nationally issued forecasts?	Yes	If yes, please specify	Yes	'EW4ALL rapid assessment	Daily and seasonal forecasts accuracy are regularly reviewed No regular report on this
h. Warning services and MHEWS operations	h.10	Feedback mechanisms in place to verify warnings for all priority hazards	Are user feedback mechanisms in place to verify warnings (incl. for relevance, timeliness, etc.) for all priority hazards?	Yes		Yes	'EW4ALL rapid assessment	via comments from social media (Facebook...)
h. Warning services and MHEWS operations	h.11	Warning system(s) subjected to regular system-wide tests and exercises for all priority hazards.	Is the national MHEWS subjected to regular system-wide tests and exercises?	No		No	'EW4ALL rapid assessment	No national MHEWS in place
h. Warning services and MHEWS operations	h.12	Failsafes and business continuity plans	Are there fail-safe systems in place, such as power back-up, equipment redundancy and on-call personnel systems, including business continuity and contingency plans? (incl. infrastructure and operations)	Yes, in part	If not, please specify:	No	'EW4ALL rapid assessment	HQ has power backup; additional support needed for database and data line backups for full fail-safe systems. No on-call personnel system
h. Warning services and MHEWS operations	h.13	8.03 Delivery of NMHS warnings in CAP format	Is your NMHS delivering warnings using Common Alerting Protocol (CAP) format?	Yes		Yes	'EW4ALL rapid assessment	

h. Warning services and MHEWS operations	h.14	Warning dissemination channels	Which of the following communication channels are used in your country or territory to disseminate warnings to the public or other end-users?	TV; Radio; Web application (Third-party); E-mail; social media; Mobile phone application (Third-party)		No	'EW4ALL rapid assessment	
h. Warning services and MHEWS operations	h.15	Regional/local warning dissemination	Is your NMHS disseminating warnings at the regional and/or local level in your country or territory?	Yes	If yes, how? If not applicable, who is responsible for it?	No	'EW4ALL rapid assessment	NMS on national level, NHS on basin level (Mekong river commission)
h. Warning services and MHEWS operations	h.16	RAA information complete and up-to-date	Are the information on the Registry of Alerting Authorities for your country/territory complete and up-to-date?	No		No	'EW4ALL rapid assessment	
h. Warning services and MHEWS operations	h.17	8.22 Standard Alerting Procedures in place with registered authorities and stakeholders	Are standard alerting procedures in place with registered alerting authorities?	No		No	'EW4ALL rapid assessment	
h. Warning services and MHEWS operations	h.18	8.18 Performance and role of NMS evaluated (e.g. service delivery and coordination) within the national MHEWS/DRR platform	Does your NMHS evaluate its performance and role (e.g. service delivery and coordination) within the national MHEWS/DRR platform?	No		No	'EW4ALL rapid assessment	
h. Warning services and MHEWS operations	h.19	Effectiveness of NMHS service to save lives and reduce loss	How would you rate the effectiveness of your NMHS service to fulfil the MHEWS major goals of saving lives and reducing material loss?	1-5 scale (from not effective to very effective) 3 - moderate		No	'EW4ALL rapid assessment	I would rate this as "3"
i. Cross-cutting enablers	i.01	4.01 Total annual budget of NMS	What is the total annual budget of your institution? Please indicate the currency and the year.	Total budget: App. USD 300,000 2024		No	'EW4ALL rapid assessment	
i. Cross-cutting enablers	i.02	4.05 Percentage of budget going to	What is the approximate percentage of this budget that goes to:	Staff cost (35%); Operational costs (65%); Investments; Other		No	'EW4ALL rapid assessment	
i. Cross-cutting enablers	i.03	Stability and speed of internet bandwidth at NMHS HQ	What is the stability of the internet bandwidth available at your NMHS HQ/national meteorological centre (NMC)?	limited and upgrade is needed		No	'EW4ALL rapid assessment	
i. Cross-cutting enablers	i.04		What is the download speed of the bandwidth available?	10 Mbps		No	'EW4ALL rapid assessment	
i. Cross-cutting enablers	i.05		What is the upload speed of the bandwidth available?	11 Mbps		No	'EW4ALL rapid assessment	
z. Socio-economic benefits (SEB)	z.01	6.08 Studies on socio-economic benefits undertaken in the last 10 years	Have any studies of the socioeconomic benefits of hydrological, climatological, and meteorological services been undertaken in your state/territory?	No		No	'EW4ALL rapid assessment	No SEB studies have been conducted
	z.02		If yes, and if available, please provide the title of the study, the year of the publication and a link to the document(s).	0-Jan		No	'EW4ALL rapid assessment	
	z.03		If yes, how frequently are the SEB studies updated in your country/territory?	N/A	If other, please specify	No	'EW4ALL rapid assessment	
	z.04		If yes, for which sector(s) were SEB studies conducted?	N/A	If other, please specify	No	'EW4ALL rapid assessment	
	z.05		If yes, who conducted the SEB studies in your country/territory?	N/A	If other, please specify	No	'EW4ALL rapid assessment	

Core Capability for Dissemination & Communication: Itemised Checklist

Key actors: National and local disaster management agencies; scientific and technical agencies such as meteorological and hydrological organizations, health authorities and geophysical agencies; military and civil authorities; telecommunication organizations (e.g. national telecommunication regulators, satellite and mobile-cellular network operators), media organizations (e.g. television, radio and social media) and amateur radio; businesses in vulnerable sectors (e.g. tourism, care facilities for older people, marine vessels); community-based and grassroots organizations; international and United Nations agencies

EW4ALL Pillar 3 Outcome	Component	Associated product, system or service	Self-assessed availability	Link to source / data (if available)
1. Are organizational and decision-making processes in place and operational?				
Outcome 1: Governance	1.1 Functions, roles and responsibilities of each actor in the warning dissemination process enforced through government policy or legislation at all levels and included in the warning communication strategies and standard operating procedures.	• Direct observation of existing policies, legislation, protocols and mechanisms related to the procedures of alert. • Interviews with key people associated with both political profiles as technical mechanisms • Interviews with key people associated to organizations of major groups (including community-based groups representing women, children and youth, people with disabilities, farmers etc)	Partially available	Prakas (Ministerial Decree) makes **MPTC** responsible for any emergency telecom-related issues, including early warning communications. MPTC, MoWRAM & NCDM are all involved in early warning monitoring, production and dissemination but their individual protocols/practices are not harmonized or centrally managed. Emergency Telecommunications Protocol under MPTC not established. Greater role of MPTC in national Emergency Telecom Cluster can support adoption of newer comms technologies for EW alert dissemination **MoWRAM, DOM, Office of Forecasting & Research,** is mandated to generate warnings and bulletins on potential dangerous extreme meteorological conditions. Under **DHRW, Office of Research & Flood Forecasting**, among other functions, provides water level and flood forecasts for dissemination. **NCDM** operates the river level monitoring and IVR-based early warning dissemination system 'EWS1294'. The system runs parallel to MoWRAM's warning bulletins and their dissemination through various channels. EWS1294 has 200,000 subscribers across all provinces.
Outcome 1: Governance	1.3 Regular coordination, planning and review meetings between the warning issuers, the media and other stakeholders	• Protocols for activation of the warning (if any) • Records and reports of simulation exercises and drills. • Women and men are both part of volunteer network trained and empowered to receive and widely disseminate early alerts to remote households and communities	Partially available	**NCDM** has a process/protocol but limited to flood warning alerts via EWS1294. Provincial/local departments are responsible for flood monitoring, using EWS1294, MoWRAM data (where available) and direct observation. Alert activation remains at the discretion of provincial governors. Annual refresher trainings and simulation exercises on EWS are organized by NCDM/PCDMs. In some places, Village Disaster Management Groups are active. **MoWRAM** warning bulletins are shared via various channels but are not sufficiently localized due to current bulletin structure and limited impact forecasting capacities.
Outcome 3: Inclusion and people-centered approach including	1.4 Professional and volunteer networks exist to ensure that last-mile stakeholder groups, receive and disseminate warnings widely	• Protocols for activation of the warning (if any) • Records and reports of simulation exercises and drills.	Partially available	Alerts via EWS1294 activated at provincial level (governor's call) for specific communes at risk. MOWRAM warning bulletins are distributed to sub-national levels but further last-mile dissemination processes are unclear and effectiveness varies across the country.

through existing local networks.	1.5 Communication strategies evaluated and feedback mechanisms in place to verify that warnings have been received and to correct potential failures in dissemination and communication, leading to trust among and between stakeholders.	• Two-way and interactive communication system allows for verification, so it can be determined that everyone has received warnings. • Records and reports of simulation exercises and drills. • Reviews on communication strategies	Not available	Two-way communication system for EWS1294 currently under development by PIN. Using Cell Broadcast would be more effective and affordable solution.
2. Are communication systems and equipment in place and operational?				
Outcome 2: Infrastructure networks and services	2.1 Understanding of last-mile connectivity to know which population groups can be reached by different services, including mobile-cellular, satellite and radio services	• coverage data on mobile phone coverage, radio and TV coverage and household availability, complemented by baseline assessment to understand a country's situation	Available	TRC, MPTC, ITU, telcos and GSMA
Outcome 2: Infrastructure networks and services	2.2 Warning communication and dissemination systems reach the entire population, including seasonal populations and those in remote locations, through multiple communication channels (satellite and mobile-cellular networks, social media, flags, sirens, public address systems, etc)	• Interviews with relevant institutions/NGOs/CBOs • Reviews on communication strategies • Two-way and interactive communication system allows for verification, so it can be determined that everyone has received warnings.	Partially available	EWS1294 alert messages reach service subscribers (up to date figures available from PIN). Reach by other channels (e.g. radio, TV, social media, public loudspeakers, informal channels, etc) is unclear.
	2.2.1 Mobile early warning systems, in particular cell-broadcast system and/or location-based SMS system, in place to alert the population via mobile network	• Record from Mobile Network Operators on using cell-broadcast and Location-based SMS.	Partially available	Cell Broadcast not available. EWS1294 uses voice messages based on IVR technology. SMS-broadcasting system currently in pilot phase, in partnership with Smart Axiata (multi-donor project implemented by PIN). Meftone/Celcard currently not engaged. Sub-decree on sms-broadcasting exists and calls on all Cambodian telcos to cooperate with NCDM and MPTC, but uptake remains limited.
	2.2.2 Agreements developed to utilize private sector resources where appropriate (e.g. mobile-cellular, satellite, television, radio broadcasting, amateur radio, social media) to disseminate warnings	• Agreements with private sector entities. • Multiple communication mediums for warning dissemination are used, encompassing those used or preferred by women.	Partially available	Yes, all telcos (i.e., Smart, Cellcard and Metfone) have enabled the use of number '1294' for warning alerts free of charge; small annual usage fee is charged to NCDM. Agreements exist with major radio broadcasters to use single telegram channels for receiving new ews1294 alerts and sharing them further through local radio networks. Need to evaluate if Telco's systems are supporting cell broadcast with small upgrades.
Outcome 2: Infrastructure networks and services	2.5 Early warning infrastructure and systems are tested, maintained and upgraded to ensure resilience, redundance, and functionality with back-up systems and processes in place.	• Schedule of equipment maintenance including upgrading • Record of communications systems including redundancies • Record of communications infrastructure • consultation with private sectors such as mobile network operators	Partially available	Maintenance of observation networks under MoWRAM and NCDM-run ews1294 river level sensors takes place irregularly. Main reasons are lack of resources (staffing, equipment, financial) that affect planning and viability of O&M for critical EWS infrastructure. MOWRAM does have annual O&M budget for observation network maintenance but appears underutilized.
3. Are impact-based early warnings communicated effectively to prompt action by target groups?				

Outcome 4: Quality and trust	3.1 Common alerting protocol (CAP) adopted for warning messages to make sure alerts sent across the different channels are consistent in order to avoid confusion and reinforce the message.	• Records of early warning messages • Records and reports of simulation exercises and drills. • Interviews with key technical officers, NGOs/CBOs • After action reviews • Studies to determine how people access and interpret early warning messages.	Partially available	Neither DOM and DHRW have capacities for impact-based forecasting and warning. They also do not use CAP when disseminating warnings and alerts. CAP introductory training was provided by WMO in September 2023 and a refresher given in Nov 2023. It is important for MOWRAM and NCDM to use the CAP tool to produce warnings and ensure that these warnings are registered in the CAP registry. EWS1294 has been standardized in line with CAP but each warning message is recorded individually, and it is unclear whether always fully following CAP standards.
Outcome 3: Inclusion and people-centered approach including through existing local networks.	3.3 Impact-based early warning messages should communicate risk clearly and provide advice on actions that can be taken to reduce risks		Partially available	see above
	3.4 In the case of events with a short timeframe for reaction (e.g. earthquake early warning), automated systems should be in place to mitigate impacts (e.g. automatic stop of transport, activation of red lights in tunnels, stopping elevators on the closest floor, opening of fire-truck gates, etc.		Not available	Cambodia's key climate-related hazards are floods, drought and storms. Current systems, such as EWS1294, have automation capacities but those have been discouraged across government agencies to avoid false alerts. Extreme hazard alerts require MOWRAM Minister's sign-off; EWS1294 alerts require provincial governor's approval. For CB and CAP and other solutions we have tried our best not to tailor solutions to nature of disaster e.g. same solutions for flooding or volcanic eruption, typhoons etc., but the emphasis is that solutions should be affordable and people in last mile (who can afford feature phone) also get the messages. Current EWS1294 system involves lot of manual distribution.
Outcome 3: Inclusion and people-centered approach including through existing local networks.	3.5 Public and other stakeholders are aware of which authorities issue the warnings and trust their message		Partially available	MOWRAM is the national authority issuing weather alerts. National study on how people access and interpret EW messages is yet to be carried out. Studies exist on the impact of ews1294 on a limited number of its subscribers. https://cambodia.peopleinneed.net/en/impact-assessment-on-ews1294-reach-on-vulnerable-groups-1867pub

Minimum Core Capability for Preparedness to Respond: Itemised Checklist				
EW4ALL Pillar 4 Outcome	**Preparedness to Respond Component** (compliant with CDEMA checklist, as well as CREWS and WMO)	**Associated product, system or service**	**Self-assessed availability**	**Link to source / data (if available)**
Outcome 1: Comprehensive Risk Management Policy, Laws and Strategies	**Is there a process to review crisis/disaster risk management and climate adaptation laws, policies and/or plans?**			
Outcome 1: Comprehensive Risk Management Policy, Laws and Strategies	Standard operating procedures are in place at country level: - Common Alerting Protocol (CAP) - Impact Based Forecasting & Warning Services (IBFWS) - Global Multi-hazard alert system (GMAS)	~	Partially available	Neither CAP, IBFWS nor GMAS used in MoWRAM systems. No specific law, regulation, norm exists to mandate integration of these approaches/systems. NCDM's EWS1294 system has been designed according to CAP principles and PCDM staff have been trained (although staff retention/turnover remains an issue)
Outcome 1: Comprehensive Risk Management Policy, Laws and Strategies	EWAA is integrated in district and community-level disaster risk management, climate, development and/or resilience planning (i.e. there are mechanisms to disseminate warnings and activate local plans ahead of extreme weather impacts)	~	Available	EWS1294 is managed at provincial level and alerts can be localized up to commune level. Protocols for activation exist, some provincial contingency plans refer to EWS1294 as go-to mechanism for warning dissemination. Commune development plans are updated annually but unclear if they include references to EWS1294 or other alert dissemination channels
Outcome 1: Comprehensive Risk Management Policy, Laws and Strategies	Broad multi-stakeholder forecast-based plans and protocols have been tested during the course of the last year to increase local capacities in Early Action Protocol (EAP) development, readiness and pre-positioning activities (e.g., civil society base, logistics, cash)	~	Not Available	
Outcome 1: Comprehensive Risk Management Policy, Laws and Strategies	Social protection systems integrate anticipatory action and preparedness, and can respond effectively to the diverse needs and impacts on affected people, incl. marginalised groups.	~	Not Available	MoSAVY and GS-NSPC were developing a national contingency plan for social assistance - a protocol for activating cash-based social support to specific categories of IDPoor HHs under 'Family Package'. The protocol envisioned EWS1294-based triggers. The project was stopped following leadership change after 2023 national elections but interest remains at GS-NSPC to explore trigger-based EA, in line with the Shock-Responsive Social Protection (SRSP) framework recently endorsed by the government.
Outcome 2: Local preparedness capacities	**Is there a mechanism to track how many warnings lead to the activation of early action protocols? Is there an increase year to year in this percentage?**			*Understanding people's different needs, risks and capacities (How a person's sex, gender identity, age, physical ability, ethnicity, nationality, and many other factors can influence how they are affected, how they can respond and recover) is reflected in above plans and scenarios, which seek to actively address exclusion by meaningfully involving and engaging excluded people.*

Outcome 2: Local preparedness capacities	Disaster preparedness, including plans or standard operating procedures, developed in a participatory manner, account for the needs of people with different vulnerabilities, and are disseminated to the community, practiced and underpinned by legislation where appropriate	• Disaster preparedness plans - SOPs - Response plans • Contingency plans • Legislation • Risk scenarios • Emergency preparedness and response plans are disseminated	Available	Contingency plan for floods exists at national level, updated annually. Several provincial contingency plans exist as well. Neither accounts for specific needs of vulnerable people. Provincial-level preparedness events, including contingency planning and simulation, are limited and entirely DP-supported given lack of budget for preparedness operations (often de-prioritized by communes themselves in their planning processes in favor of infrastructure projects)
Outcome 2: Local preparedness capacities	Multi-hazard risk assessments utilized to develop and update disaster preparedness plans and design evacuation strategies (evacuation routes, demarcation of safe areas and location of temporary shelters, use of vertical evacuation if needed) (Source: WMO Checklist)	~	Not Available	No multi-hazard risk assessments conducted. It is unclear to what extent preparedness plans and evacuation strategies use hazard risk information for informing EPR systems.
Outcome 2: Local preparedness capacities	Community's ability to respond effectively to early warnings assessed, particularly women and people in vulnerable conditions, and their capacities have been strengthened through training and equipping	~	Partially available	Typically project-based but not commissioned or used in EPR planning by NCDM. The Impact Assessment on EWS1294 Reach on Vulnerable Groups (People living with disabilities, elderly, women, and minority groups) provides an overview of key research findings on EWS1294's inclusiveness of vulnerable groups. The study was conducted in four provinces, Prey Veng, Stung Treng, Koh Kong, and Battambang provinces in the beginning of March 2022. https://cambodia.peopleinneed.net/en/impact-assessment-on-ews1294-reach-on-vulnerable-groups-1867pub
Outcome 2: Local preparedness capacities	Contingency planning developed in a scenario-based manner following forecasts or likely scenarios across different timescales (short-term, seasonal, long-term) and informed by climate projections and scientific research	~	Partially available	Yes, national contingency plan includes simulation exercise but forecast-based scenarios are not part of the drill.
Outcome 2: Local preparedness capacities	Anticipatory action and response options across time and geographical scales are linked to the provision of funding to support them	~	Partially available	Drought anticipatory actions available targeting agro sector under MAFF leadership. Funding options available through FAO's AA activation grant and FORTE Insurance's weather-based index insurance product partially subsidized by MEF & ADB. Flood anticipatory action protocol under development by WFP.
Outcome 2: Local preparedness capacities	Strategies implemented to maintain preparedness for longer return-periods and cascading hazard events	~	Partially available	Preparedness and contingency planning taking place on annual basis. Longer-term plans stipulated in NAP-DRR but no implementation plan nor M&E framework in place. No strategies for addressing cascading hazard events.
Outcome 2: Local preparedness capacities	Protocols incorporated in the plans or standard operating procedures to reach emergency and health services that need to be ready to respond to events promptly	• Manuals and protocols • Documentation related to the mechanisms of alert.	Available	Part of national/provincial contingency plans for flood updated annually by NCDM. SOPs and sector response mechanisms included.

Outcome 2: Local preparedness capacities	Protocols established to evacuate last mile operators (e.g. local police, firefighters, volunteers, health services) who disseminate warnings to the public and decide public measures, including issuing orders for evacuation or shelter-in-place.	Manuals and protocols	Partially available	At the provincial level, flood emergency preparedness and response plans are developed and updated annually with clear SOPs for each cycle from the preparedness to response; roles and responsibilities at the sub-national level also available. Provincial governor activates warnings which are then disseminated by districts, communes and village chiefs.
Outcome 2: Local preparedness capacities	Regular exercises undertaken to test and optimize the effectiveness and inclusiveness/accessibility of the early warning dissemination processes, preparedness and response.	• Documented evidence of drills carried out • Record or report of the simulation • Interviews with women and men from diverse backgrounds who have participated in the organization of drills • Feedback from regular tests and drills are undertaken to test if the early warning and dissemination process and responses reach women and men from diverse backgrounds equally • Women's ability to respond effectively to early warnings is assessed. • Gender-differentiated response to previous disasters analysed with an intersectional lens and gender sensitive lessons learned are incorporated into future capacity building strategies to ensure that all people can be reached.	Partially available	National and provincial simulation exercises taking place 1-2 times a year. Focus is on search and rescue preparedness, use of PRISM rapid impact assessment tool and alert dissemination protocols under EWS1294. Testing and optimizing EWS1294 is provided by PIN as part of long-term technical assistance to NCDM. Assessment of inclusiveness/accessibility around vulnerability, gender, disability inclusion indicators not part of routine system evaluations. However, recent studies assessing these metrics are available (see pillar 3 answers).
Outcome 2: Local preparedness capacities	Local governments have a plan to act on early warnings	~	Available	Several, but not all, provinces have contingency plans for flood emergencies, including early warning protocols (ews1294).
Outcome 2: Local preparedness capacities Is public awareness and education conducted? (Linkages to Pillars 1, 3 and cross-pillar)	Public awareness and education on hazards, vulnerabilities, exposure and how to reduce disaster impacts built into school curricula from primary through university.	• Gender sensitive PAE materials and Plans of study • Existence of methodological guides in the school • Records of extracurricular activities	Partially available	Curriculum on climate change is available for Bsc and MSc at few universities (RUPP, RUA, etc.). In 2019, MoEYS with the support of MoE CC's project published a textbook on general climate change conceptualisation for secondary school. Feb 2023, training books "Environment and Climate Change" of several versions are available at the primary schools, Grades 4-6. Link: https://ncsd.moe.gov.kh/kh/resources/document/training/cc/book/G5 Climate change education and learning initiatives supported by CCCA3 and implemented by MoEYS: https://ncsd.moe.gov.kh/dcc/project/mainstreaming-climate-change-and-increasing-resilence
	Public education provided to recognise hydro-meteorological and geophysical hazard signals and disease signs and symptoms in order to contribute to community surveillance and to allow and promote robust no-regret response measures.	• Plans and/or awareness programmes • Interviews with technical/professional facilitators or responsible outreach • Radio spots, material from visibility campaigns, among others.	Not Available	

	People educated on how warnings will be disseminated, which sources are reliable and how to respond.	~	Partially available	Public campaigns on ews1294 conducted in the past but not part of any routine awareness-raising campaign. Local radios active in supporting early warning education among at-risk populations.
	Utilization of most effective media (e.g., established media, social networks, alternative media), complimented with locally used and trusted communication methods, to improve public awareness.	~	Available	Mostly local radio, telegram, Facebook, voice messages supported by all telcos. Facebook is the most popular social media and used also by local people. Weather forecast is disseminated on the MoWRAM's public Facebook page on a daily basis.
	On-going inclusive and accessible public awareness and education campaigns tailored to the specific needs of target groups (e.g., women, children, older people, illiterate and persons with disabilities).	~	Partially available	Project-specific campaigns, not regular (e.g. ActionAid)
	Population at risk took action for a priority hazard when an alert was received	~	Available	Yes, but experience varies across the country depending on levels of awareness, ews1294 subscription levels, local contingency plans, availability of dissemination channels and citizentry engagement levels. The Impact Assessment on EWS1294 Reach on Vulnerable Groups (Mar, 2022), conducted in few select provinces, found that 90% are ready to evacuate if ordered to.
	Women's organisations and e.g. organisations of persons with disabilities, lead public awareness and education campaigns for all priority hazards	~	Not Available	Limited information available
Outcome 2: Local preparedness capacities Is public awareness and response tested and evaluated?	Previous emergency and disaster events and responses analysed, and lessons learnt incorporated into preparedness and response plans and into capacity building strategies.	• Post-impact analyses • Preparedness and response plans • Reports of reviews • Reports of drills and exercises • Public awareness strategies and programmes are evaluated at least once per year to determine if men and women from different backgrounds are effectively involved in the response process	Available	NCDM & PCDM contingency plans, EPR drills & exercises led by NCDM, NAP-DRR 2024-28
	Public awareness strategies and programmes evaluated regularly and updated as required.	~	Partially available	DRR Days organized at national and local levels but not designed for increasing public awareness.
	Drills and exercises conducted with first responders and community	~	Available	1-2 times annually, organized by NCDM & PCDMs
	Forecast-based plans and protocols have been tested during the course of the last year to assess the effectiveness of people-centred early warning dissemination processes, anticipatory actions, evacuation strategies and other preparedness and response actions	~	Not Available	Plans and protocols not forecast-based

Outcome 2: Local preparedness capacities	Relevant government departments and EWAA partners have conducted a review of existing assessments of institutional and operational capacity needs on preparedness, anticipatory actions and response	~	Partially available	Annual review of some aspects of EPR conducted as part of the national contingency plan process. Risk assessments generally not available and AA not considered
	Investments in forecast-based actions incorporate cash systems, supply chains, stockpiling and prepositioning	~	Not Available	Forecast-based actions not available.
	Existing anticipatory action frameworks and protocols and corresponding sources of pre-arranged financing have been documented	~	Available	Anticipatory action protocol for drought developed by FAO in collaboration with MAFF. Financing available through FAO's internal funds. Other AA plans under development.
	UN Humanitarian Response Plans integrate Anticipatory Action and preparedness plans	~	Partially available	Last UN HRP issued in 2020 in response to large-scale floods. Some preparedness activities developed under the Humanitarian Response Forum (HRF) integrated. AA not integrated.
	Preparedness and anticipatory actions have been planned as part of/aligned with longer-term locally led adaptation and resilience actions	~	Not Available	
Outcome 3: Financing and delivery mechanisms connected to effective anticipatory action plans	**Is the number of people reached through anticipatory action funding tracked via dedicated mechanisms?**			
Outcome 3: Financing and delivery mechanisms connected to effective anticipatory action plans	There is funding reserved/allocated for anticipatory action in the national budget and/or other pre-arranged and reliable funding sources.	~	Partially available	No AA-specific funding lines in national budget. Following AA financing options exist: - FAO's AA activation fund for drought - MEF/ADB subsidies for weather-based index insurance (drought & flood) implemented by FORTE Insurance - WFP's AA funds from GFFO or IrishAid - CERF through OCHA for large-scale event but Cambodia not a priority country
	Local and national anticipatory action plans exist/are in place.	~	Partially available	AAP for drought developed & owned by FAO (3 provinces in NW), yet incorporated into national/local plans WFP in process of developing AAP for floods in Pursat

Core Capability for Early Warning Systems: Cross-cutting			
EW4ALL Outcome	**Question**	**Self-assessed availability**	**Description**
Outcome 1: Governance, policy and legislation	**Is there a clear institutional, policy and legislation framework in place for the development and implementation of early warning systems?**		
Outcome 1: Governance, policy and legislation	1.1 Is there national legal and institutional framework in place that provides a basis for implementation of early warning systems and ensures the execution of subsequent early and anticipatory action?	Available	Disaster Management Law of 2015 provides overarching DRR policy framework. National Action Plan for DRR 2024-28 provides 5-year strategic direction.
	1.2 Does the institutional or legal framework cover the academia, technical-scientific actors, the private sector, and CSOs and their roles and responsibilities?	Not available	
	1.3 Are there national policies in place that provide guidance for the development and implementation of early warning systems?	Available	National Action Plan for DRR 2024-28 provides strategic guidance for developing EWS as part of Cambodia's longer-term DRM vision.
	1.4 Are agreements and interagency protocols established for data exchange of monitoring systems based on open-source data and platforms and baseline data necessary to produce data products for all priority hazards? (**CREWS custom indicator**)	Not available	Protocol for data exchange and information flow between MOWRAM and NCDM developed by UNDP some years but seems to have been never put into practice.
Outcome 1: Governance, policy and legislation	1.5 Is there a system for cross-border exchange of warnings with neighbouring countries, through bilateral / multilateral agreements for all priority hazards? (**CREWS custom indicator**)	Not available	No system available. Cambodia and Laos have an agreement on sharing data information, including through the Mekong River Commission (MRC)'s data-sharing and coordination arrangements. However, warning alerts are not shared across the border. PIN currently developing adapted version of EWS1294 in Laos which could be used for transboundary exchange of warnings in the future.
	1.6 Do EWS policies and legislation address issues related to equity, social inclusion, and gender in the development and implementation of early warning systems?	Available	Gender and social inclusion considerations included in NAP-DRR 2024-28, including as they pertain to EWS priorities. Gender mainstreaming guidelines for DRR developed by NCDM.
	1.7 Does EWS legislation provide for the protection of personal information collected through early warning systems?	Not available	
Outcome 2: Coordination	**Is there effective coordination between relevant agencies and stakeholders?**		
Outcome 2: Coordination	2.1 Has a stakeholder mapping been conducted to identify key stakeholders and their roles and responsibilities in the development and implementation of early warning systems?	Available	As part of developing EW4ALL National Roadmap
	2.2 Is there an institutional framework that clearly defines the roles and responsibilities of government agencies, civil society organizations, and other stakeholders involved in the development and implementation of early warning systems?	Not available	See 1.4. To be included in the EW4ALL National Roadmap.

Outcome 2: Coordination	2.3 Are there multi-stakeholder platforms, such as working groups or committees, to facilitate coordination and collaboration among stakeholders involved in early warning systems?	Partially available	**Humanitarian Response Forum** that brings in 60+ UN agencies, INGOs and CRC. NCDM is also HRF member and takes part in periodic and emergency meetings. However, no specific EWS TWG or Committee exists - to be established under EW4ALL. Coordination platforms under **MoE**: **- Cambodia Partner Coordination Meetings on NDC-LTS4CN** indirectly contribute to EWS discussions, in particular by coordinating the National Mitigations, Adaptations and Enabling Actions implementation plan. **- Climate Change Technical Working Group under NCSD** could be considered as an additional platform that could be used for coordination/update purposes https://ncsd.moe.gov.kh/ncsd/ncsd-organizational-chart/technical-working-groups
Outcome 2: Coordination	2.4 Are representatives of key communities (including women, persons with disabilities, youth, rural communities, etc.) included as stakeholders in the development and implementation of early warning systems, and their views and perspectives taken into account in decision-making processes?	Not available	
	2.5 Have broad multi-stakeholder forecast-based plans and protocols been tested during the course of the last year to increase local capacities in EAP development, readiness and pre-positioning activities (e.g., civil society base, logistics, cash)?	Not available	
Outcome 3: Communication and advocacy	**Is there targeted communication, outreach and advocacy to promote the benefits of EWS at national and local level?**		
Outcome 3: Communication and advocacy	3.1 Is there a national communication plan or strategy that outlines the target audiences, key messages, communication channels and activities to be implemented in promoting early warning systems?	Not available	
	3.2 Are awareness-raising activities and campaigns conducted to inform the public, relevant stakeholders, and decision-makers about the importance of early warning systems and their benefits?	Partially available	Awareness-raising campaigns during DRR Day. Project-/issue-specific, DP-funded advocacy activities (e.g. Safe Steps campaign for EWS1294 awareness organized by NCDM and PIN)
	3.3 Are key stakeholders - including government agencies, civil society organizations, private sector, local communities and volunteers - engaged to build consensus and support for the implementation of early warning systems?	Partially available	Limited engagement as part of national/provincial-level coordination and planning activities, such as NAP-DRR, contingency planning, simulation exercises; typically project-specific activities funded by DPs
	3.4 Is communication with the media established to increase awareness and understanding of early warning systems and their role in promoting disaster risk reduction and anticipatory action?	Available	
Outcome 4: Planning and finance	**Is there a medium-term plan for the development and implementation of early warning systems that takes into account changing environmental and socio-economic conditions?**		
Outcome 4: Planning and finance	4.1 Are adequate financial resources allocated for the development and implementation of early warning systems and early action at national level? Do they reach the last mile?	Partially available	Annual budgetary allocation to MOWRAM is used for development of EWS systems under Pillar 2. This is complemented by strategic support by DPs, mainly WMO, WB, ADB or KOICA. No budget for implementing last-mile alert dissemination via EWS1294 or similar channels. For EWS1294, NCDM relies on DP technical support for O&M, software development and innovations.
	4.2 Are sustainable financing mechanism in place to ensure the continuity of early warning systems over the long term?	Partially available	MOWRAM's national budget allocation. Some elements of EWS1294 covered by NCDM, especially the cost of alert calls. Other no long-term sustainable financing mechanism for last-mile EWS.

	4.3 Is there engagement with a range of stakeholders, including civil society organizations, the private sector, and international organizations, to leverage additional resources and ensure that the planning and financing of warning systems reflect diverse perspectives and needs?	Available	Yes, typically project-specific based on available grants and donor priorities. See EW4ALL stakeholder map for more details.
Outcome 4: Planning and finance	4.4 Is there a mechanism to track finance for anticipatory action in the national budget?	Not available	
	4.5 Are mechanisms in place for mobilizing financial and other resources for the development and implementation of early warning systems, including through public-private partnerships and other innovative financing mechanisms (resilience dividends approach)?	Not available	
	4.6 Has transparency and accountability in the planning and financing of early warning systems been ensured, including by providing publicly available information on budget allocation, expenditures, and results achieved?	Not available	
Outcome 5: Monitoring & Evaluation	**Is there a clear mechanism for monitoring and evaluating the effectiveness of early warning systems?**		
Outcome 5: Monitoring & Evaluation	5.1 Are there clear and well-defined objectives for early warning systems to be monitored and evaluated against?	Partially available	EWS objectives submitted by NCDM and MoWRAM in the updated Nationally Determined Contributions (NDC), 2021. NDC presents a formal commitment to UNFCCC and a tracking system is currently operating (https://ncsd.moe.gov.kh/ndc-tracking/)
	5.2 Are there performance indicators that can be used to monitor and evaluate the effectiveness of early warning systems. These indicators should be specific, measurable, and relevant to the objectives of the early warning systems	Not available	
	5.3 Is there a reliable and consistent system for collecting data on early warning system activities, including data on the use of early warning messages, response rates, and system performance?	Partially available	EWS1294 data tracked by PIN
Outcome 5: Monitoring & Evaluation	5.4 Are there regular reports on the performance of national early warning systems, including information on the use of warning messages, response rates, and system performance against performance indicators?	Partially available	Project-specific reports available, e.g. EWS1294 impact reports by PIN, CREWS assessment of hydro-met capacities.
	5.5 Are there mechanisms in place to collect authoritative and objective feedback from relevant stakeholders regarding the effectiveness of early warning systems across different sectors?	Not available	
Outcome 5: Monitoring & Evaluation	5.6. Are there mechanisms in place to incorporate cross-pillar feedback from lessons learned and exercises undertaken to test and optimize the effectiveness of the EWS when developing risk assessments and developing/improving warning messages and operational forecasting processes and when developing/improving communication dissemination agreements and protocols among agencies, institutions and the public. (CDEMA combined)	Not available	