CREWS Project Proposal Document

Project Title	*Strengthening early warning and early action systems for meteorological, hydrological and climate extremes in Cambodia and Lao People's Democratic Republic (PDR)* (CREWS Cambodia and Lao PDR 2.0)	
Document Reference	(to be provided by CREWS Secretariat) CREWS/RProj/16/South-East Asia Phase 2	
Geographic coverage	*Cambodia and Lao People's Democratic Republic (Lao PDR)*	
Timeframe	July 2025 - July 2029 (4 years)	
Total CREWS Contribution	7,820,000 (in US$)	
Lead Implementing Partner	World Meteorological Organization (WMO)	
	a. Execution	US$ 3,355,000
	b. Fees	US$ 436,150
	c. Total	US$ 3,791,150
Additional Implementing Partners	United Nations Office for Disaster Risk Reduction (UNDRR)	
	a. Execution	US$ 2,370,664
	b. Fees	US$ 308,186
	c. Total	US$ 2,678,850
	World Bank (WB)	
	a. Execution	US$ 1,215,000
	b. Fees	US$ 135,000
	c. Total	US$ 1,350,000
Main objective(s)	To enhance the effectiveness and reach of early warning and early action systems for improved disaster preparedness and strengthened resilience.	
Project Recipient/ Beneficiary (*people and organisations at risk who are the intended beneficiaries of the project at impact level)*	Lao People's Democratic Republic (PDR): Department of Meteorology and Hydrology (DMH), Ministry of Natural Resources and Environment (MoNRE), Department of Social Welfare (DSW), Ministry of Labour and Social Welfare (MoLSW) Cambodia: Department of Meteorology (DoM), Cambodia & Department of Hydrology and River Works (DHRW), Ministry of Water Resources and Meteorology (MOWRAM), National Committee on Disaster Management (NCDM) Total populations of Cambodia and Lao PDR: ● Cambodia: 17,847,982 ● Laos: 7,873,046 The project had the potential to impact up to 25.7 million people.	

Additional Operational Partners (*intended direct beneficiaries of the project in the form of increased capacity, products and services the project will deliver)*	Regional Forecast Support Centre (RFSC) Ha Noi, Viet Nam Regional Specialized Meteorological Centre (RSMC), Hong Kong WMO Global Information System Centres (GISCs), Tokyo operated by the Japan Meteorological Agency (JMA) Centre for Climate Research (CCRS), Singapore, part of Meteorological Service Singapore under the National Environment Agency (NEA) People in need (PIN) - International NGO with country operations in Cambodia and Lao PDR World Food Program (WFP) Cambodia and Lao PDR United Nations Development Programme (UNDP) Cambodia and Lao PDR Food and Agriculture Organization (FAO) Cambodia and Lao PDR Universities in Cambodia and Lao PDR Asian Disaster Preparedness Center (ADPC) Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre)	
Initial state of play	a. Vulnerability, exposure to risks, disasters impacts (on people and economy)	**Southeast Asia** The Lower Mekong Countries (LMCs) are extremely vulnerable to a host of extreme weather and climate events. Cambodia and Lao PDR are situated within the Lower Mekong Basin and their climates are characterized by two distinct seasons, a wet and dry season. They frequently experience various hydrometeorological hazards, such as strong winds, floods, or droughts, and subsidiary hazards such as landslides, pose a direct threat to lives and impact livelihoods by damaging and destroying infrastructure, assets and land. Given the characteristics of the climate of both countries, floods and droughts are ranked as two of the main hazards affecting them. The weather and climate conditions over the Indochina Peninsula, along with the complex air-land-water interactions in the Lower Mekong Region (including Cambodia and Lao PDR), make it one of the most vulnerable regions on the planet. Furthermore, both countries consistently figured among the most disaster-prone countries in the region, and the world. Their vulnerabilities to such hazards are compounded by the fact that both countries rely heavily on their services sector, and climate sensitive sectors such as agriculture, which employs the largest proportion of the workforce of any sector. **Cambodia and Lao PDR** Cambodia has a short coastline along the Gulf of Thailand and the country's topography consists primarily of flat, low-lying plains that are drained by the Tonle Sap Lake and the Mekong and Bassac Rivers. This makes Cambodia susceptible to coastal inundation and flooding. Flooding is a frequent and naturally occurring process in Cambodia that provides both benefits and negative impacts. Regular flooding and swelling of the Mekong River bring sediment deposition that contributes to the fertility of the flood plains and is important for local communities. However, it also often causes damage to infrastructures, lives, and livelihoods.

		Lao PDR is a landlocked country located northeast-central in mainland Southeast Asia. Lao PDR's Second National Communication to the UNFCCC suggests that the southwest monsoon and inter-annual rainfall variability due to regional climate drivers like El Niño Southern Oscillation (ENSO) are linked with flooding in the south and drought in the north. Floods typically happen from May to September as monsoon rains accumulate in the upper Mekong River basin while droughts occur between November and March. While relatively frequent, storms are not a direct threat since they usually lose strength as they cross the South China Sea. However, their excessive rainfall causes floods, and therefore damage (ESCAP and WMO, 2017). Prominent instances include Typhoons Ketsana in 2009, Haima in 2011 and recently Yagi, in which heavy rains caused floods and landslides, impacting Lao PDR's northern provinces of Luang Namtha, Phongsaly, OuDoMxay and Bokeo. Climate change adds another layer of uncertainty with more intense dry seasons, wetter monsoons, intensifying floods and storms (associated with heavy precipitation and strong winds), and rising sea levels. The increase in maximum and minimum temperatures is expected to be more rapid than the increase in average temperature, for example in Cambodia, observed impacts of climate change trends in recent years have been marked by more intense rains over shorter periods of time, leading to floods, delayed onset of rainy season (preventing any early wet season crops), longer dry season and more intense El Niño related droughts, unexpected dry periods during the rainy season, and untimely rains spoiling ready-to-harvest or drying crops. The observed impact and projections of climate change highlight the increasing vulnerability of Cambodia to climate change, particularly in areas adjacent to waterways, including the Mekong River. In Lao PDR, the increase in extreme heat represents a major threat to health, agriculture, water and related sectors. In addition, precipitation is reported to transition from the country's precipitation regime over the 20th century towards more intense precipitation periods, with the frequency of months with more than 600 mm rainfall increasing (WB and ADB, 2021). In contrast, the country has low capacity to adapt due to poor socio-economic development. Rural areas have underdeveloped infrastructure and a substantial portion of the country's towns are situated on flood plains across the central and southern regions, which are frequently flooded by major rivers like the Mekong and Sekong.
	b. Status of the EWS, DRM institutions and NHMSs, actors / players present	Both countries have institutions who are mandated to work on providing weather forecasts and early warning information and also institutions ensuring disaster preparedness and response. **CAMBODIA** In Cambodia, the highest national designated institution for disaster management 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. Chaired by the Prime Minister, the NCDM has 22 member ministries and consists of a Secretariat and five technical departments i) Admin and Finance, ii) Preparedness and Training, iii) Information and International Communication, iv) Search and Rescue, and v) Emergency Response and Rehabilitation. In addition to the NCDM, there are Provincial, District and Commune Committees for Disaster Management as well as Village Disaster Management Group. Similarly, there are counterpart secretariats at the province, district and commune levels. Figure 1 shows the coordination structure among NCDM, NCDM Secretariat, Disaster Management (DM) Working Groups of ministries and subnational committees for disaster management from provinces to districts, communes and villages.

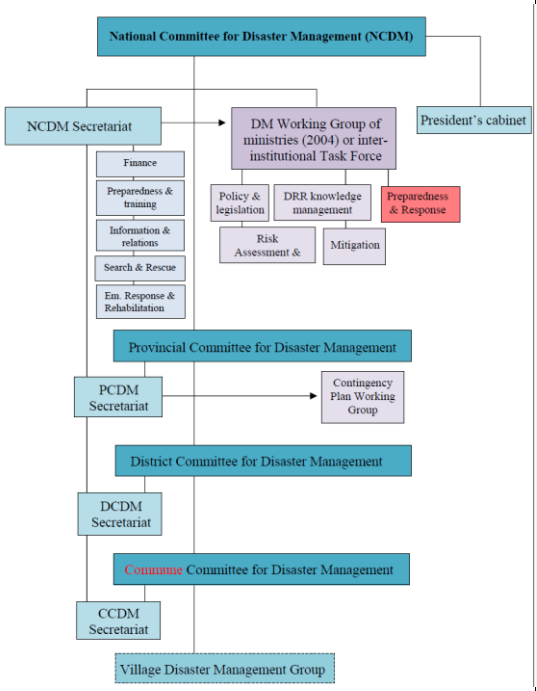

Figure 1 Cambodia, Disaster management coordination structure (NAP DRR 2014-2018)

The NAP-DRR 2024-2028 recently endorsed aims to boost Cambodia's disaster resilience through four strategic objectives: understanding risks, strengthening governance, investing in risk reduction, and enhancing preparedness. It includes 18 priority programs engaging government, partners, and communities, with a focus on sustainability, vulnerable groups, and integrating

		disaster risk reduction with climate change adaptation. NAP-DRR has an interlinkages with the Cambodia Climate Change Strategic Plan 2024-2033 which integrates other key national climate policies such as Nationally Determined Contribution (NDC) and National Adaptation Plan (NAP) and the Cambodia Sustainable Development Goals. Currently, NCDM maintains the Cambodia Disaster Loss Database (CamDi). CamDi was developed using DesInventar methodology to collect, store, and analyze disaster loss and damage data, and subsequently improve understanding of risks and vulnerabilities in the country. Launched in 2013 with support from UNDP, the database now contains almost 10,000 data cards for flood, lightning, drought, storm, fire, pest outbreak and other disasters that occurred from 1996 to present. In recent years, NCDM has collaborated with WFP to establish the Platform for Realtime Information Systems (PRISM) for dynamic hazard and vulnerability mapping of events as they occur. Under the first CREWS Cambodia and Laos project a consortium of technicians from MoWRAM, NCDM and other relevant institutions developed a national flood and drought risk profile integrating hazards, vulnerability and exposure data. However, there is no standardization of methods employed nor consolidation of data gathered, and there is limited, if any, use and integration of these map and assessment outputs in national early warning systems. In the absence of this, the maps have limited national data. The monitoring, forecasting and generation of warnings for hydro-meteorological hazards in Cambodia is the responsibility of the Department of Meteorology (DoM) and the Department of Hydrology and River Works (DHRW) in the Ministry of Water Resources and Meteorology (MoWRAM). 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 advice 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.

DoM provides weather forecasts (i.e., daily, 3-day, weekly), severe weather warnings (e.g., thunderstorm, cold and heat wave, tropical cyclone, high wave) and seasonal outlooks (i.e., 6-month) while DHRW provides 3-day water level and flood forecasts for the Mekong River.

Forecast products and severe weather warnings of DoM and DHRW are posted in their respective websites (http://www.cambodiameteo.com/ and http://www.dhrw-cam.org/), in MoWRAM's Facebook page, and disseminated through many other channels. In general, forecasts are released immediately, but severe weather warnings need to be approved by MoWRAM Minister prior to dissemination (see Figure below).

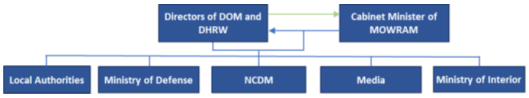

Figure 2 Dissemination of hydro-meteorological forecasts, bulletins and warnings in Cambodia

Early warning information received by NCDM are relayed to the Emergency Coordinating Centre, the Disaster Management Working Groups, Provincial CDM and District CDM Secretariat, civil society and private sector, Commune CDM, Village Disaster Management Group and finally to affected communities. Warnings and advisories are disseminated through telephone, fax, email, mobile phone, radio, television, online (DoM and DHRW websites), social media and mobile applications (i.e., Facebook, Telegram, WhatsApp, Viber and Line). In addition, NCDM established the EWS 1294 with support from UNDP and People In Need (PIN). EWS 1294 allows NCDM to send a voice recording of warning messages to mobile phones of registered users in areas at risk of flooding.

During the last decade, DoM and DHRW have had major upgrades in terms of their observation network and forecasting systems. Staff in both agencies have also had access to capacity building initiatives, and programs that provide hydro-meteorological monitoring and forecasting support. Many of these upgrades and support provided with regards to capacity building was facilitated under CREWS 1.0. At the same time, there is now increased demand for localized, actionable early warning information among agencies and end-users from different sectors.

LAO PDR

Lao PDR started in 1975 with policies focused on providing emergency relief for basic needs like food, water and shelter. This relatively narrow focus changed in 1999 with the creation of the Center Disaster Management Committee (CDMC). As stated by

		the DM Law, the CDMC is responsible for the general implementation of DRR and disaster management, coordination of various implementing bodies, coordination with development partners, and assessment of the overall situation of DRR in the country. The National Strategy on Disaster Risk Reduction 2021-2030 designates the CDMC as the responsible body for the implementation, monitoring, and evaluation of the NSDRR throughout the country. There are four tiers of the Disaster Management Committees, and they are non-standing organizations whose role is to assist and advise, deliberate, supervise, and coordinate with the sectors and local authorities concerned to elaborate and implement disaster management activities. The Disaster Management Committees consist of: Central Disaster Management Committee; Provincial Disaster Management Committees; District Disaster Management Committees; Village Disaster Management Committees. Central Disaster Management Committee (CDMC): Appointed by the Prime Minister, based on the Minister of Labor and Social Welfare's proposal. It supports the implementation of disaster management policies, laws, and programs, with the Department of Social Welfare as the Secretariat. Provincial Disaster Management Committee (PDMC): Appointed by the Provincial Governor or Vientiane Capital Mayor. It supports disaster management policies and projects, with the Social Welfare Division in the Provincial Labor and Social Welfare Department as the Secretariat. District Disaster Management Committee (DDMC): Appointed by the District Governor or City Mayor. It leads disaster management activities at the district level, with the Social Welfare Unit in the District Labor and Social Welfare Office as the Secretariat. Village Disaster Management Committee (VDMC): Appointed by the Village Head. It leads disaster management activities at the village level and coordinates with stakeholders, with the Social and Cultural Unit as the Secretariat. The CDMC leads disaster risk coordination and management in Lao PDR with the assistance of the National Disaster Management Office (NDMO). Figure 3 shows the coordination structure among NDPCC, NDMO, National Ministerial DPCCs, focal points of line agencies and subnational committees for disaster prevention and control from provinces to districts and villages. The Vice Prime Minister/Minister of Defense chairs the CDMCC, convenes Ministers across various line agencies, and mobilizes resources of the military during response efforts.

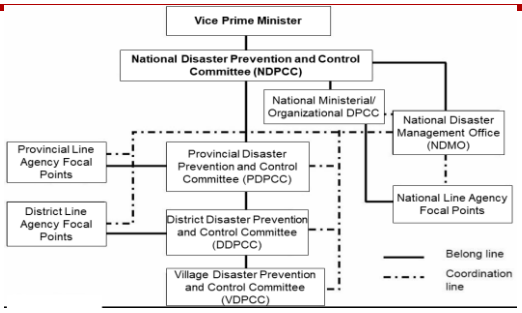

Figure 3 Disaster Management Coordination Structure in Lao PDR

Lao PDR's NDMO also established the country's disaster loss and damage database using the methodology and analytics within Desinventar. Launched in 2010-2011, the database contains 4,482 data cards for cold wave, drought, flood, flash flood, rain, storm, thunderstorm, windstorm, epidemic, fire and other disasters that occurred from 1990-2023. Under the first CREWS Cambodia and Lao project, support was provided to the Department of Social Welfare, MoLSW to revive the LaoDi system and enhance the system. However, LaoDi still needs to be upgraded and localized.

Under the first CREWS Cambodia and Lao PDR project a consortium of technicians from MoNRE, MoLSW and other relevant institutions developed a national flood and drought risk profile integrating hazards, vulnerability and exposure data. However, there is no standardization of methods employed nor consolidation of data gathered, and there is limited, if any, use and integration of these map and assessment outputs in national early warning systems. In the absence of this, the maps have limited national data.

In Laos, the monitoring, forecasting and generation of warnings for hydro-meteorological hazards is the responsibility of the Department of Meteorology and Hydrology (DMH) in the Ministry of Natural Resources and Environment (MoNRE). DMH is responsible for meteorological and hydrological services as well as earthquake-related activities. Its main responsibilities include the following:

- Primary operator of Lao PDR's hydrometeorological observing network
- Collects and disseminates hydro-meteorological data
- Process and analyse hydro-meteorological data, and provide statistical information on trends of extreme hydro-meteorological conditions
- Generate forecasts and early warning for flood, drought and extreme weather events and provide bulletins on earthquake events
- Generate aeronautical forecasts

DMH provides weather forecasts (i.e., daily, 3-day, weekly), severe weather warnings (e.g., thunderstorm, cold and heat wave, tropical cyclone), monthly and seasonal outlooks (i.e., 3-month), and 2-day water level and flood forecasts for the

Mekong and other major river basins. During the last decade, DMH have had major upgrades in terms of their observation network and forecasting systems.

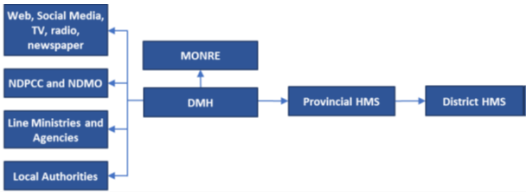

Figure 4 Dissemination of hydro-meteorological forecasts, bulletins and warnings in Lao PDR

DMH forecasts are disseminated by the Weather Forecasting and Early Warning Division through the DMH website, MoNRE website, DMH's YouTube channel and Facebook page, WhatsApp, radio (i.e., Lao Army Radio, Lao National Radio, Vientiane Radio Station), television and newspaper. Hazard forecasts and warning messages from DMH are sent to provincial and district hydro-meteorological services, media, NDPCC and NDMO, line ministries and agencies as well as local authorities (see Figure 4). The NDMO, provincial and district authorities further disseminate the information to NGOs, Laos Red Cross and village leaders, who then disseminate the information and advisory to village members.

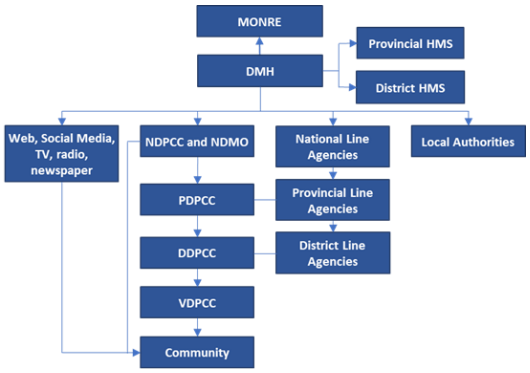

Figure 5 Multi-hazard early warning information flow in Lao PDR

In addition to this, in recent months DMH has been supported by PIN to develop the EW1294 system in Lao PDR (https://laos-ews.com/), and is currently operational within the Southern provinces of the country including Champasack, Attapeu and Saravane.

Staff at DMH have also had access to capacity building initiatives, and programs that provide hydro-meteorological monitoring and forecasting support. Many of these upgrades and support provided with regards to capacity building was facilitated under CREWS 1.0. Similarly, there is now increased demand for localized, actionable early warning information among agencies and end-users from agriculture, disaster risk management and other sectors.

	c. Projects and programs dealing with EWS and hydromet under implementation or preparation	**Regional Projects and Programmes** **Weather and Climate Information Services (WISER) Asia Pacific:** The WISER programme aims to deliver transformation in the generation and use of co-produced weather and climate services to support decision making at local, national, and regional levels, building resilience to the impacts of climate change. From April 2023, WISER expanded to include WISER Asia Pacific, funded under the UK government's Foreign, Commonwealth and Development Office's (FCDO) Climate Action for a Resilient Asia (CARA) programme, and will run until February 2029. Geographically, this WISER programme will provide support to South Asia, Southeast Asia, and the Pacific islands – and will support transformational change in weather and climate services. **Enhancing Integrated Water Management and Climate Resilience in Vulnerable Urban Areas of the Mekong River Basin:** The project aims to strengthen the resilience of the people and communities in these climate and disaster vulnerable regions of Cambodia and Lao PDR. To accomplish this, the project seeks to address the critical need for risk data to inform integrated water resources management and, in so doing, enable increased investment in risk reduction measures. Specifically, it looks to address gaps in data collection management and analysis, enhance institutional and technical capacity at the subnational level for integrated climate and flood risk management, enhance availability of resources for investment in water-related risk reduction, and aid the flow of risk knowledge and coordination across the borders of Cambodia and Lao PDR. The project is a joint initiative between the Ministry of Environment of the Republic of Korea and the United Nations Development Programme (UNDP) and is being implemented in both Cambodia and Lao PDR. 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. They target the urban centres of Kratie and Stung Treng, with the goal of strengthening the resilience of 46,055 people in these vulnerable areas. **Greater Mekong Subregion Climate Change and Environmental Sustainability Program:** The Technical Assistance (TA) is aligned with the following impact: environment sustainability and climate-compatibility of economic growth and propensity in the Greater Mekong Sub-region improved, as stated in Greater Mekong Sub-region Core Environment Program Strategic Framework and Action Plan. The TA will have the following outcome: climate resilience, green growth, and environmental quality in the Greater Mekong Sub-region enhanced. **The Systematic Observations Financing Facility:** The Systematic Observations Financing Facility (SOFF) is a financing mechanism that supports countries to close the basic weather and climate observations data gap. SOFF works with countries with the most

		severe shortfalls in observations, prioritizing the Least Developed Countries and Small Island Developing States. By providing long-term financial and technical assistance, SOFF contributes towards a global public good. SOFF aims to support and accelerate the sustained collection and international exchange of the most essential surface-based weather and climate observations in compliance with the internationally agreed Global Observing Basic Network. The SOFF GBON contribution plan for Cambodia recommends that Cambodia's Department of Meteorology improve five existing surface observation sites to GBON standards. The locations of the 5 stations are located in Siem Reap, Phnom Penh, Kratie, Ratanakiri, and Kohkong provinces. Furthermore, given that there are no upper air observing stations in Cambodia, SOFF intends to support commissioning 1 upper air station[1]. The SOFF GBON contribution plan for Lao PDR recommends that the Department of Meteorology and Hydrology proceeds with the uniform upgrade of 6 stations located within Vientiane, Pakse, Luang Namtha, Savannakhet, Luang Prabang, and Samneua provinces. Furthermore, given that there are no upper air observing stations in Lao PDR, SOFF intends to support commissioning 1 upper air station[2]. **National Projects** **CAMBODIA** **Multi-country Project Advancing Early Warnings for All (EW4All):** PPF resources will be used to prepare a full proposal which accelerates the delivery of the priority actions required to meet the targets of Early Warnings for All (EW4All) as announced by the United Nations Secretary General at COP-27 in March 2023. The resulting EW4All programme will stimulate the design and funding of multiple regional delivery mechanisms, global and regional initiatives to support financial and technical needs of countries and formulation of national projects that lead to the institution of Multi-Hazard Early Warning Systems and their effective use by the most vulnerable communities. Seven country specific proposals including country specific pre-feasibility studies, economic analysis, gender analysis and safeguard assessments will be prepared for each of the 7 countries, namely Antigua, Cambodia, Chad, Ecuador, Ethiopia, Fiji and Somalia. UNDP will contribute to this effort in terms of national expertise from each of the seven Country Offices and in supporting the groundwork for the in-depth assessments required for proposal development as well as in coordinating national and global stakeholders. UNDP will further tap into its own global expertise in shaping these national projects bringing

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		in inhouse expertise as required. The participating countries and the UNDP will support the co-financing of each country's proposal with in kind contributions (offices, officers time…etc). Specifically in Cambodia support will be provided to develop disaster risk knowledge systems, broaden observation and monitoring networks, strengthening MHEWS forecasting capacity (incl. human Resource development plan, including hands-on training, forecasters workstation, mentoring and exchange programmes), strengthen EW dissemination systems (reaching last-mile), develop preparedness protocols and providing communities with appropriate training and equipment for improved disaster resilience. **Early Warning System 1294 Cambodia:** The EWS 1294 Cambodia is a life-saving system that provides accurate and timely flood information to national and provincial authorities and allows them to easily and quickly disseminate reliable warning messages to at-risk communities regarding climatic or societal hazards. **Public-Social-Private Partnerships for Ecologically Sound Agriculture and Resilient Livelihoods in the Northern Tonle Sap Basin (PEARL):** Rolled out in April 2023, the PEARL project is a project led by FAO Cambodia and financed by the GCF, which aims to enhance the resilience of communities in the Northern Tonle Sap Basin to the impacts of climate change by increasing their access to climate advisory services, climate-resilient technologies and practices, financing options and prospective premium markets. PEARL is being implemented over six years from 2023 to 2029 with execution by MAFF, MoE, and FAO. It targets 450 000 farmers directly and 1 000 000 other value chain actors in the Northern Tonle Sap Basin indirectly, covering 24 districts in the four provinces of Oddar Meanchey, Kampong Thom, Preah Vihear, and Siem Reap. **Pipeline Projects Cambodia** **CREWS Simplified Approval Process (SAP) Cambodia (WFP Led):** WFP Cambodia is currently developing a CREWS GCF SAP proposal which is aligned with the outcomes of CREWS Cambodia and Lao PDR 1.0 and has been planned in conjunction with CREWS Cambodia and Lao PDR 2.0. Early plans include to strengthen disaster risk ecosystems and tools, support MoWRAM beyond GBON requirements for higher network density and to cover other parameters, improve forecasting systems for riverine and flash floods, provide capacity building and training for MoWRAM staff and significantly strengthen IBFWS through inter-institutional collaboration. **LAO PDR** **Early Warning System 1294 Laos:** The EWS 1294 Laos is a life-saving system that provides accurate and timely flood

		information to national and provincial authorities. It is currently operational in the Southern part of Lao PDR and allows authorities to easily and quickly disseminate reliable warning messages to at-risk communities regarding climatic or societal hazards. There are plans from PIN to scale this up to national level. **Lao PDR Southeast Asia Disaster Risk Management Project:** The objective of the Southeast Asia Disaster Risk Management Project for Laos is to reduce the impacts of flooding in Muang Xay and enhance the Government's capacity to provide hydro-meteorological services and disaster response. This project is funded by WB/GFDRR. Both EW4All Roadmaps map the projects and partners working on strengthening early warning systems in both countries. Furthermore, the Roadmaps break down the country priorities for early warning and map which partners are best placed to support them. Therefore, the EW4All coordination and technical working groups will be leveraged to ensure complementarities with other projects and initiatives in Cambodia and Lao PDR is achieved. **Pipeline Projects Lao PDR** **CREWS Simplified Approval Process (SAP) Lao PDR (FAO, Ministry of Planning and Interior and DMH led):** The government of Lao PDR along with the support of FAO is currently developing a CREWS GCF SAP proposal which is aligned with the outcomes of CREWS Cambodia and Lao PDR 1.0 and has been planned in conjunction with CREWS Cambodia and Lao PDR 2.0.
	d. Describe the multiplier /leveraging potential of the CREWS investments	There is a significant leveraging potential in Cambodia and Lao PDR, of approximately USD$ 100 million through ongoing and planned early warning systems and disaster risk reduction projects being implemented by development partners in the region included in the section above. In particular, the CREWS investment in both countries will leverage on the planned SOFF acquisitions and the experience and knowledge of the selected SOFF Peer Advisors UK Met Office in Cambodia and Geosphere Austria in Lao PDR, especially in terms of capacity building activities tailored to NMHS staff to better produce forecasts. In addition, the WB is the SOFF Implementing Entity and will guide coordination between initiatives. This alignment was made during the CREWS Cambodia and Lao PDR write-shop in November 2024, in which the WB technical team involved in both CREWS and SOFF to better identify needs and gaps on capacity, and how to complement investments in infrastructure and information technology between the two initiatives. Furthermore, the proposed CREWS project will support the design and implementation of forthcoming investments and consists of national activities and regional coordination mechanisms to foster knowledge exchange and increase access

		to early warning services to key socio-economic sectors. Furthermore, future planned investments from climate finance mechanisms such as the GCF will be developed and designed following the CREWS structure and plan. Continuous coordination, implementation and updating of the EW4All roadmap at the country level will also inform further investment by other actors.
	e. Describe measures to ensure coherence with existing initiatives	The CREWS implementing partners, WMO, WB and UNDRR, will bring their expertise and draw on key engagements within the countries covered under the previous CREWS project and further engagement across the region. As this project progresses, this strong engagement will ensure continuity and further enhance the outcomes from these projects, especially through capacity development, institutionalization, and development of standards, for sustained benefits at local, national and regional level. In addition, coherence with existing initiatives will be ensured by leveraging existing coordination mechanisms which are led by the national agencies. For example, the project will ensure close alignment with the EW4All initiative/Roadmaps in both countries led by NCDM in Cambodia and MONRE in Lao PDR. The EW4Alll initiative is critical for bringing together EW4All stakeholders and initiatives for effective collaboration. The project will ensure collaboration with existing WMO network of regional centres such as RSFC Ha Noi. Thus, regional centres will have an important role in the project by providing capacity development and technical support and promotion of strengthened operational exchanges of data and products between NMHSs.
Project Rationale	a. Who, where and in what ways and to what hazards people and ecosystems are exposed and vulnerable	Cambodia and Lao PDR are marked by tropical monsoon climates with two distinct seasons – wet and dry. The southwest monsoon brings rains from mid-May to early October while the northeast monsoon prevails from early November to mid-March. Rainfall is heaviest in September and October while the driest period occurs in January and February. Both countries are considered highly vulnerable to climate change and are expected to experience adverse impacts from increased temperatures and aridity, as well as reduced precipitation, resulting in longer periods of drought during the dry season. Additionally, the more frequent occurrence of intense rainfall will lead to a heightened risk of flooding and flash floods during the monsoon period. Cambodia is affected by extreme weather events. Storms often occur between August and November, with the highest frequency in October. Since Cambodia is surrounded by mountain chains, it is rarely exposed to the full force of tropical cyclones and typhoons. However, the storms bring about rainfall associated with localized flooding. Cambodia's Second National Communication to the UNFCCC indicates floods and drought as the most common hazards affecting the country. Most of the flooding result from increased water levels in the Mekong River and Tonle Sap Lake from early

		July to early October. Although seasonal flooding helps provide fish and nutrients to the soil in the central plains, the frequency of severe floods over the last decade is considered to have increased. Similarly, droughts are becoming more common and more geographically widespread. Analysis of historical and PRECIS (a regional climate model) data for Cambodia suggests that since 1950, the annual mean temperature has increased by 0.023^0C per year while annual precipitation has decreased at a rate of 0.184% per year, both most rapid during the dry season (Thoeun, 2015). Meanwhile, projections indicate potential increase in temperature between 0.013^0C and 0.036^0C per year by 2099, potential decline in dry season rainfall, and delayed arrival of wet seasonal rainfall despite projected increase in wet season rainfall (MoE, 2013). These findings suggest potential increase in drought, flood, and related hazards as well as subsequent increase in socioeconomic impacts if the hazards are not mitigated. (analysis based on the CamDi data, 1996-2023) Cambodia's history of disasters shows that frequent floods, droughts, and storms have caused significant loss of life, injuries, and economic damage, affecting millions directly and indirectly. The agricultural sector is particularly vulnerable, with recurring droughts and pest outbreaks leading to substantial crop losses and food insecurity. Data from NDCM's CamDi https://camdi.ncdm.gov.kh/ maintains the disaster records between 1996 and 2023, and it highlights a country frequently impacted by floods, droughts, storms, fires, and other hazards, each leaving a significant mark on its people and infrastructure. The Impact of Disasters: Floods remain the most frequent and impactful disaster with 3,727 recorded events over the last 27 years. These floods have caused 1,243 deaths, 1,115 injuries, and the destruction of 2,401 houses. Cumulatively, floods have affected over 13 million people, disrupting lives and livelihoods, and causing extensive damage to infrastructure and agriculture. Droughts, recorded 1,377 times, have directly affected cumulatively 2.8 million people over the past years. These droughts have led to significant agricultural losses, with over 1 million hectares of crops damaged, highlighting the vulnerability of Cambodia's agrarian economy. Storms, with 3,150 events, have caused 243 deaths, 822 injuries, and the destruction of 15,492 houses. These storms have affected over 113,000 people and caused widespread damage to housing and infrastructure. Fires, occurring 2,954 times, have resulted in 243 deaths, 372 injuries, and the destruction of 5,530 houses. The economic losses from fires are cumulatively estimated at US$180,000, primarily affecting urban areas. Lightning strikes, recorded 1,077 times, have caused 1,182 deaths and 664 injuries, making them a significant cause of fatalities and injuries, particularly in rural areas. Pest outbreaks, recorded 102 times, have affected 2,378 hectares of crops, leading to food insecurity and economic losses.

		Riverbank collapses, with 68 events, have caused 3 deaths and 2 injuries, affecting 1,222 people and leading to localized damage and displacement. Yearly Trends in Cambodia: The late 1990s saw significant flood events, with notable impacts in 2000, including 388 deaths and extensive damage to infrastructure and agriculture. The early 2000s continued to experience a mix of floods, droughts, and storms, with 2009 being particularly severe, recording 177 deaths and extensive damage to crops and infrastructure. The early 2010s were marked by severe floods, with 2011 being a notable year with 458 deaths and significant economic losses. The latter part of the decade saw a mix of disasters, including droughts and storms, with 2018 recording high economic losses due to floods and storms. The 27 years of data collection provides strong insights including geographical trends in the impact of disasters. However, the gaps are still observed in the availability of disaggregated impact data per sex, age, disability, and critical economic sectors and assets - that are critical to inform the policy and further investment in early warning services and risk reduction and prevention. The gender and social inclusion analysis in Cambodia's Early Warning-Early Action (EW-EA) system (2024) highlighted the need for gender-sensitive and disability-inclusive approaches in early warning messages. The study found that vulnerable groups, including women, children, elderly, and persons with disabilities, still face significant barriers in accessing and responding to early warning messages. The study recommended improvements in communication channels, utilizing user-friendly technologies, and ensuring the engagement of those populations in designing of warning messages. Collaboration with organizations specializing in services for vulnerable groups was also suggested as a way forward in developing accessible and inclusive warning messages[3]. (Insights from LaoDi data) Lao PDR's official disaster database LaoDi https://laodimolsw.la/ records the disaster data between 1990 and 2023. The trend from the past 33 years shows that floods, fires, storms, and droughts have left significant marks on its people and infrastructure, causing loss of life, injuries, and substantial economic damage. Floods are the most frequent and devastating disasters, with 1,461 recorded events. These floods have caused 205 deaths and affected over 4.8 million people directly and indirectly. The economic toll is immense, with losses amounting to approximately US$2.3 billion cumulatively. Floods have also damaged 73,435 houses and 674,701 hectares of crops, disrupting lives and livelihoods across the country.

3 https://docs.google.com/document/d/1BXBC_I2O2H_GJkB3XQ2uI3v8vvdbCRjJ/edit?usp=sharing&ouid=115956446336402128317&rtpof=true&sd=true

		Fires have been recorded 1,431 times, resulting in 41 deaths, 48 injuries, and the destruction of 1,486 houses. The economic losses from fires are estimated at US$170.9 million USD, highlighting the vulnerability of urban areas to such hazards. Storms, with 726 events, have caused 45 deaths, 222 injuries, and the destruction of 2,768 houses. These storms have affected over 564,000 people and led to economic losses of approximately US$662 million USD cumulatively, causing widespread damage to housing and infrastructure. Droughts, recorded 153 times, have indirectly affected over 528,950 people and led to significant agricultural losses, with 827,205 hectares of crops damaged. This underscores the vulnerability of Lao PDR's agrarian economy to prolonged dry spells. Epidemics have been recorded 102 times, causing 186 deaths and affecting 7,122 people, highlighting the need for robust health systems to manage public health crises. Cold waves, flash floods, landslides, lightning, and forest fires have also impacted the country, each contributing to the overall picture of a nation frequently challenged by natural hazards. **Yearly Trends:** The yearly trends reveal a pattern of recurring disasters. The early 1990s saw relatively low disaster activity, but significant flood events in 1996 caused considerable damage. The early 2000s experienced a mix of floods, droughts, and storms, with 2008 being particularly severe, recording 53 deaths and extensive damage to crops and infrastructure. The early 2010s were marked by severe floods, with 2011 being a notable year with 27 deaths and significant economic losses. The latter part of the decade saw a mix of disasters, including droughts and storms, with 2018 recording high economic losses due to floods and storms. Recent years have continued to see a mix of disasters, with floods and storms being the most frequent and impactful events. **Geographical Trends**: Certain regions in Lao PDR are more prone to specific types of disasters. For instance, Attapeu and Champasack provinces frequently experience floods, causing significant damage to houses and infrastructure. Khammuane and Savannakhet provinces are also heavily impacted by floods, with substantial economic losses recorded. On the other hand, provinces like Luangnamtha and Phongsaly are more affected by fires and droughts, leading to crop losses and food insecurity. Vientiane Capital, being an urban area, faces challenges from fires and storms, causing damage to housing and infrastructure. While the LaoDi data shows the country's robustness of disaster impact data, the gaps remain in the disaggregated data (sex, age, and disability) and the availability of economic impact in various development sectors of the critical infrastructure assets. The 2024 early warning system perception survey revealed that Lao PDR's early warning systems struggle to reach vulnerable groups, including persons with disabilities and ethnic minorities. The survey recommended tailoring warning messages for diverse

		audiences, enhancing communication infrastructure, and utilizing multiple dissemination methods. It emphasized the importance of regular training, awareness campaigns, and system evaluations to ensure the early warning system remains effective, inclusive, and lifesaving. While trust in the early warning system is high, accessibility and understanding need improvement, especially in remote areas. Addressing technological gaps and language barriers was suggested as crucial for enhancing the inclusivity of early warning systems. Additionally, the knowledge gap exists in the extent of people's trust in traditional knowledge related to weather and early warning precursors. This becomes critical as the level of trust and action around early warning could depend on the perception of scientific information v.s. traditional knowledge. Despite advancements made through CREWS 1.0—including improved access to risk data and tools, enhanced monitoring and forecasting capabilities, and better preparedness and response among local communities in Cambodia and Lao PDR—the situation in both countries continues to highlight the importance of further developing and strengthening national multi-hazard early warning systems.
	b. Describe proposed partnerships and approach for stakeholder engagement in design and in implementation	This project directly builds off the CREWS Cambodia and Lao PDR 1.0 project and established partners which have been nurtured over the past four years. The project will be led by the government of both Cambodia and Lao PDR, including NCDM and MoWRAM in Cambodia and MoLSW and MoNRE in Lao PDR, who have the mandates for disaster preparedness, response and early warning. Therefore, the project proposal and key annexes were developed following extensive consultations between the CREWS Implementing Partners and the lead national institutions. Furthermore, a write-shop was held in both Cambodia and Lao PDR between the 25 - 29 November 2024 with lead national agencies and other key organizations including World Food Programme (WFP) and Asian Disaster Preparedness Centre (ADPC). The design phase of this proposal has benefited from the global EW4All initiative. Having directly supported this EW4All in both countries, CREWS and the CREWS Implementing Partners were well positioned to leverage partnerships with other pillar leads, namely the International Telecommunication Union (ITU) and International Federation of Red Cross and Red Crescent Societies (IFRC). Furthermore, the approach to partnership and stakeholder engagement will build on the EW4ALL process. For example, Lao PDR CREWS Initiative has funded and driven transformative progress in early warning systems, with significant impacts in Lao PDR through its support for the EW4All initiative roll out. The project effectively mobilized resources and harnessed global technical expertise from pillar lead agencies. Within 16 months, and with the support of the CREWS Initiative, the formulation and endorsement of the EW4All National Roadmap 2024–2027

Commented [1]: Would be good to also cite here what changes or improvements have been made since the CREWS phase 1, with a note that indeed continued support is still needed.

		were successfully achieved. The support provided by the CREWS Initiative fostered strong leadership and coordination among key government agencies, including the DMH under MoNRE and the Department of Social Welfare under MoLSW. Enhanced awareness and ownership among government ministries, development partners, and other stakeholders have ensured that the roadmap's priorities are integrated into sectoral plans and aligned with national development objectives. Furthermore, Laos emerged as a model country to effectively roll out early warnings for all initiatives and it shared its experiences at UNFCCC's Conference of the Parties COP29 and COP30, and the Asia-Pacific Ministerial Conference on Disaster Risk Reduction (APMCDRR) 2024. The lessons from Lao PDR's EW4All Roadmap process were shared with Cambodia, Bhutan, Mongolia, and Bangladesh, while multi-country forums have extended Lao PDR's experience sharing to representatives from over 30 nations. Through strengthened disaster risk knowledge, innovative resource mobilization, and enhanced coordination, the CREWS Initiative has laid the foundation for effectively implementing the EW4All Roadmap over the next three years, positioning Lao PDR as a strong advocate for the global rollout of the EW4All initiative. In Cambodia CREWS supported the rollout of the EW4All initiative and fostered successful collaboration with global pillar leads and in-country experts, Cambodia successfully formulated and validated the EW4All National Roadmap 2025–2028, with government endorsement expected to endorse the roadmap in early 2025. The initiative has strengthened leadership and coordination among key government agencies, including NCDM and MoWRAM, while fostering greater stakeholder awareness and ownership. This has ensured the roadmap's integration into national disaster risk management and climate resilience frameworks. Cambodia's progress has positioned it as a regional leader in multi-hazard early warning systems, with its experiences shared at major international forums such as UNFCCC COP29, COP30, and the APCMDRR 2024. The next phase of CREWS in Cambodia and Lao PDR is expected to continue to drive the EW4All process in both countries and facilitate the ongoing collaboration between critical stakeholders. Therefore, activities within *Attachment 2: Workplan/Timeline* for implementation are directly addressing the priorities mapped within both EW4All Roadmaps. Furthermore, the project will build on established partnerships with key regional and sub-regional institutions in Southeast Asia, developed during the first phase. These organizations will play prominent roles in implementation, taking the lead on specific activities and contributing valuable technical expertise and contextual knowledge of the region and its dynamics. In addition, the project will facilitate peer-to-peer learning and exchange between institutions and stakeholders in Cambodia and the Lao People's Democratic Republic (Lao PDR). This collaborative approach is a core strength of a regional initiative,

		fostering mutual learning, strengthening institutional capacity, and promoting shared solutions to common challenges. Alignment with the SOFF's initiative and programme in Cambodia and Lao PDR has also been established during the design phase of the CREWS Cambodia and Lao PDR 2.0 project and is expected to be maintained throughout project implementation. This is especially considering that the WB is the SOFF implementing entity in both countries. In addition to this, many consultations have been held with the SOFF peer advisors for both countries ensuring alignment of activities supporting the NMHSs with monitoring and forecasting of hydrometeorological hazards. In addition, the project has been designed with the GCF-SAP-CREWS scale up in mind. For example, in Cambodia the CREWS-SAP and CREWS Cambodia and Lao PDR 2.0 workplans have been designed as a coherent programme which mirror and complement one another.
Project design	a. Project components and activities, including describing what and how people centered, risk informed, and gender responsive approaches will be applied and how people most-at-risk, local actors and organizations will be engaged	**The project structure follows the CREWS Monitoring, Evaluation and Learning Framework both at the Outcome and Output level. Activities are further detailed in the annexed project log frame.** **Outcome 1- National and local multi-hazard early warning systems prioritized and funded** *Output 1.1 A country and/or region has developed or strengthened legislative and/or institutional frameworks to support and sustain multi-hazard early warning systems* 1.1.1: Legislation on (Hydro) Meteorology/ multi-hazard early warning systems 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 climate services to priority sectors 1.1.2: 5-year strategy for DoM (including a National Framework for Climate Services) and DHRW (Cambodia) and DMH (Lao PDR) 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 climate services (NFCS) to priority sectors 1.1.3: Enhance climate and disaster risk reduction and management governance at both national and sub-national levels. *Output 1.2 multi-hazard needs, gaps and priority assessments, analyses and related investment plans for early warning systems in a country or region are driven by CREWS financing* 1.2.1: Enhance multi-stakeholder platform to foster collaboration, coordination, learning, and experience-sharing,

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		aimed at strengthening disaster risk management and monitoring actions for multi-hazard early warning systems **Outcome 2 - Improved early warning service delivery and accessibility by national and regional institutions** *Output 2.1 Risk information and tools generated by countries to enable the delivery of impact-based early warnings or advisory services* 2.1.1: Enhance standards, methodologies, and tools for and availability of risk knowledge and information, including risk assessments and disaster losses and damages data, to support impact-based forecasting and anticipatory actions *Output 2.2. Monitoring, analysis and forecasting of hazards that threaten the country/region are improved and sustained by the countries* 2.2.1: Update HimiwariCast Receiving System 2.2.2: Improving the quality and availability of observational data regionally and internationally (WIGOS, WHOS and WIS 2.0) 2.2.3: Develop a unified data collection system, ensure data transmission through WIS2.0 and strengthen the database management system to collect observation data from hydrological and meteorological stations and use it for modelling and forecasting including the capacity development of IT and database experts in NMHSs 2.2.4: Capacity Building on ICT services to support DMH data systems 2.2.5: Assessment of Hydromet Network across Lao PDR (including operating status of stations and maintenance plan) 2.2.6: Provide training for Provincial Office of Natural Resources and Environment (PONRE) and District Office of Natural Resources and Environment (DONRE) personnel in the maintenance and upkeep of meteorological and hydrological observing stations. Targeted for local PONRE and DONRE staff 2.2.7: Education and training of staff from MoWRAM and MoNRE for better operational and service delivery capacity (through WMO's Regional Training Centres (RTC) and Regional Network) 2.2.8: Review the arrangements around the provision of aviation meteorological services with a view to bringing these into the responsibility of DoM, and of ensuring that the revenues from aviation users for the provision of meteorological services in Cambodian airspace are provided to DoM in accordance with the Chicago Convention of International Civil Aviation Organization (ICAO) 2.2.9: Support capacity building on DMH's new Integrated System to ensure effective uptake 2.2.10: Capacity building on further developing and implementing a National Accuracy and Verification System

		2.2.11: Enhance use of forecast products from global and regional centres to generate, customize and disseminate weather and early warning services 2.2.12: Impact-based Forecast and Warning Services (IBFWS) training and supporting pilot projects between DMH and DoM and select key user groups 2.2.13: Enhance the existing flood early warning system by increasing the scale and include additional hazards, improving its impact information and linking with Anticipatory Action 2.2.14: Piloting an urban flood forecasting system for Phnom Penh and Vientiane 2.2.15: Enhancing seasonal forecast for Cambodia and Lao PDR to develop seasonal forecast for target sector(s) 2.2.16: Support MoWRAM and MoNRE to facilitate the Monsoon Fora 2.2.17: Strengthen hydrologcial status and outlooks at national and transboundary scale 2.2.18: Development of marine meteorology observation network *Output 2.3 Warnings are communicated by the countries based on common alerting protocols under agreed standard operational procedures (SOPs)* 2.3.1: Refresher training on the Common Alerting Protocol (CAP) to MoWRAM and MoNRE 2.3.2: Coordination between NMHS and disaster risk management DRM agencies to ensure warnings are tailored and used by disaster management for response and anticipatory action *Output 2.4 Warnings are received, understood and acted upon based on co-produced preparedness and response plans by the countries* 2.4.1: Implement Community-based Flood Management (CBFM) approaches in target communities 2.4.2: Enhance the application of risk knowledge and information in multi-hazard early warning systems at last miles 2.4.3: Enhance national contingency plan to have better integration of post-disaster recovery **Outcome 3 - Early warning programmes are driven by people-centered and gender-responsive principles and promote private sector engagement** *Output 3.1 People of different backgrounds, gender, youth, older persons, people with disability, poor, marginalized, displaced, and non-native, as well as related institutions have co-produced climate and weather information products tailored to their needs*

		3.1.1: Gender mainstreaming for end-to-end multi-hazard early warning systems at the local and national levels for improving participation of women, men and other vulnerable groups 3.1.2: Enhance the integration of traditional knowledge and adopt an inclusive approach in the multi-hazard early warning systems *Output 3.2 Private sector is engaged to foster innovation and sustainability in delivery of early warning services* 3.2.1: Engage the private sector in a multi-stakeholder platform to advance early warnings for all and strengthen resilience

Organization and operating procedures	a. Institutional framework (Describe the planned project management set up and how all the organisations involved in implementing the project will work together. Give a brief description of each partner/actors key roles by component)	The project will be jointly implemented by WMO, WB and UNDRR supporting the NMHSs and NDMOs of Cambodia and Lao PDR, respectively, in collaboration with other relevant stakeholders at the local, national and regional level. A project governance mechanism (Steering Committee) has been established in phase 1 to ensure delivery on time, budget and with the expected quality results. Hence, within phase 2, the Project Steering Committee (PSC) will be led by national stakeholders with support from CREWS implementing partners and relevant regional stakeholders. The PSC will ensure quality of governance, and the effective delivery of project activities on time, on budget and within the expected quality results. The PSC will play an oversight role including: ● Definition of roles, responsibilities and contributions of project stakeholders; ● Review of implementation progress; ● Management of project risks; ● Guidance and recommendations including for developing synergies and leveraging opportunities with other initiatives in the countries and region; and ● Alignment with coordination bodies and relevant national and regional initiatives such as EW4All. The PSC will provide oversight and direction on the project activities. The main functions would include ensuring alignment with relevant frameworks, strategies and priorities in the region along with assessing the project progress. The PSC will also be used as a mechanism to engage with key institutions at the national and regional levels such as the Mekong River Commission (MRC), Association of Southeast Asian Nations (ASEAN) etc., among others, to enhance collaboration at the regional level and to promote sustainability of the activities planned within this project. The proposed PSC will meet once a year and will consist of actors who play a key role in the project development and execution. Furthermore, the PSC will act as a channel to keep the relevant ministries informed of the developments and achievements made within the project. A draft of the detailed Terms of Reference (ToR) for the PSC is provided in Attachment 5. Through the EW4All initiative in both countries, a technical working group has been established. This is also in line with the

		lessons from the CREWS 1.0 project and will be used to monitor the progress across the Implementing Partners every 12 months.
	b. Monitoring and evaluation system (ensure sufficient resources for monitoring and evaluation)	The project logical framework will be used to monitor progress and achievements against the indicators for each of the outputs. The Project Management Team will be responsible for review of outputs, risks and progress achieved on an annual basis. These annual reviews will be in accordance with CREWS Monitoring and Evaluation System and will also comply with the systems set up by WMO, WB and UNDRR with input from key national agencies. To further track the impacts of the project, beneficiaries including vulnerable groups (people with disabilities, women, elderly and minority groups) will be included in the feedback process. In addition to the annual review, WMO, WB and UNDRR will jointly prepare a yearly progress report, highlight the risks and take corrective actions, as required. The outcomes of this yearly progress report will be presented to the CREWS Steering Committee, following already established reporting procedures of CREWS projects.
Project viability and sustainability	a. Main identified risks	*A risk matrix is provided in Attachment 7 and a full narrative is provided below.* **Overall risks: Medium** **Coordination** (medium): There are multiple agencies and development partners involved in providing support and/or developing and disseminating early warning information in the region, creating a coordination challenge. *Mitigation measures*: The project will work closely with and reinforce already established coordination mechanisms in each country and at a regional level, and also communicate frequently and coordinate with all the identified partners during the implementation. **Political instability** (low): Both countries have had stable political context in recent decades. *Mitigation measures*: Political situation in the region will be closely monitored and discussed early on potential impacts on the projects and remedies if the situation is deteriorating. The project will also work closely with regional entities, which could provide backup functions to provide services for national entities in case a country situation forces them to discontinue the services. **Environmental risks** (medium): Natural hazards such as severe weather, floods and drought have the potential to cause delays in project implementation. *Mitigation measures*: To mitigate this risk, flexible adjustment of the sequence of activities as well as regular project reviews are required. As the project mainly provides technical assistance no large civil works are anticipated and hence, will not generate any negative environmental impact. **Lack of commitment from participating countries** (low): Given that the project builds upon previous CREWS Cambodia and Lao PDR project and is developed / directly aligned with the EW4All initiative in both countries, the risk of lack of commitment from participating countries is low. However, the complex structure of the various departments involved in the project along with the potential administrative complications may impede implementation.

		Mitigation measures: Partners will establish and maintain their strong communication lines with the countries and the different stakeholders through national networks/offices. This will be realised through the nomination of focal points, who will create a systematic communication channel with the stakeholders to ensure that they are informed of needs, developments and progress. Additionally, through the support of the PSC, institutional and operational challenges may be addressed by establishing a high-level framework for cooperation among the participating countries and agencies. **Human resources / capacity risks** (high): The capacity of the NMHSs and NDMOs and sub-national DRM authorities to support the project activities on top of their regular activities is a risk that can impact the project outputs. For instance, institutions in Cambodia and Lao PDR lack human resources and the government has a limited fiscal space to enhance the number of human resources within their department. Some of the training requirements of the staff can be supported through the project. However, the issue of inadequate staff may not be fully addressed through the project, though efforts will be made to provide guidance to the Institutions on a long-term hiring strategy. *Mitigation measures*: Through close collaboration, the partners will provide support and training to the NMHSs and NDMOs to manage any extra demand brought upon by the project. **Social Risks** (moderate): Any activities that are engaged with or touch upon the lives of communities present the risk that they exacerbate problems such as power dynamics, inequality and exclusion. *Mitigation measures*: The program team will take social issues into consideration during implementation. In particular, the project will seek to ensure gender responsive design in line with CREWS Operational Procedures. The program will work closely with the social science and gender specialists who are engaged with ongoing initiatives in the countries. **Financial Risks** (moderate): Currency fluctuations and fraud and corruption. *Mitigation measures*: A contingency budget will be kept in case of currency fluctuations. Furthermore, whenever possible, CREWS IPs will be implementing key project activities directly, or through a regional partner. For activities being implemented by national partners, clauses will be included in contracts to ensure the staggered transfer of money to implementing partners.
	b. Critical assumptions	The success of the project hinges on the following critical assumptions: ● Strong political commitment from governments of the participating countries through the EW4All initiative; ● Cooperation among/between and support from the WMO network of NMHSs, Regional Centres, and partners; ● An increase in public awareness to hydro-meteorological hazards and a desire to build resilience; ● Agreement among partners and stakeholders on their complementary roles within the four components of people-centered early warning systems (Disaster risk knowledge; Detection, monitoring, analysis and

		forecasting of the hazards and possible consequences; Warning dissemination and communication; Preparedness and response capabilities) (and the early warning – early action, which focuses on reducing risks, especially vulnerabilities and minimizing disaster impacts); ● Agreement among the stakeholders on the objectives along with a clear understanding of the initiatives implemented.
	c. Judgment on the project sustainability	The project activities have been co-designed based on inputs from multiple entities within both target countries and relevant actors in the region who are involved in various initiatives that target early warning services, early action and preparedness. The sustainability of the outcomes achieved through this project, will be ensured through: (i) Transferring and ensuring country ownership during the project development and execution through active engagement of the key stakeholders. (ii) The project aims to provide guidance to and improve visibility of the project beneficiaries (national institutions), to promote the relevant initiatives and support with mobilization of additional resources (financial, human, technological) from National Governments and other donors to sustain the benefits of the project outcomes. (iii) The projects PSC and WMO Regional Association II (Asia) (RA II) will support with putting in place the appropriate mechanisms for sustaining the progress made in the project. In addition, a sustainability plan driven by the PSC will be developed over the lifetime of the project. This plan will not only focus on sustaining the tools and the hardware but also address ways of sustaining knowledge and capacity within the region. (iv) With support of the regional initiatives/committees such as ASEAN, ASEAN Disaster Management Committee (ACDM), ASEAN Climate Outlook Forum (ASEANCOF) ESCAP/WMO Typhoon Committee, ASEANCOF, Monsoon Forum and the guidance from regional centres such as CCRS, RFSC Ha Noi and ASMC enhance capacities in the region. (v) Leverage the ASEAN-UN Joint Strategic Plan of Action on DIsaster Management (JSPADM), Asia Pacific Climate Weeks, UNDRR Asia Pacific Science and Technology Advisory Group (STAG) and the Asia Pacific Partnership for Disaster Risk Reduction (AP-DRR) and Asia Pacific Disaster Risk Reduction partnership (AP DRR) to ensure synergies with other resilience, preparedness, and risk financing initiatives in early action, forecast based financing and risk-informed sock responsive social protection, to promote relevant learning from this project at ASEAN level and to mobilize additional resources to replicate good practices and to sustain the benefits of the project outcomes. (vi) The project is aligned with the development and implementation of EW4All in both countries which is driven by the NMHSs and NDMOs of Cambodia and Lao PDR ensuring maximum ownership and continuity.

Attachment 1 & 2: Logframe and Budget Attached Separately

Attachment 3: Workplan/Timeline for implementation

Outcome/output/activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Outcome 1- National and local multi-hazard early warning systems prioritized and funded																
Output 1.1 A country and/or region has developed or strengthened legislative and/or institutional frameworks to support and sustain multi-hazard early warning systems																
1.1.1 Legislation on (Hydro) Meteorology/ multi-hazard early warning systems 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 climate services to priority sectors					x	x	x	x	x	x	x	x	x	x		
1.1.2 5-year strategy for DoM (including National Framework for Climate Services (NFCS) and DHRW (Cambodia) and DMH (Lao PDR) 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 climate services (NFCS) to priority sectors				x	x	x	x									
1.1.3 Enhance climate and disaster risk reduction and management governance at both national and sub-national levels			x	x	x	x	x	x	x	x	x	x				
Output 1.2 Multi-hazard needs, gaps and priority assessments, analyses and related investment plans for early warning systems in a country or region are driven by CREWS financing																
1.2.1 Enhance multi-stakeholder platform to foster collaboration, coordination, learning, and experience-sharing, aimed at	x	**x**	**x**	**x**	x	x	x	x	x	x	x	x	x	x	x	x

Outcome/output/activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
strengthening disaster risk management and monitoring actions for multi-hazard early warning systems (MHEWS)																
Outcome 2 - Improved early waning service delivery and accessibility by national and regional institutions																
Output 2.1 Risk information and tools generated by countries to enable the delivery of impact-based early warnings or advisory services																
2.1.1 Enhance standards, methodologies, and tools for and availability of risk knowledge and information, including risk assessments and disaster losses and damages data, to support impact-based forecasting and anticipatory actions			x	x	x	x	x	x	x	x	x	x	x	x		
Output 2.2. Monitoring, analysis and forecasting of hazards that threaten the country/region are improved and sustained by the countries																
2.2.1 Update HimiwariCast Receiving System		x	x	x	X											
2.2.2 Improving the quality and availability of observational data regionally and internationally (WIGOS, WHOS and WIS 2.0)		x	x	x	x	x	x	x	x	x	x	x				
2.2.3 Develop a unified data collection system, ensure data transmission through WIS2.0 and strengthen the database management system to collect observation data from hydrological and meteorological stations and use it for modelling and forecasting including the capacity development of IT and database experts in NMHSs		x	x	x	x	x	x									
2.2.4 Capacity Building on ICT services to support DMH data systems	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2.2.5 Assessment of Hydromet Network across Lao PDR (including operating status of stations and maintenance plan)	x	x	x													
2.2.6 Provide training for Provincial Office of Natural Resources and Environment (PONRE) and District Office of Natural Resources and		x				x				x				x		

Outcome/output/activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Environment (DONRE) personnel in the maintenance and upkeep of meteorological and hydrological observing stations. Targeted for local PONRE and DONRE staff																
2.2.7 Education and training of staff from MoWRAM and MoNRE for better operational and service delivery capacity (through WMO's Regional Training Centre (RTC) and Regional Network)			x	x	x	x	x	x	x	x	x	x	x	X		
2.2.8 Review the arrangements around the provision of aviation meteorological services with a view to bringing these into the responsibility of DoM, and of ensuring that the revenues from aviation users for the provision of meteorological services in Cambodian airspace are provided to DoM in accordance with the Chicago Convention of International Civil Aviation Organization (ICAO)			x	x	x	x	x	x	x	x	x	x				
2.2.9 Support capacity building on DMH's new Integrated System to ensure effective uptake	x	x	x	x	x	x	x	x		x		x		x		
2.2.10 Capacity building on further developing and implementing a National Accuracy and Verification System	x	x			x	x			x	x						
2.2.11 Enhance use of forecast products from global and regional centres to generate, customize and disseminate weather and early warning services			x	x	x	x	x	x	x	x	x	x	x	x		
2.2.12 Impact-based Forecast and Warning Services (IBFWS) training and supporting pilot projects between DMH and DoM and selected key user groups			x	x	x	x	x	x	x	x	x	x	x	x		

Outcome/output/activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.2.13 Enhance existing flood early warning system by increasing the scale and include additional hazards, improving its impact information and linking with Anticipatory Action			x	x	x	x	x	x	x	x	x	x	x	x		
2.2.14 Piloting an urban flood forecasting system for Phnom Penh and Vientiane			x	x	x	x	x	x	x	x						
2.2.15 Enhancing seasonal forecast for Cambodia and Lao PDR to develop seasonal forecast for target sector(s)					x	x	x	x	x	x	x	x				
2.2.16 Support MoWRAM and MoNRE to facilitate the Monsoon Fora					x	x	x	x	x	x	x	x				
2.2.17 Strengthen hydrological status and outlooks at national and transboundary scale				x	x	x	x	x	x	x	x	x	x	x	x	
2.2.18 Development of marine meteorology observation network				x	x	x	x	x	x	x	x	x	x	x	x	
Output 2.3 Warnings are communicated by the countries based on common alerting protocols under agreed standard operational procedures (SOPs)																
2.3.1 Refresher training on Common Alerting Protocol (CAP) to MoWRAM and MoNRE					x	x										
2.3.2 Coordination between the National Meteorological and Hydrological Services (NMHSs) and disaster risk management (DRM) agencies to ensure warnings are tailored and used by disaster managementDM for response and Anticipatory Action			x	x	x	x	x	x	x	x						
Output 2.4 Warnings are received, understood and acted upon based on co-produced preparedness and response plans by the countries																
2.4.1 Implement Community-based Flood Management (CBFM) approaches in target communities			x	x	x	x	x	x	x	x	x	x	x	x		

Outcome/output/activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.4.2 Enhance the application of risk knowledge and information in multi-hazard early warning systems at last miles			x	x	x	x	x	x	x	x	x	x	x	x		
2.4.3 Enhance national contingency plan to have better integration of post-disaster recovery			x	x	x	x	x	x	x	x	x	x	x	x		
Output 3.1 People of different backgrounds, gender, youth, older persons, people with disability, poor, marginalized, displaced, and non-native, as well as related institutions have co-produced climate and weather information products tailored to their needs																
3.1.1 Gender mainstreaming for end-to-end multi-hazard early warning systems at the local and national levels for improving participation of women, men and other vulnerable groups			x	x	x	x	x	x	x	x	x	x	x	x		
3.1.2 Enhance the integration of traditional knowledge and adopt an inclusive approach in the Multi-Hazard Early Warning Systems (MHEWS)						x	x	x	x							
Output 3.2 Private sector is engaged to foster innovation and sustainability in delivery of early warning services																
3.2.1 Engage the private sector in a multi-stakeholder platform to advance early warnings for all and strengthen resilience			x	x	x	x	x	x	x	x	x					

Alignment to the CREWS MEAL framework

CREWS MEAL Outcomes	Outcome 1. National and local multi- hazard early warning systems prioritized and funded			Outcome 2. Improved early waning service delivery and accessibility by national and regional institutions				Outcome 3. Early warning programmes are driven by people- centered and gender responsive principles and promote private sector engagement	
CREWS MEAL Outputs **Project Outputs**	Output 1.1. A country and/or region has developed or strengthened legislative and/or institutional frameworks to support and sustain multi- hazard early warning systems	Output 1.2. Multi-hazard needs, gaps and priority assessments, analyses and related investment plans for early warning systems in a country or region are driven by CREWS financing	Output 1.3. Partnerships and cooperation frameworks developed for financing and scaling up support to multi-hazard early warning systems	Output 2.1 Risk information and tools generated by countries to enable the delivery of impact- based early warnings	Output 2.2. Monitoring, analysis and forecasting of hazards that threaten the country/region are improved and sustained by the countries	Output 2.3 Warnings are communicated by the countries based on common alerting protocols under agreed standard operational procedures (SOPs)	Output 2.4 Warnings are received, understood and acted upon based on co-produced preparedness and response plans by the countries	Output 3.1 People of different backgrounds, gender, youth, older persons, persons with disability, poor, marginalized, displaced, and non- native, as well as related institutions have co- produced climate and weather information products tailored to their needs	Output 3.2 Private sector is engaged to foster innovation and sustainability in delivery of early warning services
Output 1.1:	✓								
Output 1.2:		✓							
Output 1.3:									
Output 2.1:				✓					
Output 2.2:					✓				

	Output 2.3:						✓			
	Output 2.4:							✓		
	Output 3.1								✓	
	Output 3.2									✓

Attachment 4: Monitoring and Evaluation Plan

4.1 Theory of Change

This section will present the Theory of Change (and logic model) for the project, inclusive of key causal factors, assumptions and risks. Please ensure alignment with the CREWS MEAL framework Theory of Change.

The project is structured around three key outcomes with theories of change that interlink respective outcomes.

Outcome 1: Prioritization and Funding of MHEWS

- **Legislative and Institutional Frameworks:** If countries develop and enhance legislative and institutional frameworks, then they can sustain MHEWS effectively. This includes creating policies that ensure the availability and accessibility of hydrometeorological data and services. The assumption is that strong legislative support will lead to better resource allocation and institutional commitment. This is based on the assumption that the country's macroeconomic and fiscal conditions are stable and the government is able to continuously allocate the resources for institutional enhancement over time.
- **Strategic Planning:** If national meteorological and hydrological services and national disaster management offices are equipped with mid-term strategic plans in sync with the countries' EW4All roadmaps, then they can guide improvements in observation networks, data policies, and resource mobilization for early warnings with improved preparedness to act. The assumption here is that the EW4All initiative remains a high policy priority for Cambodia and Lao PDR during the project implementation. There is always a certain level of risk in fragmentation of initiatives from outside the project because of increased investment. This will be mitigated by ensuring that the project supports the coordination function of EW4All roadmap stakeholders under the leadership of the government.

Outcome 2: Improved Service Delivery and Accessibility

- **Risk Information and Tools:** If CREWS 2.0 enhances the generation and dissemination of risk information, then countries can deliver impact-based early warnings more effectively. This involves developing national risk profiles and methodologies for assessing and estimating disaster losses and damages. The assumption is that hydromet and disaster management policymakers and practitioners appreciate the historical losses and accurate risk information will lead to timely and targeted actions. A risk is that data collection challenges could hinder the accuracy and comprehensiveness of risk assessments.
- **Capacity Building:** If national and local institutions are equipped with procedural standards, protocols, and technical knowhow of the subject of hydrometeorological service deliveries and handling of risk information, then the reliability and effectiveness of early warning systems will improve. The assumption is that trained personnel will apply their skills consistently. A risk is that high staff turnover could undermine the continuity of capacity-building efforts. It is the project's intention to increase the sustainability of the efforts of capacity building by focusing on better institutionalization of the knowledge by partnering with the national institutions including universities for the subject of human resources development for hydrometeorology and risk assessment.
- **Community-Based Disaster Risk Management (CBDRM**): If communities and the population at risk are actively engaged in the development and implementation of disaster risk management plans, then they will be better prepared to respond to early warnings and take effective action. This includes conducting awareness sessions and developing and implementing community-based flood and disaster management plans. The assumption is that community engagement will lead to increased local ownership and resilience. A risk is that varying levels of community capacity and resources could affect the consistency and effectiveness of CBDRM efforts.
- **Impact-Based Forecasting and Action:** If impact-based forecasting and warning services are integrated into national and local systems, then stakeholders can make informed decisions to mitigate the impacts of natural hazards. This involves training forecasters, developing pilot projects, and enhancing flood early warning systems. The assumption is that accurate and timely impact-based forecasts will lead to proactive measures and reduced disaster impacts.

Outcome 3: People-Centered and Gender-Responsive Early Warning Programs

- **Inclusive Engagement:** If CREWS 2.0 promotes the co-production of climate and weather information products tailored to the needs of diverse groups, then early warning systems will be more people-

centered, inclusive, and responsive. This includes engaging women, youth, older persons, marginalized communities, and users of traditional knowledge of early warnings. The outputs of the activities under Outcome 3 will be integrated into the activities under Outcome 2 Improved Service Delivery and Accessibility by utilizing the products and contents in the last-mile connectivity in community-based DRM. The activities on inclusive early warning will follow the gender, disability, and social inclusion guidance for early warning systems which was developed during CREWS 1.0.

- **Private Sector Involvement:** If the project engages the private sector, then it can foster innovation and sustainability in the delivery of early warning services. Based on the existing private sector networks in Cambodia and Lao PDR, the project aims to explore the private sector's interest and potential in the ecosystem of early warning systems.

Through these outcomes, CREWS Cambodia and Lao PDR 2.0 aims to build robust, inclusive, and sustainable early warning systems that effectively mitigate the impacts of natural hazards, thereby enhancing the resilience of communities in Laos and Cambodia. If these systems are successfully implemented, then communities will be better prepared for disasters, reducing loss of life and economic damage.

4.2 Monitoring

This section describes how the project will monitor performance and track progress toward planned results in the results framework.

Roles and responsibilities for monitoring activities

Responsible	Tasks
Project team, WMO, WB and UNDRR	● Oversee the overall monitoring and evaluation (M&E) process. ● Ensure alignment of monitoring activities with the project's goals and objectives. ● Monitor project activities, including assessing progress toward deliverables. ● Review and approve monitoring plans and performance reports. ● Carry out internal mid-term evaluation to assess project progress.
External Evaluator	● Conduct independent end-of-project assessments or evaluations to validate internal monitoring results. ● Provide recommendations based on findings to enhance future project performance. ● Assess whether the project outcomes and impacts are in line with the goals and objectives.
Project Steering Committee	● Review monitoring reports to provide strategic guidance. ● Hold the project accountable for achieving its stated objectives.

A baseline data report which is a tool that presents the initial magnitudes of indicators, i.e. their value at the start of an intervention:

1. Introduction	*Briefly explain the purpose of the report and relevant information about the process of collecting the baseline data (period of collection, mention of methods used, locations where data was collected, total number of indicators in the report, team or individual who undertook the collection, and other elements that the manager finds important).* This baseline data report supports the CREWS Cambodia and Lao PDR project, ensuring alignment with national priorities. It documents the initial status of NMHSs, NDMOs, and EWS capabilities, providing a foundation for monitoring project progress. Data was collected through a participatory process, led by the CREWS Cambodia and Lao PDR project management teams at WMO, WB and UNDRR during 2024 & 2025, involving:

	• Face-to-face Needs and Gaps Assessment: Conducted with NMHSs and NDMOs, to identify gaps in climate services and EWS. • Face-to-face EW4ALL Consultations: EW4All roadmaps were developed for both countries throughout 2023 & 2024. • Face-to-face and virtual stakeholder engagements: Validation of priorities through one-on-one consultations with NMHSs and NDMOs as well as a write-shop in each country. • Technical Partner Coordination: In-person and virtual discussions with regional agencies like ADPC, RIMES, GWP etc. This collaborative process ensures the project's baseline reflects the challenges and priorities of key stakeholders. Additionally, a desktop review was conducted on the national and regional projects/programmes ongoing and planned with partners and NMHSs to gather data on what they have achieved and where the gaps still exist especially gaps that have not been addressed through other donors aside from CREWS.
2. Summary of intervention (program, project or investment)	*Briefly describe the intervention in question, including objective, approach, main components, partners, start-up, duration and any other elements considered relevant.* The proposed project will contribute to the implementation of the EW4ALL initiative in both countries, the ASEAN-UN Joint Strategic Plan of Action on Disaster Management (JSAPDM), Sendai Framework and the 2015 Paris Agreement. The project's objective is to enhance the effectiveness and reach of early warning and early action systems to improve disaster preparedness and resilience. This ensures enhancing adaptive capacity, strengthen resilience and reduce vulnerability and adverse impacts related to climate change and extreme weather events. The project will be implemented within 4 years, building on the first phase of the CREWS Cambodia and Lao PDR project, and will provide support to institutions in both Cambodia and Laos, through regional and national level activities based on their respective needs and in alignment with other relevant initiatives and programmes.
3. Baseline values for the indicators	*Include the following information for each indicator:* • *Indicator name and code* • *Type of indicator* • *Output or result measured by the indicator* • *The immediate and/or intermediate outcomes (as appropriate) into which the immediate output or outcome fits (the results chain).* • *Baseline data, including baseline data broken down by corresponding categories if applicable.* • *Target, including annual targets and end-of-project targets, including targets broken down by corresponding categories if applicable.* ***The baseline values and indicators are attached separately within the logframe**.*

4.3 Evaluation

This section describes all anticipated evaluations from performance to impact, relevant to the project, and can be used to track evaluations over the project's timeframe. It can include:

An evaluation plan, which identifies the different types of internal and external evaluations to be carried out over the implementation period. It also includes the timetable for carrying out the evaluations, as well as the budget, i.e. the human and financial resources required.

Evaluation type	Evaluation management		When it will be performed				Resources	Budget
	Internal	External	Yr 1	Yr 2	Yr 3	Yr 4		
Formative evaluation (mid-term or process evaluation)	x	x		x			Internal resources	N/A
Final evaluation		x				x	External Consultant / Independent Evaluator	USD 100,000
Impact evaluation		x				x		

4.4 Learning

The learning section identifies how the project will use available information to learn and adaptively manage implementation. It can include:

A learning plan which describes the learning activities to be carried out over a given period (annual, biannual, etc.), specifying objectives and expected results, participants and timetable.

Type of activity	Objective/ expected results	Methodology/ material needed	Target audience/participants	Execution calendar
Peer to peer learning and exchange on End-to-end Impact-Based Flood Forecasting.	The overall objective of this workshop is to promote peer to peer learning on End-to-end Impact-Based Flood Forecasting, with a focus on lessons learned and best practices. Cooperation with regional partners will also be a strong element.	The methodology and materials will be defined by WMO and partners during the implementation of the project.	Staff from NMHS and NDMOs from Cambodia and Lao PDR.	
Strengthening nationally led production and application of risk information for effective early warning and decision making.	This activity will complement other initiatives at the national and sub-national levels to strengthen operationalization of the nationally led production and use of risk information through capacity building and training opportunities.	The methodology and materials will be defined by UNDRR and partners during the implementation of the project.	Staff from NMHS and NDMOs from Cambodia and Lao PDR.	
Strengthening capacity and peer-to-peer learning on the production and use of risk information for early warning systems	Peer-to-peer learning exchange on the generation and application of risk information for early warning systems at the regional level. This activity will complement ongoing	The methodology and materials will be defined by UNDRR during the	Staff from NDMOs and NMHSs.	

at the regional level through training of trainers (ToT).	capacity-building initiatives on risk information and modelling at the regional level.	implementation of the project.		
Conduct follow up IBFWS training for both countries.	Follow-up training with the NMHSs and NDMOs will be implemented in order to support the institutions in advancing and enhancing their IBFWS-capacities.	The methodology and materials will be developed by WMO experts with the support from external consultants with expertise on IBFWS.	Selected staff from the NMHS and NDMOs.	
Assess, implement and Operationalize WIS 2.0 in Cambodia and Lao PDR.	Training of NMHS staff on the utilization and technicalities of the WMO Information System (WIS 2.0).	The methodologies and materials will be developed by WMO experts and tailored to each country's needs.	Selected staff from the NMHSs of both countries.	
Cambodia MCH review	Training of staff from the Department of Hydrology and River Works and the Department of Meteorology Cambodia on the utilization of the Meteorological, Climate and Hydrology (MCH) database, installed in Cambodia during the CREWS Cambodia and Lao PDR 1.0.	The methodology and materials used are standardized by WMO for the deployment of MCH around the world. The WMO expert will tailor the training to Samoan staff based on feedback received during the CREWS Cambodia and Lao PDR 1.0.	Selected staff from the Department of Hydrology and River Works and the Department of Meteorology Cambodia.	
Implement and operationalize CAP in Cambodia and Laos and facilitate peer learning.	Training on CAP operationalization at the national level in Cambodia and Lao PDR.	The materials and methodologies for the tailored national training will be developed and delivered by WMO experts.	Selected NMHS staff from both countries.	
Support regional and national capacity building on Anticipatory Action.	Build on existing anticipatory action initiatives in the Pacific and continue capacity development and awareness raising activities on anticipatory action (planned and potential national level Anticipatory	The methodology and materials will be defined by WMO and UNDRR during the implementation of the project.	Selected NMHS and NDMO staff from Cambodia and Lao PDR.	

	Action workshops in Cambodia and Lao PDR.			
Capacity development on gender responsive and disability inclusive early warning early action at the national and local level.	Support NDMO, NMHS, OPDs and women's organizations to mainstream gender responsive and disability inclusive early warning early action at the national and local levels. This will include application and mainstreaming of the Inclusive early warning early action checklist and implementation guide into national plans and frameworks on EWS, practical exercises and training.	The chosen methodology will be based on the Inclusive early warning early action checklist and implementation guide developed under the CREWS project.	Selected staff from NDMO, NMHS, OPDs and women's organizations in both countries.	

Attachment 5: Terms of Reference for the Project Steering Committee (PSC) for the Project CREWS Cambodia and Lao PDR 2.0

Background

Cambodia and Lao PDR are highly vulnerable to the impacts of natural hazards. Hydrometeorological hazards, such as strong winds, floods, droughts, or storm surges and those triggered by these hazards (such as landslides), pose a direct threat to lives and impact livelihoods by damaging and destroying infrastructure, assets, and land. In recent years, a succession of tropical cyclones/typhoons, floods, and droughts has resulted in major loss of lives, livelihoods, and economic assets in both countries. Lao PDR experienced major typhoons in 2009 (Ketsana) and in 2011 (Haima), and in 2013 when floods caused damages of over US$270 million21. In 2018, Lao PDR experienced its most devastating floods in a decade, with estimated damage and losses worth US$371.5 million, or 2.1 percent of Lao PDR's projected Gross DoMestic Product (GDP) for 201822. In Cambodia, Typhoon Ketsana in 2009 and floods in 2011 and 2014 caused damages and losses totalling over US$1.1 billion. In Cambodia, the strongest El Niño episode of the past 50 years in 2015/2016, resulted in 2.5 million people being affected by droughts, water shortages, land degradation, livestock loss and reduced agricultural productivity.

1. Climate Risk and Early Warning Systems (CREWS) Initiative

Announced by the French Minister of Foreign Affairs in Sendai in March 2015, the Climate Risk and Early Warning Systems (CREWS) Initiative was officially launched at the COP21 in Paris as part of the Solutions Agenda. The Initiative aims to raise USD 100 million by 2020 to strengthen multi-hazards early warning systems (MHEWSs) in Least Developed Countries (LDCs) and Small Island Developing States (SIDS). CREWS implementing partners are the World Bank (WB), World Meteorological Organization (WMO) and United Nations Office for Disaster Risk Reduction (UNDRR), through a Special Program managed by the WB's Global Facility for Disaster Reduction and Recovery (GFDRR). WMO provides Secretariat services, and WB serves as Trustee (see http://crews-initiative.org/en for more information).

The CREWS-financed project titled "Reinforcing the capacities of hydro-meteorological services and enhancing early warning systems in Cambodia and Lao PDR (CREWS Cambodia and Lao PDR)" 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. It is implemented jointly by all three implementing partners and in close collaboration with the Department of Meteorology (DoM), the Department of Hydrology and River Works (DHRW) and the National Committee for Disaster Management (NCDM) of Cambodia, the Department of Meteorology and Hydrology (DMH) and the National Disaster Prevention and Control Committee (NDPCC), Lao PDR.

2. Project Steering Committee (PSC) Members

The PSC will be led by the national institutions, including National Meteorological and Hydrological Services (NMHSs) and National Disaster Management Offices (NDMOs), and also be comprised of representatives of the implementing partners of the project, namely WB, WMO and UNDRR and representatives from RFSC Ha Noi for regional initiatives such as SeASWFP and SeAFFGS. Other national and regional bodies can be invited as observers and will be determined by the PSC members.

Further, the PSC members will be required to nominate a focal point from an organization who willoversee the mainstreaming of gender and disability across the project outcomes and is connected with DRM in Cambodia and Laos. This focal point will also provide recommendations on how the project activities can better meet the expectations and address the gaps with respect to the engagement and participation of women, children, people with disabilities, minorities etc.

3. PSC Terms of Reference

The PSC will provide oversight and direction on the project with the aim of strengthening the NMHSs and NDMOs in the two countries. Specifically, the PSC will consider options to overcome in-country and regional barriers to implementation; identify and recommend incentives to advance strong coherence, complementarity, collaboration and coordination within and between projects; and reflect on progress towards achieving key milestones, which includes reviewing good practice and lessons learned from concrete country examples. The PSC will also ensure strong alignment of regional and national initiatives to ensure complementarity.

The PSC will perform the following functions:

- Lead in anchoring the project to relevant regional and national institutions, and ensuring alignment with relevant frameworks, strategies and priorities, to ensure ownership and sustainability of investment;
- Ensure alignment with key national and regional strategies and priorities in SeA, in order to raise visibility of the projects, and maximize their benefits for the countries;
- Assist in resolving implementation issues, policy conflicts and priority settings
- Assess project progress and ensure that project delivery is in line with the agreed project timelines and budget
- Ensure coordination with other related programmes and projects implemented by other UN agencies and development partners
- Review, advise and endorse project's annual implementation workplan and budget
- Work with WMO and its partners to secure national and regional level leadership support for projects and initiatives aimed at addressing the needs and priorities.

4. Role of the PSC Members

The roles of PSC members includes:

- Understand the goals, objectives and the desired outcomes of the project;
- Liaise with project partners to highlight national and regional requirements for strengthening EWS;
- Understand and represent the interests of the NMHSs' and stakeholders of Cambodia and Lao PDR;
- Ensure that project funding decisions made are feasible and respond to issues, prioritization, risks and proposed changes to project activities;
- Report on the progress made within their institution/country;
- Actively participate in meetings through attendance, open discussion and review of project annual progress report, Monitoring and Evaluation, and sustainability plan; and
- Review and endorse the report and/or minutes from the steering committee meetings. The process for the review should be completed within two weeks from the date of receipt of the draft report and/or minutes.

5. PSC Members: TBD

Institution	Name & Title	Email

Attachment 6: Acronyms and References

List of Acronyms

AADMER	Agreement on Disaster Management and Emergency Response
AAL	Average Annual Losses
ADB	Asian Development Bank
ADRC	Asian Disaster Reduction Center
AEZ	Agro-Ecological Zones
SeAFFGS	Southeast Asia Flash Flood Guidance System
AHC	ASEAN Hydroinformatics Data Centre
APFM	Associate Programme on Flood Management
APMCDRR	Asia Pacific Ministerial Conference on Disaster Risk Reduction
ASEAN	Association of Southeast Asian Nations
ASEANCOF	ASEAN Climate Outlook Forum
ASMC	ASEAN Specialised Meteorological Centre
SeASWFP	Southeast Asia Severe Weather Forecasting Programme
AWS	Automatic Weather Stations
CAP	Common Alert Protocol
CBFM	Community-based Flood Management
CCA	Climate Change Adaptation
CCDM	Commune Committees for Disaster Management
CCRS	Hong Kong Centre for Climate Research
CIAT	International Center for Tropical Agriculture
CIMA	Centro Internazionale in Monitoraggio Ambientale
CRC	Cambodian Red Cross
CSIS	Climate Services Information System
DRR	Disaster Risk Reduction
ECCC	Environment and Climate Change Canada
ECHO	European Union Directorate General for Humanitarian and Civil Protection
ECMWF	European Centre for Medium-Range Weather Forecasts

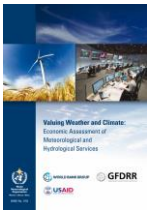
ENSO	El Niño–Southern Oscillation
EOC	Emergency Operation Center
ETF	Emergency Task Force
EW4ALL	Early Warnings for All
GDPFS	Global Data Processing and Forecasting System
GFCS	Global Framework for Climate Services
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
HKO	Hong Kong Observatory
Mekong-HYCOS	Mekong-Hydro Meteorological Cycle Observation System Project
IFRC	International Federation of Red Cross and Red Crescent Societies
ITU	International Telecommunication Union
JSPADM	ASEAN-UN Joint Strategic Plan of Action on Disaster Management
LMB	Lower Mekong Basin
LMC	Lower Mekong Countries
LRC	Laos Red Cross
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines
MoLSW	Ministry of Labour and Social Welfare
MoNRE	Ministry of Natural Resources and Environment
MoWRAM	Ministry of Water Resources and Meteorology
MRC	Mekong River Commission
NAP	National Adaptation Plan
NCDM	National Committee on Disaster Management
NCSD	National Council for Sustainable Development
NDMC	National Disaster Management Steering Committee
NDMO	National Disaster Management Office
NDPCC	National Disaster Prevention and Control Committee
NEA	National Environment Agency

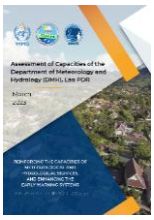
NEWC	National Early Warning Centre
NMHS	National Meteorological and Hydrological Services
NSEDP	National Socio-Economic Development Plan
NWP	Numerical Weather Prediction
OGC	Open Geospatial Consortium
PCDM	Provincial Committees for Disaster Management
PRISM	Platforms for Real-time Information Systems
PSC	Project Steering Committee
RCC	Regional Climate Centre
RCOF	Regional Climate Outlook Forum
RFSC	Regional Forecast Support Centre
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
RRT	Rapid Response Teams
RSMC	Regional Specialized Meteorological Centre
RTC	Regional Training Centre
SAMIS	Strengthening Agro-climatic Monitoring and Information Systems
SAVA	Socio-Agricultural Vulnerability Analysis
SEADRIF	Southeast Asia Disaster Risk Insurance Facility
SOFF	Systematic Observations Financing Facility
SOP	Standard Operating Procedure
SSOP	Synergized Standard Operating Procedures
SWFP	Severe Weather Forecasting Programme
UIP	User Interface Platform
UniSQ	University of Southern Queensland
UXO	Unexploded Ordnances
VDMG	Village Disaster Management Groups
WB	World Bank
WMO	World Meteorological Organization
WHOS	WMO Hydrological Observing System

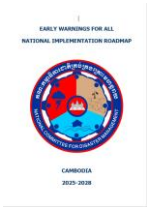
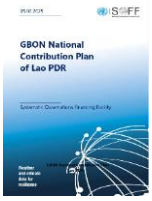
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WRM	Water Resource Management

Attachment 7: Risk matrix attached separately

Reference Materials

	WMO, Guide to the WMO Integrated Global Observing System". 2019 edition. Updated in 2019 https://library.wmo.int/doc_num.php?explnum_id=10962
	WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services Part II: Putting Multi-hazard IBFWS into Practice https://library.wmo.int/doc_num.php?explnum_id=10965
	Multi-hazard Early Warning Systems: A Checklist https://library.wmo.int/doc_num.php?explnum_id=4463
	Valuing Weather and Climate: Economic Assessment of Meteorological and Hydrological Services https://library.wmo.int/index.php?lvl=notice_display&id=17225#.YVGgw7gzZxQ
	Resolution 16 (Cg-18) - Guide(s) on the support of national meteorological and hydrological services to their national multi-hazard early warning procedures, coordination mechanisms, systems and services https://library.wmo.int/doc_num.php?explnum_id=9827#page=84

	Resolution 15 (Cg-18) - Strengthening multi-hazard early warning services in areas prone to all flooding types and severe weather https://library.wmo.int/doc_num.php?explnum_id=9827#page=80
	Resolution 15 (Cg-18) - Strengthening multi-hazard early warning services in areas prone to all flooding types and severe weather https://library.wmo.int/doc_num.php?explnum_id=9827#page=80
	Assessment of capacities of the Department of Meteorology and Department of Hydrology and River Works, Cambodia https://filecloud.wmo.int/share/s/i0iLckRKTxOPUBS_TaRpFg
	Assessment of capacities of the Department of Meteorology and Hydrology, Lao PDR https://filecloud.wmo.int/share/s/OT18vqEQTEKX8a_cRL6C9Q
	Country Hydromet Diagnostics Cambodia https://www.un-soff.org/document-library/?_sf_s=Cambodia
	Lao PDR EW4All Roadmap https://laopdr.un.org/en/282223-early-warning-all-ew4all-roadmap-2024-2027?afd_azwaf_tok=eyJhbGciOiJSUzI1NiJ9.eyJhdWQiOiJsYW9wZHIudW4ub3JnIiwiZXhwIjoxNzQ0MjIzNjk2LCJpYXQiOjE3NDQyMjM2ODYsImlzcyI6InRpZXIxLTU5NDVjY2JkNGYtYzR3dmYiLCJzdWIiOiIxOTQuMjMwLjE0Ni4xNyIsImRhdGEiOnsidHlwZSI6Imlzc3VlZCIsInJlZiI6IjIwMjUwNDA5VDE4MzQ0NlotMTU5NDVjY2JkNGZjNHd2ZmhDMVpSSHY4dmcwMDAwMDAwZG0wMDAwMDAwMDA2dHhjIiwiYiI6ImJqWWZ5cEF5Y2xLNzlYLURWQzRWOWEyakIndktrbGxPbWVWOTNfYUhwRXciLCJoIjoidHRYSXBXV0NnRktKV2VxNlJXdzRGNHREU0pVc2plU9GRDMyZnZUeHZnZyJ9fQ.DTue-7l_LgYw62xFjiAYojwCH7U-

	9re8j1QW2aRALqc5GDswRys0StTPa9W5hRzAszsNymg6bljjzlV2RTfjqSZh9w-l6tdF4Vb4z4yvGHeALbfnUPJoZ39FMsMk_9C62vYFLaGW4pElLxVQqQMl4SCIBXZiBnRS3RUn7-9OuxxFkNjMi68YlQPeBENIaz6SQ8qzA69bicz-QT42nl0P5E5lVcpKbRg8yuG3_7T6F5SOv2VsH-i9cVzK_HRgKQlqz3nPjN6fdr0WVGjRn9pKwO2FoUDJIPvoTFaMWqvHjlvlpAkFo_jHWyXexiyPCjjdJa-ks8yblxpG8HcvpwxCwQ.WF3obl2IDtqgvMFRqVdYkD5s
	Cambodia EW4All Roadmap *Please note the Cambodia EW4All Roadmap is in final draft and being reviewed by government agencies. Endorsement is expected after Khmer New Year. Once we have the final version (which will be signed by the NCDM Senior Minister, following an endorsement by the PM), it will be linked.*
	GBON National Contribution Plan of Cambodia https://www.un-soff.org/document-library/?_sf_s=cambodia
	GBON National Contribution Plan of Lao PDR https://www.un-soff.org/document-library/?_sf_s=Lao

Comment Matrix (synthesis of comments received from Experts nominated by CREWS Steering Committee Members)